Legal Aspects of Forensic Science: A Bird's Eye View

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Jitendra Mishra, Sandeep Mishra, Ankit Srivastava, and Kumar Askand Pandey

Abstract

Forensic science is the blend of science with law having multidisciplinary dimensions. Forensic analysis not only provides the information of evidential value but also enhances the support to the justice delivery system. The technological advances have introduced new investigative methods. Here, the admissibility of the evidence extracted from this scientific practice is a germane question that is frequently asked in the court of law. Further, before the evidence is considered, it is necessary to ensure that the technique has not violated any legal rights of an individual. This chapter reviews the status of legal frame work and issues related to the assessment of the admissibility and the probative value of the forensic evidence in the court of law.

J. Mishra
Department of Law, Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur, Uttar Pradesh, India

S. Mishra
Department of Legal Studies, Dr Ram Manohar Lohiya National Law University, Lucknow, Uttar Pradesh, India

Amity Law School, Amity University Uttar Pradesh, Lucknow, Uttar Pradesh, India

A. Srivastava
School of Forensic Sciences, The West Bengal National University of Juridical Sciences, Kolkata, West Bengal, India
e-mail: ankitsrivastava@nujs.edu

K. A. Pandey (✉)
Department of Legal Studies, Dr Ram Manohar Lohiya National Law University, Lucknow, Uttar Pradesh, India
e-mail: ka_pandey@rmlnlu.ac.in

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4.1 Introduction

The relationship between law and science has been a curious one and the law has traditionally tried to keep pace with the advances in science and technology, often failing at that and more often than not the former has followed the latter. The advances in science and technology have often facilitated wrongful activities with greater precision but at the same time, science and technology has also helped in better detection, investigation and prosecution of such wrongs. A better interface between the law and science and technology leads to better dispensation of justice. Law and forensic science have had a long cherished symbiotic relationship and the law as administered in the courts often derives strength and greater acceptability by looking up to forensic science. Proof of legal claims that the courts of law insist on can be made in many cases only by invoking what we call the principles of forensic science, i.e. by application of scientific methods and techniques. While, forensic science has greater application in detection and proof of crimes, its role is equally important in many other legal disputes such as paternity disputes, etc.

The role of forensic evidence such as DNA, Polygraph, Ballistics, Fingerprints and Toxicology in the process of administration of justice has often proved that scientific investigation of crime with the aid of forensic science has more probative value than direct evidence in deciding cases. In majority of cases where forensic evidence has been used, greater rate of conviction is witnessed.

4.2 Forensic Science: Role and Importance

The word 'forensic' is derived from a Latin word *forensis* which means relating to 'court of law' or of 'public debate or discussion'. According to the Oxford companion of law, forensic science means '... branch of science concerned with the application of scientific knowledge for legal purposes'. According to the Oxford Dictionary, the forensics means, 'scientific tests or techniques used in connection with the detection of crime'. The Cambridge dictionary defines it as 'scientific methods of solving crimes that involve examining objects or substances related to a crime'. In other words, we can say that forensic science is a scientific discipline for identification and evaluation of physical evidence by the application of the methods and principle of natural science for the purpose of administration of justice. In legal terminology it may mean the science which deals with the principles and practice of different branches of science which help to clear the doubtful question before the courts. It is a science composing of those matters which may be considered as common ground to both the scientist and legal practitioners. Use of science to detect

truth is not new, it is as old as the society; but with the changing of society's behaviour the methods of scientific uses are also transformed. The help of science to discover the truth is available and used across the globe.

Forensic science has remarkable contribution in administering justice in criminal investigation and others serious violations. Evidence which is used in courts and which is arrived at by scientific or technical means is called forensic evidence. Forensics deals with the recovery and analysis of latent evidence. Latent evidence can take many forms, from fingerprints left on a window to DNA evidence recovered from blood stains to the files on a hard drive.

The carefully collected scientific information and test results establish a fact or truth at or before trial. The purpose of the scientific evidence is to help the court for arriving at a correct decision. It must be remembered that in criminal matters, the ultimate goal of all forensic science is to link the accused to a particular crime based on the physical sample obtained from the place of incidence with the help of scientific methods and analysis. Available scientific evidence can always link the culprit with crime, victim and place, etc. with certainty; it is free from feelings, bias, emotions, memory lapse, etc. The main purpose of scientific evidence is to provide the information based on scientific result which is not capable of being interpreted by ordinary people or judges. In many cases, forensic science processes identify and compare the materials. They establish the presence or absence of a link between the crime and criminals. In the scientific investigation the investigator is most important person among all. In fact, his works determines the success or failure of the application of forensic evidence in the processing of a criminal case. If he fails to collect the relevant evidence correctly or is unable to provide accurate sample for comparisons the findings of a forensic scientist will not only be useless; but they will be misleading and even may help the culprit. Forensic science is not only useful in the conviction of accused but by the use of proper technique in evidence collection we can save an innocent who is falsely alleged in a criminal activity.

Forensic evidence can mainly help in two ways: first, in specific terms which is related to the presence of suspect or accused; second, one which is of general nature and does not associate with a particular person. For example, if a shoe is recovered from the place of incident, the scientific test will demonstrate type of footmarks; but the recovery of semen-stained cloths from the place of incident may point towards a particular person present on the crime scene.

4.3 Expert Evidence and Forensic Science

The closest interaction between forensic science and law is to be found in the Indian Evidence Act, 1872 (hereinafter IEA) which recognises an expert's testimony on certain facts on which the court must form an opinion. Interestingly, generally, the law of evidence does not allow any person to give his or her opinion on facts under consideration by the court of law. Every witness is a witness of fact and not allowed to give opinion upon it. However, it may be that on certain facts of scientific nature, the presiding judge is not experienced in the concerned area and needs assistance to

form an opinion on it. The law, therefore, as an exception to the general rule against admissibility of opinion evidence, allows an expert to proffer their opinion on technical and scientific matters. But how do we know that a person is an expert and qualified to give evidence on a fact related to the area of their expertise? Most experts are professionally qualified with years of experience in their field, and so their expertise will not be questioned.[1] But there may be cases where expertise may be acquired unconventionally.[2] The law does not insist on a professional qualification for an expert and anyone who has acquired special skills and knowledge through education, training or practise may be called as an expert. In *R* v. *Silverlock*[3] the solicitor of the prosecution was permitted to give evidence as a handwriting expert because he had acquired the expertise by giving considerable attention and studying handwriting over a period of more than a decade, although it was not his professional work. Similarly, in *R* v. *Stockwell*[4] an artist working in the field of medicine and life sciences whose job was to compare photographs and prepare pictorial illustrations of the essentials of anatomical features and surgical operations, was allowed to give expert opinion as a facial mapping expert. His evidence was declared admissible as he had gained sufficient experience in the field and the expert opinion was crucial for arriving at a conclusion which would not have otherwise been possible. The Indian law has not deviated from the English practice and no 'formal qualification' is required for an expert to testify in a particular field of knowledge where he has gained sufficient experience.

That opinion of an expert is relevant and the answer to the question 'who is an expert' is to be found in Section 45 of the IEA.[5] Indian Supreme Court has also said

[1] Alan Taylor, Principles of Evidence, (Cavendish Publishing Limited, London, 2nd ed., 2000) at 396.

[2] Ibid.

[3] [1894] 2QB 766.

[4] (1993) 97 Cr App R 260.

[5] Opinions of experts. – When the Court has to form an opinion upon a point of foreign law or of science, or art, or as to identity of handwriting, or finger impressions, the opinions upon that point of persons specially skilled in such foreign law, science or art, or in questions as to identity of handwriting or finger impressions are relevant facts.

Such persons are called experts.

Illustrations

(a) The question is, whether the death of A was caused by poison.

The opinions of experts as to the symptoms produced by the poison by which A is supposed to have died, are relevant.

(b) The question is, whether A, at the time of doing a certain act, was, by reason of unsoundness of mind, incapable of knowing the nature of the act, or that he was doing what was either wrong or contrary to law.

The opinions of experts upon the question whether the symptoms exhibited by A commonly show unsoundness of mind, and whether such unsoundness of mind usually renders persons incapable of knowing the nature of the acts which they do, or of knowing that what they do is either wrong or contrary to law, are relevant.

that no formal qualification is required for an expert. Obviously, a person who throws light on complex issues relating to science is called an expert. A person may be an expert in medical science, forensic science or ballistic science or any other branch of science or art. An expert is a person who by his experience, training and education has obtained superior knowledge about the subject in which he/she is testifying. The expert has peculiar knowledge or skill in a particular subject and such knowledge or skill is not common to all. The court of law, before admitting any of the opinions made by an expert, needs to ensure that the person is an expert according to the said provision of law.

The requirements for the admissibility of expert evidence are:

- The expert must be from within a recognised field of expertise;
- The expert's evidence must be based on reliable principles; and
- The expert must be qualified in that discipline.[6]

4.4 Forensic Science As a Tool in Administration of Justice

Under the IEA, 'evidence can be given only of relevant facts and facts in issue'.[7] A fact may be relevant but not necessarily admissible; also, a document may be relevant but not necessarily admissible. It may also be possible that a document or an expert report may be admissible but it will not be accepted by the court. Therefore, owing to its relevancy, the principles of relevancy and admissibility are equally applicable to the forensic evidence in India.[8]

The admissibility of scientific evidence is governed by several other Indian legislations as well such as the Code of Criminal Procedure, 1973 (CrPC),[9] the Identification of Prisoner Act, 1920. These legislations have some provision on admissibility and relevancy of scientific evidence. As mentioned earlier, the scientific evidence must pass the relevancy and admissibility test under the IEA. Therefore, generally, admissible and acceptable scientific evidence form part of the study of forensic science. Facts relating to forensic medicine and forensic science may be relevant, inter alia, under:

(c) The question is, whether a certain document was written by A. Another document is produced which is proved or admitted to have been written by A.
The opinions of experts on the question whether the two documents were written by the same person or by different persons, are relevant.

[6] *Ramesh Chandra Agrawal* v. *Regency Hospital Ltd.*, (2009) 9 SCC 709.

[7] Section 5, IEA.

[8] For a detailed discussion on relevancy and admissibility of facts, meaning of facts and facts in issue, see Kumar Askand Pandey, Vepa P. Sarathi's Law of Evidence, (Eastern Book Co., Lucknow, 8th ed. 2021).

[9] See Sections 291-293, 311A.

- Section 7 of the IEA as to 'cause or effect' of a relevant fact. This may include effects of poison, asphyxia, gunshot wounds, rigor mortis, etc.
- Section 9 of the IEA, i.e. 'identity of anything or person' or 'fixing the time or place in which any relevant fact happened'. Fingerprints, footprints, handwriting, polygraph test, narco-analysis test, DNA test, blood test, ballistics, cause and time of death, autopsy and fixing the age, etc. come under this provision.
- Section 14 of the IEA as to 'state of mind or bodily feeling'.[10]

The primarily requirement for an expert evidence to be admissible is that the evidence must be rendered by the expert himself. The test is that the matter is outside the knowledge and experience of the lay person. Thus, there is a need to hear an expert opinion where there is a scientific issue to be settled. The scientific question involved is assumed to be not within the court's knowledge. Thus, cases where the science involved is highly specialised and perhaps even mysterious, central role of expert cannot be disputed. Therefore, the expert opinion performs an important role in arriving at legitimate conclusion. The reliability of the opinion of expert depends on the facts upon which it is based and the validity of the process by which the conclusion is reached. Thus, the importance of an opinion is decided based on the credibility of the expert and the relevant facts supporting the opinion, so that its accuracy can be cross checked. Therefore, the emphasis has been on the data on the basis of which opinion is formed and the same is clear from following inference: Mere assertion without mentioning the data or basis is not evidence, even if it is produced by expert. Where the experts give no real data in support of their opinion, the evidence although admissible, may be excluded from consideration as affording no assistance in arriving at the correct value.[11]

Section 67 of the IEA provides, inter alia, that if a document is alleged to be signed by any person, the signature must be proved to be in his handwriting. Sections 45 and 47 of the said Act, prescribe a method in which such signature can be proved. Under Section 45, the opinion of the handwriting expert is relevant while under Section 47 the opinion of any person acquainted with the handwriting of the person who is alleged to have signed the document is admissible. Section 73 of the IEA provides for ascertainment of the disputed seal and signature through the process of comparison. Under this section, the court has the power to compare the writings and adjudicate the matter accordingly.

Expert opinion on any technical matter may be considered, but it is purely discretionary. The court, if it deems fit, may not require any expert opinion for arriving at a conclusion. For example, in the matter of pollution control, it is not necessary that for determination of the question of forest land, any latest technology should be used when the technology already in use is adequate to make an accurate

[10] V. Nageswara Rao, The Indian Evidence Act, (LexisNexis, Gurgaon, 2nd ed. 2015).

[11] *Ramesh Chandra Agrawal* v. *Regency Hospital Ltd.,* (2009) 9 SCC 709.

assessment. It has been observed that expert opinion affirming infringement of the copyright in a musical composition was relevant and admissible in evidence.[12]

Let us now look into some specific instances where forensic scientist's or medical expert's opinion is often resorted to and the jurisprudence thereof.

4.4.1 Opinion of Handwriting Expert

In connection with the ascertainment of hand writing, it is stated that if the court must form an opinion as to the person by whom any document was written or signed, the opinion of any person acquainted with the handwriting of the person by whom it is supposed to be written or signed that it was or was not written or signed by that person, is a relevant fact.[13]

Under both the Sections 45 and 47, the evidence of expert is an opinion; in the former, it can be proved by scientific method with the help of experts; and in the latter, it can be proved based on third person opinion bestowing to their familiarity resulting from frequent observations and experience. A Witness is said to be acquainted with the handwriting of accused if he has much familiarity with the writings of accused, one who had not seen the accused person's writing so much or in such a way as to become familiar with their writings could not be said to be really acquainted with the handwritings of the accused.

4.4.2 Evidence of Seal and Signature

When the signature, writing or seal of a person is in dispute, to find out the fact whether a signature, writing or seal is that of the person by whom it purports to have been written or made, any signature, writing or seal admitted or proved to the satisfaction of the court to have been written or made by that person may be compared with the one which is to be proved, although that signature, writing or seal has not been produced or proved for any other purpose. The court may direct any person present in the court to write any words or figures for the purpose of enabling the court to compare the words or figures so written with any words or figures alleged to have been written by such person.[14] Under Section 73 of the IEA, a court can satisfy itself about the handwriting of the accused either by asking the accused to write the words in the court, or to obtain a fresh opinion of the expert. Under Section 67 of the IEA, 'If a document is alleged to be signed or to have been written wholly or in part by any person, the signature or the handwriting of so much

[12] *Ram Sampath* v. *Rajesh Roshan*, 2008 SCC Online Bom. 370.

[13] Section 47, IEA.

[14] Section 73, IEA.

of the document as is alleged to be in that person's handwriting must be proved to be in his handwriting'.[15]

It is important to note that Section 311 A of the CrPC empowers a magistrate to direct any person to give specimen of signature or handwriting for the purpose of investigation and proceeding.

4.4.3 Evidence of Fingerprint and Footprint Impression

With necessary modifications Section 45 of IEA applies also, to the identity of finger impressions. The IEA provides several modes of proving a finger-impression, such as:

1. By the opinion of a person especially skilled in the science/study of finger impressions, like an expert under Section 45 of IEA.
2. By the evidence of a person who has actually seen the person thumb-marking on a document, which then become relevant under Section 60 of IEA.
3. By the court comparing the finger impression of a person with his admitted or proved finger-impressions under Section 73, IEA.

Under Section 4 of the Identification of Prisoner Act, 1920, a police officer is competent to take fingerprints of the accused. Section 5 of the said Act lays down that if a Magistrate is satisfied that for the purposes of any investigation or proceeding it is expedient to direct any person to allow his measurements or photograph to be taken, he may make an order to that effect, and in that case the person to whom the order relates shall be produced or shall attend at the time and place specified in the order and shall allow his measurements or photograph to be taken, as the case may be, by a police officer. The above provision of said section is not mandatory but is directory and to eliminate the possibility of fabrication of evidence it was eminently desirable that they were taken before or under the order of a Magistrate.[16] However, the mere absence of magisterial order authorising the collection of fingerprint evidence will not be termed illegal.[17] Thus, there cannot be any hard and fast rule that in every case, there should be a magisterial order for lifting the fingerprints of the accused.[18]

Under the now repealed Prevention of Terrorism Act, 2002, the Chief Metropolitan Magistrate or the Chief Judicial Magistrate was authorised to record the statement, if any, made by the person produced before it and get his signature or finger-impression.[19]

[15] Section 67, IEA.

[16] Section 5, Identification of Prisoner Act, 1920.

[17] *Mohd.Aman* v. *State of Rajasthan*, (1997) 10 SCC 44.

[18] *Sonvir* v. *State (NCT) of Delhi*, (2018) 8 SCC 24.

[19] Section 32 (5), Prevention of Terrorism Act, 2002.

It must be noted that with some modification Section 45, IEA applies to footprints as well. Obviously, the word 'measurement' in Identification of Prisoners Act, 1920 also includes footprints. The evidence of footprint is quite relevant to investigation and can help in tracing the offender as in almost every crime offender must leave some impressions of footprint or shoeprint at the crime scene. These impressions should be collected by investigator very cautiously and these impressions can be examined by a forensic analyst and used to identify the culprit. Just like fingerprints, the footprint of every individual is unique due to the difference in ridges and patterns and can be used for identification. However, there are some obvious drawbacks in footprints impressions' analysis viz. when a footprint is made by a person with dirty shoes who walked on the dirty floor; they are not visible to the naked eye. Footprint analysis itself is a difficult and time-consuming task and the available database on the footprints may not provide a match. The accuracy of these results is debated and therefore, there are apprehensions in relying on the evidence in the courts. The science of identification of the footprints or sole print has not yet reached the stage of an exact science. The fact that the foot marks tallied with those of the accused means no more than that these marks were made by shoes of a size corresponding to the size of the shoes of the accused. There may be a large number of shoes of the size of the shoes of the accused in the area.[20] Further, the science of identification of footprint is not a fully developed science and, therefore the conclusions as to the identity of a culprit may not be arrived at based on such evidence.[21]

As the biological constitution of every person is distinct so the fingerprint impression of everyone has a distinct character. Opinion of a fingerprint expert has been held to be more reliable than a handwriting expert. Unlike the science of comparison of handwriting, the science of fingerprint expert is almost perfect. It cannot be laid down as a rule of law that it is unsafe to have the conviction on the sole ground of uncorroborated testimony of fingerprint expert; however, caution is the best rule. The value of opinion of fingerprint expert has same value as any other expert. In the *Jaspal Singh case*[22] the Supreme Court has held that the science of identifying thumb impression is an exact science and does not admit of any mistake or doubt and a conviction can be based on the opinion of thumb-impression expert. It was also held that as a prudent rule a court of law must not play the role of a fingerprint expert. In every case where the fingerprint is a crucial piece of circumstantial evidence, the court must take the help of fingerprint expert. To ascertain whether a finger-impression is that of the person it is said to be, any finger-impression of that person may be compared with the former impression, although that impression has not been produced or proved for any other purpose. The court may also direct any person to be present in court and to make a finger impression for

[20] *Bharat Bhandari* v. *State (Govt. of NCT of Delhi),* Crl.A.227/2011, decided on 3 August 2012.
[21] *Mohd.Aman Babu Khan* v. *State of Rajasthan*, AIR 1997 SC 2960.
[22] *Jaspal Singh* v. *State of Punjab,* AIR 1979 SC 1708.

the purpose of enabling the court to compare the impression so made, with any impression alleged to be finger impression of such person.[23]

The IEA makes facts, not otherwise relevant, relevant if they support or are inconsistent with the opinions of experts, when such opinions are relevant.[24] When there was no clarity in the process adopted by the investigating agency for lifting fingerprints from the scene of crime and further analysis made thereafter, the Supreme Court said that no reliance can be placed on report that the lifted fingerprints from the glasses matched with the sample fingerprints of the accused.[25]

4.4.4 Medical Evidence

The medical opinion of an expert has great bearing on and is of great assistance in the trial of criminal cases. It greatly helps the prosecution in establishing its case by soliciting corroboration from it by showing that the injuries could have been caused by the alleged weapon of offence by the accused person in the manner alleged. It may also help the accused to prove his innocence in the alleged case. The accused persons with the assistance of medical evidence try to demolish the prosecution story by showing that the offence could not have been caused by the alleged weapon of offence or the death could not have occurred in the manner alleged by the prosecution. The medical evidence play a huge part in proving the guilt of the accused and lead the investigating authorities to the truth. 'Medical evidence' means a proof given by medical expert, which is based on his scientific knowledge skill and personal experience. These evidence are corroborative in nature and do not necessarily prevail over testimony of an eye-witness, unless such testimony is invalidated.

With the aid of medical examination through the process of scientific evaluation, the courts can take the help of experts to form an opinion on issues such as identification of person, examination of cause of death, type of assaults, wound, injuries, ascertaining sexual matters, state of poisoning, rape, age, consent, etc. A medical professional witness who performs a post-mortem examination or examination of the injuries is also a 'witness of fact' although he also 'gives an opinion' on certain aspects of the case. Whether the injuries are anti-mortem or post-mortem, the probable weapon used in causing injuries, the effect of injuries, consequences of injuries, whether they are sufficient in the ordinary course of nature to cause death, the duration of injuries and the probable time of death, cause of death, plea of unsoundness of mind, determination of age, etc. may be proved and done with the help of scientific evidence. On these aspects, the court may not have any expertise and must rely on the opinion of the scientific expert.

Collection of medical evidence may be crucial and critical in many cases under the IPC, e.g. to determine the case of murder, to prove rape or to prove acid attack or

[23] *State of Uttar Pradesh* v. *Ram Babu Mishra,* AIR 1980 SC 791.

[24] Section 46, IEA.

[25] *Hari Om* v. *State of Uttar Pradesh*, (2021) 4 SCC 345.

causing of grievous hurt with a corrosive substance, etc. Chemical examination and the consequent result may be crucial under the Narcotic Drugs and Psychotropic Substances Act, 1985; state of pregnancy for the purpose of termination under the Medical Termination of Pregnancy Act, 1971. The CrPC contains several provisions related to the medical examination of accused and victim. These are only few illustrative legislations under which the scientific evidence assumes great importance in determination of rights and liabilities.

However, it is to be noted that any medical evidence does not itself prove the case; its value is only corroborative. It can only prove that the injuries could or could not have been caused in the manner alleged and the death could or could not have been caused by the injuries. It is well settled that the medical jurisprudence is not an exact science and it is indeed difficult for any doctor to say with precision and exactitude as to when a particular injury was caused and the time when sexual intercourse took place. The evidence of an expert is merely an opinion which may lend corroboration to the direct evidence. It is well settled that medical evidence is only opinion evidence.[26] If the opinions of two competent experts conflict on a particular point, the court ought to accept that opinion which is not in conflict with the direct evidence. Since witnesses are the eyes and ears of justice a court is not entitled to discard the direct evidence of credible witnesses deposing to thing observed by their own eyes, merely on the opinion of medical evidence.[27] Where the opinion of a medical witness is contradicted by another medical witness both of whom are equally competent to form an opinion, the court should normally accept the evidence of the medical witness whose evidence is corroborated by direct evidence.[28]

4.4.5 Medical Examination of Accused

Under the scheme of CrPC, an emphatic recognition of medical evidence is to be found in Sect. 53. The law says that if an offence is committed and the medical examination of the accused is likely to bring out evidence of commission of the offence or its nature, it is lawful for a registered medical practitioner or anyone acting in his aid and in good faith to conduct medical examination of the accused upon a request made by a police officer, not below the rank of a sub-inspector. This section specifies and explains that that the medical examination so conducted shall include examination of biological material collected from the person of the accused by using modern and scientific techniques including DNA profiling o any other test deemed necessary by the examining medical practitioner. It has been held that the import of the expression 'examination of the person' cannot be confined only to external

[26] *Ram Dev* v. *State of Uttar Pradesh,* 1995 Supp. (1) SCC 547.
[27] *Piara Singh* v. *State of Punjab*, AIR 1977 SC 2274.
[28] Ibid.

examination of the body of the person.[29] It has been a practice of the police to subject an accused of rape to potency test. However, it may be noted that enlarging the definition of rape after the Criminal Law (Amendment) Act, 2013 has rendered such test unnecessary as the present definition of rape is not confined to mere peno-vaginal intercourse. Even inserting any body part or a foreign object in the vagina, anus, urethra or inserting penis in the mouth of the victim shall constitute the offence of rape.

Interestingly, medical examination of the accused who is arrested by the police is now mandatory after substitution of Section 54 of CrPC with a new provision through the Code of Criminal Procedure (Amendment) Act, 2008.[30] The object of the earlier provision was to enable the accused to dissociate him from the alleged offence or to show that some other person may have committed the offence in question. The provision in its present form does not explicitly spell out these objectives, however, even under the present provision, a medical examination may help the accused the way earlier provision did.

4.4.6 Medical Examination in Sexual Assault Cases

We have seen that medical examination of an accused for the purposes of effective investigation of a criminal charge has received a wider meaning by the Criminal Law (Amendment) Act, 2005 whereby numerous provisions were added in the CrPC for the medical examination of accused. Section 53 A of the CrPC provides for the procedure for medical examination of accused of rape: 'When a person is arrested on a charge of committing an offence of rape or an attempt to commit rape and there are reasonable grounds for believing that an examination of arrested person will afford evidence as to the commission of such offence, it shall be lawful for a registered medical practitioner employed in a hospital run by the Government or by a local authority and in the absence of such a practitioner within the radius of 16 kms. from the place where the offence has been committed by any other registered medical practitioner, acting at the request of a police officer not below the rank of a sub-inspector, and for any person acting in good faith in his aid and under his direction, to make such an examination of the arrested person and to use such force as is reasonably necessary for that purpose'.

By way of Criminal Law (Amendment) Act, 2005,[31] provisions have been made for medical examination of a rape victim within 24 hours of the report of the incident. Medical examination so conducted may afford crucial piece of scientific evidence that shall be irrefutable in connecting the accused to the crime. The doctor conducting the medical examination shall be an important prosecution witness and the result of the medical examination will invariably be relied upon by the

[29] *Anil Anantrao* v. *State*, 1981 Cri LJ 125.

[30] Act 5 of 2009.

[31] Act 25 of 2005.

prosecution in proving its case. For the medical examination of such woman, it is necessary that her consent should be taken. Without the consent of the woman or any other person competent to give consent on her behalf, the medical examination shall be rendered unlawful.[32]

The medical examination of both the accused and the victim under Sections 53 A and 164 A of CrPC, respectively, shall include the examination of blood, blood stains, semen, swabs in case of sexual offences, sputum and sweat, hair samples and finger nail clippings using modern and scientific techniques including DNA profiling and such other tests which the registered medical practitioner thinks necessary in a particular case.

It should be noted that in a primitive practice, the rape survivors were subjected to what is known as 'two-finger test'. This test, it was believed, would lead to an inference whether the survivor was sexually active or not. In a land mark judgment *Lillu* v. *State of Haryana*[33] the Supreme Court deprecated the practice of subjecting the rape victims to 'two-finger test', holding that 'rape survivors are entitled to legal recourse that does not re-traumatize them or violate their physical or mental integrity and dignity' and declared the 'two-finger test' inhuman, cruel and degrading and thereby outlawed the same.

4.4.7 Identification of Persons Through DNA

In many legal disputes, identification of a person assumes great importance and in some other, identity of a corpse may be a controverted fact. The discovery of deoxyribonucleic acid (DNA) has made the most significant contribution in the identification process. DNA is unique in every individual and therefore, the DNA technology is widely resorted to and legally recognised across jurisdictions for establishing identity. DNA profiling not only assists in identifying the victims but also establishes the identity of the perpetrators mainly by the recovered biological substance from the person of the victim or accused or from the crime scene.

The identification of individuals by the aid of DNA test is considered to be an errorless process, provided that the samples are collected in the scientific manner and a proper chain of custody is maintained. It has been pointed out by the Supreme Court that after the incorporation of Section 53A in the CrPC, it has become necessary for the prosecution to go for DNA test in appropriate cases which would facilitate the prosecution to prove its case against the accused.[34]

To make DNA based forensic evidence more reliable and helpful in the justice delivery system of the country the government of India has proposed DNA Technology (Use and Application) Regulation Bill, 2019 for the purpose of establishing identity of missing persons, victims, offenders, under trials and unknown deceased

[32] Section 164 A, CrPC.

[33] (2013) 14 SCC 643.

[34] *State of Gujarat* v. *Kishanbhai*, (2014) 5 SCC 108.

persons. The primary intended purpose of Bill is for expanding the application of DNA based forensic technologies to solving crime. The Bill seeks to ensure that there is also the assurance that the DNA test result is reliable and furthermore that the data remain protected from misuse or abuse in terms of the privacy right of the citizens. Establishment of national and regional DNA data banks and DNA regulatory board will assist in forensic investigation.[35]

4.4.8 The Deception Detection Tests

Scientific advancements have led to discovery of many tests which are widely used during investigation of offences and their result are sought to be made part of the charge-sheet filed by the police after completing investigation. It is beyond the scope of this chapter to discuss the scientific and technical aspects of these tests commonly known as Deception Detection Tests (DDTs) which include brain mapping, polygraph and narco-analysis tests. However, subjecting the accused or a suspect to these DDTs often raise questions of legal and constitutional importance.[36] The results obtained by conducting brain mapping, polygraph, narco-analysis or similar other tests have no substantial evidentiary value, i.e. the test results cannot be acted on by the court in drawing an inference about the guilt or innocence of the accused except for corroboration.

4.4.9 Ballistic Science

In criminal cases, the main purpose of the science of fire arms is to establish the distance from where the shot was fired, the direction from which it was fired, the approximate time since when the weapon was last fired, and whether the wounds caused were accidental, suicidal or homicidal and whether a given bullet or cartridge was used in a particular weapon. The range from which a shot has been fired is usually of the utmost value to the investigating officer and to the courts. It may assist in verifying a statement made by the accused or a witness, or may be of value in deciding whether a wound could be self-inflicted. In *Santokh Singh* v. *State of Punjab*[37] the Supreme Court ruled out suicide where the ballistic report pointed out that the shot was not fired from point-blank range.

Firearms identification is now a well-known subject of expert testimony. It is of immense help to the court in adjudicating that a certain bullet was fired from specified gun and with the approximate distance and side. Such testimony is based on an established scientific principle that each arms has its own impact and they

[35] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1577738 (last visited on 12 July 2021).

[36] Math, Suresh Bada. 'Supreme Court judgment on polygraph, narco-analysis & brain-mapping: a boon or a bane'. The Indian journal of medical research vol. 134,1 (2011): 4-7.

[37] (2010) 8 SCC 784.

leave different marks and pattern. Firearms identification is subject of scientific research, and a proper field of expert testimony. In a leading case underlying the importance of ballistic expert's evidence and acquitting the accused, the Court said that 'In cases where injuries are caused by firearms, the opinion of the ballistic expert is of a considerable importance where both the firearm and the crime cartridge were recovered during investigation to connect an accused with the crime. Failure to produce the expert opinion before the trial court in such cases affects the creditworthiness of the prosecution case to a great extent'.[38]

It is necessary that in the collection process of articles the police officer investigating the case must be cautious of all facts, circumstances and recovery of physical things. Seal and seizure of cartridge and firearms should be done with proper prudence. Delay in sending articles for examination of recovered substances diminishes the value of opinion. In a case court acquitted the accused and stated that it was not safe to place reliance on the report of the ballistic expert because it was an admitted fact that the empty cartridges which were sent to the ballistic expert after six months were not sealed at the time of seizure.[39] Interestingly, when there is no other evidence to convict the accused, acquittal may be recorded based on the ballistic expert's report. Normally, when the evidence of the eyewitnesses is in contradiction with medical evidence and ballistic expert's report, the accused would be acquitted.

4.5 Cyber Forensics

In an era when criminal activities in cyber space are on a rise, cyber forensics has assumed great significance and importance in detection and prosecution of crime.

Conventional crimes are also committed in more sophisticated manner through computers in which case traditional methods of investigation may not be of any help in bringing the accused to book. Cyber criminals who are tech savvy and well versed with the technological knowhow may evade detection and identification if subjected to traditional investigative methods. New age crimes require new age methods for their detection and investigation and development of cyber forensics has provided powerful tool in the hands of the law enforcement agencies and the judiciary.

The cyber forensics or computer forensics focuses on digital evidence by involving data acquisition, preservation and recovery of potential data related to a particular case. Digital evidence is defined as information and data of value to an investigation that is stored on, received or transmitted by an electronic device and this valuable evidence can be acquired when electronic devices are seized and secured with care, for examination. The computer forensics works to find out digital evidence, such evidence required to establish whether a crime has been committed and by whom. It may be defined as the discipline that combines elements of law and

[38] *Sukhwant Singh* v. *State of Punjab*, (1995) 3 SCC 367.

[39] *State of M.P.* v. *Ghudan,* (2003) 12 SCC 485.

computer science to collect and analyse data from computer systems, networks, wireless communications, and storage devices in a way that is admissible as evidence in a court of law.[40] In other words, computer forensics is the collection of tool and techniques used to find evidence in a computer.[41] From a technical standpoint, the main goal of computer forensics is to identify, collect, preserve, and analyse data in a way that preserves the integrity of the evidence collected so that it can be used effectively in a legal case. Cyber forensics involves the procedure of preservation, collection, validation, identification, analysis, interpretation, documentation, presentation of computer evidence stored in a computer.

There are some typical aspects of a computer forensics investigation such as those who investigate computers must understand the kind of potential evidence they are looking for to structure their search. Second, the investigator must pick the appropriate tools to use. Files may have been deleted, damaged, or encrypted, and the investigator must be familiar with an array of methods and software to prevent further damage in the recovery process. Two basic types of data are collected in computer forensics known as Persistent data and Volatile data. Persistent data is the data that is stored on a hard drive (or another medium) and is preserved when the computer is turned off. Volatile data is any data, which is stored in memory, or exists in transit, that will be lost when the computer loses power or is turned off. Volatile data resides in registries, cache, and random-access memory (RAM). Since volatile data is ephemeral, it is essential an investigator knows reliable ways to capture it.

Proof of electronic record is a special provision introduced by the IT Act that amended various provisions under the IEA. The Sections 65 A and 65 B of IEA prescribe the rule of admissibility of the electronic record in the court. The electronic records may be proved by producing the original computer resource as primary evidence or as secondary evidence in accordance with Section 65 B of the IEA. The special provisions on admissibility of evidence relating to electronic record shall that as prescribed in Section 65 B of the IEA. It is also provided in Section 45 A of the IEA that when in a proceeding, the court has to form an opinion on any matter relating to any information transmitted or stored in any computer resource or any other electronic or digital form, the opinion of the 'examiner of electronic evidence' is a relevant fact. An examiner of electronic record shall be an expert within the meaning of Section 45 of the IEA.

The most crucial questions that have come up for consideration before the courts in India relate to the condition of admissibility of electronic evidence. For more than a decade, it seems, even the Supreme Court did not give any weigh to the special provisions of the IEA exclusively dealing with admissibility of electronic evidence. For example, in the *Parliament attack case*[42] the Supreme Court held that call details record (CDR) are admissible as secondary evidence even without compliance with

[40] https://us-cert.cisa.gov/sites/default/files/publications/forensics.pdf (last visited on 15 July 2021).
[41] https://www.certconf.org/presentations/2006/files/WD4.pdf (last visited on 15 July 2021).
[42] *State (NCT of Delhi)* v. *Navjot Sandhu*, (2005) 11 SCC 600.

Section 65 B of the IEA as the applicability of general provisions in the IEA to electronic records is not excluded.[43]

However, it is to be noted that the IEA prescribes procedural conditions for making electronic evidence admissible. The admissibility of a digital document, i.e. electronic record alternatively called a computer output, depends on the satisfaction of the four conditions as follows:[44]

1. The electronic record containing the information should have been produced by the computer during the period over which the same was regularly used to store or process information for the purpose of any activity regularly carried on over that period by the person having lawful control over the use of that computer;
2. The information of the kind contained in electronic record or of the kind from which the information is derived was regularly fed into the computer in the ordinary course of the said activity;
3. During the material part of the said period, the computer was operating properly and that even if it was not operating properly for some time, the break or breaks had not affected either the record or the accuracy of its contents; and
4. The information contained in the record should be a reproduction or derivation from the information fed into the computer in the ordinary course of the said activity.

Interestingly, when the original electronic record itself is produced before the court it is treated as a primary evidence and there is no need of any certificate but when any electronic record which is only a copy of the original digital document[45] is produced before the court as relevant, it is mandatory for the person in whose control the computer/communication device was, at the time data was fed/recorded in the computer/communication device or any other electronic storage medium, to produce a certificate as envisaged under Section 65 B of the IEA.

That a certificate is mandatory for admissibility of an electronic record was finally settled by the Supreme Court in *Arjun Panditrao Gorantyal* v. *Kailash Kushanrao Gorantyal*,[46] endorsing the earlier decision of the Supreme Court in *Anvar P.V.* v. *P. K. Basheer*[47] and disagreeing with the decision in *Shafhi Mohammad* v. *State of Himachal Pradesh,*[48] where it was held that as the requirement of certificate pertains to only a procedural aspect of admissibility, it shall not be insisted upon if the device from which the secondary electronic data has been produced was not under the

[43] See Kumar Askand Pandey, 'Appreciation of Electronic Evidence: A Critique of Judicial Approach', 6 RMLNLUJ (2014) 24.

[44] Section 65 B (2), IEA.

[45] Any information originally recorded in a computer that has been copied on an optical or magnetic media is secondary electronic record.

[46] (2020) 7 SCC 1.

[47] (2014) 10 SCC 734.

[48] (2018) 2 SCC 801.

control of the party intending to produce it in the court. The certificate, said the Supreme Court in *Anvar P.V.* v. *P.K. Basheer*[49]:

(a) Must describe the manner in which the electronic record was produced;
(b) Must furnish the particulars of the device involved in the production of that record;
(c) Must deal with the applicable conditions mentioned under Section 65B (2) of the IEA; and
(d) Must be signed by a person occupying a responsible official position in relation to the operation of the relevant device.

The Supreme Court further clarified that the person issuing a certificate need only say that the statement in the certificate is 'true to the best of his knowledge'. The Supreme Court has interpreted Sections 22A, 45A, 59, 65A & 65B of the IEA to hold that data in CD/DVD/Pen Drives or similar devices are not admissible without a certificate under Section 65B (4) of the IEA. It is now absolutely clear that in case of computer output without such a certificate, neither there can be oral evidence to prove the contents of the electronic evidence nor the opinion of the expert under Section 45A of the IEA could be resorted to prove the genuineness of the electronic evidence.[50]

4.6 Forensic Evidence and Rule Against Self Incrimination

The Indian Constitution contains an invaluable right against self-incrimination which prohibits testimonial compulsion.[51] In simple terms this right means that no one can be compelled to be a witness against himself. It is often argued that the procedure of conducting DDTs is violation of right against self-incrimination. It is quite possible that a person suspected or accused of a crime may have been compelled to testify through methods involving coercion, threats or inducements during the investigative stage. Also, involuntary statements are more likely to mislead the judge and the prosecutor, thereby resulting in miscarriage of justice. However, it must be noted that compelling an accused person to give his specimen handwriting or signature, or impressions of his fingers, palm or foot to the investigating officer or under orders of a court for the purpose of comparison do not incriminate the accused person, or even tend to do so. It has been held by

[49] (2014) 10 SCC 734.

[50] Kumar Askand Pandey, 'Appreciation of Electronic Evidence: A Critique of Judicial Approach', 6 RMLNLUJ (2014) 24, 38.

[51] See Article 20 (3): 'No person accused of any offence shall be compelled to be a witness against himself'. International Covenant on Civil and Political Rights (ICCPR) in Article 14 (3) (g) enumerates the minimum guarantees that are to be accorded during a trial and states that 'everyone has a right not to be compelled to testify against himself or to confess guilt'.

11-judge Constitution Bench of the Supreme Court that by giving these impressions or specimen handwriting, the accused person does not furnish evidence against him and the scope of right against self-incrimination is limited to 'personal testimony', i.e. conveying of information based on personal knowledge.[52] In a recent decision, the Supreme Court has said that a Judicial Magistrate can direct an accused to provide his voice samples for investigation even without his consent.[53] It must also be remembered that the right against self-incrimination applies only and exclusively to criminal cases and in a civil case, e.g. for establishing paternity, a person may be compelled by to provide his biological material for DNA test.[54]

In *Selvi* v. *State of Karnataka,*[55] the Supreme Court had an opportunity to look into the question of right against self-incrimination vis-à-vis DDTs and observed: 'Even though the actual process of undergoing a polygraph examination or a BEAP test is not the same as that of making an oral or written statement, the consequences are similar. By making inferences from the results of these tests, the examiner is able to derive knowledge from the subject's mind which otherwise would not have become available to the investigators. These two tests are different from medical examination and the analysis of bodily substances such as blood, semen and hair samples since the test subject's physiological responses are directly correlated to mental faculties. Through lie-detection or gauging a subject's familiarity with the stimuli, personal knowledge is conveyed in respect of a relevant fact. It is also significant that unlike the case of documents, the investigators cannot possibly have any prior knowledge of the test subject's thoughts and memories, either in the actual or constructive sense. Therefore, even if a highly-strained analogy were to be made between the results obtained from the impugned tests and the production of documents, the weight of precedents leans towards restrictions on the extraction of 'personal knowledge' through such means. In any case, the compulsory administration of the impugned tests impedes the subject's right to choose between remaining silent and offering substantive information. The requirement of a "positive volitional act" becomes irrelevant since the subject is compelled to convey personal knowledge irrespective of his/her own volition'. The Supreme Court also found the narco-analysis test to be intrusive and held that DDTs cannot be conducted without the consent of the accused or a suspect and such consent must be obtained before a Judicial Magistrate in the presence of their lawyer. Interestingly, considering the inherent invasive nature of polygraph tests and their likely misuse by the investigating agencies, the National Human Rights Commission (NHRC) had published 'Guidelines for the Administration of Polygraph Test (Lie Detector Test) on an Accused' in 2000. The Supreme Court has said that these guidelines

[52] *State of Bombay* v. *Kathi Kalu Oghad,* AIR 1961 SC 1808.

[53] *Ritesh Sinha* v. *State of U.P.,* (2019) 8 SCC 1.

[54] *Narayan Dutt Tiwari* v. *Rohit Shekhar*, (2012) 12 SCC 554.

[55] (2010) 7 SCC 263.

must be strictly followed and other DDTs should also comply with them. The salient features of the said guidelines are:

1. No Lie Detector Tests should be administered except when consented by the accused. An option should be given to the accused whether he wishes to avail such test.
2. If the accused volunteers for a Lie Detector Test, he should be given access to a lawyer and the physical, emotional and legal implication of such a test should be explained to him by the police and his lawyer.
3. The consent should be recorded before a Judicial Magistrate.
4. During the hearing before the Magistrate, the person alleged to have agreed should be duly represented by a lawyer.
5. At the hearing, the person in question should also be told in clear terms that the statement that is made shall not be a 'confessional' statement to the Magistrate but will have the status of a statement made to the police.
6. The Magistrate shall consider all factors relating to the detention including the length of detention and the nature of the interrogation.
7. The actual recording of the Lie Detector Test shall be done by an independent agency (such as a hospital) and conducted in the presence of a lawyer.
8. A full medical and factual narration of the manner of the information received must be taken on record.

4.7 Evidentiary Value of Expert's Opinion

The report given by a forensic expert is not substantive evidence and is inadmissible in evidence unless the expert is examined. If, however, the expert is dead or is not available for examination in court, under the circumstances mentioned in Section 32 of the IEA, the report is admissible and relevant. Where the expert who conducted the examination is not examined in court nor the report of expert is tendered in evidence, the same cannot be used as substantive evidence. Being an expert witness, his testimony has to be assigned great importance. However, there is no irrebuttable presumption that an expert is always a witness of truth; his testimony has to be evaluated and appreciated like the testimony of any other ordinary witness. The opinion of expert has only corroborative value. It has been held that a handwriting expert's evidence under Section 45 of IEA is only opinion evidence and it can rarely, if ever, take the place of substantive evidence. Before acting upon such evidence, it is usual to see if it is corroborated either by clear, direct evidence or by circumstantial evidence.[56] Similarly, opinion of a fingerprint expert is not substantive evidence and such opinion can only be used to corroborate some items of substantive evidence which are otherwise on record.[57]

[56] *Sashi Kumar Banerjee* v. *Subodh Kumar Banerjee*, AIR 1964 SC 529.

[57] *Hari Om* v. *State of Uttar Pradesh*, (2021) 4 SCC 345.

In *Palani* v. *State of T.N.*,[58] the Supreme Court has recently reiterated that oral evidence of an eye witness has to get primacy, and the medical evidence is basically opinionated and that the medical evidence states that the injury could have been caused in the manner alleged and nothing more. 'The opinion given by a medical witness need not be the last word on the subject', said the Supreme Court in *State of Haryana* v. *Bhagirath.*[59] It further added that 'Such an opinion shall be tested by the court. If the opinion is bereft of logic or objectivity, the court is not obliged to go by that opinion. After all opinion is what is formed in the mind of a person regarding a fact situation'.

However, corroboration may not invariably be insisted upon before acting on the opinion of a handwriting expert and there need be no initial suspicion. But, on the facts of a particular case, a court may require corroboration of a varying degree. There can be no hard and fast rule, but nothing will justify the rejection of the opinion of an expert supported by unchallenged reasons on the sole ground that it is not corroborated. The approach of a court while dealing with the opinion of a handwriting expert should be to proceed cautiously, probe the reasons for the opinion, consider all other relevant evidence and decide finally to accept or reject it.[60]

4.8 Conclusion

The scientific expert is a competent, reliable and dependable witness whose evidence inspires confidence. The scientific evidence is not an infallible one and cannot be placed on a higher pedestal than other evidence found credible by the court. Mere forensic evidence will not be sufficient to warrant conviction in criminal cases and at best such evidence may be used to test the veracity of the eyewitness. If the ocular evidence and forensic evidence are at variance, it is settled that the former shall be preferred provided that it inspires confidence.

There is no absolute rule of law or even of prudence which has developed into a rule of law that in no case can the court base its findings solely on the opinion of an expert; but the imperfect nature of the forensic evidence places onerous responsibility on the courts to exercise extra care and caution before acting on expert opinion. Before a court can place reliance on the opinion of an expert, it must be shown that he has not betrayed any bias and the reasons on which he has based his opinion are convincing and satisfactory. Reasons for the opinion must be carefully probed and examined. All other relevant evidence must be considered. In appropriate cases, corroboration must be sought. The sophistication with which crimes are committed nowadays and the primitive methods of investigation result in a very high rate of acquittal. Forensic science is a promising field of knowledge and its judicious uses in

[58] (2020) 16 SCC 401.

[59] (1999) 5 SCC 96.

[60] *Murari Lal* v. *State of M.P*, (1980) 1 SCC 704.

investigation shall certainly ensure qualitatively better justice dispensation. Utility of forensic science in administration of justice cannot be overemphasised but in a country governed by rule of law and constitutional principles, the forensic science has to conform to the legal norms for its acceptability.