

A research paper on

**FORENSIC EVIDENCE IN RESPECT OF BALLISTICS: AN INTERNATIONAL
PERSPECTIVE**

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ABSTRACT:

This paper deals with and goes to be study regarding the proficiency of these tools and system and the way implementing those in India with already existing technology are going to be helpful for enhancing criminal justice system. “Forensic” comes from an ancient Rome wherever justice was distributed within the market place referred to as “forum”. Hence, “forensics” implies that that belongs to the court of law. Ballistics entails the science that deals with the launching, flight behaviour, and result of projectiles, particularly bullets. Thus the study of ballistics for legal purpose or ends of justice is termed rhetorical ballistics. The law that primarily regulates guns and their proliferation is that the Arms Act 1959. The law of proof is that the construction on that the system of dispensation of justice rests. In fact, the aim and object of proof is to guide the Courts to come back to a conclusion concerning a case at hand. But, in sure cases, wherever the queries concerned area unit on the far side the vary of common expertise and data, proof in sort of facts cause issues because the Court might not have ample ability to reach a conclusion supported those facts. Thus, the necessity arises for consultants who have the desired ability and data to tender evidences. In modern times, the reliance on skilled proof has been overwhelming,

particularly within the space of ballistics. This article tries to critically analyze the foundations of acceptability with relation to skilled proof, generally and ballistics proof, above all.

KEYWORDS: ballistic imaging, operations management, queuing theory, optimization, statistic

INTRODUCTION:

Ballistic imaging systems will facilitate solve gun crimes by comparison pictures of cartridge cases, that are recovered from a criminal offense scene or test-fired from a taken gun, to a info of pictures obtained from past crime scenes. However, many U.S. municipalities lack the resources to method (i.e., enter pictures into the info and rummage around for matches) all of their recently non heritable cartridges, and external laboratories are usually underneath capacitated and generate hits (i.e., matches between new cartridges and info entries) solely when long delays.

The word “Ballistics” is etymologically derived from the Latin word ‘ballista’ and refers to a body in motion. Ballistics is that a part of rhetorical science that deals with the study of motion of projectiles. Projectile is thought as a body projected by force principally from firearms, particularly through air.[1](Hacker 2010) The science of projectile so involves the study of firearms. Rhetorical ballistics is that the study of firearms, ammunition and explosives with a read to reconstruct the crime scene accurately. It’s currently become an integral a part of the crime investigation because the reconstruction will cause several evidences which might be utilized in a given case with major effects. The overall truth of ballistics is that no missiles discharged from a similar or totally different firearm bear a similar trace marks.

Thus, as an instance, every rifled piece leaves its own striations (a form of tell-tale fingerprint) in terms of barrel and striker markings on the pink-slipped bullet and cartridge case severally. This makes it attainable to trace a bullet or cartridge to the actual weapon that is in question. If a proof bullet has constant category characteristics and matching individual characteristics to check bullets pink-slipped from a ‘suspect firearm’, the piece examiner will conclude that the bullet was pink-slipped from the suspect piece.[2](Anon 2002) A thriving demonstration of those facts by the utilization of comparison magnifier in conjunction with photomicrography is often the foremost valuable and foolproof proof. Trajectory consultants work closely with the police work officers, members of the community and judiciary before

whom they eventually seem as freelance skilled witnesses. They, play a very important 'complementary' role in making certain justice within the trendy society. With the help and experience of ballistics, it's currently attainable not solely to tally the cartridge pink-slipped with the piece used, however variety of alternative necessary factors additionally, although with varied degrees of chance. Among these factors is that the vary of firetrace, the approximate time once the piece was discharged and alternative queries of comparable nature. The aim of the paper is to know about the effectiveness of ballistic imaging as evidence in India.

Hypothesis:

The principle of ballistic imaging technology admissible as forensic evidence is not well versed in India.

Methods and materials:

The present research paper is conclusive, descriptive and based on non-empirical study. Qualitative data was generated to test the research hypothesis. The study was conducted on secondary sources like books, journals, e-sources, theories and relevant provision with decided case laws

AN OUTLOOK ON BALLISTICS – AN INTERNATIONAL PERSPECTIVE

For abundant of the 20th century, the rhetorical science of firearms identification was AN intensively individualized activity. A firearms examiner inspected ballistics proof (spent cartridge cases and bullets) underneath a comparison magnifier, shaped a mental pattern of distinctive marks and options, and tried to match that pattern against alternative exhibits. Establishing connections between completely different cases trusted the memory recall of the firearms examiner or having the ability to acknowledge options from pictures in open case files or postings on bulletin boards. Hence, looking through massive amounts of trajectory proof and validatory a match was a labor intensive and long task.[3](Cork et al. 2010) Circumstances began to amendment speedily within the late Nineteen Eighties and Nineties as advances in assembling and looking out computerised image databases were applied to rhetorical proof analysis.

The advent of the Federal Bureau of Investigation DRUGFIRE system (for cartridge cases) and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF)-funded BULLETPROOF system (for bullets) made the first significant breakthroughs, permitting individual law enforcement agencies to begin searching new ballistics proof against huge volumes of already-captured pictures and suggesting possible “hits.” The late-1990s formation of the National Integrated Ballistic Information Network (NIBIN), under ATF, condensed down the previously formidable geographic barrier by linking the image databases across multiple agencies and permitting searches within regions of the country.[4]

Automated ballistics imaging and analysis systems, admire the integrated identification system system (IBIS) have advanced gun enforcement operations by permitting pictures of gun crime proof to be chop-chop compared to an outsized inventory of proof collected from alternative crime scenes. When small-arm examiners ensure candidate matches, detectives will use the data generated by the links among gun crimes to assist solve their cases.[5](Braga & Pierce 2004) Links between recovered cartridge casings represent the overwhelming majority of trajectory matches created through wader. Sadly, the two-dimensional grayscale photography utilized by the initial wader instrumentality was typically not refined enough to counsel potential matches between typically extremely broken bullets from separate crime scenes. Through the acquisition of three-dimensional measurements, the BulletTrax-3-D image acquisition technology was specifically designed to boost the flexibility of enforcement agencies to form bullet matches through machine-controlled trajectory imaging and analysis.[6](Braga & Pierce 2011)

At least 69 % of homicides involve a gun. For homicides and different gun crimes during which firearms, fingerprints and polymer proof don't seem to be recovered (e.g., the shooter fires from a distance and doesn't leave the gun at the crime scene), trajectory imaging are often a valuable crime-solving tool. Gun-specific markings square measure left on the spent cartridge case, hereafter brought up as a cartridge, once a gun is unemployed, and trajectory imaging compares the markings on the cartridge to the markings on antecedently recovered cartridges; trajectory imaging of bullets is additionally potential however has been abundant less eminent than trajectory imaging of cartridges, and our study restricts itself to cartridges.

The National Integrated Ballistic Information Network (NIBIN), developed by The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) in 1999, uses computerized

imaging technology (in particular, the Integrated Ballistic Identification System (IBISTM) created by Forensic Technology, Inc.) to maintain a national database of 2 or 3 D images of cartridges that are either recovered from crime scenes (referred to here as evidence) or test-fired from confiscated weapons (referred to as test-fires), and computes similarity scores between a newly acquired cartridge and the database entries.

The computer code generates an inventory of (e.g., ten or 20) doable matches, that area unit after analyzed by somebody's examiner to work out whether or not there area unit any confirmed hits. Confirmed hits will doubtless reveal links between crimes or generate a chilly hit between a confiscate weapon and a past crime, each of which may be helpful in resolution gun crimes. The success of this approach hinges on the established proven fact that bound firearms tend to be utilized in multiple gun crimes.

It took almost a century to improvise the ways of ballistics technology and it's approach towards criminals investigations and this was mainly because of the admissibility of such evidence, to make suck evidence admissible one has to be well versed with the latest imaging technologies and this posed as a challenge to many experts in and around the world. But as the times change and the crimes become improvised, new enactments and providing were brought into view in this regard.

THE IMPORTANCE OF BALLISTIC EVIDENCE

While gun violence has diminished since the first Nineties, several Americans still die by shooting and plenty of additional area unit still stricken by non-fatal gun violence. In 2009, a complete of 9,146 folks was dead with firearms and it's calculable that another 48,158 were treated in hospitals for shooting wounds received in assaults. Analysis suggests that the majority of urban gun violence is committed by a comparatively little range of extremely active criminals. Crime guns area unit consumer goods and, if not recovered by enforcement, is employed in multiple violent incidents. This presents a challenge and a chance for strategic gun enforcement operations.[7](Anon n.d.)

As the IBIS technology developed, a number of firearms examiners and other researchers tested the system's performance. Some analysts scrutinized particular parts of the IBIS comparison process, such as the default comparison pass and 20 percent threshold for detailed

image scoring and ranking.[8](Boesman et al. 2001) However, a bulk of the analysis targeted on execution problems raised by the creation of large-scale reference trajectory image databases.

Case studies:

In *United States v. Monteiro*[9], adequate documentation was lacking, because the professional had not created any sketches or taken images. The court wrote: “Until the premise for the identification is represented in such some way that the procedure performed by [the examiner] is reproducible and verifiable, it is inadmissible.

By 2007 courts were becoming more cautious. In *United States v. Diaz*[10], the court found that the record failed to support the conclusion that identifications may be created to the exclusion of all alternative firearms within the world. Thus, “the examiners who testify during this case might solely testify that a match has been created to a ‘reasonable degree of certainty within the ballistics field.” Even courts that admitted the evidence expressed reservations. For example, in *United States v. Williams*[11], the Second Circuit upheld the acceptability of firearms identification proof involving bullets and cartridge casings. The opinion, however, contained some cautionary language: “We don't would like this opinion to be taken as expression that any proffered flight skilled ought to be habitually admitted.”

Several recent court cases have acknowledged the limitations surrounding the reliability of firearms identification evidence. In 2009, a district court in *United States v. Taylor*[12], wrote: attributable to the restrictions on the responsibility of firearms identification proof mentioned on top of, Mr. Nichols won't be permissible to testify that his methodology permits him to succeed in this conclusion as a matter of scientific certainty. Mr. Nichols conjointly won't be allowed to testify that he will conclude that there's a match to the exclusion, either sensible or absolute, of all different guns. He might solely testify that, in his opinion, the bullet came from the suspect rifle to among an affordable degree of certainty within the firearms examination field.

In 2010, the court in *United States v. Willock*[13], based on a comprehensive magistrate's report, command that “Sgt. Ensor shall not opine that it's a ‘practical impossibility’ for a piece to own pink-slipped the cartridges on the other hand the common ‘unknown firearm’ to that Sgt.

Enzor attributes the cartridges.” Thus, “Sgt. Ensor shall state his opinions and conclusions with none characterization on the degree of certainty with that he holds them.”

Since 2005, admissibility of ballistics evidence has changed considerably. The 2008 and 2009 reports from the National Academy of Sciences as well as *United States v. Green* and subsequent cases illustrate that, unlike the initial challenges to admissibility of firearms evidence in the wake of Daubert, new challenges are likely to find more success.[14]

Ballistics evidence matching is intended to assist police investigations of crimes involving firearms, thereby increasing the chance of arrest, conviction, and punishment of criminals. The desired result is the incarceration of gun-using criminals and the deterrence of gun crime a higher percentage of such criminals are incarcerated, it may deter other criminals from using guns, and incapacitate those who get caught from committing further crimes, and that is exactly what the provisions of U.S. courts is trying to do.

BALLISTIC IMAGING IN INDIA

- The Indian Law - THE ARMS ACT, 1959

India includes a strict policy in licensing of firearms that is indicated by its position in rate of possession index-110 out of 177 countries. The Arms act, underneath chapter III, lays down a procedure that must be followed to achieve license. first of all associate application must be filed (section 13, clause 1), that is then verified by the officer of the closest station house (section 13, clause 1, sub clause 1), and once acceptable payment of fees, if the licensing authority deems the person eligible, the person is granted license for the gun, creating it a sophisticated and rigid technique. In India, solely an individual on top of the age of twenty one, not of associate unsound mind and with no previous list or once five years of discharge from the sentence, is eligible to possess an authorized piece. A person, underneath Chapter five (section 25) of the Arms Act is answerable for imprisonment of 1-3 years and/or fine if he/ she square measure in resistance of section three (prohibition of possession of a weapon while not a license).

In India, in the case of *State (through Central Bureau of Investigation New Delhi) v. S. J. Choudhary*[15], the Supreme Court has control that the expression “science or art” in Section

forty five of the proof Act 1872 is of wide import. Every of the words 'science' and 'art' must be construed wide to incorporate at intervals its compass the opinion of an professional in every branch of those subjects: the that means of the word 'science' as understood usually with relevance its lexicon that means should be attributed to the word. Therefore, the present section 45 of the Indian Evidence Act, 1872 can be better worded by amendment to clearly imply the above observations

It was also held that the cases in which the examination of a ballistic expert is essential will 'depend on the circumstances of each case'. The most common circumstance wherever the conditions area unit apt for the proof of a flight professional is during a case 'where death is thanks to injuries or wounds caused by deadly weapons. it's been thought-about to be the duty of the prosecution to prove by professional proof that it absolutely was doubtless or a minimum of attainable for the injuries to own been caused with the weapon with that and within the manner during which they're purported to are caused.

This understanding of the courts today is the result of a very appropriate judgment by the Supreme Court in the case of *Jaidev and Hari Singh v. State of Punjab*,[16] where the case of *Mohinder Singh v. State* [17], was quoted by the learned counsel for the appellants to mention that the Court was of the opinion that wherever a gun is employed within the commission of a criminal offense, the prosecution 'must' bring knowledgeable proof to attach the injuries with the weapon and its alleged manner of use.

In the case of *Ajay Singh v. State of Bihar*,[18] the pistol used in the perpetration of the crime was never sent to the ballistic expert for examination. This was seen as a lacuna on the part of the prosecution but the case did not go in favour of the appellant as there were witnesses who testified to the satisfaction of the Court that accused had done that act of crime.[19]

In *Charan Singh v. State of Punjab*,[20] the medical and flight knowledgeable opinion was conflicting regarding the vary of fireplace. The court, when appreciating the proof before it, was glad with the scientific conclusions of the flight knowledgeable. This was one of the landmark cases in India where the ballistic expert's opinion prevailed over that of the medical expert[21]. Furthermore, in the case of *Kalua v. State of Uttar Pradesh*[22], the court being

satisfied with the evidence of Ballistic Expert held that the conclusion of Ballistic expert is sufficient to prove the guilt of the accused.

Although gun crime constitutes a small percentage of violent crimes, guns are used in two-thirds of homicides. Criminal assaults with guns are more lethal in comparison with those involving other common weapons, and the misuse of guns by criminals creates a sense of insecurity. of “no safe place“ for residents of a neighborhood where gunfire is common. It is therefore important for the Indian legislature to improves new laws on basis of ballistics so as to strengthen their core on criminal investigations.

RECOMMENDATION:

- More research needs to be undertaken and databases developed to ensure a reliable and adequate repository of information and processes for the forensic experts and judges to rely on.
- Changes need to be made in the Arms Act to balance the need for gun rights versus need for gun control.
- Indian policy makers need to keep in mind the Indian scenario while framing laws and realize that a strict anti-licensing policy is not helping as the criminals any ways have access to a vast illegal arms market.

CONCLUSION:

In the contemporary social context, the role and significance of ballistics can be overwhelming in administration of criminal justice. While of the one hand, the sophistication and complexities of modern weapons and arms and ammunition call for expert knowledge and skills in deciphering the nature, category and manner of use in specific cases, on the other, the effective interpretations of culpability and criminal liability require the blending of such knowledge in legal paradigm. In fact, the latter is important for bringing the guilty to the gallows and the innocent to freedom. Forensic ballistics is a “road not taken”. Although much progress

has been made in the field, many questions remain that need to be answered for better adjudication.

It is only the innocent civilians who bear the brunt of these draconian laws, and because of no fault of their own they are deprived of an opportunity to protect themselves. Therefore steps must be taken to ensure that people have controlled access to guns.

REFERENCES:

- [1] Antoine James, *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity*, (May 27, 2018, 03.10 PM), <http://docplayer.net/60381351-The-scientific-way-of-warfare-order-and-chaos-on-the-battlefields-of-modernity.html>
- [2] *Rethinking Ballistic Fingerprints*, THE NEW YORK TIMES, (May 27, 2018, 03.30 PM), <https://www.nytimes.com/2002/11/11/opinion/rethinking-ballistic-fingerprints.html>
- [3] Daniel L. Cork, Vijayan N. Nair, and John E. Rolph, *Some Forensic Aspects Of Ballistic Imaging*, 38 FORDHAM URB. L.J. 473 (2010), (May 27, 2018, 04.00 PM), <https://ir.lawnet.fordham.edu/ulj/vol38/iss2/2>.
- [4] U.S. Department of Justice, *The Bureau Of Alcohol, Tobacco, Firearms And Explosives' national Integrated Ballistic Information Network Program*, (May 27, 2018, 05.15 PM), <https://oig.justice.gov/reports/ATF/a0530/final.pdf>
- [5] Anthony Braga, *Linking Crime Guns: The Impact of Ballistics Imaging Technology on the Productivity of the Boston Police Department's Ballistics Unit*, *Journal of Forensic Sciences*, 49(4):701-6 · August 2004, (May 28, 2018, 01.10 PM), <https://www.researchgate.net/publication/839473>
- [6] Anthony A. Braga, *Reconsidering the Ballistic Imaging of Crime Bullets in Gun Law Enforcement Operations*, (May 28, 2018, 01.40 PM), <https://www.tandfonline.com/doi/abs/10.1080/19409044.2011.613444>
- [7] *Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). 2011. ATF FACT SHEET: NATIONAL INTEGRATED BALLISTIC INFORMATION NETWORK (NIBIN)*, (May 28, 2018, 03.00 PM), <http://www.atf.gov/publications/factsheets/factsheet-nibin.html>

- [8] William C. Boesman, *National Integrated Ballistics Information Network (NIBIN) for Law Enforcement*, (May 28, 2018, 03:30 PM), <https://mchenry.house.gov/uploadedfiles/second%20amend%20-%20ballistic%20fingerprinting.pdf>
- [9] *United States v. Monteiro*, 407 F. Supp. 2d 351
- [10] *United States v. Diaz*, 2007 WL 485967
- [11] *United States v. Williams*, 506 F.3d 151
- [12] *United States v. Taylor*, 663 F. Supp. 2d 1170
- [13] *United States v. Willock*, 696 F. Supp. 2d 536, 546
- [14] Paul C. Giannelli, *The 2009 NAS Forensic Science Report: A Literature Review*, (May 30, 2018, 05:00 PM), https://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1098&context=faculty_publications
- [15] *State (through Central Bureau of Investigation New Delhi) v. S. J. Choudhary*, 1996 Cri LJ 1713.
- [16] *Jaidev and Hari Singh v. State of Punjab*, 1963 Cri LJ 495
- [17] *Mohinder Singh v. State*, AIR 1953 SC 415.
- [18] *Ajay Singh v. State of Bihar*, AIR 2000 SC 3538
- [19] *Vineet Kumar Chauhan v. State of U.P.*, AIR 2008 SC 780
- [20] *Charan Singh v. State of Punjab*, 1974 Cri LJ 1253
- [21] *Kartar Singh v. State of Punjab*, AIR 1977 SC 349
- [22] *Kalua v. State of Uttar Pradesh*, AIR 1958 SC 180
- [23] Dr. Lakshmi T and Rajeshkumar S “In Vitro Evaluation of Anticariogenic Activity of Acacia Catechu against Selected Microbes”, *International Research Journal of Multidisciplinary Science & Technology*, Volume No. 3 , Issue No. 3, P.No 20-25, March 2018.
- [24] Trishala A , Lakshmi T and Rajeshkumar S, “ Physicochemical profile of Acacia catechu bark extract –An In vitro study”, *International Research Journal of Multidisciplinary Science & Technology*, Volume No. 3 , Issue No. 4, P.No 26-30, April 2018.

PAPERPILE:

Anon, 2002. Rethinking Ballistic Fingerprints. *The New York times*. Available at:

<https://www.nytimes.com/2002/11/11/opinion/rethinking-ballistic-fingerprints.html>

[Accessed June 13, 2018].

Anon, Website. Available at: <http://www.atf.gov/publications/factsheets/factsheet-nibin.html>

[Accessed June 13, 2018].

Boesman, W.C. et al., 2001. *National Integrated Ballistics Information Network (NIBIN) for Law Enforcement*,

Braga, A.A. & Pierce, G.L., 2004. Linking Crime Guns: The Impact of Ballistics Imaging Technology on the Productivity of the Boston Police Department's Ballistics Unit. *Journal of forensic sciences*, 49(4), pp.1–6.

Braga, A.A. & Pierce, G.L., 2011. Reconsidering the Ballistic Imaging of Crime Bullets in Gun Law Enforcement Operations. *Forensic Science Policy & Management: An International Journal*, 2(3), pp.105–117.

Cork, D.L., Nair, V.N. & Rolph, J.E., 2010. SOME FORENSIC ASPECTS OF BALLISTIC IMAGING. *The Fordham urban law journal*, 38(2), p.473.

Hacker, B., 2010. Antoine Bousquet. *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity*. (Critical War Studies.) ix 265 pp., illus., bibl., index. New York: Columbia University Press, 2009. *Isis; an international review devoted to the history of science and its cultural influences*, 101(3), pp.623–624.

