

Examining Wrongful Convictions Based on Fingerprint Evidence

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Abstract:

Fingerprint evidence has long been seen as a cornerstone of forensic science, valued for its unique traits and reliability. However, some wrongful conviction cases reveal significant flaws in how fingerprint evidence is collected, interpreted, and relied upon, highlighting its limitations. This article reviews key cases like those of Brandon Mayfield, Stephen Cowans, and Shirley McKie, where mistaken interpretations led to serious injustices. Contributing factors to these erroneous convictions include unclear or incomplete prints, personal biases, laboratory errors, and systemic issues within fingerprint databases. Moreover, cognitive biases can influence analysts' judgments, especially in high-stress scenarios. To improve accuracy and ensure justice, the forensic field must refine evidence collection techniques, enhance examiner training, establish reliable databases, include independent witnesses in searches and seizures, record processes with video documentation from scene of crime to the forensic laboratory, and support fingerprint evidence with additional methods along with improved protocols, blind testing, and independent verification to mitigate risks and preserve the reliability of fingerprint evidence in the justice system. While fingerprints remain vital in forensic investigations, it's crucial to reevaluate their use to prevent future wrongful convictions.

Keywords: Fingerprint evidence, wrongful convictions, collection inaccuracies, cognitive biases, database integrity, miscarriages of justice, erroneous identification, evidential protocols, legal reform.

1. Introduction:

Fingerprint evidence is regarded as very dependable because each person's fingerprints are unique and remain unchanged throughout their life. Nonetheless, its reliability hinges on the appropriate collection, preservation, and analysis of the prints. When collected and handled properly, fingerprint evidence can offer valuable investigative leads or authenticate identities. However, inaccuracies may occur due to poor-quality prints, human errors, or the misinterpretation of incomplete or smudged prints. Technological advancements, like automated fingerprint identification systems (AFIS), have enhanced accuracy, but human oversight is still crucial. To maintain reliability, rigorous protocols, comprehensive training, and verification processes are essential in forensic laboratories that work with fingerprint evidence.

Fingerprint evidence has historically been deemed a fundamental aspect of forensic science, stemming from the assumption that each person's prints are unique. Nevertheless, recent research and notable legal cases have underscored that fingerprint analysis is not foolproof, exposing potential errors in collection, interpretation, and biases among examiners that can lead to wrongful convictions.

Despite its value, the trustworthiness of fingerprint evidence is contingent upon stringent protocols and supporting information. To improve accuracy in criminal investigations, experts are now calling for

enhanced validation methods, blind testing, and independent reviews, aiming to minimize mistakes and uphold the integrity of judicial outcomes.



2. Investigating Officer is empowered to take Fingerprints of the Accused:

Section 3 of the Prisoners' Identification Act of 1920 empowers investigating officers to gather fingerprints from individuals who have been convicted of crimes with potential sentences of one year or more in prison. As per Section 51 of the Bharatiya Nagarik Suraksha Sanhita, 2023, investigating officers has the right to request a medical examination of a suspect, which may include the collection of fingerprints or other necessary measurements for the investigation. Additionally, Section 349 of this legislation empowers magistrates to require any person linked to a criminal case to provide samples such as handwriting, fingerprints, or signatures to assist in the investigation or legal proceedings.

Section 4 of the Prisoners' Identification Act of 1920 broadens this authority to encompass individuals charged with serious offences that also carry the possibility of one year or more of imprisonment, regardless of whether they have been convicted. In such cases, the investigating officer is allowed to collect fingerprints as part of their investigation.

As outlined in Section 5 of the Prisoners' Identification Act of 1920, investigators are permitted to obtain fingerprints from individuals who are being held for investigative reasons under the Bharatiya Nagarik Suraksha Sanhita, 2023, provided there is an order from a Class I Magistrate. This provision grants law enforcement crucial powers throughout the investigation.

Section 6 of the Prisoners' Identification Act of 1920 clarifies that individuals who refuse to provide their fingerprints when requested by an investigating officer or a court may face penalties as stipulated in Section 186 of the Indian Penal Code, 1861 (now Section 221 of the Bharatiya Nyaya Sanhita, 2023).

3. Notable Wrongful Conviction Cases Stemming from Errors in Fingerprint Evidence:



- Brandon Mayfield (2004): An incorrect fingerprint identification led to Brandon Mayfield, an attorney from Oregon, being wrongfully linked to the 2004 Madrid train bombings. The FBI incorrectly matched his fingerprint to one found on a bag of detonators linked to the attacks. Despite the lack of any connection between Mayfield and Spain or the incident, the FBI maintained confidence in their findings. Eventually, Spanish authorities revealed that the fingerprint actually belonged to Ouhane Daoud, an Algerian national. Mayfield was released afterward, and the U.S. government issued an official apology for the error. This incident highlighted significant shortcomings in fingerprint analysis, particularly regarding the potential for mistakes even in high-stakes cases.
- Shirley McKie (1999): Shirley McKie, police officer originally from Scotland, encountered perjury charges when investigators claimed her fingerprint was discovered at a murder scene, she asserted she had never been to. Despite her firm denials, she was charged and nearly convicted. Subsequently, independent experts confirmed that the fingerprint evidence was unreliable, resulting in her acquittal.
- Stephen Cowans (1997): Stephan Cowans faced multiple charges, including the attempted murder of a police officer, largely due to erroneous testimonies from two fingerprint analysts at the Boston Police Department and incorrect identifications. When the biological evidence was analysed and the incriminating fingerprints were determined to be fake, he was exonerated in 2004. He spent six years in prison until DNA evidence proved his innocence and a re-evaluation of his fingerprint showed it had been misanalysed.

These cases illustrate that while fingerprint evidence can be conclusive, it can also lead to miscarriages of justice if misinterpreted or manipulated with ulterior motive.

4. Literature Review:

Fingerprint evidence has historically been viewed as a dependable forensic instrument, owing to the distinctive nature of individual fingerprints. Nevertheless, recent research and notable cases have highlighted that errors in the collection, examination, and interpretation of fingerprint evidence can result in wrongful convictions and judicial injustices.

A significant contributor to wrongful convictions originates from the fingerprint collection process. Factors such as smudged, partial, or contaminated prints can undermine the integrity of the evidence.

Risinger and Saks (2003) argue that improperly collected prints can create uncertainty, prompting examiners to arrive at incorrect conclusions. The subjective nature of matching partial prints has faced criticism for introducing the possibility of error, especially when forensic analysts are under pressure in high-profile cases.

A leading cause of mistakes in fingerprint evidence stems from errors made during the collection process. In investigations of crime scenes, fingerprints can appear smudged, incomplete, or contaminated, which undermines their integrity. Saks and Koehler (2005) contend that inaccuracies during the collection phase can alter the results, particularly when incomplete or distorted prints are mistaken for complete matches. In such instances, forensic analysts may need to work with inferior data, potentially leading to erroneous outcomes. Further complicating matters is the mishandling of evidence, such as contamination or damage sustained during the chain of custody, which can affect the reliability of the acquired prints.

Fingerprint analysis primarily relies on expert interpretation, which, while guided by training, is still susceptible to human error and cognitive bias. According to Dror et al. (2006), forensic examiners are prone to confirmation bias, particularly when they are affected by prior knowledge or external influences. Such biases can lead to erroneous judgments, as illustrated by the Brandon Mayfield case, where FBI agents mistakenly matched his fingerprint to one found at the Madrid bombing site, a mistake later rectified by Spanish authorities.

Cognitive bias significantly contributes to mistakes in fingerprint analysis. Kassin et al. (2013) examine how forensic analysts are vulnerable to numerous forms of bias, including confirmation bias, which arises when an analyst subconsciously seeks to validate a preexisting belief. This issue can become especially problematic in high-profile cases, where external pressures might lead analysts to produce results that conform to the expectations of law enforcement or prosecutors. One significant example demonstrating the effects of cognitive bias is the case of Brandon Mayfield, who was mistakenly linked to the 2004 Madrid bombings because of a faulty fingerprint identification.

Another issue arises from the shortcomings of fingerprint databases. Incomplete or erroneous databases can lead to false positives, incorrectly identifying an innocent person's fingerprint as a match. Cole (2005) highlights how systemic weaknesses in fingerprint repositories have contributed to wrongful convictions by either failing to provide accurate comparisons or allowing false matches due to the poor quality of partial prints. This underscores the need for improved maintenance and accuracy of forensic databases.

The legal system's heavy reliance on forensic evidence, particularly fingerprints, has sparked demands for reform. Garrett (2011) contends that wrongful convictions resulting from fingerprint errors expose systemic deficiencies within the justice process. He calls for stricter validation protocols for fingerprint evidence and enhanced oversight to ensure that examiners are not improperly influenced by cognitive biases or prosecutorial pressures. Acknowledging these potential issues has led to increased scrutiny of forensic methods in courtrooms.

Several prominent cases illustrate the ramifications of errors in fingerprint analysis. For instance, Shirley McKie, a police officer from Scotland, was wrongfully accused of perjury after fingerprint specialists incorrectly asserted that her print was present at a crime scene. Likewise, Brandon Mayfield was unjustly detained due to a fingerprint misidentification that was subsequently corrected by Spanish authorities. Such instances underscore the risks associated with an over-reliance on fingerprint evidence without additional corroboration.

The acknowledgment of errors in fingerprint evidence has sparked calls for reform within the forensic field. Mnookin (2008) stresses the importance of more stringent validation procedures for fingerprint

analysis and enhanced oversight of forensic laboratories. Additionally, researchers advocate for the implementation of blind testing and independent verification to mitigate the influence of cognitive bias and ensure that forensic results attain maximum objectivity.

Fingerprint evidence has long been considered a trustworthy forensic tool because of its assumed uniqueness and permanence. However, numerous cases of wrongful convictions due to fingerprint inaccuracies have emerged over the years, exposing the method's limitations and potential flaws. Research indicates that mistakes made during the collection, analysis, and interpretation of fingerprints can lead to serious judicial errors, as demonstrated by the cases of Brandon Mayfield and Shirley McKie.

5. Is Fingerprint Evidence Infallible?

For many years, fingerprint evidence has been considered a fundamental element of forensic science, serving as a reliable method for identifying suspects in criminal cases. The unique characteristics and enduring nature of fingerprints make them an essential resource for law enforcement across the globe. Since every person has their own distinct fingerprints, the detailed patterns they exhibit can provide vital information for crime investigations. This clarity and the longstanding tradition of using fingerprints as key evidence in securing guilty verdicts have enhanced their standing in the realm of criminal justice. However, despite its longstanding acceptance, it is crucial to recognize that fingerprint evidence is not infallible.

One of the fundamental challenges associated with fingerprint evidence lies in the collection and analysis processes. Errors can occur at various stages, potentially skewing the results and leading to misidentifications. For instance, when fingerprints are smudged or only partially collected, the quality of the evidence may be compromised. Such imperfections can significantly affect the accuracy of human interpretation. Even in instances where technology aids in fingerprint analysis, the subjective nature of matching prints remains a concern. Experts must rely on their judgment, which can be influenced by various factors, leading to discrepancies in interpretations. This subjectivity raises critical questions about the reliability of fingerprint evidence, especially in cases where stakes are high.



Another pressing issue in the realm of fingerprint evidence is the risk of contamination and mishandling during the collection process. When evidence is not properly secured, it may be compromised, leading to

biased or incorrect conclusions. For example, a fingerprint discovered at a crime scene could belong to an innocent bystander rather than the actual perpetrator, as it might have been inadvertently transferred through unrelated activities. This potential for cross-contamination highlights the importance of rigorous protocols in collecting and handling evidence to ensure its integrity. As forensic investigators work to establish facts, they must remain vigilant about the context of each piece of evidence, understanding that not all prints found at a scene directly link to criminal activity.

The reliability of fingerprint evidence heavily hinges on the precision and comprehensiveness of fingerprint databases. When these databases are flawed or poorly maintained, they can lead to erroneous identifications, potentially resulting in significant legal repercussions and undermining the integrity of the criminal justice system. If a fingerprint database lacks essential information or is incomplete, the chances of inaccurate identifications increase, potentially implicating innocent individuals in criminal activities. Furthermore, as technology evolves, there is an ongoing need for law enforcement agencies to update and maintain these databases to reflect current and accurate information, ensuring that they serve as effective tools for investigations rather than sources of error.

Bias in fingerprint analysis is a growing concern, particularly in high-stakes cases that demand intense scrutiny. In such situations, the pressure to deliver results can lead to cognitive biases, such as confirmation bias, where analysts may unconsciously favour evidence that supports a predetermined conclusion. This phenomenon can cloud judgment and lead to misguided interpretations of fingerprint evidence. The psychological aspects of forensic analysis are often overlooked, yet they play a critical role in the outcomes of criminal investigations. It is imperative that analysts remain aware of their potential biases and strive to adhere to objective standards in their work to minimize the risk of erroneous conclusions.

Errors in fingerprint analysis within laboratories can arise from human mistakes, contamination, or inadequate quality control. Misidentification may stem from mishandling evidence, ineffective comparison methods, or reliance on outdated technology. A poorly conducted analysis can result in wrongful accusations or the inability to identify a suspect, thus undermining the integrity of the investigation. Forensic laboratories must uphold strict standards regarding training, documentation, and verification to reduce the likelihood of errors. Conducting regular audits and following accreditation guidelines is essential for ensuring the trustworthiness of fingerprint evidence, as errors can lead to serious legal and investigative repercussions.

Inaccurate identification of latent and smudged fingerprints can lead to wrongful accusations, putting innocent people at risk. Latent prints, which are often incomplete or ambiguous, are especially vulnerable to misreading, particularly when smudging obscures important details. Misidentifications may arise from human mistakes, low-quality images, or an excessive dependence on automated systems. These inaccuracies can result in wrongful convictions, threatening the legal system and eroding confidence in forensic science. To mitigate this risk, it is crucial to establish rigorous guidelines, carry out detailed peer evaluations, involve independent observers during search and seizure activities, guarantee that the entire process is captured on video, oversee the transportation and examination of fingerprint evidence meticulously, and leverage cutting-edge imaging technologies for accurate and reliable fingerprint analysis in criminal investigations.

The lack of independent and trustworthy witnesses during the collection of fingerprints at a crime scene, coupled with insufficient video documentation throughout the procedure, can greatly compromise the reliability and integrity of fingerprint evidence. When critical phases such as collection, search, seizure, transportation, and laboratory analysis are not effectively monitored or recorded, concerns may emerge

regarding the evidence's authenticity. In the absence of independent oversight, the risk of mishandling, contamination, or tampering rises, complicating the verification that the fingerprints were properly gathered and analysed. Thorough video documentation and the presence of impartial witnesses are crucial for maintaining the chain of custody, ensuring transparency, and enhancing the credibility of the evidence submitted in court.

To sum up, fingerprint evidence is an important asset in criminal investigations; however, it's crucial to be aware of its limitations and potential challenges. The distinctive nature of fingerprints, along with their enduring characteristics, strongly supports their ongoing use in forensic science. However, it is equally important to recognize the factors that can compromise their reliability, such as errors in collection, absence of independent witnesses during the search and seizure operation and transportation, contamination, absence of video documentation, inadequate databases, and biases during analysis. As the field of forensic science evolves, ongoing training and awareness of these issues must be prioritized to ensure that fingerprint evidence is employed effectively and responsibly within the legal system. This balanced approach will contribute to the integrity of criminal investigations and the pursuit of justice.

6. Daubert Standard:

The Daubert standard serves as a guideline in U.S. courts for determining whether expert scientific evidence can be accepted in legal proceedings. This criterion mandates that the evidence is pertinent, trustworthy, evaluated by peers, and broadly recognized by the scientific community. Additionally, it considers any known or potential errors associated with the evidence, ensuring that only sound scientific testimony is presented in legal proceedings. For instance, in a case involving fingerprint evidence, the court must assess if the testing methods are established, widely accepted by forensic scientists, and have been subject to scrutiny by other experts. Additionally, the potential for errors in the methodology and interpretations is evaluated to ensure that the evidence presented meets the rigorous standards necessary for legal consideration.

7. Court Judgments:

- In the 1999 case of *United States v. Byron Mitchell*, the US District Court for the Eastern District of Pennsylvania examined whether fingerprint evidence could be admitted based on the criteria set by the Daubert standard, which assesses the reliability of scientific evidence. Byron Mitchell contested the credibility of fingerprint identification methods; however, the court concluded that fingerprint analysis is a reliable and well-established technique that has been used in criminal investigations for almost a century. The court emphasized that fingerprinting undergoes peer review, is widely endorsed within the scientific community, and demonstrates a low error rate when performed accurately. This ruling bolstered the acceptance of fingerprint evidence in US courts and impacted its recognition on an international scale.
- A significant ruling from a UK court on fingerprint evidence is the case of *R v. Buckley* (1999), where the Court of Appeal assessed the reliability and admissibility of such evidence. The case focused on Buckley's conviction, which was largely based on a fingerprint found at the crime scene. The defence argued that the identification was unreliable due to an insufficient number of comparison points in the fingerprint analysis. However, the court upheld the conviction, asserting that fingerprint evidence could be deemed admissible even with fewer than 16 comparison points, as long as expert testimony effectively substantiated the match. This ruling underscored the importance of professional assessment

in fingerprint examination and established a new standard for a more adaptable approach to the admissibility of fingerprint evidence in UK legal proceedings.

- In this case, the judge had the discretion to determine whether to admit fingerprint evidence based on the number of matching ridge characteristics. The court provided guidance regarding the minimum number of these characteristics that should be required for a judge to make such a determination. This decision was made by the Court of Appeal (Criminal Division), consisting of Lord Justice Rose, Judge McKinnon, and Judge Collins.
- In the landmark judgment of *Shankaria v. State of Rajasthan* (1978), it was confirmed that the police can collect fingerprints under Sections 4 and 5 of the Prisoners' Identification Act without needing consent from a magistrate. This ruling reinforced the admissibility of fingerprint evidence, emphasizing that law enforcement agencies should incorporate it into their investigative practices.
- In the case of *State of Uttar Pradesh v. Ram Babu Misra* (1980), the Supreme Court of India declared that fingerprint evidence plays a vital role in criminal cases. The court highlighted that when fingerprints are collected and analysed correctly, they serve as trustworthy evidence linking the accused to the crime scene. The judgment stressed the importance of adhering to proper protocols during the collection and examination of fingerprints to maintain the validity of this evidence in judicial proceedings.
- In the matter of *Mohd. Aman & Anr. v. State of Rajasthan* (1997), the Supreme Court underscored the significance of fingerprint evidence in confirming the identity of the accused. The court decided that fingerprint evidence, when supported by additional corroborating evidence, could result in a conviction. It also pointed out that minor discrepancies in witness testimonies do not diminish the impact of fingerprint evidence, provided that it is collected and analysed accurately.
- In the case of *Hari Om v. State of Uttar Pradesh* (2021), the Supreme Court addressed the convictions of multiple individuals for theft and murder, with fingerprint evidence being a significant factor. Although the Court affirmed the death penalty for Hari Om and a life sentence for two others based on a fingerprint match, it ultimately deemed the fingerprint evidence to be unreliable. The Court highlighted several shortcomings in the methods used to lift latent prints, inadequate documentation, and concerns regarding the qualifications of the officer who collected the prints. Consequently, the Supreme Court acquitted the defendant due to insufficient material evidence connecting them to the crime.
- In the case of *Singh Rajput and others* (1978), the defendants were accused of conspiracy, criminal breach of trust, and embezzlement through forged muster rolls and fraudulent use of fingerprints for fictitious payments. The trial court acquitted them, citing insufficient evidence from the prosecution, particularly regarding the flawed fingerprint analysis provided by the state's expert, who only had enlarged photos of the disputed prints. The Madhya Pradesh High Court upheld the acquittal, highlighting the necessity for detailed examination of enlarged fingerprint images and noting that there is no strict guideline on the required number of similarity points for identification. The court deemed the expert's analysis inadequate, confirming the trial court's decision.

8. Conclusion:

Fingerprint evidence remains an essential tool in forensic investigations, yet its vulnerabilities have been highlighted by instances of wrongful convictions stemming from errors in collection, analysis, and database management, as well as cognitive biases that can distort findings. An increasing awareness of the

limitations within the legal and forensic sectors has sparked demands for enhanced standards and reforms aimed at improving the precision and dependability of fingerprint evidence. To mitigate the risk of mistakes and to ensure that justice is served effectively, the forensic field must improve collection techniques, provide better examiner training, establish reliable databases, ensure presence of independent witnesses during search and seizure, arrange video documentation of the entire process from search to laboratory analysis, and supplement fingerprint evidence with additional corroborative methods. Ultimately, while fingerprint evidence is a valuable asset, it is crucial to acknowledge its potential for error and to implement more rigorous practices in future assessments.

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