

## **THE ROLE AND NATURE OF EVIDENCE: FORENSIC INSIGHT**

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### **Abstrak**

Bukti sebagai unsur dalam bidang hukum, ilmiah, dan akademis, dan berfungsi sebagai kunci dalam membedakan bersalah dan tidak bersalah. Dalam penyidikan tindak pidana bukti memandu penegakan hukum, mengungkap narasi dan meminta pertanggungjawaban pelaku. Namun dengan kompleksitas kejahatan bukti bisa menjadi beragam jenis dan keakuratan yang tidak jelas. Penelitian ini dilakukan secara kualitatif dengan pendekatan literature review dan pendekatan konseptual. Hasil penelitian ini mengungkapkan bahwa bukti memainkan peran penting dalam menentukan bersalah atau tidak seseorang yang melakukan suatu tindak pidana. Berbagai jenis bukti menciptakan dinamika berbeda dalam pembuktian kasus, masing-masing dengan karakteristik berbeda yang mempengaruhi proses pembuktian. Menyortir bukti, baik secara individual atau melalui perbandingan, menjadi sangat penting dalam mengidentifikasi elemen yang paling relevan untuk pengambilan keputusan hukum.

**Kata kunci:** bukti; forensik; tindak pidana.

### **Abstract**

*Evidence plays a pivotal role across legal, scientific, and academic domains, serving as the linchpin in distinguishing guilt from innocence. In criminal investigations, it guides law enforcement, unraveling narratives and holding perpetrators accountable. However, with the complexity of crimes, evidence can take various forms, and the clarity of accuracy may be uncertain. This study aims to investigate the diverse types of evidence and sorting procedures crucial for proving crimes. The results of this study indicate that evidence plays a crucial role in determining guilt or innocence, especially in criminal cases. Various evidence types create a nuanced dynamic in proving cases, each with distinct characteristics influencing the proof process. Sorting evidence, whether individually or through comparison, becomes pivotal in identifying the most relevant elements for legal determinations.*

**Keywords :** Evidence; Forensics; Crime.

## INTRODUCTION

Evidence plays a pivotal role in various domains, serving as the cornerstone of legal proceedings, scientific investigations, academic research, and decision-making processes across diverse fields.<sup>1</sup> The importance of evidence in uncovering a crime cannot be overstated, as it serves as the linchpin in distinguishing guilt from innocence, truth from falsehood, and ensuring the fair and equitable administration of justice.<sup>2</sup> In the labyrinth of criminal investigations, evidence acts as a guiding beacon for law enforcement, prosecutors, and legal professionals.<sup>3</sup> The meticulous collection, preservation, and presentation of evidence are imperative in establishing the facts surrounding a crime, unraveling the narrative, and holding perpetrators accountable for their actions.<sup>4</sup> The stakes are high, as the outcome of a trial often hinges on the quality and admissibility of evidence.

Legal systems worldwide rely on a robust framework for gathering, presenting, and evaluating evidence to ensure the integrity of verdicts and judgments.<sup>5</sup> The diverse forms of evidence, ranging from witness testimonies to physical artifacts, collectively weave the tapestry of truth in the courtroom. Evidence stands as the silent witness, the indisputable storyteller that meticulously chronicles the events leading to an alleged crime.<sup>6</sup> The position of evidence is pivotal, serving as the compass for law enforcement agencies navigating the labyrinth of criminality.<sup>7</sup> In the absence of a clear and convincing evidentiary trail, the pursuit of justice becomes an elusive endeavor, casting shadows of doubt over the integrity of investigations. The significance of evidence is paramount, assuming the role of a silent sentinel that guides law enforcement agencies through the intricate labyrinth of criminal investigations.<sup>8</sup> It serves as an indispensable compass, directing investigators toward clarity amid the complexities of criminality. Without a discernible and compelling evidentiary trail, the quest for justice transforms into an elusive pursuit, casting lingering shadows of doubt over the probity of investigative processes.

The inherent challenge lies in the dynamic nature of criminal activities. As criminal tactics evolve, so must the tools and methodologies employed to uncover them. The position of evidence is thus intricately tied to the ability of investigators and legal

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<sup>1</sup> Garrett, B. L. (2016). Constitutional regulation of forensic evidence. *Wash. & Lee L. Rev.*, 73, 1147.

<sup>2</sup> Denno, D. W. (2015). The myth of the double-edged sword: An empirical study of neuroscience evidence in criminal cases. *BCL Rev.*, 56, 493. See also, Thompson, W. C., & Schumann, E. L. (2017). Interpretation of statistical evidence in criminal trials: The prosecutor's fallacy and the defense attorney's fallacy. In *Expert Evidence and Scientific Proof in Criminal Trials*. Routledge. 371-391

<sup>3</sup> Bakhtiar, H. S. (2022). Utilization of Forensic Evidence in the Criminal Justice System. In *International Conference on Law Studies (INCOLS 2022)* Atlantis Press. 237-245.

<sup>4</sup> Wells, G. L., Kovera, M. B., Douglass, A. B., Brewer, N., Meissner, C. A., & Wixted, J. T. (2020). Policy and procedure recommendations for the collection and preservation of eyewitness identification evidence. *Law and human behavior*, 44(1), 3. See also, Accatino, D., & Collins, C. (2016). Truth, evidence, truth: The deployment of testimony, archives and technical data in domestic human rights trials. *Journal of Human Rights Practice*, 8(1), 81-100.

<sup>5</sup> Martinez i Coma, F., & Van Ham, C. (2015). Can experts judge elections? Testing the validity of expert judgments for measuring election integrity. *European journal of political research*, 54(2), 305-325.

<sup>6</sup> Rock, F. (2020). Witnesses and suspects in interviews: Collecting oral evidence: The police, the public and the written word. In *The Routledge Handbook of Forensic Linguistics* (pp. 112-126). Routledge.

<sup>7</sup> Carter, D. L., & Carter, J. G. (2016). Effective police homicide investigations: Evidence from seven cities with high clearance rates. *Homicide Studies*, 20(2), 150-176.

<sup>8</sup> Bakhtiar, H. S., Sofyan, A. M., Muhadar, M., & Soewondo, S. S. (2019). The essence of autopsy in the criminal investigation process. *International Journal of Scientific & Technology Research*, 8(10), 9-16.

practitioners to adapt to emerging technologies, forensic advancements, and novel investigative approaches.<sup>9</sup> Failure to embrace these shifts in the landscape may result in a widening gap between criminal innovation and the investigative response. Moreover, the importance of evidence is not confined to the courtroom alone; it extends its reach to the broader societal realm.<sup>10</sup> Public confidence in the justice system relies heavily on the perceived fairness and transparency in the handling of evidence.<sup>11</sup> When evidence is mishandled, compromised, or misinterpreted, the repercussions are profound, eroding the public's trust in the effectiveness of the legal apparatus. The problem at hand, therefore, is multifaceted. It involves not only the intricacies of collecting and presenting evidence but also the need for a comprehensive understanding of the evolving nature of crime.<sup>12</sup> The position of evidence in criminal investigations necessitates a nuanced perspective that balances the imperative to uphold justice with the imperative to protect individual rights and liberties.

This study aims to investigate the diverse types of evidence and sorting procedures crucial for proving crimes. The complexities surrounding evidence in legal proceedings necessitate a comprehensive understanding of the various forms it can take and the protocols that govern its collection, preservation, and presentation.

## METHOD

This research is conducted qualitatively using a literature review approach and a conceptual approach. The study commences by gathering scholarly articles, subjecting them to review to extract information regarding the types of evidence in criminal cases. The accumulated data is then subjected to narrative analysis, offering a paradigm and conceptual understanding of the role and nature of evidence in criminal cases.

## DISCUSSION

### 1. Kinds of Evidence

Real evidence, often stemming directly from a crime scene, constitutes a crucial component in legal investigations.<sup>13</sup> Hairs, fingerprints, paint, blood, and shoeprints represent tangible traces that authenticate the occurrence of criminal activities.<sup>14</sup> However, within the realm of forensic analysis, a nuanced perspective emerges as certain evidence may be intentionally fashioned to complement or elucidate real evidence. The majority of evidence is authentic, generated as an inherent part of a crime and recovered

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<sup>9</sup> Arshad, H., Jantan, A. B., & Abiodun, O. I. (2018). Digital Forensics: Review of Issues in Scientific Validation of Digital Evidence. *Journal of Information Processing Systems*, 14(2).

<sup>10</sup> Berlian, B., & Firdaus, A. (2022). Good Governance Melalui Kebijakan Berbasis Bukti Reformulasi Sistem Peradilan Pidana Nasional. *Jurnal Yuridis*, 9(1), 27-36.

<sup>11</sup> Grimmelikhuisen, S., & Klijn, A. (2015). The effects of judicial transparency on public trust: Evidence from a field experiment. *Public Administration*, 93(4), 995-1011. See also, Lee, M. K., Jain, A., Cha, H. J., Ojha, S., & Kusbit, D. (2019). Procedural justice in algorithmic fairness: Leveraging transparency and outcome control for fair algorithmic mediation. *Proceedings of the ACM on Human-Computer Interaction*, 3(CSCW), 1-26.

<sup>12</sup> Bakhtiar, H. S. (2022). Pentingnya Bukti Forensik Pada Pembuktian Tindak Pidana. *Jurnal Hukum Pidana dan Kriminologi*, 3(2), 36-43.

<sup>13</sup> Carter, D. L., & Carter, J. G. (2016). Effective police homicide investigations: Evidence from seven cities with high clearance rates. *Homicide Studies*, 20(2), 150-176.

<sup>14</sup> Geberth, V. J. (2020). *Practical homicide investigation: Tactics, procedures, and forensic techniques*. CRC Press.

at locations linked to the suspect or victim.<sup>15</sup> Yet, there are instances where items are strategically created post-incident to enhance the comprehension of intricate testimony. Diagrams detailing hair characteristics, computer simulations illustrating crime scenes, or demonstrations of bloodstain pattern mechanics fall into the category of demonstrative evidence.

Demonstrative evidence serves as a visual aid, crafted later to facilitate a clearer understanding of technical or intricate aspects for the trier-of-fact.<sup>16</sup> Unlike real evidence directly tied to the incident, demonstrative evidence is a strategic tool designed to enhance the comprehensibility of complex forensic narratives. This interplay between authentic and illustrative evidence underscores the multifaceted nature of forensic analysis, ensuring that the legal system navigates the complexities of evidence presentation and interpretation.

**a. Circumstantial evidence**

Circumstantial evidence, a cornerstone in legal contexts, relies on inference rather than direct personal knowledge or observation.<sup>17</sup> It plays a vital role in situations where direct proof may be absent or insufficient. Unlike direct evidence, which offers explicit confirmation of a fact, circumstantial evidence requires interpretation. In legal proceedings, this form of evidence serves as a crucial tool for constructing a comprehensive understanding of a situation. The strength of circumstantial evidence lies in its ability to imply a set of circumstances, indirectly pointing to the occurrence of a particular event or the involvement of certain individuals. It demands a nuanced evaluation by legal professionals who must interpret the inferred connections between pieces of circumstantial evidence to form a cohesive narrative that supports or challenges a legal claim.

**b. Conclusive evidence**

Conclusive evidence holds an unparalleled strength, surpassing any conflicting evidence in its compelling nature. In the legal arena, it emerges as an irrefutable element that singularly substantiates a claim, leaving minimal space for counterarguments or alternative interpretations. This form of evidence exerts an overwhelming influence, establishing a fact or point with utmost certainty, thereby shaping legal determinations decisively.<sup>18</sup> When presented, conclusive evidence commands attention, as its robustness inherently overpowers and diminishes the probative value of any opposing evidence. Its persuasive force lies in its ability to leave no substantial room for alternative explanations or contradictory viewpoints. In the judicial realm, the presence of conclusive evidence significantly tilts the scales of conviction in favor of the party presenting it, reinforcing the notion that its weight and persuasiveness stand paramount in the hierarchy of evidentiary considerations.

**c. Conflicting evidence**

Conflicting evidence, arising from diverse sources, presents a legal challenge due to its irreconcilable nature. In legal proceedings, this type of evidence introduces complexity as it originates from different outlets, creating a clash that hinders the

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<sup>15</sup> Wiltshire, P. E., Hawksworth, D. L., Webb, J. A., & Edwards, K. J. (2015). Two sources and two kinds of trace evidence: enhancing the links between clothing, footwear and crime scene. *Forensic science international*, 254, 231-242.

<sup>16</sup> Nemeth, C. P. (2023). *Law and Evidence: A Primer for Criminal Justice, Criminology, and Legal Studies*. CRC Press. See also, Emanuel, S. L. (2018). *Emanuel CrunchTime for Evidence*. Aspen Publishing.

<sup>17</sup> Gamm, T. (2018). The Straw That Breaks the Camel's Back: A Final Argument for the Demise of the McDonnell Douglas Framework. *U. Cin. L. Rev.*, 86, 287.

<sup>18</sup> Houck, M. M. (Ed.). (2015). *Professional issues in forensic science*. Academic Press.

establishment of a coherent narrative. The discord among disparate sources renders the evidence inherently challenging to align or reconcile within the context of a case.<sup>19</sup> Legal professionals tasked with deciphering conflicting evidence grapple with the need to discern the most credible and probative elements amidst divergent narratives. Resolving such disparities is crucial for constructing a comprehensive and accurate understanding of the events under scrutiny. This complexity necessitates a meticulous examination of the sources, their reliability, and the potential impact of these contradictions on the overall credibility of the case. In navigating these intricacies, the trier-of-fact must carefully weigh and evaluate conflicting evidence to arrive at sound and just conclusions, acknowledging the challenges posed by irreconcilable contradictions in the pursuit of legal clarity and fairness.

#### **d. Corroborating evidence**

Corroborating evidence, a crucial element in legal proceedings, differs from but enhances or confirms other evidence.<sup>20</sup> In the legal context, this form of evidence plays a pivotal role by providing additional support and validation to the existing evidentiary framework. Unlike identical evidence, corroborating evidence introduces variations while aligning with the overarching narrative, contributing to the robustness and credibility of the case. When presented, it acts as a reinforcing agent, enhancing the overall persuasiveness of the legal argument. Corroborating evidence's strength lies in independently affirming the veracity of a claim, bolstering the probative value of the entire body of evidence. Legal professionals rely on it to establish a comprehensive and reliable understanding of the events under scrutiny. The nuanced interplay between differing yet complementary elements within corroborating evidence exemplifies its significance in building a compelling and well-substantiated legal case.

#### **e. Derivative evidence**

Derivative evidence, arising from the discovery of illegally obtained evidence, faces inadmissibility due to the primary taint associated with its origin.<sup>21</sup> In legal proceedings, this type of evidence is considered legally impermissible as it inherits the flaws and unlawfulness of the initial illegally acquired evidence. The legal system adheres to the principle that evidence tainted by its association with unlawful sources should be excluded to uphold the integrity of legal proceedings. Consequently, derivative evidence is precluded from admission in order to prevent the perpetuation of legal actions based on unlawfully obtained information.

#### **f. Exculpatory evidence**

Exculpatory evidence holds significant legal weight as it tends to establish the innocence of a criminal defendant. In legal proceedings, this type of evidence plays a crucial role by favoring the accused, offering support that contradicts or challenges the prosecution's case. Its inclusion is imperative for a fair trial, as it contributes to a balanced presentation of evidence. The legal system recognizes the importance of exculpatory evidence in ensuring that individuals are not wrongfully convicted. Its relevance lies in its potential to sway legal determinations in favor of the defendant,

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<sup>19</sup> McKillop, B. (2017). Forensic science in inquisitorial systems of criminal justice. In *Expert Evidence and Scientific Proof in Criminal Trials*. Routledge. 593-600.

<sup>20</sup> Gehl, R., & Plecas, D. (2017). What You Need To Know About Evidence. *Introduction to criminal investigation: Processes, practices and thinking*.

<sup>21</sup> Merin, Y. (2015). Lost between the fruits and the tree: In search of a coherent theoretical model for the exclusion of derivative evidence. *New Criminal Law Review*, 18(2), 273-329.

emphasizing the critical role of a comprehensive evidentiary framework in the pursuit of justice.<sup>22</sup>

**g. Foundational evidence**

Foundational evidence serves as the linchpin in legal proceedings, exerting paramount influence over the admissibility of subsequent evidentiary submissions. It operates as the cornerstone, establishing the framework upon which the edifice of legal arguments is constructed. Its significance lies in its capacity to authenticate and validate other pieces of evidence, thereby shaping the trajectory of legal deliberations. Courts accord foundational evidence special consideration due to its pivotal role in ensuring the reliability and integrity of the broader evidential landscape. This foundational scaffold not only substantiates the credibility of subsequent proofs but also delineates the boundaries within which legal arguments unfold.<sup>23</sup>

**h. Hearsay**

Hearsay, within the legal context, embodies testimony wherein a witness imparts not their firsthand knowledge but instead recounts information gleaned from others. The veracity of hearsay hinges on the credibility of individuals beyond the testifying witness. This form of evidence raises concerns about reliability and authenticity, as it introduces an additional layer of potential error or misinformation. Courts scrutinize hearsay with a discerning eye, acknowledging its inherent limitations in providing direct insight into events. Assessing the credibility of the original declarant becomes crucial, as the admissibility and weight of hearsay evidence pivot upon the trustworthiness of those who initially conveyed the information.

**i. Incriminating evidence**

Incriminating evidence refers to proof that supports the assertion of guilt or provides a basis from which a fact-trier, such as a judge or jury, can reasonably infer culpability. This type of evidence is crucial in legal contexts, as it directly contributes to establishing the guilt of an individual accused of a crime. Its significance lies in its ability to substantiate allegations and sway the decision-making process during legal proceedings. The weight of incriminating evidence hinges on its relevance and reliability, shaping the narrative presented in court and influencing the ultimate determination of a defendant's culpability or innocence.<sup>24</sup>

**j. Presumptive evidence**

Presumptive evidence is inherently considered true and adequate unless contradicted or discredited by opposing evidence.<sup>25</sup> This category of proof holds a unique standing in legal contexts, wherein its initial acceptance relies on the assumption of reliability and truthfulness. Courts and fact-finders generally regard presumptive evidence as sufficient to establish a fact or support a claim unless a compelling challenge or contrary evidence is presented. This legal principle underscores the weight accorded to the initial presumption of truth, emphasizing the need for substantial countervailing evidence to overcome the presumption. The

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<sup>22</sup> Smith, A. M., & Wells, G. L. (2023). Telling us less than what they know: Expert inconclusive reports conceal exculpatory evidence in forensic cartridge-case comparisons. *Journal of Applied Research in Memory and Cognition*.

<sup>23</sup> Meester, R., & Slooten, K. (2021). *Probability and forensic evidence: Theory, philosophy, and applications*. Cambridge University Press.

<sup>24</sup> Thompson, W. C., & Newman, E. J. (2015). Lay understanding of forensic statistics: Evaluation of random match probabilities, likelihood ratios, and verbal equivalents. *Law and human behavior*, 39(4), 332.

<sup>25</sup> Usman, M., & Ahmad, M. M. (2021). Admissibility of Circumstantial Evidence in Shariah and Pakistani Legal System. *Zia E Tahqeeq*, 11(22), 13-23.

effectiveness of presumptive evidence lies in its capacity to shape legal outcomes absent compelling refutation.

**k. Prima facie evidence**

Prima facie evidence, articulated as *pri-mə fay-shə*, holds the intrinsic power to establish a fact or uphold a judgment in the absence of contradictory evidence.<sup>26</sup> This legal concept implies that the presented evidence, on its face, is sufficient to warrant acceptance as true or valid until proven otherwise. In legal proceedings, it serves as a foundational basis for initial rulings or decisions, requiring opponents to provide substantial contrary evidence to challenge its presumptive validity. Prima facie evidence streamlines legal processes by offering a straightforward means to establish certain facts, placing the onus on opposing parties to dismantle its credibility through compelling counterarguments and evidence.<sup>27</sup>

**l. Probative evidence**

Probative evidence constitutes information that leans towards proving or disproving a point in contention. In legal proceedings, this type of evidence serves the crucial purpose of shedding light on the key issues at hand, influencing the decision-making process. Whether supporting or challenging a claim, probative evidence is presented to establish the validity or invalidity of a particular point. Its significance lies in its ability to contribute substantively to the overall narrative, assisting fact-finders, such as judges or juries, in reaching well-informed conclusions. Legal arguments hinge on the persuasive impact of probative evidence, as it actively shapes the resolution of disputes and the determination of factual truths.<sup>28</sup>

**m. Rebuttal evidence**

Rebuttal evidence plays a pivotal role in legal proceedings, as it is presented to contradict or disprove the evidence put forth by an opposing party. This critical component of the adversarial system allows parties to challenge the veracity or significance of the presented facts. By introducing rebuttal evidence, litigants aim to undermine the strength of their adversary's case, casting doubt on the credibility or persuasiveness of the initial evidence.<sup>29</sup> The strategic deployment of rebuttal evidence is essential for reshaping the narrative in favor of the presenting party, providing a means to counterbalance and potentially refute the arguments and assertions advanced by the opposing side.

**n. Tainted evidence**

Tainted evidence is rendered inadmissible due to its acquisition through direct or indirect illegal means. This type of evidence, marred by its unlawful origins, cannot be considered valid or permissible in legal proceedings. The exclusionary rule, a fundamental principle in many legal systems, precludes the use of tainted evidence to

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<sup>26</sup> Ahmad, M. H., Baharuddin, A. S., Hashim, H., Razak, R., Saharudin, N. S., & Omar, S. N. (2022). Forensic Evidence As A Mean Of Proof In Developing Prima Facie Case In Takhbib Criminal Offence. *Uum Journal Of Legal Studies*.

<sup>27</sup> Shikha, S. (2021). Admissibility of DNA and Forensic Evidence in Criminal Cases. *Issue 4 Int'l JL Mgmt. & Human.*, 4, 1682.

<sup>28</sup> Thompson, W. C. (2023). Shifting decision thresholds can undermine the probative value and legal utility of forensic pattern-matching evidence. *Proceedings of the National Academy of Sciences*, 120(41), e2301844120. See also, McEwen, T., & Regoezci, W. (2015). Forensic evidence in homicide investigations and prosecutions. *Journal of forensic sciences*, 60(5), 1188-1198.

<sup>29</sup> Imwinkelried, E. J. (2020). Defense Attacks on Prosecution Scientific Evidence: The Standard for Defense Rebuttal Evidence is Already Lower than the Standard for Prosecution Evidence. *Temp. L. Rev.*, 93, 55.

safeguard the integrity of the justice system. Whether obtained through unauthorized searches, coercion, or other illicit methods, tainted evidence is systematically disregarded. Its inadmissibility underscores the commitment to upholding legal standards, ensuring that only lawfully obtained and ethically sourced evidence contributes to the establishment of facts and the pursuit of justice within the legal framework.<sup>30</sup>

In the realm of criminal investigations, the adage "not all evidence is created equal" holds profound significance.<sup>31</sup> The weight and significance of evidence are contingent upon various factors, primarily influenced by the context of the crime and the characteristics of the evidence itself, such as type, amount, and quality. Understanding the nuanced nature of evidence is crucial for investigators, legal professionals, and forensic experts tasked with unraveling the complexities of criminal cases. The context of a crime serves as a critical backdrop for interpreting and evaluating evidence.<sup>32</sup> Different crimes unfold in diverse settings, each presenting unique challenges and opportunities for investigators. Whether a crime occurs in a bustling urban environment, a remote rural area, or within the confines of a private residence, the contextual factors shape the available evidence and the investigative strategies employed. For instance, a crime scene in a public space may yield numerous potential witnesses, surveillance footage, and a variety of forensic traces, while a crime committed in a secluded location might offer fewer external clues. Moreover, the nature of evidence varies widely, and its significance is contingent upon the specific details of a case. Biological materials, such as hair, are ubiquitous in our daily lives, often produced or manufactured en masse by the human body. However, the sheer abundance of these materials introduces challenges in terms of their forensic relevance. Thousands of hairs on an individual's body, for example, may not always provide distinctive or conclusive information unless subjected to advanced forensic analysis.

The type of evidence also plays a pivotal role in determining its probative value.<sup>33</sup> While some forms of evidence, such as eyewitness accounts or surveillance footage, may offer direct insights into the events surrounding a crime, others, like circumstantial evidence or trace materials, require careful interpretation and correlation. The diversity of evidence types demands a multidisciplinary approach, combining the expertise of forensic specialists, investigators, and legal professionals to construct a comprehensive and coherent narrative.<sup>34</sup> Quantity, too, is a critical factor in assessing the significance of evidence. The sheer volume of evidence collected at a crime scene can be overwhelming, ranging from physical items to digital data. Sorting through this abundance requires meticulous attention to detail and the application of forensic techniques tailored to the specific characteristics of each piece of evidence. While a single piece of evidence may

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<sup>30</sup> Turvey, B. E., & Crowder, S. (2017). *Forensic investigations: An introduction*. Academic Press.

<sup>31</sup> Ariel, B. (2018). Not all evidence is created equal": on the importance of matching research questions with research methods in evidence based policing. *Evidence based policing: An introduction*, 63.

<sup>32</sup> Zapf, P. A., & Dror, I. E. (2017). Understanding and mitigating bias in forensic evaluation: Lessons from forensic science. *International Journal of Forensic Mental Health*, 16(3), 227-238.

<sup>33</sup> Pardo, M. S. (2018). Safety vs. sensitivity: Possible worlds and the law of evidence. *Legal Theory*, 24(1), 50-75. See also, Pardo, M. S. (2019). The paradoxes of legal proof: A critical guide. *BUL Rev.*, 99, 233.

<sup>34</sup> Roux, C., Bucht, R., Crispino, F., De Forest, P., Lennard, C., Margot, P., ... & Willis, S. (2022). The Sydney declaration—Revisiting the essence of forensic science through its fundamental principles. *Forensic Science International*, 332, 111182. See also, Dirkmaat, D. C., & Cabo, L. L. (2016). Forensic archaeology and forensic taphonomy: Basic considerations on how to properly process and interpret the outdoor forensic scene. *Academic forensic pathology*, 6(3), 439-454.



not be determinative, the cumulative effect of a well-curated collection can provide a compelling case for the prosecution or defense. Quality, in terms of both the integrity of the evidence and the methodologies employed in its analysis, is paramount. Ensuring the chain of custody for physical evidence and maintaining the authenticity of digital evidence are essential prerequisites for establishing the credibility of the investigative process. Additionally, the application of scientifically sound forensic techniques, such as DNA analysis or fingerprint comparison, enhances the reliability and admissibility of evidence in a court of law.<sup>35</sup> The nuanced interplay between the context of a crime, the type, quantity, and quality of evidence shapes the landscape of criminal investigations. Recognizing the inherent differences in evidentiary value is fundamental to constructing a compelling case or mounting a robust defense. As technology advances and forensic methodologies evolve, the pursuit of justice demands a holistic and adaptive approach to deciphering the intricate web of relationships between people, places, and things in the aftermath of a crime.

## 2. Individualization and Comparison of Evidence

### a. Individualization of Evidence

The concept of individualization is based on two assumptions:

- 1) All things are unique in space and time; and
- 2) The properties by which a thing is classified are constant over time.

However, these assumptions come with their own challenges. Firstly, the assumption of the uniqueness of space is inherently unprovable. The population size of "all things that might be evidence" is simply too large to account for; think of all the fingerprints on all the surfaces throughout the world.<sup>36</sup> A contributing factor to this is that, throughout its history, forensic science has been casework-driven, not research-driven. Thus, many principles and concepts are derived from years of work-related experience, which is, regrettably, inconclusive from a research standpoint. A jury may reach a decision, a person may confess, and an accomplice may inform, but from a purely scientific perspective, we do not know what really happened. In a laboratory experiment, the scientist has control of all the variables of interest except one; any change in that variable leads to a stronger cause-and-effect statement. In forensic science, the scientist has absolutely no control over the circumstances during the crime.<sup>37</sup> Put a bit more simply, casework is not research.

Forensic science relies on employing statistical methods to formulate interpretive statements due to the multitude of uncertainties it confronts. As Schum aptly articulates, "Such evidence, if it existed, would make necessary a particular hypothesis or possible conclusion being entertained. In lieu of such perfection we often make use of masses of inconclusive evidence having additional properties: The evidence is incomplete on matters relevant to our conclusions, and it comes to us from sources that are, for various reasons, not completely credible. Thus, inferences from

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<sup>35</sup> Villavicencio-Queijeiro, A., Loyzance, C., García-Castillo, Z., Suzuri-Hernández, J., Castillo-Alanís, A., López-Olvera, P., & López-Escobedo, F. (2022). Development of an instrument for assessing the quality of forensic evidence and expert testimony from three feature-comparison methods: DNA, voice, and fingerprint analysis. *Journal of Forensic Sciences*, 67(1), 217-228.

<sup>36</sup> Houck, M. M. (Ed.). (2018). *Forensic toxicology*. Academic Press.

<sup>37</sup> Robertson, B., Vignaux, G. A., & Berger, C. E. (2016). *Interpreting evidence: evaluating forensic science in the courtroom*. John Wiley & Sons. See also, Edmond, G., Found, B., Martire, K., Ballantyne, K., Hamer, D., Searston, R., ... & Roberts, A. (2016). Model forensic science. *Australian Journal of Forensic Sciences*, 48(5), 496-537.

such evidence can only be probabilistic in nature". Schum's point is that if scientists were absolutely certain of their samples or the accuracy of their methods, statistics would not be needed.<sup>38</sup> Forensic science grapples with the ultimate uncertainties in the real world of criminal activities involving varying physical objects. The gap between the controlled laboratory and the real world is central to forensic science's fundamentals: Uncertainty is everywhere. Even in DNA analysis, where each person's genetic material except for identical twins is known to be unique, statistics are used. Statistics are, in fact, what give forensic DNA analysis its power. Forensic scientists are now acknowledging the intricacy of their evidence and are adapting their methods accordingly. Recent efforts in the realm of fracture matches, where an item undergoes physical breakage into two or more pieces that are positively associated, offer optimism for a statistical approach to forensic interpretations.

#### **b. Comparison of Evidence**

The process of comparison plays a crucial role in identifying the source of evidence. In this method, questioned evidence is systematically juxtaposed with items of known origin. The objective is to assess the presence of shared physical and/or chemical characteristics between the samples. A positive determination of such similarities leads to the conclusion that an association exists between the questioned and known evidence. The strength of this association depends on a number of factors, including:<sup>39</sup>

- 1) Kind of evidence;
- 2) Intra- and inter-sample variation;
- 3) Amount of evidence;
- 4) Location of evidence;
- 5) Transfer and cross-transfer;
- 6) Number of different kinds of evidence associated to one or more sources.

The process of comparison stands as a cornerstone in forensic science, serving as a methodical and systematic means to identify the source of evidence.<sup>40</sup> Through the careful juxtaposition of questioned evidence with items of known origin, forensic experts unravel the complexities of various materials, discerning shared characteristics that underpin the establishment of a credible association. The importance of this process lies not only in identification but also in the nuanced determination of an evidentiary link that contributes to the robustness of forensic conclusions.

## **CONCLUSION**

Evidence is the basis for determining someone's guilt or innocence in legal proceedings, especially criminal cases. The array of evidence types introduces a nuanced interplay of strengths and weaknesses in the process of proving a case. Each type carries distinct characteristics that contribute to the intricacies of the proof process. The significance of evidence is paramount, shaping the determination of a crime's occurrence

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<sup>38</sup> Schum, D. A. (2001). *The evidential foundations of probabilistic reasoning*. Northwestern University Press.

<sup>39</sup> Houck, M. M. (2010). *Fundamentals of Forensic Science*. Academic Press.

<sup>40</sup> Redmayne, M., Roberts, P., Aitken, C., & Jackson, G. (2017). Forensic science evidence in question. In *Expert Evidence and Scientific Proof in Criminal Trials*. Routledge. 325-334. See also, Giovanelli, A. (2023). The forensic's scientist craft: toward an integrative theory. Part 2: meso-and macroapproach. *Australian Journal of Forensic Sciences*, 1-16.

or disclosure. The process of sorting evidence, whether individually or through comparison, becomes pivotal in discerning the most suitable and informative elements. This meticulous examination aims to identify the evidence with the highest relevance, capable of providing substantive information crucial for legal determinations. Ultimately, the effectiveness of evidence in legal cases hinges on its ability to withstand scrutiny, contribute to a comprehensive understanding, and influence the ultimate verdict in the pursuit of justice.

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