



Rethinking scientific communication in courts: A question of credibility

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ARTICLE INFO

Keywords:

Forensic science
Communication
Policing
Credibility
Quality
Justice

ABSTRACT

The high value placed on forensic information in the criminal justice process is demonstrated by the fallout resulting when questions are raised as to the validity of methods used, deficiencies in the understanding of the limitations of results, or uncertainties around the professional expertise or ethical practices of the provider of the information. To effectively act as the “speaker” for the scientific evidence in court, forensic science needs to have credibility. The workshop “Rethinking scientific communication in courts” held at the Australian National University College of Law in November 2023 explored the subject of science communication in the legal context through the lens of philosophy, law, forensic service provision and meta-science, demonstrating the unique challenges placed on the field of forensic science as a scientific profession confined and defined within a non-scientific system. Stemming from the discussions at the workshop, this paper examines the notion of credibility in science, how forensic science aligns with the hallmarks of a credible scientific community and the influence this has on our understandings of scientific communication in courts.

1. Introduction

Forensic science, since its origins as a scientific approach to address the public need to solve crime, has become an ever-present feature of the criminal justice process. As the field of forensic science and the disciplines that comprise it have grown dramatically over the past century, so has the demand for forensic evidence within court proceedings. However, this very public rise has not come without significant questioning, particularly in recent decades. Questions have been raised as to the validity and scientific basis of entire forensic fields [1]. High profile media attention and inquiries have been paid to practices displaying dubious ethics by individual practitioners impacting hundreds, if not thousands, of past criminal investigations [2]. Similarly, the constant increase in the application of more sensitive, more advanced technology and techniques has raised the level of complexity associated with forensic evidence in courts [3]. All of this emphasizes the need to ensure that the evidence is communicated and understood in a way that the court can make objective and measured sense of its relevance and weight to the matter at hand. Where this communication fails, or is later found lacking, it is often the credibility of the forensic science (and its communicator) that comes under scrutiny. This paper examines the notion of credibility in forensic science and how, through understanding

the hallmarks of credibility demonstrated throughout other sciences, trust in forensic science may be enhanced through credible communication in the courts.

2. Was it always this way?

Forensic science, distinct from other scientific disciplines which evolved from human curiosity and were cultivated through systematic experimentation, has an existential link with and subservience to criminal justice systems in general, and policing in particular. In the context of this discussion, the term “forensic science” refers to the application of scientific techniques and methods to the examination of physical evidence to provide information to the criminal justice system to better meet the objectives of protecting the rights and safety of the public it serves. The genesis of forensic science is marked by its burden to legal applications rather than an open pursuit of scientific inquiry. In contrast to the scientific disciplines whose principles and techniques make up the applied methodologies known as “forensic science” (for example, serology, DNA, and chemistry), its validation derives not from empirical testing alone but more from legal acceptance, such as case precedent. Although the branches of forensic science may have grown from the roots of modern sciences, its confinement within the legal

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domain impedes forensic science from attaining the scientific legitimacy enjoyed by its parent disciplines, legitimacy that is gained through experimentation, data transparency, replicability of findings, and the reproducibility of the analytical method [4]. Forensic science operates within its role as a captive profession, only existing within the confines of the criminal justice system, a non-scientific entity. Consequently, it may be that its deficiency in scientific credibility is not a consequence of a fall from grace but rather a result of its historical confinement, depriving it of the opportunity to establish such credibility in the first place [5], and the political asymmetry of its place in the criminal justice infrastructure [6].

3. Erosion of trust in (forensic) science

It should be qualified here that this paper does not advocate for the broad view that trust in forensic science is depleted, or misplaced. Rather, perhaps the trust placed in forensic science has, in recent decades, come more into question through a growing awareness of unvalidated methodologies, issues in the communication of findings, translation of forensic science into a legal environment and a lack of acceptance for self-correction.

Sentinel events for the field, such as the National Academies of Science hearings and the UK House of Lords Science and Technology Select Committee, signalled a change in general perceptions: trust in forensic information or evidence cannot be assumed, just because it is nominated as “science” [7,8]. Further inquiries and hearings have followed since those mentioned above, including the current Westminster Commission on Forensic Science, which is specifically examining the role of forensic science in the miscarriage of justice. The Commission’s co-chair, Professor Angela Gallop, is quoted:

“Forensic science has now become so powerful that you don’t need to be able to see a trace of potentially relevant material to get a result from it. This means that it is increasingly important to ensure that the right tests are applied by properly trained scientists to the right items, and the results are carefully interpreted in the context of the specific case at hand. If any of this doesn’t happen, then forensic science will not only fail to prevent miscarriages of justice but is likely actively to contribute to them.” [9].

Research has identified a significant subset of cases where unvalidated methodologies have been associated with cases of wrongful conviction [10] and there is acknowledgement that methodologies lacking the underpinnings of analytical validity have led to the discrediting of methods used in evidence under the banner of forensic science (e.g. bite marks) [11,12]. Although in recent decades the substantiation of forensic science practices through improved validation has increased, the legacy effects of these historical failures are still being felt. For example, a 2021 study of international hair examiners noted that the impacts of reviews of hair analysis testimony and reports from more than 20 years’ prior, which found a significant proportion containing erroneous and misleading statements, is still impacting the confidence of experts in the field, to the point where some forensic laboratories had discontinued provision of hair analysis [13].

Miscommunication and/or misunderstandings between forensic laboratories and end users of forensic information can be attributed as the cause of substantial concerns with regard to the weight of evidence and its impact on investigations or court proceedings [14]. For example, in the 2022 Commission of Inquiry into DNA testing in Queensland, Australia, the distinction between “DNA not detected” and “Not suitable for DNA testing”, and the potential for different meanings to be attributed to each statement by the reporting laboratory versus the reader of the report, was highlighted as a critical issue affecting the reliability of the laboratory’s findings in an investigative and judicial context [15].

Further, there are challenges faced when the forensic analyst’s understanding of the rule of law and their role in the justice system may be, sometimes inadvertently, in disagreement with legal expectations of evidence. For example, as noted by Edmond et al. [16], it is the role of

the expert witness, and their institution, to be abreast of relevant authoritative literature and research pertinent to their field of expertise or techniques for which they are providing evidence in. Unawareness of these may lead an expert witness to unknowingly omit disclosures of information to the court that are required of an expert. Whilst there is benefit in legal practitioners themselves having training to understand scientific evidence and engage with the forensic science community, it is ultimately the responsibility of the expert witness to meet their role in assisting the court [10]. Material omissions in reports or testimony have the potential to open judgements to appeal and leave the expert, and their agency, open to questions as to the strength of their expertise, quality of work and the validity of the forensic information [16].

When these shortcomings are identified, for the most part, forensic science service providers can move to correct the deficiency through renewed rigour in validation and research, engagement with end users and academia, and strengthening of expert training and competency evaluation. Implementing these corrections may bring change to the previously accepted “truths” of the science. “Certainties” may become uncertain, “matches” become qualified, and even “experts” may become relegated to the status of novices. Although efforts by forensic science to self-correct demonstrate a commitment to change and improvement, when viewed through the lens of the law and the public, it may be that these efforts are not seen as a positive move, rather, as evidence of flaws, and thus, signs of diminishing credibility [17].

Self-correction in other fields of science is a known and fundamental part of the scientific process [18,19]. What is known or demonstrated today by science could easily be disproved or amended tomorrow by further investigation. However, while self-correction is an expected norm for science, the correction of *forensic* science is less tolerable; the outcomes of a correction echo far past the laboratory doors, into the criminal justice system and the public. It may be that the erosion of trust in the credibility of forensic science is a matter of “quality uncertainty” [20].

Ultimately, the common thread between the examples listed above (unvalidated methodologies; poorly or miscommunicated findings and results; omission of relevant contextual material by expert witnesses, and the nature of self-correction in fields of science, including forensic science) is that they all convey a perceived lack of transparency: Transparency in methodologies, transparency in communication and transparency of expertise and qualification. This builds a culture of distrust and questioning as to the quality of forensic science services and delivery and, inevitably, the credibility of forensic science evidence in courts.

4. Rethinking scientific communication in courts

Contemporary issues in the communication of forensic science in courts formed a strong theme across the speakers at the recent seminar hosted by the Australian National University (ANU) College of Law [21], beginning with the notion of scientific values and trust within a legal system. Accepting the values of what makes good scientific practice, forensic or not, forms a foundation for building transparency and credibility. So, in rethinking scientific communication in courts, how can forensic science bring credibility to its claims?

5. Credibility in forensic science

Vazire notes that for the claims of a field of science to have credibility, the scientific community making the claims must demonstrate hallmarks of credibility, for example, transparency in research and peer review, investment in error detection and quality control and an emphasis on calibration, rather than popularisation [22], and at the ANU workshop, presentations from the wider forensic community, practitioners, academics and legal experts, made it evident that these concerns are at the forefront of the forensic community’s attention.

5.1. Transparency in research and peer review

A Scopus bibliometric search¹ shows the number of articles published using “forensic science” in the keywords increasing consistently over the past 20 years, and although the rate has slowed in recent years, 2023 still saw over 4000 articles published in this category. Peer reviewed research remains a critical reference for not only practitioners in the field, but to the legal system in being able to discern valid evidence from unsubstantiated claims. Within the framework of forensic science, systematic reviews represent the means to reduce the gap between legal evidence and scientific practice by synthesizing a critical appraisal of the available research on a specific topic. Recent research, however, indicates that the practice of systematic reviews in forensic science may not yet demonstrate the level of consistency required to provide this assurance to the courts [23]. Further examination of standardizing practice for systematic review and meta-analyses of forensic science literature will continue to build robust frameworks to support transparency in forensic science research and the peer review process.

The registered report format is also gaining popularity in journal publications, providing a mechanism for peer review of research preceding the data collection phase. The value of this format is that the research study being proposed for publication is essentially “quality controlled” prior to it being conducted, enabling the research team to refine methodology and research scope and providing greater transparency over research practices and future findings [24]. This format, although well recognised in clinical medicine, has yet to gain traction in forensic science publications. Registered reports could offer a valuable tool to forensic science in assuring high quality, peer reviewed validation study design and methods to facilitate well supported scientific findings to be used in practice [25]. Forensic journals offering a registered report format for submission are limited, therefore adoption of this strategy will be contingent on the support of the forensic community and its publications.

5.2. Investment in error detection and quality control

Forensic science is a high-risk, high-consequence field which brings with it an extremely low tolerance for error or learning by experimentation. Evidence can be collected from crime scenes only once, so errors resulting in evidence being undetected, untested, lost, contaminated, their results invalidated, or improperly reported or communicated can have catastrophic outcomes for justice and the individuals or agencies involved. Parallels can be drawn between forensic science and other “high reliability” fields that have been characterised by their complexity and risk of catastrophic outcomes as a result of system errors, such as aviation and nuclear power [26]. The traits of high reliability include a preoccupation with error, and a reluctance to simplify in the case of identifying the root cause(s) of potential or actual risks of failure [27]. These strategies can be used to inform enhanced practice in forensic science service provider systems, particularly with regards to strengthening quality management systems. Investment in building robust and transparent systems to support the proactive identification of risks to forensic science services is the key to mitigating these errors. Frameworks of good practice, such as international standards and expert guidance documents, can guide the process for forensic science service providers in identifying sources of risk and designing systems capable of preventing or minimizing the impact of such risk, with several being developed through collaboration and expertise from within the forensic community itself, for example: [28,29]. However, to enhance the prevention, detection and control of errors in forensic science, there needs to be a better understanding of those errors. The lack of standardized language or categorization systems for issues detected within forensic science quality management systems makes comparison and analysis of

this data enormously challenging. New research from within the field is investigating an evidence-based approach to addressing this task with the aim of developing a standardized system for categorization to facilitate data sharing and analysis [30]. A standardized approach can support the development of an enhanced, transparent reporting culture for issues detected within and across forensic science service providers to improve understandings of error, and transparency in error detection and quality control.

5.3. Emphasis on calibration

Central to many criticisms of the forensic sciences is the lack of clear communication of limitations within disciplines or sub-disciplines along with the perceived reluctance of certain areas within the field to calibrate their findings appropriately when faced with evidence in support of those limitations [8,10,15]. This stems, in part, from forensic science operating within the criminal justice system and, thus, any science it produces being mediated through that lens. Approaches to addressing this vary widely between forensic science service provider agencies, often influenced by the jurisdictional environment they are operating in, or applicable legislative requirements. One example comes from the Victorian Police Forensic Services Department, Australia, which utilizes bespoke annexures to forensic reports to provide extensive reference material and background context on the results, framing and “calibrating” them within the current environment of available research [31]. However, for this calibration to work the information must be received and understood by the recipient, often a non-scientist. Bridging the gap between accurate scientific calibration of the information and ensuring the message is understood by a receiver highlights an inherent contradiction faced by forensic science; the expectation to behave as a science with complex technical expertise, closely calibrated to ensure reliability of results, but also the responsibility to impart understanding of those results to a non-scientific entity, the law, without diminishing or failing to pass on relevant nuances to enable the court to calibrate their weighting accurately.

6. Credible communication

Those traits mentioned above demonstrate a commitment to good science, however as already discussed, credible forensic science is only part of the puzzle. To meet the needs of justice and the courts, credible communication of forensic information is key to assuring trust and mitigating risks to quality uncertainty. It is through collaborative engagement with the law that science may build the necessary structures to support meaningful and credible communication of evidence to the justice system, whether for investigators, the courts or, as in the matter of Kathleen Folbigg, as independent advisors on the evaluation of evidence under judicial inquiry [32].

7. Conclusion

Aristotle’s theory of rhetoric draws that credibility of the speaker is fundamental to persuasion [33]. Within the scope of court proceedings, forensic science is the “speaker” for the evidence, and it is clear that the credibility of this speaker may have a significant effect on the persuasion of a decision maker. Credibility in forensic “science” may not be attainable in the same sense as for other sciences unconstrained by the confines of its place within a non-scientific system, however this does not prohibit its ability to identify, address and demonstrate the characteristics of a credible scientific community to meet this standard. Adopting a philosophical approach to understanding the positioning of forensic science, its role, and the communities it services can encourage rethinking of scientific communication in courts [34]. By stepping outside the “science” of forensic science, strategies to address empirical, scientific concerns may be reframed in the context of the wider justice organism to benefit and support the forensic science community as it

¹ Search date: 24/04/2024.

continues to work toward a culture of enhanced and sustainable credibility.

CRediT authorship contribution statement

Anna L. Heavey: Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Max M. Houck:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Anna Heavey and Max Houck report that financial support was provided by Australian National University to attend the workshop. One of the authors of this paper, Max Houck, serve(s) as the Editor-in-Chief of this journal. The standard peer review process was followed and an editor who is not on the author panel handled the review process for this paper. The authors had no influence over the peer review process. The final decision was made by an editor who is not on the author panel.

Acknowledgements

The authors wish to acknowledge Dr Jason Chin of the Australian National University College of Law for his curation of the workshop “Rethinking scientific communication in courts”, held at the Australian National University in 2023.

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