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Abstract
In 2009, the National Academy of Sciences produced a lengthy report illuminating significant weaknesses present within the forensic community. One complex fault found in forensics was conformation bias. Since it is within human nature to make decisions based on contextual information, assumptions, and pre-held opinions, confirmation bias is an issue that will continue to persist. Therefore, stronger efforts must be made to recognize and abate the problem of bias within the field of forensics in order to preserve the notion that forensic science exists to serve principles of both truth and justice. Accordingly, this paper argues for the fight against bias to return to the forefront of forensic concern while providing a list of viable suggestions to help battle these unwarranted biases.

Keywords
forensic science, confirmation bias, NAS Report, sequential unmasking

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In 2009, the National Academy of Sciences produced a lengthy report illuminating significant weaknesses present within the forensic community. One complex fault found in forensics was conformation bias. Since it is within human nature to make decisions based on contextual information, assumptions, and pre-held opinions, confirmation bias is an issue that will continue to persist. Therefore, stronger efforts must be made to recognize and abate the problem of bias within the field of forensics in order to preserve the notion that forensic science exists to serve principles of both truth and justice. Accordingly, this paper argues for the fight against bias to return to the forefront of forensic concern while providing a list of viable suggestions to help battle these unwarranted biases.

Introduction

> *"Forensic scientists are not policeman. We are scientists. We deal with these matters objectively. We do not [act] on our suspicion."*
> – Dr. Cyril Wecht

The above quotation is from an American forensic pathologist who has been involved in numerous high-profile death examinations. Notably, he has also served as the president for the American Academy of Forensic Sciences—a well-known and prestigious group of forensic professionals. However, while Wecht makes a reasonable and professional statement in which he clarifies the role of a forensic scientist, his proclamation is more idealistic than rooted in truth and reality. In fact, recent years have produced more evidence of forensic science mishaps and have called into question the integrity of the work that forensic scientists output. While few forensic technicians have purposely crossed ethical lines, many have still made honest mistakes without consciously doing so. These unconscious derailments from true, objective evaluations stem from the ever-present problem of bias within the field of forensics.

This paper argues the need for immediate, aggressive actions to be taken against the constant threat of bias entering forensic evaluations. Sources of bias can be subsided by mandating that all forensic laboratories be accredited and independent from law officials, implementing a new method of analysis called sequential unmasking, and lastly, regaining a focus on forensic research to cultivate a better understanding of how bias affects forensic studies and more importantly, how pertinent improvements can be made.

Literature Review

Historically, forensics did not arise from scientific discovery, but instead from a need to aid law officials in criminal investigations. The application of science to help solve crime dates back to 1247 when the Chinese first recorded the function of medical knowledge to help distinguish between drowning and strangulation as a cause of death. However, rapid advancement and integration of the field only began to occur between the 1800s and 1900s; but even at that, most forensic procedures came about from personal experimentation, as opposed to studied, accredited procedures (New York State Police, 2016). For example, in 1910 the first forensic laboratory was created and established in the mere attic space above the police department of Lyon, France by Dr. Edmond Locard, who was a student of both medicine and law.

Forensic Science: An Introduction to Scientific Techniques is an introductory text on the field of forensic science and its various components. Ironically, the opening page of this large, comprehensive text refutes Wecht's earlier statement, redefining the job of a forensic scientist. Contrary to Wecht's sentiments, this book instead addresses the complex nature of forensics and states that "the forensic scientist serves two masters—science and the legal system" (2014, p.1). This assertion is more accurate to the reality of forensic workings. While forensic science incorporates facets of biology, medicine, physics, and chemistry into the crime-solving world, it is not a traditional science as it encompasses an overarching aim and goal of solving crime, rather than simply answering questions about the workings of the world.

A report produced in 2009 by the National Academy of Science (NAS), titled *Strengthening Forensic Science in the*

United States: A Path Forward, highlighted all the ways in which forensic science is lacking a scientific foundation of being reliable, repeatable, empirical, and objective (National Research Council, 2009). One of the many issues the NAS report addresses is the presence of bias in forensic evaluations. For instance, many evaluations of forensic evidence require comparisons between crime scene samples and known reference samples. This comparative science was specifically formed to meet the demands of crime-scene investigations, but has been criticized for the intrinsically subjective nature of its forensic comparison evaluations.

Many articles further address the very existence of contextual and confirmation bias within the forensics world and some even propose how to work against said bias. In *Minimizing Contextual Bias in Forensic Casework*, Stoel, Berger, Kerkhoff, Mattijssen, and Dror define the term contextual bias as "the human tendency to draw conclusions in certain situations based on (irrelevant) contextual factors, other than the results of the examination (i.e., the evidence)" (2015, p. 68). Moreover, they acknowledge that this cognitive process does not always need to be received negatively—it is not necessarily a bad thing. This human thought process is "the very basis of human intelligence and expertise" (p. 68). Nonetheless, this thought process simply cannot be a part of what is supposed to be a scientific (objective), forensic evaluation of evidence.

A Perspective on Errors, Bias, and Interpretation in the Forensic Sciences and Direction for Continuing Advancement, published in 2009, further defines the varying layers and degrees of bias, particularly with respect to how biases affect forensic evaluations. In particular, one article that was published in 2008 (before the NAS Report compiled its list of offenses), provides a

strategy for eliminating bias entering an evaluation; this strategy is strongly endorsed in this paper. *Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation* was primarily written to provide a solution for objective analysis of DNA allele comparisons and suggested the method produced could be further applied to other comparative sciences (Dror et al., 2008). The issue of bias within the forensics field is nothing new; records from 1894 detail an instance when a questioned document examiner rightfully noted that extraneous information should be withheld from the examiner in order to prevent influences opinions from being erroneously made (Stoel et al., 2015). Despite the impressive longevity of this concept being in existence, only forensic scientists from recent decades have taken the issue of bias more seriously, in a stark contrast to their predecessors.

Intrinsically, forensic science developed out of a need for assistance with police investigations. Thus, the introduction of science into criminal investigation was, and is, supposed to bring more truth to the investigative process. While science seeks truth, forensic science should seek only the empirical truths that evidence can produce. This legitimate understanding of the job requires a constant awareness and effort on the part of the forensics community; this effort must be pursued, for forensic scientists are servants of the truth first and foremost, and as such, must fight against bias and strive for trustworthy science.

Proposed Efforts to Abate Detrimental Effects of Bias

Primarily, forensic laboratories should become independent from law officials so as to remove outside influences and secure the objectivity of examinations. The NAS Report of 2009 addressed this issue of forensic laboratories

under the administration of the law, highlighting the idea that a lab independent from law enforcement would be able to prioritize its workings and budget to suit the lab itself, rather than a police agency (National Research Council, 2009). Beyond the monetary advantage of independence, a greater benefit is the immediate removal of sources with preconceived agendas and ideas about the evidence in question. For instance, a lab technician working in the same building as law officials can easily overhear or directly receive contextual information about a case. Though this information should be inconsequential to the technician, once details are overheard or become known, they are difficult to forget and therefore have the potential to improperly influence the examination. In regards to criminal cases, because the prosecution and the police are the parties who administer the initial filter for evidence as they search for the guilty, they both "implicitly convey information to forensic examiners by their very decision to submit samples for testing" (Whitman & Koppl, 2010, p.69). This translates to most submitted reference samples already having an associated, contextual bias of guilt. Though scientists are supposed to remain objective, when labs are under the authority of the law there then exists a greater chance for prosecutorial bias, where the lab technician may receive pressure or unconsciously seek results that support the administrator's goals (James, Nordby, & Bell, 2014). An independent forensic laboratory, separated from law officials, follows one of the important suggestions made by the NAS report and makes for a more objective, scientific environment.

Moreover, mandatory accreditation of labs should be fully implemented to strengthen the reliability of lab workings. An accredited lab is one that takes any necessary measures to

ensure the performance of sound science, which includes acknowledging and working against biasing factors. In the 2014 publication of *Forensic Science: An Introduction to Scientific and Investigative Techniques,* James, Nordby, and Bell defined accreditation to mean that "a laboratory has agreed to operate according to a professional or industry standard and has proven that it can and does operate this way" (2014, p. 14). Mandatory accreditation was yet another suggestion made in the NAS report, which stated "all laboratories and facilities (public and private) should be accredited" (National Research Council, 2009, p. 47). However, despite this important suggestion from the report in 2009, accreditation today remains voluntary (James et al., 2014). Accreditation of labs helps to alleviate bias because all employees of an accredited facility work under a professional code of ethics, which readily acknowledges the presence of bias and actively works against it. In addition to abiding by a code of ethics, accredited labs and their employees are regularly tested to ensure reliability. This testing includes blind proficiency tests, which is one of the suggestions for defense against bias by Whitman and Koppl (2010). Blind proficiency tests are when a technician is given what seems like normal casework, when really it is a mock evidence sample with known results. This testing checks the accountability of individual technicians, confirming the examination is completed appropriately and, most importantly, objectively. A study making use of blind testing, conducted in 2006 by Dror, Charlton, and Peron demonstrated how contextual information given with a sample can change a technician's conclusion. Initially, five latent print examiners were given a print that each examiner had concluded to be a match to the given reference sample in a previous evaluation. For the next print examined, the examiners were unaware the

print had been previously evaluated and they were given information that highly suggested the print belonged to someone else. Four out of the five technicians yielded different conclusions than the first time the print was evaluated (Dror et al. 2006, as cited in Stoel et al., 2015). These results clearly indicate that contextual information affects and compromises an evaluation. Blind testing and mandatory accreditation are strides to catch and diminish these breaches in objective examinations.

Perhaps the most effective, albeit selective, suggestion for the fight against bias, came from Dror and colleagues in their 2008 report, with their proposed method of sequential unmasking (2008). Sequential unmasking is the process of completing a full analysis of questioned material—evidence collected from the crime scene—with determinations and notes written down before performing an examination and analysis on reference samples (Dror et al., 2008). Sequential unmasking serves as a regulator of information flow, allowing access to potentially biasing, contextual information only after determinations on questioned samples are completed. This helps prevent bias because "if the reference material has not been given to the expert, it cannot influence the analysis of the question material" (Stoel et al. 2015, p.79). While this method is effective in eliminating confirmation bias, it unfortunately has limited application to only those evidence samples that can be analyzed individually, without the coexisting information from a reference sample being simultaneously studied. Cartridge case and bullet comparisons is one such forensic discipline that cannot apply the sequential unmasking method because examinations of these evidence items require a reference sample for the comparison of striations and tool marks (Stoel et al., 2015). While sequential unmasking cannot apply to all

disciplines of forensic examination, it is a viable method for protecting an analyst from making biased observations.

A final aid in abating bias, as well strengthening all of forensic science, is a stronger implementation of research conducted on behalf of the forensics field. The need for research within the forensics world was again among the suggestions from the 2009 report issued by the NAS; however, empirical research on the effects of bias on forensic examinations is still scarce (Stoel, et al., 2015). If bias is to be effectively combated, then how and why bias occurs must first be known. This knowledge can only be gained through more focus on research; research will build the scientific foundation for forensic sciences. *A Perspective on Errors, Bias, and Interpretation in the Forensic Sciences and Direction for Continuing Advancement* notes that a mainstay of science is to perpetually reassess and investigate one's views and discoveries (Budowle et al., 2009). Strengthening the focus of research in the forensics sciences will help improve upon the already present shortcomings in forensic science, as well as continually find new areas for improvement.

Conclusion

Moser (2013) stated "to restore the integrity of the forensics sciences, the sources of confirmation bias need to be identified and eliminated" (p.71). A predominant source of bias can be eliminated by the simple separation of forensic laboratories from law enforcement establishments. Additionally, implementing the highly suggested mandate of accreditation for all forensic laboratories restores integrity and reliability of labs since all accredited would be subject to code of ethics and blind testing. Utilizing the sequential unmasking method of evidence evaluation provides a plan for further defense against bias, and placing unlimited focus on forensic research serves as a sound

offensive plan against bias continually being a prevalent problem in the world of forensic science. Criticism and scrutiny should persist, as they are healthy for scientific enquiry. A healthier forensic community requires a healthy awareness and continual fight against all forms of bias so as to ensure true justice.

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