Revista Bioética
ISSN: 1983-8042
ISSN: 1983-8034
Conselho Federal de Medicina

Barros, Franciéllen de; Kuhnen, Barbara; Serra,
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Ciências forenses: princípios éticos e vieses
Revista Bioética, vol. 29, no. 1, 2021, January-March, pp. 55-65
Conselho Federal de Medicina

DOI: https://doi.org/10.1590/1983-80422021291446

Available in: https://www.redalyc.org/articulo.oa?id=361570669007

Revista Bioética
Print version ISSN 1983-8042 On-line version ISSN 1983-8034

Rev. Bioét. vol.29 no.1 Brasília Jan./Mar. 2021

Forensic sciences: ethical principles and biases

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Abstract

Forensic sciences use diverse scientific and technical knowledge to investigate crimes and other legal matters – civil, criminal, or administrative. Its primary role is to enable investigations related to civil and criminal justice, aiming to clarify issues of the public security system. But with technological advances, certain crimes, and consequently forensic practice, have become more complex. Like all professions, forensic sciences are governed by ethical principles and practices that include duties and responsibilities, aiming to add both technical and human quality and avoid biases. Thus, this article presents reflections on ethical issues and biases related to the forensic science professionals' work.

Keywords: Forensic sciences. Ethics. Bioethics.

Resumo

Ciências forenses: princípios éticos e vieses

As ciências forenses empregam conhecimentos científicos e técnicas diversas para apurar crimes e outros assuntos legais – cíveis, penais ou administrativos. Sua principal função é viabilizar as investigações relativas à justiça civil e criminal, visando esclarecer as questões do sistema de segurança pública. Porém, com o avanço tecnológico, certos crimes – e, consequentemente, a prática forense – tornaram-se mais complexos. Como todas as profissões, as ciências forenses são regidas por princípios e práticas éticas que acrescentam deveres e responsabilidades ao profissional, objetivando agregar qualidade tanto no plano técnico quanto humano e evitar vieses. Com isso, este artigo apresenta reflexões sobre questões éticas e vieses relacionados à atuação dos profissionais das ciências forenses.

Palavras-chave: Ciências forenses. Ética. Bioética.

Resumen

Ciencias forenses: principios éticos y sesgos

Las ciencias forenses utilizan conocimientos científicos y técnicas para investigar delitos y otros asuntos legales (civiles, penales o administrativos). Su función principal es posibilitar las investigaciones relativas a la justicia civil y penal, con el objetivo de resolver problemas del sistema de seguridad pública. Sin embargo, con el avance tecnológico, ciertos delitos –y, en consecuencia, la práctica forense– se han vuelto más complejos. Al igual que todas las profesiones, las ciencias forenses se rigen por principios y prácticas éticas que agregan deberes y responsabilidades al profesional, con el objetivo de mejorar la calidad técnica y humana y evitar sesgos. Este artículo presenta reflexiones sobre las cuestiones éticas y los sesgos relacionados con la actuación de los profesionales de las ciencias forenses.

Palabras clave: Ciencias forenses. Ética. Bioética.

Update

The authors declare no conflict of interests.

Forensic sciences consist of all the scientific and technical knowledge used to investigate crimes and different legal matters (civil, criminal, or administrative) [1]. Its role is to study and interpret the traces that characterize infractions to clarify criminal acts and collaborate with law enforcement authorities [2]. In criminal investigations, the main task of the forensic expert is to confirm the authorship of the crime or to exclude the involvement of suspects – avoiding the unjust conviction of innocents – using methods that allow to determine with relative precision, for example, if a person was at the crime scene [3,4].

According to Silva and Rosa [5], this science's primary role is to assist investigations related to civil and criminal justice, using scientific methods to ascertain damages, deaths, and unexplained crimes. Based on the study of the evidence gathered under the investigation, forensic sciences help to identify suspects and elucidate a particular crime, creating hypotheses about what happened. Therefore, they have the main objective of *searching in the criminal fact traces the necessary elements to formalize the corpus delicti exam*, *producing the evidence to instruct the criminal process* [6].

In the early days, forensic practices were conducted by professionals of general education [7]. But with technological advances, certain crimes have become more complex, requiring the participation of professionals specialized in other science areas to conduct more effective police investigations [6]. Thus, many areas – such as anthropology, criminology, entomology, dentistry, toxicology, engineering, pathology, psychology and medicine, among others – started to compose and assist forensic sciences, considered an interdisciplinary field [3]. Their area of activity is, therefore, quite comprehensive, seeking to serve justice and society.

The field's interdisciplinary nature delineates several methodologies for forensic examinations [3,6]. Just as a judge uses various elements to apply the law, experts use knowledge from different science areas to analyze the traces found at a crime scene [6,7].

Unlike other scientific disciplines, Law is a standard tool in the forensic field [8]. Despite this, science and Law obtain information and results in different ways [8,9]. During the investigation, a hypothesis is proposed, and tests are performed to verify it; if the data found do not contradict it, the hypothesis is considered fair and reliable. However, experts work with certain scientific limitations, because even with technological advances the conclusions are not always accurate, which can lead to questioning the findings. Law operates in a contradictory way, often acting without demanding any support data to base the doubts of the trial lawyers. In other cases, the accusations cannot validate the admissibility of the method proposed by the defending counsel. But forensic science methods have been continuously scientifically validated and tested [10].

As with all professional activities, forensic sciences are governed by ethical principles and practices that aim to outline each worker's duties and responsibilities to add quality not only to the technical but also the human side of the profession. Experts who do not follow ethical principles violate ethical standards, regardless of the field in which they work.

Thus, this article aims to analyze ethical and deontological aspects of professional performance in forensic sciences. A survey was carried out in three databases – PubMed, Web of Science, and Embase –, using the descriptors "forensic sciences," "ethics," "biases," "deontology," "ethical principles," "bioethics," "professional ethics," and "expert" to support this discussion. We selected articles in English or Portuguese that discussed ethical dilemmas and biases in forensic sciences and book chapters that addressed the topic.

Ethics and forensic sciences

According to Dinkar, Frabkena described ethics as a *moral philosophy or philosophical thinking about morality, moral problems and moral judgment. However, ethics in its strict sense is different from morality. Ethics is based upon knowledge and thinking; morality is based upon belief and feeling* [11].

Ethics prescribe the individual's correct behavior, allowing human beings to discern right from wrong,

 http://dx.doi.org/10.1590/1983-80422021291446

and transgressing the rules or regulations in force in society results in unethical attitudes [2,12]. Each person's behavior has been modulated since birth by their parents, but external influences from their daily lives interfere with this behavior and their own personality [2].

Private and professional rules limit people during life, and labor practice is governed by deontological rules [2,13]. The professional who promotes false results betrays the public trust, harms other professionals, and puts justice at risk. One of the most effective ways to protect oneself from ethical violations is to be aware of the paths that lead to error [14].

The expert must be impartial when disclosing information to the courts, as society, victims, and suspects have rights related to this professional's duties. For society, the expert's primary duty is based on the trust placed in them. For the prosecution, victims and suspects, this professional is responsible for the correct outcome of the investigation, which must be conducted efficiently and effectively. Often, the prosecution can rely entirely on the expert's report [2,13,15].

Therefore, the judicial system must be able to rely entirely on the specialists' work, as they are responsible for establishing useful parameters to identify the perpetrator or to exempt the suspect from criminal liability [2,13,15]. In this sense, besides complying with the relevant legislation, it is understood that experts' performance must be guided by the observance of ethical standards and ethical principles.

Ethical practice and the expert

In forensic sciences, many areas that act separately come together to provide accurate results and thus confirm the authorship of the crime or rule out the suspect's involvement. Experts must have experience in their field to provide authority for their work; but to become an expert, they must have extensive and in-depth knowledge, thus being competent to prepare their final report [2,12,15].

Magistrates trust experts. Courts usually accept their reports without challenge, mainly due to the difficulty that laypeople in technical topics have to question the information provided. Thus, the experts' evidence must be reliable, accurate, and as free from bias as possible [16].

The complexity of analyzing and interpreting forensic data is an intensely debated topic [17]. Concerns about the evidence admissibility and specialist testimonies have been widely expressed regarding validation and error rates in methods used in investigations [18]. According to Hiss, Freund, and Kahana [18], when experts are called upon to provide specialized opinion on a subject outside the scope of their professional field, they are expected to be honest enough to refuse. The authors reviewed expert witnesses' competence in several forensic cases and found inconsistencies and discrepancies in clinical and forensic analyses in the assessed areas [18].

For Dinkar [2], the most significant ethical issue in the forensic field, identified in a study conducted with lawyers and experts associated with the American Academy of Forensic Sciences, is competence. In this context, the author suggests two ethical requirements: the use of reliable methods and a report restricted to the area of expertise, written with honesty according to their qualification or experience.

Experts must have an ethically correct behavior when testifying on a specific subject and cannot exaggerate their qualifications or experience [2]. It is not ethical – nor legal – to make false statements about one's career [12,15], and to assume the responsibility of analyzing an investigation without having experience for it contradicts the ethical values of forensic sciences. If not qualified for a particular subject, experts should not present their scientific opinion [2,12].

This type of professional is daily faced with crime, violence, and death. Given the urgency and complexity of the activities developed in this area, Walterscheid [14] believes that political issues, high stress, and personal bias can cause imprudence. The author thus understands that the forensic scientist must have adequate skills and technical knowledge, education, and training. In such cases, ethics has standards of conduct underpinned by justice and consistency.

Similarly, Murdock and Holmes [19] understand that forensic sciences professionals must be objective, showing how they reach the conclusions presented in their reports. In this sense, training and adherence to the professional code of ethics are essential. Ethical professionals obtain results clearly and explicitly, without any bias, not extending beyond their skills, competencies, or knowledge, recognizing the importance of conducting a thorough investigation before reaching a conclusion. Yadav [20], in turn, recalls that forensic results, as well as the opinion of experts, should never be falsified, cut, adapted, or in any way modified to serve third parties, whether for political, military, racial, financial, or other reasons.

Bias, partiality, and the expert

In forensic sciences, "bias" means a finding – directly or indirectly partial, intentional or not – that can benefit one side and harm another [2,10]. It is related to taking a stand for or against a person or thing and can take many forms. It is associated with an adverse opinion based not on objective evidence but hostile feelings motivated by judgmental habits or hasty generalizations.

The subordination of the expert to law enforcement authorities can generate bias [2,21]. Starrs [22] cites the case of an investigator who, when delivering a pistol used in a shooting to the forensic ballistics expert, informed him that he knew the weapon had been used by the suspect, asking the expert to confirm this hypothesis.

Analysis of the scene or evidence can also be biased if experts become emotionally involved in the case, which can lead them to ignore details that challenge their beliefs [23]. Similarly, indifference and lack of commitment can cause bias when they accept others' opinions without reaching their own conclusions, causing loss of objectivity [24].

Bias can also interfere with the opinions of people who live with individuals who share their beliefs and perspectives. Living with subjects with divergent convictions demands the defense of one's own opinions, which leads human beings to group with those who share their worldview. Arguably, it is preferable to have one's opinions challenged, as this requires processing information rather than merely accepting it. This is vital to overcome bias, as it allows all possibilities to be examined, allowing an unbiased opinion to be formed [24].

By the results and conclusions presented in their reports, experts assist professionals from different areas and play a key role in judicial processes and justice. Such evidence cooperates to convict the guilty and can avoid the unjust conviction of innocents [25]. Dror [25] recalls that it is the expert who observes and interprets data and thus the forensic evidence is mediated by human factors and perception, attention, and association. The author states that specialists may be exposed to information irrelevant to their work – such as confessions, criminal records, or identification of a suspect, among others [25]. Such data can cause or add bias. Expert reports must be impartial, appropriately circumscribed by what the evidence supports [25], and incorrect or exaggerated conclusions can be caused by erroneous information, which causes bias [26].

How human perceptions and judgments can be influenced by other factors irrelevant to a specific case is called "cognitive bias," which includes: contextual bias, when irrelevant information given by third parties influences the conclusions; confirmation bias, when pre-existing beliefs or assumptions act on the interpretation of information and evidence; and prevention of cognitive dissonance, when the professional disregards new information that does not correspond to their preliminary conclusion [27]. Cognitive biases are subjective and undermine evidence reliability, making the professional see and record something that did not exist or fail to see and record something real.

The conclusions of professionals influenced by biases should not be confused with the purposeful desire to testify falsely; these experts are often unaware that their conclusions are incorrect or unreliable [28]. Cognitive factors are relevant to decision-making and can influence data understanding, analysis, and interpretation in forensic cases [29].

Several authors have proposed solutions to these biases and have written about their impact

on forensic sciences, seeking to limit the factors that influence professionals working in this field to allow for objective and unbiased observations and conclusions [30]. Restricting access to information unrelated to the task and controlling the order and timing of data provision have been methods proposed to reduce the chance of bias [31]. However, a study involving 403 experts observed that most participants rejected the need for procedures to minimize cognitive biases, showing themselves still unable to recognize the predisposition to bias [26].

Confirmation and institutional bias

Confirmation bias corresponds to the loss of the ability to be objective and occurs when the individual tries to confirm his beliefs and hypotheses [32] by looking for evidence that will allow him to interpret the data in a way that favors them [33]. Positive evidence is thus privileged to the detriment of negative information [24]. In some instances, the individual is so committed to his ideas that he disregards others' hypotheses and explanations [33].

Disputes to benefit or promote interests in court, regardless of motive and negatively affecting or minimizing the other party's interests, is defined as institutional bias [2]. According to Dinkar [2], a 1994 research identified 85 cases, processed since 1974, in which consciously or unconsciously prosecutors used contaminated evidence, leading to the conviction of innocents or acquittal of perpetrators. A further 48 suspects were released after it was found that the charges against them were based on fabricated evidence, or because the exonerating or exculpatory evidence was withheld [2].

If the experts' conclusions are based on substantiated and objective evidence, privileging information that fits their personal beliefs is considered biased [32]. If the experts ignore evidence that contradicts their conclusions, objectivity is lost [24]. It is common for human beings to argue positively about their beliefs and hypotheses, even when confronted with contradictory evidence. People support their claims more easily than they contradict them, because they tend to resist the possibility of being wrong. Conclusions can then be challenged and even changed if objectivity is contaminated by biases [23].

Three common errors are found in forensic sciences to understand confirmation bias: ethical violation, honest errors, and biased supervision. Ethical violations can include fabricated prints, estimated results without thorough examination, intentionally wrong results, or cover-up for errors. Honest errors, on the other hand, can involve lack of training, the pressure to perform tasks, overwork and administrative errors, or a tendency to agree with someone else's work [24].

Dror and Cole [34] highlight three concerns about the influence of bias-based expert conclusions: cognitive biases affect all professionals, in any forensic sciences area; bias-based conclusions are even more influential because experts themselves believe them; and there has been resistance to recognizing such biases and accepting appropriate measures to combat them.

Types of partiality

According to Nickerson [33], confirmation bias can take many forms. For Byrd [24], it is essential to understand how bias enters the cognitive process, besides understanding the levels at which it is possible:

- "expectancy effect" is defined when one awaits a certain result from an initial observation or analysis, because anticipation leads to the desired result;
- paying attention only to items of interest and disregarding information that contradicts what is expected is defined as "selective attention." Human beings can focus their attention and ignore or even not notice what is around them. Combining "selective attention" with the "expectancy effect" stimulates the mind to only find information that confirms what the individual believes, disregarding all other data that is not interesting to him;
- "role effect" is defined when two people, due to their profession, collect disparate information at a crime scene, because each expert will focus on different aspects according to their role;

- the act of accepting opinions, beliefs, and behavior from colleagues is defined as a "conformity effect," because the expert submits to the opinions of colleagues;
- "need-determined perception" is defined when strong motivation causes the desired result to be obtained. This motivation may arise from the desire to help solve crimes;
- the tendency to believe that a statement or conclusion is true despite the lack of convincing evidence is defined as a "positivity bias," predisposing people to affirm what they believe to be true;
- "primacy effect" means when, in a lengthy information-collecting process, the first data gathered is privileged to guide the conclusion and consequent decisions. Opinions formed early tend to influence later information, allowing any data disclosed early in the investigation to generate the outcome or conclusion of the case;
- "overconfidence" can also cause bias, because even in the face of contradictory evidence, people who always think themselves right tend to defend their beliefs.

Such biases characterize different types of partialities, which can lead to biased conclusions and forensic reports. In forensic sciences, the evidence presented suggestively by the investigator or other analysts may prompt the expert to a particular outcome [35]. For Byrd [24], such suggestive comments can corrupt examinations and analyses and undermine conclusions, but decisions are influenced by a particular amount of information only to a certain extent.

Besides putting all findings in doubt, any erroneous or biased findings must be disclosed, as they relate to professional responsibility. For Nickerson [33], confirmation bias is not the only cause of errors, but it is significant for assessing and analyzing crime scene evidence.

As noted, forensic activity is subject to bias, which can cause partiality (even if involuntary and/or unconscious) in the reports. Thus, besides the specific technical knowledge necessary for professional practice, experts need training and ethical and legal education to perform their duties well and prevent biases and partiality.

The expert and forensic analysis

The expert's judgment supports scientific evidence in courts. As he is in direct contact with the investigators, the forensic specialist becomes part of the law enforcement team, whose main goal is to "solve the case" against the guilt party. In these situations, analysis can often tend towards police theory over the occurrence when considering subjective determinations [2,15,21].

Ethical values are also eroded in this process thanks to "hired weapons" as experts, i.e., specialists who have an affinity with a particular lawyer and try to benefit them. The number of ethically correct experts exceeds that of "hired weapons," but it is difficult for the judiciary to distinguish biased specialists from honest ones [12].

Even though experts are part of the law enforcement team and assist the investigation based on the police's data for scientific analysis, they cannot benefit the corporation or the accused, and must act independently and impartially. In this sense, Dinkar [2] questions whether there is no police interference in the experts' opinions, for many forensic science laboratories are linked to police departments.

As the responsible for fighting crime, the police collect the necessary materials and deliver them to the experts for analysis, monitoring the process from this stage until the expert examination concludes. Unusual information given about the case can also impel the examiner to achieve results reconciled to other evidence [2,15]. Thus, the search for quality is fundamental and should serve as a foundation for forensic sciences in their continuous efforts to improve products, services, or processes [10,12].

For forensic evidence to have quality, they require: authenticated technique; qualification of the instruments used in the analysis; people able to interpret the data; guidelines to avoid contamination; reliable laboratory; forensic and laboratory staff trained to conduct tests and continuously assess their analysis capacity; and suitability of technical support staff and good laboratory performance. Experts must be competent to achieve excellence in forensic service and work with a quality system and correct approach [2,36]. Most laboratories prioritize validated and well-established protocols [20].

Crime scene evidence must be preserved, respecting the chain of custody. Case analysis often accumulates due to a lack of criminal laboratories, adequate resources, and qualified personnel, raising concerns about the criminal justice system's efficiency. In the United States, for example, some laboratories may eventually restrict the receipt of materials for analysis to reduce delays [37]. According to the National Research Council's Committee on Identifying the Needs of the Forensic Sciences Community [37], if evidence or laboratory tests are inadequately analyzed or in case of subjectivity, incompetence, or a lack of necessary internal controls, the resulting judicial decision may be unfair or mistaken.

These professionals should never forget the social responsibility of forensic activity. Often their reports, which are the basis for court decisions, can define a person's fate (with conviction or acquittal). Also, mistakenly identifying bodies, remains or bones can have, among others, legal, patrimonial, and emotional repercussions.

Professional and ethical conduct

Experts must meet the highest ethical and professional standards. Several entities in the forensic field establish codes of conduct that must be regularly evaluated and updated [10,13]. Professional codes of ethics structure principles to help specialists discern what is acceptable and guide their decisions and problem solving, based on the professional values of the category [38,39]. Their regulations and guidelines aim to prevent behavior considered unethical [40] and ensure professionalism [41].

Forensic sciences include professionals with diverse training backgrounds, such as physicians, biomedical scientists, dentists, psychologists, engineers, geologists, biologists, chemists, pharmacists, anthropologists, archaeologists, etc. Usually, in each category, professional councils establish their code of ethics [42], emphasizing the principles observed in each specialty [43]. Such councils have the prerogative to apply sanctions to professionals who violate these regulations.

Expert associations from different countries have also instituted their own codes of conduct [44], and public and private criminal laboratories must adopt standards that consider society's interests [10,45]. Nevertheless, Gilman [41] recalls that codes do not exclude the specialists' moral autonomy and their obligation to reason. Experts must develop hypotheses and alternatives, solve problems, document their activities, and approach laboratory work [24] maintaining ethical values and standards that help establish the quality, validity, and authenticity of the results [20]. In their study, Costa Filho and Abdalla-Filho [46] observed dissatisfaction among the criminal experts interviewed about the ethical guidelines received, concluding that forensic practice requires establishing specific ethical references.

Professionals working in forensic sciences must have adequate scientific training to effectively conduct analytical processes in the judicial field. These specialists need to be alert to new and potential advances that can improve their current practice, besides behaving ethically to overcome the challenges of the 21st century [10,12,15], avoiding bias and emphasizing society's interests.

Final considerations

Forensic sciences include professionals from different areas and with different backgrounds, whose professional councils often adopt deontological regulations listed in their respective codes of ethics. However, the forensic activity has specific characteristics and needs. Biases are possible and can result in biased reports, even if partiality is unconscious or involuntary, and recognizing them is an essential step in implementing preventive measures.

Experts have great social responsibility and their activities have significant consequences both for Justice and for society. To develop their work, experts need specific and always up-to-date technical knowledge. Therefore, forensic science professionals must have continuous training, as well as ethical and legal orientation and education focused on the specific dilemmas and cases of their roles, seeking to prevent biases and partiality.

This research was developed with the support of the Coordination for the Improvement of Higher Education Personnel (Capes). We would like to thank professor Laura Bishop, from the Kennedy Institute of Ethics, Georgetown University, United States, for her contributions and receptivity during the visit of Fernandes and Serra, and Patricia Martin and Roxie France-Nuriddin for their help in the Bioethics Research Library at the same institution.

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Received: 7.30.2019
Revised: 9.30.2020
Approved: 12.23.2020