



Utility of the clue – From assessing the investigative contribution of forensic science to supporting the decision to use traces



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ABSTRACT

In an attempt to grasp the effectiveness of forensic science in the criminal justice process, a number of studies introduced some form of performance indicator. However, most of these indicators suffer from different weaknesses, from the definition of forensic science itself to problems of reliability and validity. We suggest the introduction of the concept of utility of the clue as an internal evaluation indicator of forensic science in the investigation. Utility of the clue is defined as added value of information, gained by the use of traces. This concept could be used to assess the contribution of the trace in the context of the case. By extension, a second application of this concept is suggested. By formalising and considering, a priori, the perceived utility of using traces, we introduce the notion of expected utility that could be used as decision factor when choosing which traces to use, once they have been collected at the crime scene or from an object in the laboratory. In a case-based approach, utility can be assessed in the light of the available information to evaluate the investigative contribution of forensic science. In the decision-making process, the projection or estimation of the utility of the clue is proposed to be a factor to take into account when triaging the set of traces.

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1. Introduction

Forensic science, being a relatively young discipline, has developed substantially in the past decades. Due to the increase in DNA and drug testing, forensic science laboratories have multiplied, university programmes continue to proliferate and technical developments continue to attract most of the attention. At the same time, the broad media attention shaped the view of forensic science as the omnipotent tool to help solve crime affecting not only the understanding of the forensic science role in the overall population, but also the everyday practice of forensic scientists and the expectations in courtrooms. This combines to shape a perception of forensic science as being an infallible science [1].

Fundamentally opposed to this view is the depiction in recent studies, challenging forensic science in its nature (e.g. [2]) and the effectiveness of its contribution to the criminal justice process [3,4]. In response to this commotion, several studies attempted to measure the efficiency or effectiveness of forensic science using a range of different indicators, essentially considering an economical, sociological or policing perspective (e.g. [5–7]). However, these indicators adopt an external

perspective of the criminal justice process. Albeit their focus is on one precise aspect of the contribution of forensic science, the responses of these indicators are extrapolated to the global impact of forensic science in the criminal justice process, providing an unbalanced view.

We suggest the introduction of the concept of utility of the clue to evaluate the contribution of traces to the investigation. The latter, defined as added value of information attainable by the use of the trace, depends on the informative potential of the clue itself, as well as the information available before the selection of traces. The aim is to depict the contribution of forensic science in different chapters of the criminal justice process and to suggest an indicator allowing to assess the added value of information provided by used traces.

By extension, we propose to use utility of the clue in the decision to use traces as an aid to make more appropriate, conscious and targeted triaging decisions. Once traces have been collected at the crime scene, a decision has to be made about which traces are used. The factors involved in this decision are not clearly identified or explicitly stated in the corresponding literature.

In the following section the current state of the literature regarding performance indicators, their connection with the definition of forensic science and the factors involved in the decision to use traces will be discussed. In Section 3, the concept of utility in general and utility of the clue will be presented and discussed in the context of performance

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measurement and decision making processes. Finally, a case example is presented to illustrate the application of the suggested concept.

2. Literature review

In early studies, police use of forensic science, in terms of number of scenes visited and number of traces collected and submitted by scene of crime officers, was scrutinised. Albeit variable between different police forces [8], the use of forensic science was found to be consistently low [9–12]. In 2009, Schroeder and White [13] reinforced this view in their study of the utilisation of biological samples in homicide cases from 1996 to 2003. The Pathfinder Project [14] and the DNA Expansion Programme [15] tried to address precisely this problem by promoting the use of traces as a mean to improve policing. However, their conclusions were contradictory, with one stating that an increased use was influencing the number of identifications and the other one stating that the increase did not measure an effect on case outcomes. Adderley et al. [16] found that an increase in the number of collected biological traces would not “dilute the matching rates for DNA samples” [16, p.176] and, similarly, Roman et al. [5] determined that an increased use of rapid DNA for burglary cases allowed to increase the number of suspect identifications.

Another way of attempting to measure the effectiveness of forensic science and its databases is by looking at the possible increase in the number of identifications [14]. While this factor appears to be pertinent at first, especially when comparing to the invested resources (e.g. number of scenes visited), it constitutes an oversimplified approach to measure the value of forensic science. From the decision to send a crime scene investigator to scene to the identification of a suspect by traces, multiple decisions need to be made: which scenes are investigated by the crime scene investigator, which traces are collected, which traces are analysed, which techniques are used in the laboratory to analyse the traces, are the results of the analysis sent to the national database, etc. When considering the aforementioned ratio, all these decision steps are reduced to one measure and confound different indicators of effectiveness on different stages of the decision making process.

As the infrequent use of forensic science was perceived as being problematic, its reasons were examined. Generally, several explanations were proposed, including the lack of knowledge of police investigators when it comes to the potential value or utility of traces for their case [12,17–19], which could possibly be comprehensible in the late 1980s or the early 1990s (due to the recent development of DNA analysis). However, by 2009, this conclusion still found support [20], which is more surprising considering the large publicity of forensic science and the strong result focused culture of police officers (i.e. investigators rapidly integrate new techniques that deliver decisive results). Nevertheless, this lack of knowledge might not have had the same reasons at this point in time. Inadequate communication, already mentioned in 1987, might be at the core of the problem [17]. The infrequent use might be caused by a lack of awareness of the available techniques on the side of the police, and a lack of awareness of the available traces on the part of the laboratory scientists. Such inadequacy in communication may be favoured by the model of integration of forensic science practice in the enquiry. As described by Williams [21], a “structural” dissociation of forensic science from police may enhance this knowledge gap. An extreme picture that could be drawn is that scientists, separated from police investigation, have to analyse what police investigators ask them to. Hence, the decision to use traces with all the dimensions involved in this decision (which traces, when, how, by which means and why) lies essentially with police investigators. This lack of communication and knowledge might therefore cause the tendency for the use of traces as means of last resort [13,22].

All the latter concerns may be explained by a misconception of the roles and responsibilities of the different actors in the criminal justice system. Laboratory scientists perceive crime scene investigators as mere evidence collectors (as opposed to forensic investigators or

specialist advisor), without following a reasoning process or selection criteria, and hence, do not acknowledge their substantial contribution to the complete process [23]. Forensic scientists can assume several different roles corresponding to differentiated needs imposed by the structural or procedural constraints. Basically, the role is threefold: (1) the investigation needs to be carried out and the relevant information found, (2) the information needs to be structured and finally (3) the traces need to be considered in the light of competing hypotheses of interest [24]. Furthermore, the criminal phenomenon at hand needs to be considered and understood and the gained information integrated into the investigation process. This may be the definition of the roles, considering the “procedural” integration model of forensic science and police investigation described by Williams [21]. This “expert collaboration” approach recognises and acknowledges the utility of expert knowledge and the potential insufficiency of knowledge on the side of the users of the service to offer informed assessments of its quality and its investigative potential [21, p.772]. The roles and competences diverge in regard to the integration system chosen by institutions and organisations [21, 25]. In addition, this dissociation of the roles is accompanied by a hierarchy established between the investigator and the scientist.

The commonly understood role of forensic science as the assistance of court through the application of scientific techniques in an adversarial system is prone to dramatically understate the potential of traces as it focuses on the judicial phase only. It epitomises forensic science as the analysis of the trace and the interpretation of the results, without considering the reasoning processes and all the decisions involved. Most of these studies deal with the anglo-saxon system, or more precisely with the British system, which has been influenced by the Home Office and its policing strategies. In particular, the roles and responsibilities of the actors in the system change depending on the system at hand. These concerns, the controversies in the definition of forensic science, the integration model as well as the use of purely quantitative, narrowed performance indicators (“forensic yield”, “forensic matches”, lack of validity and reliability), have already been raised by Williams and Weetman [26] when they described the weaknesses of the current measurement of support of forensic science to homicide investigation in the UK. The definition of forensic science and the integration model chosen are intertwined subjects and as such, are difficult to be changed. However, the third weakness mentioned is the choice of the performance indicator.

In order to measure the effectiveness of forensic science, some authors concentrated on the predictive power of trace processing on case outcomes. Although the proportion of submitted traces was close to 100% for homicide cases, their influence on any of the stages of the process (arrest, referral, charging, conviction) remained ambiguous/undefined; two groups of authors working with the same dataset obtained differing results and reached different conclusions [3,7]. Hence, the results and conclusions seem to be more influenced by the chosen methodology than by the data itself. Other factors, such as case characteristics, seem to be involved in case clearance. An interesting result was that most robberies went unsolved due to a lack of witnesses [3]. Hence, case circumstances and police strategies (in finding and questioning witnesses) seem to be the most influential factor regarding the detection of robbery cases. Similar results were found for homicide cases [4,27–29]. All these studies determined that police actions or the offender’s attitude were indicators for homicide clearance. In the study performed by Brodeur [4], scientific evidence helped to arrest a suspect in a mere 2% of cases. Whereas, in the study performed by Mucchielli [28], in only 7% of cases, physical traces collected from crime scenes were the crucial element leading to the offender(s). These findings conducted Mucchielli to emphasise the determining role of these traces, noting that they had played only a secondary role in other cases. He stated further that physical traces were more often than not getting a value once the scenario had been established, so their role would be again indirect. This would confirm the essential yet not determinative role of the work on the crime scene.

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