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Expanding forensic science through forensic intelligence

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ABSTRACT

Research and Development ('R&D') in forensic science currently focuses on innovative technologies improving the efficiency of existing forensic processes, from the detection of marks and traces at the scene, to their presentation in Court. R&D approached from this perspective provides no response to doubts raised by recent criminological studies, which question the effective contribution of forensic science to crime reduction, and to policing in general.

Traces (i.e. forensic case data), as remnants of criminal activity are collected and used in various forms of crime monitoring and investigation. The aforementioned doubts therefore need to be addressed by expressing how information is conveyed by traces in these processes. Modelling from this standpoint expands the scope of forensic science and provides new R&D opportunities. Twelve propositions for R&D are stated in order to pave the way.

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1. Introduction

The influential report produced under the auspices of the US National Academies of Sciences in 2009, is an almost mandatory starting point for debating Research and Development ('R&D') in forensic science [39]. Its focus on the development of specialised technologies and its validation provides for what are all inarguably challenges for forensic science laboratories which serve the Justice System [9,38,46,56].

Some commentators have however pointed to many anomalies with the current paradigm taken for granted by the Report. At least, it is acknowledged that forensic science does not limit itself to the application of a patchwork of technologies deployed in the laboratory [21,23,30,32,47,58]. A school of thought goes further to suggest a change of attitude to respond to the emerging crisis epitomised by the tragic closure of some of the more established traditional laboratories. A discipline should be (re-)built around the study of the 'trace', the remnant of a unique criminal activity that occurred in the past. The information it conveys is not only restricted to serve the Court process but should also support the study of many types of crime activities, following a variety of objectives [35,36,52,53].

This paper aims at structuring this debate by stating twelve interconnected propositions, at different levels of generality, to be tested by research. They should be considered as a preliminary construct open to evolution.

1.1. Is this expansion necessary?

Proposition 1. *Expanding R&D in forensic science beyond its delineation in the report is a necessity for providing a discipline with a sufficient ambition to justify its existence, ensure its own coherency and favour its sustainable development.*

The need to consider the contribution of forensic science beyond the laboratory is already occasionally postulated by scholars [30], but the scientific literature on this issue remains rare [52]. There are many possibilities to specify territories to be explored [37]. They have overlapping shapes. We propose one possible configuration that helps to pinpoint risks and opportunities for forensic science to engage in these areas.

1.2. What should this expansion cover?

The most evident step for such an expansion consists of adopting a global view that goes from the crime scene to the presentation of evidence in Court. In this context, the traditional laboratory is situated as one possible structure responsible for performing specialised operations.

Proposition 2. *Research in forensic science covers the study of its contribution along the whole chain of the justice process, from the crime scene, to the presentation of forensic information in Court.*

This elementary expansion for forensic science is not a given. There are many inhibitors that dissuade researchers to embark on such a venture. Some commentators even deny, or strictly limit, an expanded role for forensic science along this chain:

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'Expanding the forensic scientists' domain to the 'activity level' destroys the line between their expertise in their specific forensic discipline and a more general (and dangerous) claim to general investigative expertise ([46: 70]).

This confined view is mainly justified by the need to keep scientific independence, mitigating contextual bias and avoiding encroachment upon each other competencies.

Such statements are particularly stimulating for research. They immediately lead to directly address the question of the application of forensic science. Would it truly deserve existence, by merely bringing small/simple pieces of evidence before the justice system (source level involvement only)? And in doing so endangering the fairness of the judicial process at such an increased cost?

The extremity of this confinement should be more carefully studied, because it is not immediately apparent when adjoined with Polanyi's statement:

'Even the most strictly mechanized procedure leaves something to personal skill in the exercise of which an individual bias may enter' ([41]: 19).

And combined with Rosenthal affirmation:

'It costs something to reduce errors, and it costs more and more to get rid of each error as there are fewer of them left' [49].

Reconstructing specific events that occurred in the past is subject to many forms of uncertainty. Whatever the level of sophistication of procedures and models for making decisions, forensic failures will continue to occur unavoidably. Each high profile case will invariably put a little more pressure on the system with the effect of progressively confining scientific laboratories in the landscape of the justice system.

This reduction in the scope of laboratories may open space for more fragile information and biased forms of reasoning to prosper in crime investigation. This could not be more evident than in the collection of human information (interview) that is guided by forensic results, in the complete absence of forensic advice.

An alternative response to the collapse of some independent laboratories is to rebuild forensic capacity within police organisations. It may be another natural evolution of systems searching to fill gaps created. Is this movement already a reality? Research could empirically test this hypothesis.

The reality of this confinement is often tempered by the employment of a case manager in the laboratory. This still understudied function focuses on mitigating risks of biases produced by observer effects. It proceeds by separating the management of the case from the evaluation of observations, and by filtering contextual information about the case through sequential unmasking procedures [56]. However, this defensive function provides little indication on how forensic science and crime investigation should logically be articulated to favour the resolution of investigative problems. This needs to be studied also.

Whatever the viewpoint, forensic science cannot operate in isolation. Indeed, lack of research dedicated to expressing this articulation allows space for pervasive misunderstandings and tensions between organisations and individuals to prosper. It is also true that no guarantee can be made for forensic case data to be safely and transparently exploited to its full potential in the variety of processes it serves.

The study of the whole chain brings into focus two of its important components: (a) the contribution of forensic science to crime investigation and (b) crime scene investigation itself.

1.2.1. Studying how forensic science may integrate with crime investigation

The proposition to adopt a global view that starts at the scene and ends in Court forces the study of different forms of articulation of forensic science within crime investigation, and their respective consequences on the whole process.

This is an area of many controversies. They occur in a judicial context that is itself poorly formalised [25], and which is the target of many criticisms. In particular, in his 1984 seminal paper, Egger [14] pinpointed the incapacity of police systems to connect dots, leading to disastrous failures in serial murder investigations. He denounced the fragmentation of crime investigation as it causes linkage blindness.

This is where the fragmentation of forensic science, confined in specialities and silos, certainly does not address these systemic weaknesses coined by Egger. Research may examine how the fluidity of the treatment of scientific information is inhibited by traditional organisational settings of forensic laboratories. Thus, the following statement challenges the usual pathway designed for forensic science.

Proposition 3. *Crime investigation is holistic, and forensic science is a significant contributor to it.*

In shaping police organisations during the last decade, the focus has been on how crime analysts, investigators, forensic scientists and other contributors differ through their speciality, while they actually participate collectively to the same process of crime investigation. Digital traces have added new dimensions to the picture. They are used almost systematically and are central to most of today's investigations. A promising avenue for research would be to consider what the actors (i.e. the various contributors to the investigations bringing their own knowledge and expertise) share, and what kind of collaboration must be stimulated to favour and regulate problem solving. Indeed, the term investigation contains at its root vestige, which means in French the remnant of an activity, the mark, the 'trace' [10]; exactly what forensic science studies according to Margot [36]. Adopting this view allows the definition of stable concepts and frameworks.

A research programme could thus examine, as its object, a system composed of different kinds of investigators (e.g. police investigator, forensic investigator, criminal intelligence analysts) trying to solve problems through a collective approach, by bringing their specific knowledge and skills in treating specific types of information. A lot of empirical studies could be launched around this system, its functioning, its adaptation to the investigation of specific cases, its transparency and its effectiveness.

This kind of research will inevitably address the question of organising forensic science with respect to the fragmentation of the investigative process. Various forms of bias and their consequences have been intensively discussed in forensic literature. This catalysed the debate of marginalising the forensic scientist from the investigation. However, the consequences of this fragmentation and de-contextualisation have been far less considered. This opens an important consideration that is directly related with a more holistic view of the investigation.

Proposition 4. *The fragmentation of processes in systems and the distancing of scientists from other figures of the investigation might contribute to a variety of failures, not addressed by laboratory quality management. Thus, contextualisation and de-contextualisation must be studied in mirror, depending on needs and expectations of the criminal justice process.*

There are already many documented illustrations where such failures have occurred. One significant example is the Byford's report on the Yorkshire Ripper inquiry in 1981 [6]. So called 'Byford scientists' have since the mid 90s deployed good practices in the role of forensic investigators, contributing concretely to the resolution of many serious crimes [1,57].

It is their responsibility to generate a productive collaboration with the other 'actors' (i.e. a contributing figure), of the investigation. Similar models have since been developed in many laboratories. These scientists have a global view on forensic case data available in the context of a case. They provide advice on how to treat it by defining sequences of operations, as well as evaluating and integrating results with other parts of the investigation. Priorities are defined for optimising information gained and, at the same time, avoiding costly and superfluous

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