

University of Dundee

## The Construction of DNA Profiling Evidence Within Public and Private Models of Forensic Science Provision

Richmond, Karen

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# “The construction of DNA profiling evidence within public and private models of forensic science provision.”

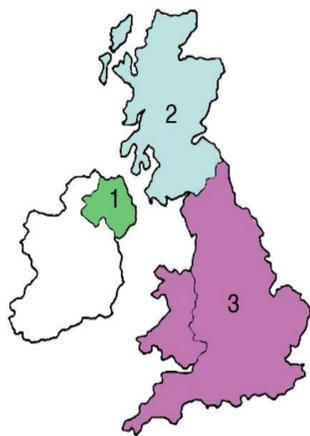
## Introduction

The United Kingdom forensic science sector has undergone significant development in recent years. Following the closure of the Forensic Science Service, provision in England and Wales is now delivered by way of a commercial market. Similar provision in Scotland and Northern Ireland remains within the public sector. Meanwhile, many police forces choose to operate additional 'in-house' laboratories.

In all parts of the UK, forensic science provision has become productised, and police forces have re-oriented themselves as consumers. As such, they have become increasingly concerned with economic value. Meanwhile forensic science providers have been tasked with maintaining a high-quality service that conforms to a body of overarching regulations. Studies suggest that these commercial developments have had a particular impact within the field of forensic DNA analysis, and may affect the way in which DNA evidence is constructed.

This research project explores the impact that these changes in policy and governance have had on the routine practices of forensic DNA experts in different parts of the UK, with a particular focus on the construction of analytical reports. The purpose of this comparative study is thus to gain a clearer understanding of the ways in which providers have responded to changes in governance and policy, and to assess the practical effects of resulting adaptations. It attempts to identify examples of best practice, whilst highlighting significant trends, problems and opportunities.

## Forensic Science Provision in the UK



### Forensic Science Provision in the UK and Northern Ireland

1. Forensic Science Northern Ireland (FSNI), a public sector agency within the NI Department of Justice.
2. Scottish Police Authority (SPA) Forensics, a public sector police support service.
3. A private sector market in forensic services, comprising;
  - a) A primary market of four large 'Tier 1' providers who regularly bid for work from individual police forces and regional consortia. (LGC, Key Forensic Services, Cellmark and ESG).
  - b) A secondary market of a dozen 'Tier 2' providers. These specialise in 'defence' work. They also support and review the work of Tier 1 providers.
  - c) 'In-house' police laboratories in almost all of the 43 police force regions in England and Wales.

## Aims, methodology and theoretical perspectives

This research project employs a comparative case study perspective utilising a variety of qualitative methods. Research was conducted in two phases. During the first phase the researcher undertook ethnographic fieldwork at forensic science laboratories in England and Northern Ireland, observing DNA profiling experts as they analysed evidence and compiled evaluative reports. Semi-structured interviews were carried out with DNA profiling experts, research scientists, solicitors, barristers, members of the judiciary, and representatives from SPA Forensics, The Royal Statistical Society, The Forensic Science Regulator, The Metropolitan Police, The Chartered Society of Forensic Sciences, Her Majesty's Inspectorate of Constabulary, and The Crown Prosecution Service Strategic Policy Group. This was followed by a second round of interviews, during which the researcher focused on emergent themes. The researcher also made use of the 'shadow report writing' technique developed by Halliday, *et al.*, (2008).

The study draws on autopoietic theory, Science and Technology Studies, Foucaultian theories of governmentality, and the constitutive sociologies of Latour and Woolgar. It aims to allow for: a deeper understanding of the extent, if any, to which commercial imperatives may alter the nature of forensic analyses; identification of examples of best practice in forensic DNA analysis and evaluation; a greater appreciation of the respective strengths and weaknesses of public and private models of forensic science provision; and a richer understanding of the ways in which innovative and customer-focussed business models may benefit (or disbenefit) the criminal justice system.

## The construction of DNA profiling evidence



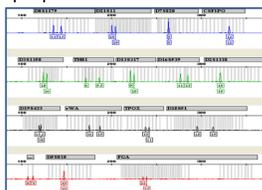
1. Selection and Sampling

The construction of DNA profiling evidence begins at the earliest stage of a criminal investigation. Police officers collect particular items of evidence in accordance with both investigative protocols and their own experience. Crime scene technicians begin the process of turning the physical, material scene into what Latour (1987; 1989) and other STS scholars call 'inscriptions' i. e. written traces.



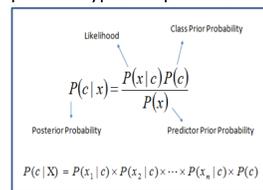
2. Commission analyses

Once the evidence has been collected, it is stabilised, and moved to the laboratory. The forensic science laboratory is a crucible in which evidence is further constructed and translated into a tangible product for consumption within the courtroom. It is here that source materials are converted into statistical data, and where traditional scientific methods for legitimising truth claims vie with economic imperatives and standardised practices. Scientific method is applied to source material through the Bayesian approach. This form of inferential reasoning is organised around the production of 'likelihood ratios' from pairs of propositions. The forensic scientist constructs these propositions, which correspond to typical explanations.



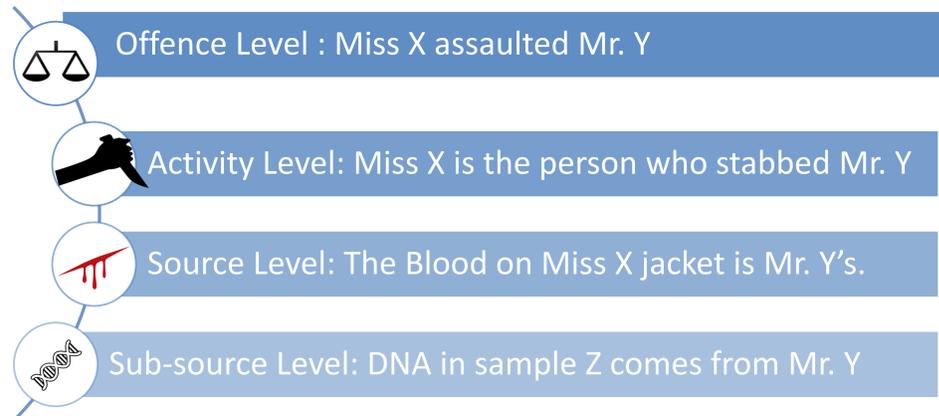
3. PCR Amplification

Since the Bayesian approach is wholly dependant on background information, and invites the scientist to ask a particular set of questions regarding the object of analysis, the scientist becomes reliant on the police or prosecutor to provide the necessary context. This process of construction, communication, and representation, is known as Case Assessment and Interpretation (CAI).



4. Bayesian analysis

## The Hierarchy of Propositions



The answers which the scientists may derive from a DNA analysis depend on the questions that (s)he asks. These questions – or Bayesian propositions – fall into four major categories, which together form a 'hierarchy of propositions': Sub-Source (Level 0), Source (Level I), Activity (Level II) and Offence (Level III). Level 0 and I propositions are made from observations, measurements and analyses. The prosecution proposition will be determined from a comparison between two samples, and the defence proposition will be determined by considering one of these samples in reference to an external population (such as the allele proportions in a reference database).

Level II propositions relate to activities. They too are based on observations, measurements and analyses. However, in order to construct an activity proposition the scientist must take account of the circumstantial framework. The scientist will need to exercise judgement in relation to the construction of Level II propositions and will require as much information as possible regarding the circumstances of the case. This will entail some degree of interaction between the forensic scientist and the investigator or prosecutor. Level III propositions relate to the ultimate probandum. The scientist may address this question but must not attempt to answer it. In order to address higher level propositions, the scientist requires additional skill, thinking time and contextual information. Communication with the investigative authorities is therefore key.

**DNA: 'God's signature' or 'weakest link'?** While accurate scientific determinations can be arrived at in terms of source attribution - with probabilities expressed in the order of 'one billion to one' - analyses relating to activity level attributions are not correspondingly accurate. Indeed, source-level attributions may be completely neutralised by activity level explanations. Attribution does not denote activity and there are currently no reliable data on DNA 'transfer and persistence.'



## The reconstruction of forensic expertise

The study shows a strong link between the introduction of measures of economic rationalisation and a reduction of thinking time and contextual investigation on the part of the scientist, leading to a marked tendency to triage cases and to avoid activity-level analyses. The study also shows significant differences in roles and working practices between the public and private sector (the latter marked by de-skilling and regulatory objectivity). The study supports the view that the ultimate goal of economic rationalisation of forensic expertise has not been commoditisation. Rather, it has been based around the reformation of attitudes and behaviours in conformation with 'economic rationality'. Within the forensic science sector, such processes have led to a disruptive crisis of governmentality, brought about by a confrontation between the relational needs of forensic experts, and the realities of legal fact-finding. Thus, marketisation and commoditisation have served to disrupt 'expert' forensic networks, but the ultimate purpose of such disruptive interventions has been to render techno-social networks open to economic reforms aimed at reconstructing the roles and identities of individual forensic scientists themselves.

## Selected Publications

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## Contact

Karen Richmond LLB(Hons), LLM, DFMS, ACSFS  
karen.richmond@strath.ac.uk

Faculty of Humanities & Social Sciences  
Lord Hope Building  
141 St. James's Road  
Glasgow G4 0LT