

Response to House of Lords inquiry on forensic science

Prepared for the 2018 UK House of Lords Science and Technology Committee's inquiry into forensic science
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by Dr Geoffrey Stewart Morrison

Associate Professor of Forensic Speech Science, Aston University

Director and Forensic Consultant, Forensic Evaluation Ltd

Member, British Standards Institute Committee on Forensic Science Processes

Member, British Standards Institute Committee on Biometrics

<http://geoff-morrison.net/>

1. All opinions expressed are my own personal opinions and do not necessarily represent the opinions or policies of any organizations with which I am affiliated.

Understanding and use of Forensic Science in the Criminal Justice System

2. The following paragraphs are in response to questions 3 through 6, but there is not a one to one relationship between paragraphs and questions.
3. In contrast to what might be inferred from the 2016 Home Office *Forensic Science Strategy*, and elsewhere, forensic science is not only the application of existing science and technology to criminal investigation and court proceedings. Forensic science is itself a coherent unified discipline, with a key unifying component extending across apparently disparate areas (DNA, fingerprints, footwear, etc.) being forensic inference and statistics. Although in practice different areas remain to a large extent siloed and some areas are progressing more slowly than others, there is an ongoing paradigm shift applicable across all areas of forensic science. The paradigm shift is away from untested subjective opinion toward the adoption of procedures based on relevant data, quantitative measurements, and statistical models, procedures that are transparent, resistant to cognitive bias, empirically validated under casework conditions, and that produce logically correct evaluations of strength of evidence in the form of likelihood ratios.
4. An essential component of the evidence base is the availability of data that are sufficiently representative of relevant populations and sufficiently reflective of casework conditions. Such data are necessary for training statistical models that calculate likelihood ratio values as meaningful answers to questions of interest to the court in the particular case, and are also necessary for empirically validating the performance of forensic analysis systems such that the results of the validation tests will be informative as to how well the system is expected to work under the conditions of the particular case. Both would be necessary in order to meet the admissibility criteria set out in section 19A of the Criminal Practice Directions [2015] EWCA Crim 1567. The amount of data must also be adequate to achieve robust training and convincing

validation results. Suitable data is not readily available in all areas of forensic science. In some areas, relevant populations and conditions vary substantially from case to case, and data collection is expensive. Substantial funding is needed to build databases that will enable both research and casework to be conducted.

5. Another essential element of the evidence base is the development and implementation of quantitative measurement techniques and statistical modelling techniques applied in specific areas of forensic science. In some areas substantial advances in research and development have been made but there have been financial and cultural obstacles to the transition to implementation in practice. In some other areas, relatively little research has been conducted to date. Substantial funding is necessary for research on quantitative measurement techniques and statistical modelling techniques applied to specific areas of forensic science and for the transition to the implementation of those techniques in practice.
6. Adequate understanding of forensic inference and statistics, and particularly the likelihood ratio framework and empirical validation, is often lacking among forensic practitioners, lawyers, and members of the judiciary. This was highlighted at several points on the 2015 Government Chief Scientific Advisor's report *Forensic Science and Beyond* (see pages 20, 26, 28, 50–52), and paragraph 3 of the 2016 House of Commons Science and Technology Committee report on *Forensic Science Strategy* echoed their 2005 report's call for better training of judges and lawyers in forensic evidence, and for improvement in the presentation of scientific and statistical evidence to juries. More training in understanding of the likelihood ratio framework and of empirical validation should be made available, and forensic practitioners, lawyers, and members of the judiciary should be encouraged to avail themselves of such training. If the professional actors in the courtroom had a better understanding of these topics, then this should lead to less confusion and better understanding by triers of fact (including lay juries) of the degree of validity of forensic analyses and the meaning of the results of forensic analyses. I do not believe that provision of written materials or online training will suffice. I believe that live interaction with knowledgeable and experienced trainers will be necessary to be effective. The Netherlands Forensic Institute appears to have had some success in providing such training for the judiciary in the Netherlands. Research is also needed in how best to communicate the results of forensic analyses to triers of fact, including lay juries, via pre-trial training and/or in the presentation or testimony (only a limited amount of research has been conducted in this area so far).

Standards and regulation

7. In response to question 9, the Forensic Science Regulator should be given statutory powers to prevent testimony from being presented in court where it is logically flawed, overly susceptible to cognitive bias, or based on procedures and techniques that have not been adequately validated. The Forensic Science Regulator should be able to act irrespective of whether the provider of forensic testimony is an accredited laboratory or not. Ultimately case by case decisions with respect to admissibility are likely to remain within the discretion of the court, but a positive or

negative report from the Forensic Science Regulator would be expected to carry substantial weight in the court's decision.

8. In response to question 11, the *Forensic Science Strategy* produced by the Home Office in 2016 is not suitable with respect to it not making an adequate provision for sustainable research and development. What might constitute an adequate provision is discussed below.

Forensic Science research landscape

9. The following paragraphs are in response to questions 12 through 14, but there is not a one to one relationship between paragraphs and questions.
10. In paragraphs 3 through 6 above, I outlined a number of research and development needs related to forensic inference and statistics applicable across multiple areas of forensic science, particularly in relation to collection of relevant data, development and implementation of quantitative measurement techniques and statistical modelling techniques, and in relation to communicating forensic analysis results to the courts.
11. The Forensic Science Service was a world leader in research and development in forensic science, including in forensic inference and statistics. As reported in paragraph 34 of the 2016 House of Commons Science and Technology Committee report on *Forensic Science Strategy*, the Forensic Science Regulator believes that since the closure of the Forensic Science Service there has been a decline in the amount of forensic science research conducted in the UK, particularly because forensic science research often does not offer a commercial return on investment and because it is difficult to obtain funding for forensic science research from traditional academic research funding sources. Key metrics by which university employers assess academic researchers' performance are external research funding obtained and peer-reviewed journal articles published. A key criterion for obtaining traditional academic research funding and for publishing in peer-reviewed journals is innovation. Forensic science research often focusses on applying existing science and technology to forensic problems and on empirical validation under casework conditions, foci which the granting agencies' and journals' reviewers often do not perceive as innovative. Problems with research funding are described in the 2015 Government Chief Scientific Advisor's report *Forensic Science and Beyond* (see pages 28, 177–178) and in chapter 3 of the 2016 House of Commons Science and Technology Committee report on *Forensic Science Strategy*.
12. Paragraph 33 of the 2016 House of Commons Science and Technology Committee report on *Forensic Science Strategy* reports Professor Silverman's observation that there is a mismatch between the experience of forensic science researchers and funding agencies' perceptions with respect to the availability of support for forensic science research. Few calls for applications for research funding are specifically targeted to forensic science research. A fundamental problem appears to be that funding agencies treat forensic science as applications of other scientific disciplines rather than as an independent discipline. Forensic science should be treated as an

independent discipline with substantial funding dedicated to forensic science research and applications for funding should be assessed with respect to criteria specifically relevant for forensic science not with respect to the criteria of other disciplines. Research UK should have a unit dedicated to forensic science research rather than calls potentially relevant to forensic science being distributed over multiple existing units. Calls should not be restricted to specific identified needs, there should also be calls that are open within the discipline of forensic science. Having only specific calls may lead to a focus on a limited number of topics with potential short-term benefit, whereas open calls will allow for funding of more fundamental and diverse research in forensic science that may have longer term benefit.

13. The research capabilities of the Forensic Science Service should be recreated (and potentially improved upon) via the creation of one or more forensic science research institutes. These institutes should be provided with stable ongoing funding guaranteeing secure career paths to forensic science researchers. The institutes should be in a position to recruit top researchers in forensic science from around the world. The institutes could be associated with universities, but should allow forensic science researchers to dedicate their time to research activities and to training Masters and PhD students to be future researchers. To achieve critical mass there should only be one research institute covering all areas of forensic science, or a small number of forensic research institutes each focussing on a subset of areas with the multiple institutes linked together in a coordinated network.