



## Editorial

## The ambition to be scientific: Human expert performance and objectivity

Forensic Science has a long history of trying to establish and strengthen itself as an accepted science in the courtroom. Recent criticisms of forensic science have greatly intensified these efforts. The criticisms have emerged from highly visible erroneous identifications and research demonstrating the subjectivity and biasability of forensic judgments, cumulating in a number of public and scientific inquiries that have been quite critical of forensic science.

The ambition to be scientific and objective is admirable and should be encouraged. Developing strict and detailed scientific methods and protocols, blinding examiners to potentially biasing irrelevant contextual information, statistical tools and measurement instrumentation that provide objective and accurate quantification, as well as best practices in collecting and analysing evidence – all based on data – are important and warranted steps in further establishing and strengthening forensic work as a science.

Science is a matter of fact, not opinion. Forensic science is comprised from a variety of domains, some of which are already quite objective and scientific, some are currently not but hopefully will be in the future, and other domains – by their very nature – may never be a matter for objective scientific methodology. Ideally all domains (not only across the forensic domains, but also medicine and others) will be purely scientific and objective. However, this is not realistic within our current knowledge and understandings. Whether it is an achievable goal for the (far) future or an idealized unattainable utopia, we should strive to increase objectivity and the scientific foundation and practices in the forensic sciences. Of course, it is not a dichotomy of either being a domain that is totally objective or one that is purely a matter of opinion. It is a continuum, where domains are more or less objective.

We must consider the implications and meaning that many forensic domains are (currently) not at the very end of the continuum of being objective and purely scientific. It seems that the drive and ambition to be a science has been so strong that it has caused (or will cause) to undervalue and underappreciate anything less than 'scientific facts', and make conclusions that are a matter of opinion seem unworthy.

Let us not underestimate and forget the value of subjective experienced-based expert opinion [1]. It can be accurate, valuable and make important contribution. All that is required is that forensic examiners present the limits of their conclusions in terms of subjective judgments and the extent to which they are not purely scientific. It is hard not to overstate the strength of the evidence and the power of your domain when you are involved in the case and are working within an adversarial system. Nevertheless, forensic examiners must not get 'sucked into' the culture of the adversarial system, they must rise above it and remember their role as forensic scientists.

It is not an easy task to weigh a piece of forensic evidence per se, when you are part of the investigative team, when you are brought in to help 'build a case against', when you take pride in helping to solve a case,

when your involvement in a case (in so many ways) goes well beyond evaluating a piece of evidence. However, and nevertheless, forensic examiners must give a balanced opinion to the court [2], and contribute to administering justice by explicitly pointing out the weaknesses and limitations of their conclusions as well as those of the domain itself.

It seems that the aspiration to be scientific may have caused (or will cause) to undervalue and underappreciate expertise that is not 'objective science' and a matter of fact. There are many expert domains that are far from objective and are nevertheless extremely valuable. Indeed, the human cognitive system is comprised with different decision making mechanisms. One is more 'objective', rational, and analytic, whereas the other one is more 'intuitive' and experience-based [3,4].

When opinion and subjectivity are involved, then the possibilities for error, contextual influences and biases increase, but:

1. These expert opinions can be valuable and make an important contribution to the court even when they are subjective and not purely scientific, a matter of opinion rather than fact (see the conclusion of the Public Inquiry that fingerprinting is based on "a series of subjective judgments on the part of the examiner" and concludes that "the decision is one of opinion, not fact" ([5], p 50, see also p 631, Key Recommendation 1 on p 740, and 'The subjective nature of fingerprint evidence' Recommendations on p 741)).
2. Acknowledging the subjectivity involved and understanding the cognitive nature of subjective decision making, enable to take steps to increase the value of those decisions (e.g., by taking simple counter measures that minimise contextual influences, biases, and the possibility of error; see [6]).
3. Even with quantification and statistical tools, the human element still plays a critical role, and therefore cognitive issues continue to play an important role even in the less subjective domains of forensic science. For example, sampling and determining what qualifies as 'data' to be used as input to the instrumentation and statistical models are highly influenced by motivational and expectation biases. Thus, even the more scientific and objective domains are required to address issues of contextual influences and other cognitive forensic issues.

Forensic science seems to be in a bit of a bind: In its attempt to be 'objective' and scientific, forensic examiners are put on a pedestal that undermines a lot of important and valuable forensic work. The ambition and drive to be an objective science are not bad things, on the contrary, they are good to strive for – whether they are fully achievable or not, they advance and improve the domain. However, there is a lot of scope for forensic expert opinion that is legitimate, powerful, and can make contribution to the criminal justice system.

The difficulty and challenge are two fold: First, how to evaluate forensic opinion, and second, how to maximise its value and strength.

As per evaluating forensic opinion, it requires examining the strength of the conclusions. There are a variety of ways to achieve that, ways that are based on the experts' actual performance (rather than relying on the fact that they have certain training or experience). For example, ability and performance accuracy can be quantified by black-box competency testing. That is, examiners' opinions may be shown to be correct, even if they are opinions, even if one cannot demonstrate that they are derived from an objective and purely scientific methodology.

A major concern in forensic science is that two distinct aspects of forensic work are often intertwined. One is carrying out the actual work, whereas the other is presenting it in court. The problem of overstating the strength of the findings (and the domain in general) has already been discussed earlier. Another issue is that scientific matters and the limits of the domain (and the ability of the examiner) are evaluated and determined in court. This is problematic, because:

1. The courtroom is not the best place (to say the least) to do science and to establish the limits of the domain and the ability of the examiner. These evaluations should be done by the appropriate scientific and professional bodies.
2. Many forensic examiners are too focused on the court's evaluations and determinations. Often I hear debates where the examiners say that "it is accepted by the court", and this is their main (if not only) concern. That is, if the court accepts something, they accept it too. Hence, they are concerned with the court's determinations, rather than the actual content and merit of the issues at hand.

As per maximising the value and strength of forensic opinion, it requires to understand the cognitive underpinning of expertise. Understanding the 'paradox' that as we become experts, we are more susceptible to contextual influences and bias because we take more 'short-cuts', rely on past experience, attend to information more selectively, and a whole range of cognitive mechanisms that make up expertise [7].

Once we understand cognitive architecture, and the strengths and weaknesses it entails, then we can develop practical best practices. An ongoing debate about forensic science reveals that there are examiners that do not fully appreciate and understand the cognitive issues and the needed best practices – this is neither a surprise nor a criticism: they are forensic scientists, not cognitive scientists. For example, we dispute the examiners' view that they should be allowed to "read investigative reports or talk to investigators before or while they examine a case" just because "such interest merely provides

some personal satisfaction which allows them to enjoy their jobs without actually altering their judgment" [8] (see [9] for the debate on this, as well as other cognitive forensic matters).

By realising that forensic examiners are the instrument of analysis in many forensic domains (and play an important role across forensic domains), we acknowledge the need (and opportunity) for cross-discipline collaborations between cognitive and forensic scientists. The contribution of cognitive scientists can help advance the objectivity of forensic science, and when that is not possible, then to help find ways that enable the best possible subjective expert opinions. The past few years have seen the forensic community take significant and impressive steps in this direction. The hope is that in the future continued collaboration and cooperation between forensic and cognitive scientists will further contribute and advance forensic science.

## References

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