

# *The Cool Crucible: Forensic Science and the Frailty of the Criminal Trial*

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## *Abstract*

Recent developments overseas and in Australia have thrown into question the assumption that the incriminating expert opinion evidence (ie forensic science and forensic medicine) relied on, routinely, in criminal trials is epistemologically robust. At the same time, scepticism about the efficacy of traditional safeguards has been rendered more acute when considering the capacity of the criminal trial to effectively manage incriminating expert evidence in a manner that genuinely reflects commitments to a fair trial. Against this background, this article provides a succinct overview of some of the current concerns and limitations both of traditional adversarial safeguards and more contemporary tailored attempts to manage incriminating forensic science. Taking into account that much incriminating expert evidence is either unreliable or of unknown reliability, this article suggests that courts need to be willing to adopt a more exclusionary orientation towards incriminating forensic science and medicine evidence, and develop new mechanisms, responsive to empirical research, to manage such evidence during criminal proceedings.

## **1. The accusatorial trial, safeguards and scientific evidence**

Now, Mr Proctor, before I decide whether I shall hear you or not, it is my duty to tell you this. We burn a hot fire here; it melts down all concealment.

Deputy Governor Danforth  
*The Crucible: Act III*

This article succinctly reviews some of the limitations and problems with the ways in which adversarial (or common law) systems have attempted to manage incriminating expert opinion evidence at trial — either via specific constraints on the admission, form and use of expert evidence, or via the reliance on traditional adversarial safeguards, such as cross-examination, the use of rebuttal experts and judicial directions. While the scientific and technical evidence routinely relied upon for criminal prosecutions is widely believed to be epistemologically robust, recent investigations question the value of many forms of forensic science and medicine evidence, and suggest that the criminal trial and its various

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personnel struggle to deal effectively with expert evidence (eg Saks and Koehler 2005; Saks and Faigman 2008; Edmond and Roach 2011; Garrett 2011).<sup>1</sup>

This article is informed by these critiques, as well as recent and authoritative revelations about fundamental problems with many types of forensic science and medicine, particularly comparison and identification techniques (National Academy of Sciences (NAS) 2009; Thompson 2009; Edmond 2011a). Remarkably, there are good reasons to believe that a significant proportion of the incriminating expert opinion evidence adduced in criminal trials is either unreliable or of unknown reliability. Alongside these emerging critiques, this article explores complementary, and frequently empirically-derived, evidence about the limits of trial safeguards and the weakness of revised admissibility standards, including those predicated upon reliability (Cheng and Yoon 2005; Edmond 2008; Findley 2008; Garrett 2011). In offering a broad review of the failures of the conventional accusatorial (or adversarial) trial in relation to incriminating expert opinion evidence, this article draws upon several years of observations of criminal trials and processes, particularly those in New South Wales (NSW) involving forensic comparison evidence (Edmond 2011a). In conjunction with recent and authoritative criticisms of the forensic sciences more generally, the arguments in this article, while grounded in an understanding of the weaknesses of the conventional accusatorial trial in relation to incriminating identification and comparison evidence, can be extended to apply to many other forms of forensic science, including forensic medicine (Cunliffe 2011; Goudge 2008; Edmond and Roberts 2011).

Conventionally, criminal trials are portrayed as truth-seeking processes aspiring to do ‘justice in the pursuit of truth’ (Ho 2008; see also Bentham 1827; Twining 1990; Jackson and Summers 2012).<sup>2</sup> We contend that expert opinion evidence that is unreliable or speculative (ie of unknown reliability) does not assist the rational assessment of fact and the pursuit of truth — in the form of guilt or non-guilt.<sup>3</sup> While many jurisdictions have embraced (eg US federal courts) or are poised to embrace (eg England and Wales) formal reliability standards for the admission of expert opinion evidence, it is important to recognise that these standards have not exerted a consistent (or even clearly discernible) effect on admissibility decision-making in criminal proceedings (Law Commission of England and Wales 2011). Under weak admissibility regimes, including some with standards stipulating ‘reliability’, many questionable scientific techniques and speculative opinions continue to be admitted and relied upon at trial (and on appeal) (NAS 2009; Thompson 2009; Cole, Cunliffe and Edmond 2011; Edmond 2012a). While we are proponents of reliability-based admissibility standards, there would seem to be a conspicuous need for further refinement and greater vigilance to make these standards effective (Edmond and Roach 2011).<sup>4</sup> Judges in all accusatorial jurisdictions appear, to

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<sup>1</sup> Though primarily oriented to the Australian accusatorial trial, and drawing on examples from New South Wales (NSW) and the *Evidence Act 1995* (NSW), many of the arguments apply *mutatis mutandis* to other adversarial jurisdictions. This article does not discuss inquisitorially oriented procedures, and while the authors doubt whether they are (consistently) superior, it may not be culturally and institutionally insignificant that many of the major critiques of forensic science and medicine in recent decades — often applicable to techniques and practices in civil law jurisdictions — emerged in the United States (US).

<sup>2</sup> There are prominent counter-narratives, such as the rules of evidence prevent the truth coming out, common amongst police and critics of admissibility rules (eg Laudan 2005).

<sup>3</sup> While the focus of this article is on the specific admissibility criteria attached to expert opinion evidence and trial safeguards, it is worth noting that opinion evidence that is not reliable may not be relevant. All common law systems require evidence that can rationally influence the assessment of facts in issue (see *Evidence Act 1995* (NSW) ss 55, 56).

<sup>4</sup> It might, in addition, be argued that those accused of criminal acts should be entitled to adduce weaker forms of expert opinion than the state because of the particular concern with not convicting the innocent. More robust

varying degrees, to be overly receptive to expert opinion evidence adduced by the state. In circumstances that would seem to create a pressing need for the exclusion of incriminating expert opinion evidence that is not demonstrably reliable, judges seem to be largely oblivious to problems with opinion evidence produced by the institutionalised forensic sciences.<sup>5</sup>

Part of the reason for inclusive approaches to incriminating expert opinion evidence is the general commitment to the admission of evidence, that is often assumed to be relevant and probative, along with faith in both the effectiveness of trial safeguards and the capability of lay fact-finders. While it is appropriate to acknowledge the potential for trial safeguards to expose limitations with expert opinion evidence, it is more important to appreciate that actuating this potential seems to be the exception rather than the rule.<sup>6</sup> Current (ie inclusive) approaches to the admissibility of opinion evidence rely on the belief — ie an article of judicial faith — that trial safeguards are routinely effective, and that limitations and weaknesses with expert opinion evidence will be identified and conveyed by lawyers and judges, and understood by a (properly directed) jury. This article challenges such beliefs. It argues that the accusatorial trial is consistently failing to utilise incriminating expert opinion evidence in ways that are consistent with espoused criminal justice values and aspirations.<sup>7</sup> Rather than being attentive to emerging (though in some instances long standing, eg Hand 1901) concerns about the efficacy of trial safeguards, current practice *assumes* that trials, including those involving quite complex arrays of evidence, will, in most cases, provide an adequate forum in which to identify and convey what are often subtle, though potentially significant, methodological and statistical issues affecting the value of expert opinions. If, however, trial safeguards, both individually and in combination (and appeals) turn out to be relatively weak, if admissibility practice is, at best, inconsistent and unprincipled, and specific interventions directed towards managing expert evidence are generally inadequate — then, notwithstanding some lofty rhetoric, accusatorial criminal trials may be far less effective in achieving espoused goals than most legal practitioners would have us believe.

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admissibility jurisprudence would, however, reduce many of the problems; in many cases eliminating the need for the defence to locate, fund and adduce speculative rebuttal evidence.

<sup>5</sup> It is striking, for example, that (as of April 2012) there have been no references in Australian judgments to the 2009 NAS Report referred to above, even in recent cases (such as *Morgan v The Queen*, *Wood v The Queen* and *Aytugrul v The Queen*) where there have been relatively robust challenges to the reliability of the expert forensic science and medical evidence adduced by the Crown.

<sup>6</sup> It is also worth noting that admissibility decision-making can be an important, and often decisive, component of trial practice in a broader sense. With the vast majority of cases being resolved before trial, a perception of an accommodating orientation to incriminating expert opinion evidence has the potential to influence and shape charge negotiation and plea bargaining. It is striking that while *The Crucible* is often perceived as a ‘courtroom drama’, none of the critical action occurs within the Salem courtroom proper (Miller 2000).

<sup>7</sup> While the criminal trial is intended to convict those guilty of the commission of criminal offences, simultaneously premiums are placed on liberty, innocence and fairness (eg *Federal Rules of Evidence* (US) r 106; Edmond and Roberts 2011; Jackson and Summers 2012). The burden and standard of proof (ie beyond reasonable doubt) and many rules and procedures (such as admissibility rules, confrontation, cross-examination and the provision of legal assistance) are intended to prevent the conviction of the innocent and to prevent criminal processes being substantially unfair to the parties — particularly those who stand accused.

## 2. Myths about practice and trial safeguards

### A. Admissibility standards, judicial discretions and weight

In most common law jurisdictions, expert opinion evidence is admitted as an exception to the general proscription on opinion evidence. Notwithstanding exclusionary rules and suggestive criteria (such as the references to the need for ‘specialised knowledge’), in the majority of cases judges are likely to admit incriminating expert opinion evidence and leave questions about its value (or ‘weight’) for the tribunal of fact to determine at trial (Cole, Cunliffe and Edmond 2011).<sup>8</sup> These decisions transfer assessment of expert opinion evidence from pre-trial — where reliability might be explored independently from the other (incriminating) evidence and away from the jury — to the trial where attributions of ‘weight’ are not merely complicated by other evidence, a range of representations and instructions, but are not necessarily framed by concerns with reliability (or ‘trustworthiness’). The actual epistemic value of techniques and opinions should be carefully considered prior to their admission.

Judicial reluctance to exclude incriminating expert opinion evidence extends to judges in jurisdictions with formal reliability standards (following *Daubert v Merrell Dow Pharmaceuticals Inc*) as well as those with more traditional common law formulations — concerned with formal qualifications, experience, the existence of fields, levels of acceptance, and whether the evidence is perceived as helpful or necessary (eg *R v Turner*, *R v Atkins*, *Clark v Ryan*, *R v Bonython* and *R v Mohan*). The reluctance to exclude questionable incriminating expert opinion evidence seems to be driven by traditions, institutional pressures and ideology, and the assumption that any limitations will be conceded by witnesses or identified and conveyed by lawyers and the trial judge and understood by the tribunal of fact. Particularly problematic is the way that ‘experience’ operates to provide a pathway for the admission of opinion evidence based on questionable techniques, presented by persons whose actual abilities (as opposed to any formal qualifications) are often unknown.

In the absence of empirical studies or demonstrable evidence of ability, prosecutors, forensic scientists and judges frequently rely on the experience of the witness as a foundation for the admission of opinion evidence. This trend is clearly exemplified in jurisdictions that recognise ‘ad hoc’ expertise, based on experience (often derived in the course of the investigation), as an adequate basis for the admission of opinion evidence (Edmond and San Roque 2009), but is not limited to such cases (see eg *R v Leung and Wong*, *Murdoch v The Queen*, *R v Li*, *R v Tang* and *Morgan v The Queen*). This may be comprehensible — though not excusable — in jurisdictions where there is recognition of ‘experience’ as a basis for the admission of expert opinion evidence based upon ‘specialised knowledge’ (eg *Evidence Act 1995* (NSW) s79(1)). Nevertheless, in considering not just the admission of evidence grounded in ‘ad hoc’ experience, but forensic comparison techniques more broadly, when it comes to assessing the admissibility of a technique and derivative opinion, the experience of the analyst, per se, should not be sufficient to overcome the failure to systematically study the technique in circumstances where the correct answers (ie ‘ground truth’) are known so that validity and reliability can be ascertained (Tangen, Thompson and McCarthy 2011; Edmond et al 2009).

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<sup>8</sup> In NSW this orientation is in many respects determined by the dominant approach to the interpretation of both s 79 and s 137 exemplified in the decisions of *R v Tang*, that explicitly rejects the need for the judge to consider questions of reliability, and *R v Shamouil* that requires the trial judge to assess the value of the evidence, ‘taken at its highest’ in deciding whether to exclude evidence that is unfairly prejudicial (Odgers and Smith 2010).

Experience cannot and should not overcome the failure to test — especially where techniques are used regularly. This is important, because in many areas of forensic science (and forensic medicine) the state has a monopoly on experienced individuals. Curiously, these experienced individuals, recognised legally as experts, have not always endeavoured to assess their techniques or their abilities. Rather, on securing admission to the trial, too often they have preferred to adhere to unsubstantiated claims about the value of their experience and legal recognition as evidence of reliability, and even used admissibility determinations as self-serving, if somewhat disingenuous, justifications (see *R v Atkins* and Edmond et al 2010).<sup>9</sup> Here, the system improperly supports the speculative opinions of witnesses, prematurely recognising them as ‘experts’ without requiring them to demonstrate the reliability of techniques or personal proficiency.

Experience is an essential component of expertise (Ericsson et al 2006). However, too much incriminating expert opinion evidence is admitted on the basis of witnesses’ experience (and past success in securing convictions). We do not want to imply that experience is without value, but rather to challenge the contention that an individual’s experience — as opposed to systematic assessment — is capable of grounding the admissibility of techniques. Experience is of value when it comes to the application of techniques that are demonstrably reliable.<sup>10</sup>

Finally, in relation to the protections that admissibility standards ought to provide, when called upon to apply exclusionary discretions (eg *Evidence Act 1995* (NSW) ss 135, 137 and *R v Christie*), judges have been reluctant to consider the actual value of incriminating techniques and opinions. Mandatory and discretionary exclusions are rarely used to exclude evidence on the basis of the danger of unfair prejudice to the accused, misleading the jury or wasting time and resources (Edmond 2008; Smith and Odgers 2010). As indicated, judges have tended to defer to whatever value (or weight) the jury might assign after the evidence has been refined through the crucible of the trial, rather than seek or consider experimental studies, research publications or proficiency testing, thereby circumventing the need to carefully scrutinise reliability (and, therefore, actual probative value).

### ***B. Cross-examination***

Empirical studies, reviews of innocence project cases, the NAS Report, and the ethnographic observations that inform this article all suggest that in many cases cross-examination appears to be ineffective in exposing (let alone conveying) methodological weakness, exaggeration or even fraud (Garrett 2011; Edmond 2011a).<sup>11</sup> Following a review of the empirical literature McQuiston-Surrett and Saks (2009:439) recently concluded that:

studies have found little or no ability of cross-examination to undo the effects of an expert’s testimony on direct-examination, even if the direct testimony is fraught with weaknesses and the cross-examination is well designed to expose those weaknesses. ... it is unlikely that defence cross-examination will reduce the impact of the forensic expert witnesses’s direct testimony.

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<sup>9</sup> The admission of facial and body mapping evidence being a particularly striking case in point: see Edmond et al (2009) and *Morgan v The Queen*.

<sup>10</sup> A surprisingly large number of forensic scientists do not have formal scientific training (or advanced research experience or degrees) and, consequently, cannot be expected to undertake technique development and assessment: see Cole (2010) and Mnookin et al (2011).

<sup>11</sup> Cross-examination is, after all, often seeking to elicit concessions or modify or repair claims made in reports or examination-in-chief.

When it comes to expert opinion evidence, many adversarial skirmishes appear to be perfunctory, misconceived or deliberately misleading. Advocates, and particularly defence lawyers, frequently focus their attention upon the chain of custody, conflicts of interest and witness credibility, rather than more fundamental methodological and interpretive issues (Findley 2008; Garrett and Neufeld 2009; Lynch et al 2008). Plausible sounding responses and appeals to experience and personal authority often mark the practical limits of cross-examination. Confronted with incriminating expert opinion evidence, particularly in the context of jurisdictions with accommodating admissibility standards, (under-resourced and overworked) defence lawyers are often ill-equipped to convey methodological weaknesses, and may elect to focus their energies upon other aspects of the case.

Even where cross-examination is sophisticated, informed and *apparently* effective, it is not obvious that its deconstructive potential will be appreciated by the tribunal of fact or trial and appellate judges (Jasanoff 1995; Lynch 1998; compare Edmond 2011b). Moreover, the utility and efficacy of cross-examination in exposing unreliable or even speculative scientific and medical evidence may be undermined by other aspects of a prosecution case that may function — deliberately or otherwise — to overcome, buttress or disguise fragility or even error in incriminating expert opinions.

### C. *Rebuttal experts*

Like cross-examination, the use of rebuttal experts trades on a symmetrical commitment: the idea of ‘a level playing field’.<sup>12</sup> Just as the accused is entitled to cross-examine the state’s expert witnesses (usually through counsel), so he or she can adduce expert opinion evidence (or advice) to assist with the preparation of the case or to challenge (or rebut) incriminating expert opinion. The trial and its shadowlands are not, however, finely balanced. Not only is the state far better resourced, but the state has a near monopoly on many types of expertise and often is the only party able to test or analyse the evidence (and any crime scene). State employees almost always collect the samples and traces, or conduct the assays and tests, that ground expert opinions. The collection and testing of traces is often oriented to the suspicions of crime scene officers and investigators, and not necessarily (or only serendipitously) oriented to examining versions of events consistent with non-guilt. The state has access to vastly greater resources, a much larger pool of experts (at earlier stages), continuing access to traces and exhibits, expert witnesses and consultants — including very experienced individuals from other jurisdictions.<sup>13</sup>

The state has the opportunity to incorporate apparently objective expert opinion evidence seamlessly into its narrative of guilt. Moreover, the state’s experts are ordinarily state-employed forensic scientists and/or forensic pathologists who tend to have considerable experience in investigations and prosecutions. Investigative experience and previous legal appearances tend to make them reasonably resilient in the witness box — particularly in response to uninformed cross-examination — and their routine involvement in investigations tend to be portrayed as impartial — even when they proffer speculative opinions, fail to concede limitations and do not disclose dissensus. Prosecution expert witnesses will often bootstrap their opinions and credibility by rehearsing the number of occasions in which they have previously been permitted by courts to testify in serious criminal proceedings (eg *R v Pera*, *R v Kaliyanda*, *R v Alrekabi* and *Murdoch v The Queen*).<sup>14</sup>

<sup>12</sup> See also the discussion of ‘equality of arms’ in Jackson and Summers (2012).

<sup>13</sup> For example, in the recent Queensland case of *R v Sica*, the Crown was able to lead evidence from an ‘expert’ witness from Canada about sock prints on carpet, despite the fact that his opinion evidence had been excluded by the Ontario Court of Appeal in *R v Dimitrov*.

<sup>14</sup> This is a curious inclusion in expert reports.

Rebuttal experts, in contrast, enter proceedings in markedly different circumstances. Except where the accused is well resourced, counsel must seek approval for any expenditure (often incrementally). In addition to continuing negotiations around funding, rebuttal experts are often unable to undertake their own tests, because samples are depleted or because they are not funded or equipped to do so. They tend to be dependent on the practices, performances and disclosure of state investigators, experts and prosecutors. In consequence, they often assume the responsive role of critic, rather than constructive proponent of exonerating evidence. Unlike prosecution witnesses, their opinions are not usually supported by other forms of evidence or aspects of the case, let alone integrated into a coherent narrative. In many cases, an expert called by an accused may provide the only evidence in the defence case.

In contrast to the presumptively impartial forensic scientist, employed by and appearing on behalf of the state, the rebuttal expert will often be an independent consultant or academic — perhaps with no previous forensic experience. They will tend to testify in ways that support the accused and may be paid specifically for this contribution. The manner in which they appear in the trial, perhaps as the only witness called in the defence case, means that it is much easier to characterise their input as interested or partial, regardless of the quality of their evidence (eg *Bropho v State of Western Australia*).<sup>15</sup> Moreover, they will often lack the forensic and investigative experience of the state's experts, even when their formal qualifications, experimental abilities and methodological sophistication are vastly superior (see eg *R v Weller*). Rebuttal experts may be able to address validity and reliability issues, but this is in the context of a response to expert opinions solicited by the state and admitted and endorsed by its courts. Such evidence may even be regarded as irrelevant; especially where confined to methodological critique (eg *R v Madigan* and *R v Weller*).<sup>16</sup> Even where rebuttal experts are admitted, and raise pertinent issues and problems — that would be widely, and perhaps universally, accepted among (non-forensic) scientific communities — there is no guarantee that they will be recognised or accepted, let alone understood, by the tribunal of fact. Admissibility, in and of itself, would seem to imply that incriminating opinion evidence is, at the very least, good enough to support conviction (see eg Schweitzer and Saks 2009). Furthermore, the presence of a defence expert can, in some cases, serve to support the prosecution's expert and the legitimacy of proceedings by providing the appearance of balance and suggesting the existence of a 'field', at the expense of a genuine investigation into reliability (Edmond and Roberts 2011).

#### ***D. Judicial directions and the hamstrung jury***

Finally, judicial directions, warnings and instructions (to the jury) are unlikely to overcome jury impressions of the evidence, the synergistic interactions between different pieces of evidence, strategic representations of the evidence, and the overall case (or narrative).<sup>17</sup> Most of the empirical evidence suggests that directions, warnings and instructions tend to be

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<sup>15</sup> Experts called by the prosecution may be partial. Often they will be routinely, and problematically, embedded in the investigation and exposed to information that is prejudicial to the accused, but irrelevant to their analysis (eg Dror, Charlton and Peron 2006). The point is that they are much less likely to be perceived as partial, and it is perhaps only in exceptional cases, eg *Wood v The Queen*, where this lack of impartiality will be made visible.

<sup>16</sup> Judges in the US, for example, seem more willing to exclude expert opinion evidence adduced by plaintiffs in civil cases (before juries) than opinions derived from questionable forensic science and medical techniques relied upon by the state. Judges in all jurisdictions seem to be more discriminating in response to defence proffers to expert evidence in criminal trials (Risinger 2000).

<sup>17</sup> This article cannot address competence of the jury in detail, and, notwithstanding, the concerns raised about the inefficacy of directions, we are not arguing for the commonly aired 'solution' to keep cases involving expert opinion evidence away from the jury, in part because such a response is based on the untested assumption that judges are better placed to assimilate the methodological complexities.

ineffective or of limited efficacy (Lieberman and Sales 1999; Ogloff and Rose 2005; Martire and Kemp 2009; NSW Law Reform Commission 2008). Jury (and to a lesser extent judicial) abilities are practically undermined by their passive roles. In addition to their own technical and cognitive limitations, juries, trial and appellate judges are highly dependent on what is presented to them by lawyers and expert witnesses. Where cross-examination and even rebuttal experts have not adequately identified limitations, actual problems are unlikely to be presented to the jury. Even where issues are identified, conventional directions to the jury are derived from relatively abstract bench books, drawing on judicial and institutional ‘experience’, impressions and ‘common sense’, and are rarely informed by relevant scientific research. Rehearsing problems in superficial terms in closing addresses, without the benefit of empirically-derived insights, is unlikely to provide a jury with meaningful guidance as to how to approach their task of evaluation (Edmond, Martire and San Roque 2011a).

Critically, though understandably, appellate review responds to what transpired during the trial.<sup>18</sup> Appellate courts have very limited information about what the jury understood or the actual basis for its decision. Appeals are primarily concerned, for example, with issues such as whether judicial warnings were necessary and legally adequate rather than whether they capture and convey what is actually known beyond the courts or have any practical effects on decision makers (Edmond 2011c).<sup>19</sup> Thus, a good deal of appellate work involves reviewing trials in terms of formal, rather than substantial, fairness. That is, appellate courts tend to adopt something of a checklist approach — that necessarily assumes the jury understood all evidence and any instructions — rather than a detailed qualitative assessment that might be informed by contemporary empirical insights, which compounds the misplaced confidence in directions as both the primary and most appropriate response to weak or problematic opinion evidence (Edmond, Martire and San Roque 2011b).

### 3. (Other) obligations and interventions

#### *A. Ethical obligations on lawyers: Prosecutorial restraint and other duties*

In this section it is our intention to consider another dimension, beyond the more familiar discussion of the frailties of the adversarial trial and its ability to protect defendants from the admission of unreliable incriminating ‘expertise’. The emphasis on symmetry (or ‘balancing’), the use of rebuttal experts, as well as deference to the jury all tend to obscure prosecutorial obligations to present evidence that can be rationally and fairly used by the tribunal of fact. Even in jurisdictions with reliability standards, prosecutors (and investigators and experts) can be indifferent to, or complacent about, the reliability (ie trustworthiness) of incriminating expert opinions, especially where the techniques are used routinely and have been admitted, under earlier and more permissive admissibility regimes. This may be, in part, because the obligations upon prosecutors are expressed at a relatively general level and do not speak directly to the adduction and use of (speculative forms of) expert opinion evidence (Saks 2001; Raeder 2007; consider also Caudill 2011).

The statements below, extracted from *Prosecution Guidelines* produced by NSW Office of the Director of Public Prosecutions (NSW ODPP 2007), provide an indication of some of

<sup>18</sup> Generally, there is a need for some kind of ‘trace’ or documentation — such as a transcriptual record. In consequence, many of the issues raised above, but also those discussed below in Section 3.C. might not be readily susceptible to review.

<sup>19</sup> A notable exception might be the arguments raised in *Aytugrul v The Queen* (NSWCCA) and *Aytugrul v The Queen* (HCA), turning on evidence that suggests that juries (and judges) are not particularly good with many forms of probabilistic and statistical evidence, particularly likelihood ratios.



the main responsibilities of a public (or state or Crown) prosecutor.<sup>20</sup> According to the *Prosecution Guidelines*:

It cannot be over-emphasised that the purpose of a criminal prosecution is not to obtain a conviction; it is to lay before a jury what the Crown considers to be credible evidence relevant to what is alleged to be a crime. Counsel have a duty to see that all available legal proof of the facts is presented: it should be done firmly and pressed to its legitimate strength, but it must also be done fairly. (NSW ODPP 2007:5 quoting *Boucher v The Queen* (1954) 110 CCC 263, 270 (Rand J))

The prosecutor does not seek conviction at any price. Rather, consistent with the aims of the accusatorial trial and prosecution by the state, the prosecutor ought to pursue truth fairly. While, at times, this will involve vigorous advocacy in favour of the state's position, it is difficult to understand how adducing unreliable or speculative opinions assists with the rational administration of justice.

While there are no direct references to expert opinion evidence in the *Prosecution Guidelines*, adducing incriminating expert opinion evidence of unknown probative value and leaving it to the crucible of the trial to resolve would seem to sit awkwardly with the role of the prosecutor as a 'minister of justice' (*R v Puddick*). Prosecutors have ethical obligations that extend to considering the value of incriminating expert opinions and the ability of the trial to credibly identify and convey frailties. The prosecutor's professional and ethical responsibilities are not exhausted by merely satisfying admissibility standards (or practice), where such standards are themselves inadequate and, in particular, where prosecutors are on notice that particular forms of evidence or techniques have been repeatedly challenged on methodological grounds. Rather, prosecutors should attend to the performance of the system, the value of the evidence and the danger that it will mislead or render a proceeding substantially unfair. Commitments to 'arrive at the truth and to do justice' should shape, substantively, the way in which prosecutors select, adduce and rely upon incriminating expert opinion evidence (NSW ODPP 2007:5; see also *Wood v The Queen*). Unlike judges, prosecutors and prosecutorial institutions are in a position to obtain further information when techniques and opinions seem to be questionable or are repeatedly challenged by a wide range of independent commentators.

The other side of the problem is that defence lawyers are generally poorly resourced and poorly equipped to explore and challenge weak forms of expert opinion evidence. In consequence, most challenges to incriminating expert opinion evidence are superficial. Most state-sponsored expert witnesses rarely have their opinions challenged in any detail or with much sophistication. Only a small proportion of lawyers and the tiny proportion of well-resourced defendants are able to mount informed challenges to incriminating expert opinion evidence. This failure is undesirable, sits uncomfortably with professional obligation such as those expressed in the relevant *NSW Barristers' Rules* (NSW Bar Association 2001:62–72, especially 62 and 65), and compounds the problems with narrowly conceived prosecutorial obligations and the inclusive approach to admissibility.

Finally, liberal admissibility practice, in combination with relatively poorly resourced defence lawyers, means that many charge negotiations and pleas — the manner in which the vast majority of prosecutions are finalised — are likely to occur either in the absence of adequate information about the value of incriminating expert opinions or in a climate that

<sup>20</sup> In many respects they are shared across common law jurisdictions. The NSW *Prosecution Guidelines* (NSW ODPP 2007) incorporate the International Association of Prosecutors *Standards of Professional Responsibility and Statement of the Essential Duties and Rights of Prosecutors*. See also the United Nations (UN) *Guidelines on the Role of Prosecutors* (UN 1990), the *NSW Barristers' Rules* (NSW Bar Association 2001) and Nagorcka, Stanton and Wilson (2005).

will be sensitive to the practical limits of the trial as a forum for credibly exploring and exposing limitations with incriminating expert opinion.

### ***B. Managing experts: Codes of conduct (and scientific norms)***

Ethical and normative precepts seem also to be of limited effect when applied to the expert witnesses themselves (Mitroff 1974; Yearley 1982; Shapin 2010; compare Mnookin et al 2011). Not only do experts take an oath or affirmation to tell the truth, in many criminal justice systems there are also formal codes of conduct or rules of court, albeit sometimes only implied from civil procedure, governing the performance of expert witnesses.<sup>21</sup> While such codes are generally desirable, formal rules have not prevented many experts from: practically ignoring reliability; becoming closely, and systematically, aligned with the prosecution (eg *Wood v The Queen*); producing very limited reports (occasionally just a few lines); avoiding transparency, and not disclosing limitations and alternative perspectives or critical literatures (eg *R v Folbigg*, *Gilham v The Queen* and *Morgan v The Queen*). The weakness of ethical prescriptions and codes of conduct manifests in the difficulty of actually establishing breaches, along with the reluctance to prosecute and maintain sanctions. Once again, the importance of establishing that techniques are reliable and individuals proficient — as opposed to (merely) experienced — would seem to have a more direct and salutary impact than appeals to scientific norms or codes of conduct.

Legal codes of conduct may also be ineffective because they do not necessarily apply to those who do not testify or those qualified as ‘ad hoc’ experts (Edmond and San Roque 2009). Those involved in investigations, and whose services are used to provide syntheses or advice, are not necessarily bound by codes imposed by courts. In addition, where prosecutors present, and courts allow, those who are embedded in the investigation — such as police officers and interpreters — to express incriminating opinions as ‘ad hoc’ experts, once again professional obligations and relevant codes are unlikely to be invoked. These individuals do not always owe relevant professional allegiances and, more troublingly, may be unfamiliar with a range of methodological problems and constraints — regardless of their good faith or sincerity. Interpreters involved in voice comparison, including cross-lingual voice comparison and identification from covert intercepts, may not even provide a report. They are routinely allowed (in England and Australia) to express a positive opinion about the identity of an unknown speaker during the course of their examination-in-chief. Such opinions, embedded as they are in both the investigation and the prosecution narrative, especially if expressed with confidence, represent an especial problem because confidence and credibility have a tendency to influence jury impressions of reliability — regardless of ability or accuracy (Kemp, Heidecker and Johnston 2008; Edmond, Martire and San Roque 2011a). Once again experience counts for more than it should, while what would seem the obvious need for demonstrable reliability is both obscured and evaded.

### ***C. Mismanaging uncertainty: The expression of results***

The admission of unreliable and speculative opinions is often contingent on conventional safeguards (eg cross-examination, rebuttal experts and, especially, scope for purportedly corrective or explanatory instructions and warnings). In recent years, however, the admission of unreliable and speculative forms of incriminating expert opinion evidence have been admitted on the basis that they could be managed through pre-negotiated constraints on expert testimony (Cole 2011).

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<sup>21</sup> The fact that these codes and rules emerged in civil (rather than criminal) proceedings reveals much about judicial confidence in state forensic science — and juries.

Imposing constraints on what the expert can say before the tribunal of fact is revealing. It usually reveals that the expert's opinion is not predicated upon a rigorous empirical foundation. That is, the studies necessary to be able to support a particular claim — whether individualisation, some probability, or a level of confidence — have not been undertaken. The witness is, nevertheless, allowed to express an incriminating opinion as a (legally) recognised expert. It also reveals that the witness is willing to say more — and often has done so in his or her report(s) — notwithstanding the lack of experimental support (compare Found and Edmond 2012). Placing constraints on what the expert can say, almost always limiting the strength or confidence of the opinion, involves courts and lawyers imposing limits because they believe that the original expression is insufficiently reliable. It does not follow, however, that weaker forms of expression are more reliable (or less likely to create unfair prejudice). If the technique does not work (ie is invalid), has a significant level of error (that may not be known), or is compromised through the analyst's exposure to gratuitous information (eg Dror, Charlton and Peron 2006; see also *R v Riscuta & Niga*), then imposing constraints on what the expert can state as some kind of admissibility compromise is inappropriate and potentially misleading. Rather than correct limitations and uncertainties, such compromises tend to obscure epistemic weakness and make forensic scientists appear more reasonable and cautious than they actually are. Simultaneously, they undermine the ability of the defence to exploit this point without drawing attention to the witness' actual belief — however unreasonable.

Such legal 'solutions' may themselves be compromised during the course of the trial.<sup>22</sup> It is incredibly difficult to manage the meaning of testimony (and, indeed, performances) and resulting impressions in real-time during the trial — across examination-in-chief, cross-examination, re-examination and various opening and closing speeches and summaries (eg *Gilham v The Queen* and *R v Folbigg*). The expert's actual opinion and its purported significance may often be informally disclosed through a range of non-linguistic cues and signs that may not transgress formal proscriptions on particular linguistic formulations. In NSW, for example, experts undertaking image comparison for the purposes of identification (sometimes described as 'facial mapping' or 'body mapping') were eventually prevented from making positive identifications — ie the accused *is* the person in the image from the bank robbery (eg *R v Tang*; see also *Murdoch v The Queen*). While the NSW Court of Criminal Appeal restricted opinions to descriptions of similarities (and, in theory, differences) between the accused and the person of interest, in practice, witnesses — highly qualified, though of unknown capability — began to push the boundaries of these proscriptions: testifying that there were 'high levels of anatomical similarity' and no discernible differences. These new permissible forms of testimony nonetheless clearly conveyed the witnesses' belief that the accused and the person of interest were 'one and the same' or that the alleged similarities were highly significant (contra *Morgan v The Queen*), perpetuating a form of opinion evidence where the witness' ability had not been tested; where there was no explanation of how the witness overcame a range of image distortions and interpretation issues; where the witness had no information about the frequency of body and facial features or their inter-relations; and in circumstances where the courts had proscribed positive identifications (Edmond et al 2009; Porter 2007; Davis and Valentine

<sup>22</sup> A reliance on controlling forms of expression is further complicated when considering recent empirical studies which suggest that the tribunal of fact may not distinguish between particular expressions of confidence or strength nor understand weaker forms of expression in the ways that experts and courts envisage (McQuiston-Surrett and Saks 2008, 2009). This, at the very least, indicates that courts should be attentive to such issues both when framing admissibility compromises and when considering more broadly the manner in which results are expressed to the jury (compare the decisions in *Aytugrul v The Queen* (NSWCCA) and *Aytugrul v The Queen* (HCA)).

2008). Restricting such opinions to similarities may make trials *appear* fairer, but the substantial evidentiary effect seems to be essentially the same as under a positive identification regime. Trials are not, in consequence, rendered fair. Notwithstanding formal proscriptions, the meaning or import of the evidence is not necessarily discounted as the expert witness and prosecutor practically renegotiate forms of expression stronger than bare similarities (see also *Gilham v The Queen* and *R v T*).<sup>23</sup>

The accused, rather than the state, should obtain any benefits flowing from uncertainty (and the failure to assess techniques). The state should not be entitled to call experts, and investigators should not be allowed to express opinions, however qualified, when they have not undertaken the requisite empirical study. In effect, admissibility compromises encourage ignorance. They reward disinterest in empirical investigation, because the gist of the expert's belief is conveyed or implied through the diluted opinion. Admissibility compromises have other pernicious effects. As an inevitable function of the operation of precedent, they are often adopted and used to support admission in subsequent trials and appeals relieving courts of obligations to inquire into, or require evidence of reliability — ie further research — to support the incriminating opinions.

#### 4. The importance of reliability, admissibility decision-making and exclusion

In reality, most trials involve little light or even heat when it comes to incriminating expert opinion evidence. Notwithstanding expressed commitment to the fairness of criminal proceedings, courts and judges seem unreceptive to the fact that safeguards, either individually or in combination, are unlikely to work in the manner intended — or claimed. Legal practice and beliefs seem to have emerged independently of empirical evidence. What gets presented in court is often difficult to reconcile with what is known within expert communities beyond the courts.<sup>24</sup> Traditional safeguards do not necessarily identify or convey the extent of problems or the potential weakness of techniques, opinions, or so-called investigative experience. Constraints such as codes of conduct and limiting the expression of results are at best partial solutions. At worst the various safeguards and mechanisms currently relied on present the appearance of fairness (and protections) in ways that tend to obscure actual limitations.

If the safeguards and constraints discussed are ineffective individually, their limitations are not necessarily transcended in combination. Where one safeguard fails, others are likely to fail or be ineffectively operationalised. Trial safeguards depend on the performance of defence lawyers and prosecutors and judges and experts. They can be subverted, for example, by prosecutors exaggerating or misrepresenting evidence in final addresses. They are also dependent on expert witnesses acting with propriety. Safeguards also, and most crucially, are

<sup>23</sup> Of interest, in *Morgan v The Queen*, the Court of Criminal Appeal found body mapping evidence to be inadmissible but said nothing about the admissibility of facial mapping evidence that relied upon the same techniques, had the same kinds of problems and was produced by the same experts.

<sup>24</sup> Parties rarely cite, and even more rarely adduce or discuss, relevant scientific studies in criminal proceedings. There is very limited scope to adduce evidence about the performance of legal institutions and procedures. As a profession, judges have been remarkably indifferent to such evidence. In part this may be a consequence of the experience of judges: many senior judges were quite able, if not entirely representative, advocates — usually in civil (often commercial) practice. They were probably capable and perhaps reasonably resourced, on average, when it came to contesting expert evidence. Many judges once worked for large (and well-resourced) defendants in civil and commercial proceedings — ‘the haves’ (Galanter 1974). These experiences, however, do not translate cleanly to criminal justice practice. Judicial confidence (or indifference) is also symptomatic of general scepticism (and ignorance) toward empirical research (see Edmond 2011c and also *Aytugrul v The Queen*).

dependent upon juries being capable of assessing expert opinion and incorporating it into their overall assessment of the evidence and standard of proof. Even when trial safeguards appear to work well, there is no guarantee that a jury will even appreciate the seriousness of issues raised during cross-examination or presented during rebuttal testimony. Closing addresses, summaries and directions are as likely to reinforce or compound mistakes and misinformation as repair them. Finally, naïve confidence in the jury and commitment to system efficiencies means that courts of appeal may be reluctant to reverse jury verdicts, notwithstanding the admission of, and reliance upon, speculative forms of opinion evidence, where the overall strength of the case against the accused is perceived as independently strong.

If the trial is a crucible, then in the majority of cases it is a cool crucible. In relation to forensic science and medical evidence, as in Danforth's tribunal, the refinement is largely illusory, falling a long way short of 'melting down all concealment'. So we must wonder about the propriety of courts admitting unreliable and speculative forms of opinion and leaving the assessment to lay persons exposed to a range of additional — though primarily prejudicial — information. Leaving lay juries to assign weight to expert opinion — especially when we have methodological tools to help us understand whether techniques work, their levels of error as well as the proficiency of individuals — seems not merely inappropriate, but indefensible. The impropriety is reinforced by requiring jurors to assess expert opinion in a system where the state has more (and sometimes monopolises) resources, where its experts are presumed to be (and are represented as) impartial, and where the judges responsible for determining and reviewing admissibility have access to domain relevant information (such as prior convictions or the case against the accused) that is usually influential, but a very poor indicator of the reliability of a technique (Wistrich, Guthrie and Rachlinski 2005). There is a very real risk that unreliable opinions or opinions that are speculative will appear to corroborate other parts of the case against the accused and vice versa regardless of their actual epistemic value. Indeed, the risk of false corroboration actually increases where techniques are unreliable or speculative (Garrett and Neufeld 2009).

The practical weakness of the accusatorial trial, the indifference of prosecutors, defence constraints, and judicial reluctance to enforce formal reliability-based standards strictly, or attend to empirical evidence about the efficacy of trial safeguards, suggests that legal personnel may need assistance to make their practice more closely resemble espoused ideals. Legal practitioners and judges should be looking to develop new mechanisms and procedures to help them respond to incriminating expert opinion that will assist with accurate outcomes, facilitate substantial fairness and place ongoing relations with forensic science and medicine on a more secure footing for the next century.<sup>25</sup>

## Acknowledgements

This research was supported by Australian Research Council (ARC) grants FT0992041, LP100200142 and LP120100063. We would like to thank David Hamer, Richard Kemp, Andrew Ligertwood, Kristy Martire, Glenn Porter, Kent Roach, Andy Roberts and Greg Taylor for critical contributions and conversations. Earlier versions of this article were presented at Monash University, the National Judicial College of Australia (NJCA), to the Supreme Court of Queensland and the Program on Understanding Law, Science, and Evidence (PULSE), UCLA School of Law.

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<sup>25</sup> One proposal, for an advisory panel, is developed in Edmond (2012b).

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