

## OF AUGURIES AND EXPERTS

Some years ago I challenged a senior medical specialist about his assertion that a proposition had been clearly established by “the literature” and raised my eyebrows when he conceded having read only one paper. “But it had a lot of footnotes”, he explained reassuringly. Such innocent faith should obviously be respected. Who knows, he might even be right. Perhaps writing things in small print at the foot of the page ensures the accuracy of what is said above. The odd smart aleck nonconformist like Kepler or Galileo might have demonstrated that fundamental truisms can be wrong but perhaps the world is not flat only because the conservatives who opposed them didn’t use enough footnotes. In any event, it is difficult to pass up the comforting thought, that if I use enough little numbers and mention enough names, I must be right. Hence, this paper is dripping with them.

Let me begin by quoting a senior scientist:

*In the days when an idea could be silenced by showing that it was contrary to religion, theology was the greatest single source of fallacies. Today, when any human thought can be discredited by branding it unscientific, the power exercised previously by theology has passed over to science; hence science has become the greatest single source of error.<sup>1</sup>*

There is much to be said for this seemingly heretical observation, though the term “science” should be interpreted sufficiently broadly to embrace all forms of factual expertise.

In early years there was widespread reliance on augury and other means of seeking supernatural intervention to ascertain truth, especially in relation to issues of crime and punishment. Even in England the early criminal procedure was simplistic, harsh and based largely on superstition. Proof by ordeal was dependent upon God revealing the truth. For example, the cold water ordeal involved binding the accused and throwing him into a river or pond. If he floated he was guilty and could be executed but if he had the good fortune to sink it would be presumed that God had declared him innocent.<sup>2</sup> Of course, he would have drowned being vindicated. A good man was a dead man, as a medieval feminist might have said. The *peine forte et dure*, a procedure which involved piling large rocks onto a person to encourage him to plead to a charge of felony, also had religious implications.<sup>3</sup> As Winston Churchill observed, the Norman innovation of trial

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<sup>1</sup> Polanyi, Prof M., quoted by Dr P McCullagh, *The Canberra Times*, 30 March, 2002 at C3.

<sup>2</sup> Baker, J.H., *An Introduction to English Legal History*, 3rd Ed., Butterworths, London, 1990, note 12 at 5. See also Bartlett, R., *Trial by Fire and Water* Clarendon Press, Oxford, 1986.

<sup>3</sup> A report of the case against the hapless Robert le Ewer in 1322 notes that even if the accused was pressed to death this was 'healthy for the soul provided he bore it with resignation'. Evans M. & Jack, I., *Sources of English and Legal Constitutional History*, Butterworths, Sydney, 1984, at 182.

by battle was based on the belief that God would strengthen the arm of the righteous,<sup>4</sup> though middle aged and, perhaps, 'righteously-challenged' barons were known to hire champions who already had strong arms. The right was not finally abrogated until an English statute of 1819 and as recently as 1985 a Scottish defendant belted counsel across the face with a glove and demanded trial by battle on the basis that the statute abolished the procedure only in England.<sup>5</sup> I understand that His Lordship reserved judgment overnight and advised counsel to use the evening brushing up his skills with a broadsword. Alas, in the morning he proved to be a spoilsport and rejected the argument.

Sadly, it seems that knights in shining armour, prancing warhorses, lances and swords have finally followed the dinosaurs into extinction and, whilst the contemporary system of justice is still dependent upon adversaries, they fight each other only with words. Yet echoes of earlier chivalric sentiments survive and seem to influence contemporary expectations. There may be scepticism about the ethical standards of lawyers<sup>6</sup> and criticism about the perceived leniency of sentences imposed by judges, but there appears to be widespread confidence in the system's capacity to produce justice. Even people with no religious beliefs sometimes reveal strong faith that their conception of the holy grail will be found. There may be many reasons for such faith, but in recent years it has apparently been strengthened by the ever-increasing availability of experts from a diversity of arcane disciplines who seem able to cast light on the murkiest scenarios.

Yet the system has been trenchantly criticised<sup>7</sup> and, whatever the merits of those criticisms, it is obviously subject to the inevitable risk of human error. One may, perhaps, readily appreciate that some guilty people will be acquitted because their guilt cannot be proven to the high standard required. What may be more disturbing are the sometimes highly publicised cases in which people have been wrongly convicted. The Royal Commission into the convictions of Lindy and Michael Chamberlain<sup>8</sup> was widely

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<sup>4</sup> Churchill, Sir W., *A History of the English Speaking Peoples*, Dorset Press, New York, 1990, Book 1, at 218.

<sup>5</sup> See Baker, J.H., *An Introduction to English Legal History*, supra, at 87 note 10.

<sup>6</sup> A Morgan poll published in April 1994 revealed that only 30% of those polled thought that Australian lawyers had 'high' or 'very high' standards of ethics and honesty.

<sup>7</sup> To take but one example, Warren Burger, then Chief Justice of the Supreme Court of the United States, has predicted that for many disputes 'trials run by the adversarial contest must in time go the way of the ancient trial by battle and blood.' The present system, he maintains, is 'too costly, too painful, too destructive, too inefficient for a truly civilised people.' See Burger, Chief Justice W. E., 'The State of Justice', (1984) *70 American Bar Association Journal*, 62 at 66. See also Friedman, Lawrence M., 'Courts over Time: A Survey of Theories and Research', in *Empirical Theories About Courts*, Ed by K. O. Boyum & L. Mather, Longman, New York, 1983, at 14 and Nardulli, Peter F., *The Courtroom Elite: An Organisational Perspective on Criminal Justice*, Ballinger Publishing Co., Cambridge, Mass., 1978, at xv-xvi.

<sup>8</sup> *Royal Commission of Inquiry into Chamberlain Convictions: Report of the Commissioner, the Hon Mr Justice T.R. Morling*, 1987. See also Crispin, K.J., *The Crown versus Chamberlain 1980-1987*, Albatross Books, Sydney, 1987.

reported overseas as well as in Australia, but there were others involving the convictions of Splatt,<sup>9</sup> McLeod-Lindsay,<sup>10</sup> Anderson,<sup>11</sup> and others<sup>12</sup> all of which found that the person had been wrongly convicted. 'Zigi' Pohl, who had been convicted of the murder of his wife in 1973, was pardoned after another man confessed to the crime and subsequently pleaded guilty to it.<sup>13</sup> In England such cases as the Birmingham Six and the Guildford Four<sup>14</sup> prompted a Royal Commission into the criminal justice system. In America it has been suggested that hundreds of people have been wrongly convicted of capital or potentially capital crimes this century and that nearly two dozen have actually been executed.<sup>15</sup> In fact, these cases are probably just the tip of the forensic iceberg.

Well publicised miscarriages of justice obviously provoke questions about how the system could have failed, especially when it was able to draw upon the apparently infallible guidance of expert evidence. It often seems to be assumed that truth will inevitably emerge with clarity unless courts are diverted from the course of justice by isolated and probably avoidable blunders. Yet truth can be an elusive quarry and perceptions as to the persuasive value of the evidence may vary widely. Juries are often unable to agree on the appropriate verdicts and, even when they can, others who have heard the same evidence sometimes come to different conclusions.<sup>16</sup> Injustice may occur

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<sup>9</sup> *Royal Commission Report concerning the conviction of Edward Charles Splatt* (S.A.), 1984.

<sup>10</sup> McLeod Lindsay failed to impugn his conviction at an inquiry in 1969: *Report of Inquiry into the conviction of Alexander McLeod-Lindsay*, 1969. He succeeded twenty two years later: *Report of the Inquiry held under s. 475 of the Crimes Act 1900 into the conviction of Alexander Lindsay*, July, 1991. (He had shortened his surname to Lindsay in the intervening period).

<sup>11</sup> *Report of the Inquiry held under s.475 of the Crimes Act 1900 into the conviction of Timothy Edward Anderson, Paul Shaun Alister and Ross Anthony Dunn*, May, 1985. Anderson was to be wrongfully convicted a second time but this conviction was quashed on appeal: *Anderson* 53 A. Crim R. 421.

<sup>12</sup> For commentary on such cases see, *Travesty!*, ed by K. Carrington, M. Dever, R Hogg, J. Barga & A. Lohrey, Academics for Justice, Macquarie University, Sydney, 1991 and Brown, M., & Wilson, P., *Justice and Nightmares, Successes and Failures of Forensic Science in Australia and New Zealand*, N.S.W. University Press, Sydney, 1992.

<sup>13</sup> *Report of the Inquiry held under s. 475 of the Crimes Act 1900 into the conviction of Johann Ernst Siegfried Pohl at Central Criminal Court on 2nd November, 1973: Mr Justice McInerney*, Sydney, 1992.

<sup>14</sup> Molomby, T., 'Miscarriages of Justice in Britain: The Guildford Four and the Birmingham Six' in *Travesty!*, op cit note 43 at 16. Bridges, L., & McConville, M., 'Keeping Faith With Their Own Convictions: The Royal Commission on Justice.' (1994) 57 *M.L.R.* 75. See also *R v Maguire & Ors* [1992] 2 All E.R. 433.

<sup>15</sup> Radelet, M., Bedau, H. A., & Putnam, C. E., *In Spite of Innocence*, Northeastern University Press, Boston, 1992, at 10.

<sup>16</sup> An American study revealed, inter alia, that juries returned verdicts which the trial judge believed to be "without any merit" in 8.3% of the cases tried (Kalven, H. J., & Zeisel, H., *The American Jury*, University of Chicago Press, Chicago, 1986, at 430). Whilst one might have expected this to have caused some judicial consternation, one judge of the Supreme Court of the United States was

not because the system is 'derailed' by some unusual event but because it is inherently vulnerable to human error. Recognition of this vulnerability may explain the remark of an American judge who, in upholding an appeal against a conviction for murder after another person had confessed to the same crime, said that '(t)he system worked but unfortunately convicted a man who was legally and factually innocent'.<sup>17</sup>

The system is constantly fine tuned to make it more efficient and effective. Rules of evidence and procedure as well as substantive legal principles are constantly reviewed and appellate courts frequently clarify the directions that must be given to juries to assist them in reaching just verdicts. Yet much remains dependent upon impression and perception. The noted American psychologist, Jerome Frank, once said that in any judicial proceeding "(t)he facts as they actually happened are ... twice refracted - first by the witnesses, and second by those who must 'find' the facts." Hence, he concluded, findings of fact are, at best, the court's 'belief or opinion about someone else's belief or opinion.'<sup>18</sup>

In the half century that has elapsed since this disconcerting observation, the field of forensic science has burgeoned and conclusions are now regularly drawn from an array of examinations and tests unknown to the legendary advocates of the past. This development has been of enormous public benefit. It has opened new windows into truth by effectively turning inanimate objects into witnesses. The blood of a latter-day Abel might not only cry out to God from the ground<sup>19</sup> but tell mortal investigators that a latter-day Cain was the culprit. New techniques have ensured the conviction of the guilty, the acquittal of the innocent and cast light on countless situations, the truth of which would have otherwise remained undiscovered.

The successes achieved by these scientific advances have understandably generated both widespread interest and professional enthusiasm. However, this enthusiasm has sometimes led scientists and lawyers to make claims about the accuracy of particular techniques or opinions of the kind normally expected only from advertising agents. The uninitiated could be forgiven for assuming that inanimate objects not only offer mute testimony: they never lie. Hence, in a recent episode of "CSI", a scientific investigator dismissed protestations that the suspect would not have committed a brutal murder with the confident affirmation, "I believe the car!"

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apparently heartened by it. He said that the study "concluded that juries do understand the evidence and come to sound conclusions in most of the cases presented to them and that when juries differ with the results at which the judge should have arrived it is usually because they are serving some of the very purposes for which they are now employed". *Duncan v Louisiana* (1968) 391 U. S. 145 per White J at 157.

<sup>17</sup> The case of Bradford Brown who had been convicted in the District of Columbia in 1975 but exonerated in 1979 appears to be unreported. The quotation is taken from Radelet, M., Bedau, H. A., & Putnam, C. E., *In Spite of Innocence*, Northeastern University Press, Boston, 1992, at 290.

<sup>18</sup> Frank, J., *Courts on Trial*, Princeton University Press, Princeton, 1949, at 22.

<sup>19</sup> Genesis 4 v10.

Some of these claims are understandable. In theory, at least, many procedures offer the degree of accuracy claimed. However, there is a danger of juries being left with the impression that any opinion expressed by a scientist must be correct, and that both the protestations of a hapless accused and any evidence from eye witnesses must be discounted because it is contrary to 'scientific fact'. Only last week, I a man asked me how juries could be expected to understand forensic science, and added, "I suppose we have to take it on faith, don't we. After all, it's a matter of science." He didn't seem to notice that my blood had run cold.

In many of the well-publicised cases in which miscarriages of justice have occurred, forensic science played a significant part in ensuring the original conviction.<sup>20</sup> As Professor Polanyi has suggested, science may sometimes subvert rather than enhance the quest for truth. Whilst there is obviously some measure of exaggeration in his statement, there can be little doubt that juries may be beguiled into error by scientific evidence. For example, in the Chamberlain trial apparently compelling evidence from eye-witnesses<sup>21</sup> was clearly discounted by the jury on the basis of scientific evidence much of which was later shown to have been in error.<sup>22</sup> This case revealed that faith in the infallibility of scientific evidence could be dangerously misplaced.

In reality, truth does not descend from forensic science laboratories with the purity and clarity of dew on a spring morning. Even if the physical evidence has not been corrupted prior to examination, the impression that is ultimately conveyed by the scientists who examined it may not fairly or adequately reflect the conclusions that could legitimately be drawn from the procedures undertaken.

Jerome Frank may have been correct in his assertion that findings of fact reflect the court's 'belief or opinion about someone else's belief or opinion', but the potential for truth to be subverted on the journey from a scientific test or examination to the mind of a judge or jurors may be even greater than Frank ruefully suggested. At least in this context, truth may be refracted at three stages; the stage at which the scientist forms his or her belief or conclusions, the stage at which the counsel presents and addresses the scientific evidence at trial and the stage at which the jurors form their conclusions. At each stage the human frailties of those concerned may lead to some measure of distortion.

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<sup>20</sup> Though, of course, it has also been crucial in overturning wrongful convictions.

<sup>21</sup> Such as Ms Lowe who said that it had been a still night and she had definitely heard the baby cry after Mrs Chamberlain had returned to the campfire when, if the Crown case had been correct, the baby must have already been dead.

<sup>22</sup> Some of the most significant errors were ultimately conceded. For example, a spray pattern on the plate under the dashboard of the Chamberlain's car which had been described as a "classic arterial blood spray" and had been said to contain foetal haemoglobin consistent with blood from the baby was subsequently conceded to be Dulux sound deadening compound which had been sprayed into the wheel arch and entered through a plenum drain hole. See generally *Royal Commission of Inquiry into Chamberlain Convictions: Report of the Commissioner, the Hon Mr Justice T.R. Morling*, 1987. See also Crispin, K.J., *The Crown versus Chamberlain 1980-1987*, Albatross Books, Sydney, 1987.

## **The refractive qualities of expert witnesses**

There is an inevitable risk of refraction at this first stage because experts charged with the duty of forming opinions and conclusions from the available evidence are subject to the same human frailties as other mortals.

Once upon a time I naively assumed that expert witnesses could be notionally divided into two categories. One group was reliant upon subjective impressions of social trends, perceived norms of human behaviour, and other largely unfathomable vagaries. Its members rejoiced in such apparently nebulous fields of human endeavour as economics, psychology and sociology. Like modern shamans or astrologers, they offered potentially plausible hypotheses based upon esoteric learning but their evidence needed to be approached sceptically lest the gullible be led astray. The other group of experts were reliant upon what were sometimes described as "hard" sciences; physics, chemistry, mathematics and the like. They dealt not in the realm of subjective impression but scientific fact and, in the absence of obvious error or fraud, their evidence offered an infallible guide to the truth.

I was, of course, much less experienced and as time went by I encountered cases which cast some doubt on the validity of this dichotomy. To take one example, I have fond memories of a personal injuries case in which four leading orthopaedic surgeons gave evidence about the length of a man's legs. One said that the left leg was two inches longer than the right, one said it was one inch longer, the other two maintained that they were the same length, but one had measured them as being 36 inches long and the other as 34 inches long. In other cases, it became apparent that biologists, pathologists and others apparently labouring within the province of "hard" science, were substantially reliant upon interpretation and that this required the application of subjective judgment. To take another example, a pathologist, who gave evidence before me recently, cheerfully conceded that cytology is more an art than a science. Cancer cells, like beauty, may lie in the eye of the beholder.

It is true, of course, that some expert evidence is likely to be more accurate and reliable than others but this truism does not justify an assessment of the apparent reliability and weight of particular evidence by a simplistic allocation to intellectual pigeonholes. On the contrary, expert evidence drawn from any field should not be accepted without question and sceptical analysis. History is replete with miscarriages of justice that amply demonstrate the danger of naively accepting oracular pronouncements even if delivered in polysyllable technical jargon.

Scientific training and practice may ingrain habits of care and accuracy and foster qualities of fairness and objectivity, but no university degree or professional experience can make one immune from error. In fact, there are a number of factors which may make any such immunity unattainable.

First, and most obviously, the axiom that everyone makes mistakes is applicable to every profession and calling. That is painfully evident not only from the prevalence of professional negligence actions, but the many other cases in which highly qualified experts provide competing opinions based on essentially the same evidentiary material and sometimes vehemently denounce the methodology, logic and competence of those who have disagreed with them.

Secondly, the validity of conclusions drawn by forensic scientists will usually depend, at least in part, upon the reliability of the scientists' understanding of what other people have done. The samples tested are usually supplied by others; apparatus, reagents and other chemicals are usually supplied by others; and the conclusions drawn from the procedures are usually based upon research done by others. A scientist may be misled if the integrity of any of these factors is compromised.

Issues relating to the reliability of research can be particularly difficult for the uninitiated, including lawyers, to resolve or even identify. In many cases not only lawyers, but expert witnesses take for granted the validity of propositions stated in relevant academic or professional literature and/or accepted by scientists of the same discipline employed within the same institution. That may be understandable but it is not always reassuring. Many expert witnesses prove to have little real knowledge of the basis for what they regard as received wisdom and few prove to have examined the available research critically, considered the extent to which it may have validated the relevant propositions, explored the limit to which they might validly be applied, or revisited these issues in the light of subsequent research. Hence, the opinions of even the most competent and experienced scientists will often be dependent upon some measure of assumption as to the quality of research and the validity of conclusions drawn from it. Yet researchers are not immune from error and misjudgement, presupposition and bias may influence even scientific literature.

In one case I heard some time ago<sup>23</sup>, a number of expert witnesses with impressive qualifications asserted that cranial injuries suffered by a young baby could only have been caused by shaking and that a great degree of force would have been required. Some ventured the opinions with due caution but others spoke with a conviction that seemed to reflect undue faith in conclusions drawn from the available research. The research most heavily relied upon consisted of interviews with people who had been convicted of offences involving shaking children. I did venture a question as to whether the anecdotes of self confessed child abusers provided a bedrock of indisputable fact upon which such scientific opinions could be based, but my misgivings were dismissed on the ground that there had been no reason for them to lie. This momentary excursion into psychology, a discipline in which none of the expert witnesses had any qualifications, was not completely reassuring. It overlooked the likelihood that the perceptions of those interviewed may have been distorted by the maelstrom of destructive emotions that had caused them to act so violently, and by subsequent processes of reconstruction due to

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<sup>23</sup> R v Lee [2001] ACTSC 133 (21 December 2001).

such factors as guilt or self-justification. More importantly, the findings were relied upon by some witnesses as a basis for postulating a “baby-shaking syndrome”, and hence suggesting that the injuries suffered by the baby in question must have been caused in the same manner. Yet the research, at best, suggested that injuries of that nature could be caused by shaking; not that they could not be caused in some other manner.

In the same case it was suggested that children under a certain age could not cause such injuries, though there was substantial disagreement as to what that minimum age might be. This opinion was supported by reference to the absence of any records establishing that children had been guilty of inflicting injuries of the nature suffered by the baby. However, young children are, of course, presumed incapable of committing offences and hence immune from criminal liability. Furthermore, it was apparent that any reports of children causing such injuries were simply dismissed. One expert said that he regarded any attempt to attribute blame to a child as grounds for suspecting the parent. Another referred to the confession of a 9 year old boy, but said that it had been rejected because children of that age do not cause such injuries. The apparent circularity of this reasoning process seemed to elude even very well qualified expert witnesses.

The studies were also invoked to demonstrate that substantial force would have been required. This was important, not only to exclude the possibility that the injuries may have been caused by a child, but also to establish recklessness on the part of the actual offender. However, the fact that injuries had been caused by the application of great force did not prove that great force was required and it was conceded that there had been very little experimental evidence relating to this issue.

Some witnesses referred to experiments undertaken in 1962 when adult monkeys were put into what was described as an “accelerometer”, held in an upright position and accelerated into a wall. Extrapolations from those experiments to models had produced theories as to the amount of force required to cause injuries in human infants and I was informed that the degree of force so “theorised” was such that most people would find “unbelievable”. At least one of the expert witnesses conceded that the evidence was “imperfect” and said that the results had been disputed because they were “just an approximation” and it was very hard to translate the results of experiments on a small monkey’s brain to a large infant’s brain. He also agreed that there had been criticism that the studies involving monkeys may have resulted in a conception of the need for very powerful forces that may not be realistic when applied to a neonate baby’s neck which has almost no muscle tone to cope with rotational forces. When it was suggested that very little force was required to “rip a neonates neck around” and thus damage its brain, he said that this was a matter for argument.

Other research referred to as a “fluid percussion study” had been carried out on the brains of cats by removal of part of the cranium, direct percussion to the dura and subsequent post mortem examination to determine the presence of axonal injury. However, the correlation, if any, between the force required to cause injury in that manner and that necessary to cause brain injuries by an acceleration-deceleration mechanism was not explained, and the significance of the obvious difference in physiology between cats and

neonate human infants was not explored. There had also been some research on pigs but the nature of that research was not explained.

Several of the expert witnesses also drew comparisons with forces generated by high speed car crashes but such comparisons only served to underline the imprecise and speculative nature of the opinions expressed. Courts constantly hear cases arising from motor vehicle accidents and it is clear that some people survive impacts that have occurred at extremely high speeds whilst others die of injuries sustained in very low speed collisions. The nature and extent of any injury is obviously dependent not merely upon the degree of force generated by the mass and speed of the opposing vehicles but by the precise geometry of such forces, the manner in which they are transmitted to the occupants, the bodily movements thereby generated, the extent to which those movements are restrained, whether by seatbelts airbags or otherwise, and matters relating to individual physiology.

Yet, whilst the research provided little, if any, real basis for some of the conclusions expressed, it was obvious that several of the expert witnesses believed that the need for force of the nature and extent suggested had been established beyond any doubt.

Thirdly, scientists have sometimes seemed to suffer from a malady which, if exhibited by a car dealer, might be described as ‘gross product enthusiasm’. This phenomenon has sometimes led to extravagant and potentially misleading claims of accuracy based upon purely theoretical considerations. In particular, evidence often has been in a manner which suggested that the accuracy of test results could be validly extrapolated from the relative rarity of the facts allegedly ascertained by them. For example, evidence of genetic “fingerprinting” was frequently followed by evidence as to the extraordinary improbability of another person having identical DNA. Yet the scientist had actually been comparing fuzzy lines, or “bands”, on gel and a visual comparison could never have produced that degree of accuracy. Furthermore, even when the bands were not wholly aligned, the discrepancy would sometimes be attributed to the phenomenon of ‘band creep’ and juries would be invited to accept the witness’ belief that the bands would otherwise have been aligned as scientific proof accurate to one chance in several billion.

Fourthly, whilst one must applaud the scientific advances that have been achieved, one must also be conscious of what Isaac Newton referred to as the great ocean of undiscovered truth. Hence, whilst potentially damning conclusions might legitimately be drawn from scientific tests or observations, one must be wary of rejecting other possible explanations. Perhaps forensic science laboratories should prominently display Arthur C. Clarke’s first law: “When a distinguished but elderly scientist states that something is possible he is almost certainly right. When he states that something is impossible, he is very probably wrong”.<sup>24</sup>

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<sup>24</sup> Clarke, Arthur C, *Profiles of the Future: An Inquiry into the Limits of the Possible*. Little comfort can be drawn from the fact that Clarke confined his law to elderly scientists. He explains that: “In physics, mathematics and astronautics it means over thirty, in other disciplines senile decay is postponed to the forties. There are, of course, glorious exceptions; but as every researcher just out of college knows, scientists of over fifty are good for nothing but board meetings, and should at all

Expert witnesses are constantly asked to express opinions to the effect that some suggested hypotheses are impossible. They may give evidence that injuries could have been caused in a particular manner and then be asked, perhaps unexpectedly, whether there could be some alternative explanation. They often dismiss any such possibility with a readiness that seems to imply either that this further opinion is merely a corollary of the first, or that it is similarly based. In many cases, however, whilst the initial opinion may be based upon sound research, there has been no comparable research justifying the dismissal of alternative hypotheses and the opinion rejecting the suggested explanation has been based upon little more than educated guesswork.

To return to the example offered earlier, several well qualified experts gave evidence that the neurological and ocular injuries suffered by the baby could have been caused by her having been shaken but could not have been caused by frantic attempts to resuscitate her by repeatedly striking her forcefully on the buttocks as her head and upper body dangled from an adult's lap. The research to which I have referred would, at most, have supported the former opinion and there was no suggestion that any research had been carried out into the possibility of injuries being caused in the manner suggested by the accused.

Opinions dismissing alternative hypotheses often seem to depend upon the witnesses' inability to imagine some manner in which the circumstances postulated might have substantially replicated the forces and other factors involved in the incidents which were the subject of the research upon which the initial opinions were based. Such subconsciously assumed intellectual constraints may exclude any consideration of relevant, perhaps decisive, issues. In the example mentioned, at least some of the experts rejected the alternative hypothesis on the basis that sufficient rotational forces would not have been generated to cause the injuries. Yet whilst the research relied upon may have demonstrated that rotational forces were capable of causing such injuries, it offered little, if any, basis for concluding that such injuries could only be caused by the application of such forces.

Furthermore, even hypotheses that cannot be readily accommodated within established scientific orthodoxy, may sometimes prove to be true. It is tempting to see the advancement of science as a process of constant enlightenment, like the dawn of an intellectual sun progressively dispelling the darkness of ignorance and superstition as it rises majestically above the horizon. Yet scientific advances frequently dispel not superstition but earlier scientific belief. New discoveries may reveal possibilities not previously considered or support hypotheses

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costs be kept out of the laboratory". Fortunately, he said nothing about the rate of intellectual decline in judges.

previously that had previously been discounted, perhaps for apparently good reasons.<sup>25</sup>

Fifthly, even in the absence of any demonstrable error, scientists may sometimes differ widely in the judgments they make concerning issues of simplicity, consistency and plausibility and those differences may be attributable, at least in part, to differences in personality and background.<sup>26</sup> This may influence both the manner in which research findings are obtained and reported, and the manner in which scientists in the laboratory interpret results. Neither scientific qualifications nor intellectual rigour can wholly insulate professional judgment from the humanity of the person making it.

Feelings and sentiments may influence beliefs and perceptions no matter how ardently one may try to be objective. In 1959 Sir Malcolm Hilberry suggested that juries were swayed largely by emotion but were not even aware of it. Sir Malcolm thought that the less training or capacity for reasoning people had, the more they would pride themselves on being susceptible only to logic and impervious to mere emotion. However, he added sadly: “But the fact is that reason is a new human toy, while emotions have been the mainspring of men's thoughts and acts since man appeared in the morning of time”.<sup>27</sup>

The simple truth of this statement cannot be doubted, but does professional training or even the conscientious application of intellectual rigour make one immune from the influence of emotion? Are honesty and fairness sufficient to ensure due objectivity, or are professional opinions also affected by the subtle and largely unrecognised influences of feelings and presuppositions? As one prominent lawyer put it, “the temperament, the imagination and the feelings may all mislead us in the chase”.<sup>28</sup> Some scientists may protest that lawyers may be susceptible to the emotions of the chase but that it is only because they are partisan advocates. Scientists chase only truth. Yet it would be naïve to

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<sup>25</sup> For example, in the Chamberlain trial in 1982 the Crown invited the jury to draw inferences from positive reactions to orthotolidine obtained from carpets in their car. It was conceded that orthotolidene was used as a screening test rather than as a means of providing positive proof of the existence of blood but evidence was given that it reacted to few, if any other substances. At the Royal Commission in 1986-87 it was revealed that orthotolidene also reacted to copper dust. The Chamberlains had lived in Mt Isa. A series of cars in their old street had been tested and all had produced positive reactions. Similarly, the “Griess” test which was relied upon by the Crown in the Guildford Four case to prove that traces of explosives had been detected on the hands of the accused was later found to react to soap and other substances including the film on playing cards.

<sup>26</sup> See, for example, Kuhn, T. S., *The Structure of Scientific Revolutions*, 2nd ed., University of Chicago Press, Chicago, 1970, at 185.

<sup>27</sup> Hilberry, Sir M., *Duty and Art in Advocacy*, Sweet & Maxwell, London, 1959 at 33. The statement was, of course, made not only before feminism expunged the generic use of male pronouns from professional discourse but at a time when jurors were invariably male.

<sup>28</sup> Reynolds QC, R.G., 'The Principles of Advocacy', in *Selected Papers on Advocacy and the Presentation of Evidence*, ANU Legal Workshop, Canberra, 1980, at 19.

assume that clinical detachment is donned with the lab coat whenever a scientist enters a laboratory.

In fact, some eminent scientists seem to jettison objectivity in their eagerness to embrace or reject arguments for or against propositions for which they have strong feelings. One example can be drawn from the experience of Professor John Taylor, a distinguished scientist who held a chair in mathematics at Kings College, London. In 1973 Prof Taylor decided to investigate Uri Geller's apparently psychic abilities, including telepathy and the capacity to bend spoons and other metal objects without exerting any physical force upon them. He found that there were no adequate scientific explanations for the observations that he had himself made under controlled conditions. One might have thought that this conclusion would have provoked some academic discussion but that the calm, objective attitude that is supposed to pervade scientific circles would have remained unruffled. But Professor Taylor, who was obviously an honest and unusually candid man, offered the following description of his own emotional reactions and those of his scientific colleagues:

*One clear observation of Geller in action had an overpowering effect on me. I felt as if the whole framework with which I viewed the world had suddenly been destroyed. I seemed very naked and vulnerable, surrounded by a hostile, incomprehensible universe. It was many days before I was able to come to terms with this sensation. Some of my colleagues have even declined to face up to the problem by refusing to attend the demonstrations of such strange phenomena.*<sup>29</sup>

This approach did not seem to reflect the highest standards of academic rigour. Some months later, as Prof Taylor reflected upon his attempts to make sense of his observations of Geller demonstrating the "impossible", he wrote sadly:

*But I was not able to convince my fellow scientists. One distinguished scientist, a Nobel prize winner, told me that metal-bending was clearly done by fraud, and his wife threw in for good measure that no scientist of repute would be caught dead investigating Geller. A scientific colleague with great research funds at his disposal would not hear of the effect being possible ... I hold no great hopes of denting the scientific complacency of my brethren. Only a machine able to perform equal miracles could do that...*<sup>30</sup>

His colleagues apparently thought that the essence of the scientific method lay in protecting opinions to which they were emotionally committed by refusing to look at the evidence and denouncing investigation. These eminent scientists would presumably have distinguished their responses from those of religious fundamentalists, but one may struggle to find a valid basis for the distinction.

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<sup>29</sup> Taylor J., *Superminds*, Picador, London, 1976 (first pub by Macmillan London Ltd 1975) at 56.

<sup>30</sup> Supra at 163.

It is inescapable that strong convictions or sympathies have the capacity to mislead even the most fair and well-qualified experts. Even within the rarefied fields of forensic science, errors occur not only because of inherent difficulties in the integrity of the samples or the reliability of test results or obvious mistakes, but because of the more subtle and perhaps unrecognised influence of underlying assumptions, sentiments and values on the judgment of scientists. Some of these influences are readily identifiable. Sympathy for a victim, a desire to help the authorities, and professional pride may all tempt scientists to venture beyond their expertise or knowledge by, for example, rejecting the possibility of alternative causes. However, there are less obvious dangers such as those posed by enthusiasm for or defensiveness concerning a particular technique or a too ready acceptance of presuppositions inherent in a strong corporate ethos such as those sometimes found in specialist victim units.

Sixthly, there is the problem of bias. I suspect that actual dishonesty is rare but some experts do seem quite incapable of maintaining objectivity when considerations of loyalty intrude. Some times even subconscious bias is obvious. Some years ago I cross-examined a medical specialist who conceded that he no longer treated anyone but only assessed plaintiffs in personal injuries claims for the purposes of providing reports to insurance companies. He assessed about two or three hundred each year and, in response to a question about how many he found to be genuinely suffering from some disability, said, "Oh, I don't know, may be four or five." When asked whether he was really suggesting that, in his experience, ninety-eight or ninety-nine percent were malingerers, he paused for a few seconds before answering: "Yes, that sounds about right".

In other cases it may be more difficult to detect and address. The opinions and perceptions of even the most objective scientist may be influenced by those in the same professional group or others with similar objectives. These may give rise to a prevailing paradigm in the sense used by Thomas Kuhn to describe a strong network of commitments which shape the practice of those who share it.<sup>31</sup> Common preconceptions and presuppositions may be the product of extensive but one-sided corporate experience. This phenomenon is frequently evident amongst legal and regulatory groups such as specialist investigators and prosecutors but may occur in any discipline. Those whose professional career is devoted to investigating criminal offences and/or supporting victims may more readily assume that offences have been committed and react more cynically to potentially exculpatory explanations.

A number of psychological factors are conducive to group conformity, including identification with others in the group and internalization of values and beliefs.<sup>32</sup> It has been suggested that when relatively cohesive groups which are substantially isolated

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<sup>31</sup> Kuhn, T. S., *The Structure of Scientific Revolutions*, 2nd ed., University of Chicago Press, Chicago, 1970, at 42. Of course, the influence of paradigms is now well recognised in other fields. See also Barker, J. A., *Paradigms*, The Business Library, Melbourne, 1992.

<sup>32</sup> For a general description of these factors see Aronson, Elliott, *The Social Animal*, 8<sup>th</sup> Ed., Worth Publishers, New York, 1999, Chapter 2, "Conformity" at 13-55.

from dissenting views are required to make decisions they may fall prey to what has been described as “groupthink”.<sup>33</sup> This term which was coined by Irving Janis adverts to a mode of thinking that emerges when “concurrence seeking becomes so dominant in a cohesive ingroup that it tends to override realistic appraisal of alternative courses of action”. However, objectivity may be endangered even when there is no obvious corporate ethos, esprit de corps, or pattern of common belief. The mere recruitment to one side may subtly influence opinions<sup>34</sup> and extensive or frequent involvement with one side may have a significant impact on the degree of objectivity that a person may bring to the relevant issues.<sup>35</sup> Furthermore, as Tony Raymond pointed out some years ago, when scientists see their tasks as attempting to prove that samples accord with their presuppositions, rather than merely trying to discover what the tests may reveal, they may well mislead themselves.<sup>36</sup>

Seventhly, confusion may occur due to a failure to appreciate incongruities between the paradigms within which scientists and lawyers may approach the issues. This point can perhaps best be illustrated by example. In one case, a medical expert agreed that he had rejected the possibility that not all of the injuries suffered by a child may have been caused in the same manner because of the application of Occam’s Razor.<sup>37</sup> This

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<sup>33</sup> See Janis, I. L., “Groupthink”, *Psychology Today*, (November,1971), 43-46. See also Janis I. L., “Counteracting the adverse effects of concurrence-seeking in policy planning groups” in *Group Decision Making*, Academic Press, New York, 1984; Kameda, T & Sugimori, S., “Psychological entrapment in group decision making: An assigned decision rule and a groupthink phenomenon”, *Journal of Personality and Social Psychology*, 65 (1993) at 282-292.

<sup>34</sup> Roger Fisher has cited university exercises in which students are given identical facts about a hypothetical company said to be for sale and asked to act as negotiators, with half acting for the vendors and half for potential purchasers. Before negotiations commence each student is asked to nominate his or her best estimate of the price that would be set by an impartial arbitrator. Those acting for vendors routinely nominate a higher figure than those acting for purchasers. Fisher suggests that simply looking at a situation from a partisan viewpoint tends to distort judgement. See Fisher, R., 'He who pays the piper' (1985) 63 *Harvard Business Review* 150, at 152.

<sup>35</sup> This is sometimes evident in the attitudes displayed by medical practitioners who regularly give evidence for either plaintiffs or defendants in personal injury cases. For example, one specialist invariably called to give evidence for defendants frequently answered questions about a particular plaintiff by referring contemptuously to “these people” and said he found that only about one or two percent were not malingerers.

<sup>36</sup> Tony Raymond, of the Victorian Institute of Forensic Science, made the comment in private conversation during the Royal Commission into the convictions of Michael and Lindy Chamberlain during 1987. The danger was acknowledged by the ACT Court of Appeal in *The Queen v Coroner Maria Doogan & Ors; Ex Parte Australian Capital Territory* [2005] ACTSC 74 (5 August 2005) at [99].

<sup>37</sup> This principle, which is attributed to the Fourteenth Century philosopher and theologian, Willam of Occam, is based upon the Aristotelian principle that entities should not be multiplied beyond what is necessary, and is interpreted to mean both that the simplest of two or more competing theories should be preferred and that an explanation for unknown phenomena should first be attempted in terms of what is already known. Sir Isaac Newton is said to have reformulated the rule to provide that no more causes of natural things should be admitted than such as are both true and sufficient to explain their appearances.

principle may provide guidance as to the approach which should be adopted when there is doubt or uncertainty but the Crown had been relying upon his evidence to exclude the existence of any such doubt. I was left with the distinct impression that the Crown may not have understood the limited basis for his opinion and, conversely, that he may not have realised the implications which the Crown sought to draw from that opinion.

In another case, an eminent scientist who gave evidence supporting an opinion by a subordinate was confronted by evidence suggesting that adequate controls had not been used in the relevant tests, that similar tests carried out by the same person appeared to have produced results inconsistent with her conclusions, and that he had not been aware of some material facts. He nonetheless said that he adhered to his opinion and, when pressed as to how he could do so, maintained that there might be an explanation for the matters raised that had been put to him in cross-examination. He conceded, however, that he did not know of any adequate explanation and, when it was suggested that in adhering to his opinion he was simply giving his subordinate the benefit of the doubt, he readily agreed, commenting: "Of course, she is my colleague". He seemed somewhat startled by the proposition that it was the accused who should have the benefit of any doubt on the issue. Had the questions not been asked, the Court would have been left with the impression that in his opinion the tests proved the disputed facts.

In the baby shaking case to which I have referred, some of the expert witnesses seemed to feel that criticism based upon the perceived inadequacy of the research was unfair. "It's the best we can do," one explained defensively. That was obviously correct, but the legal issue was whether the evidence proved guilt beyond reasonable doubt, not whether the experts retained by the Crown had done their best.

The risks of error due to these matters obviously do not arise only because of negligence or unfairness and the phenomena that cause them do not afflict only the inexperienced or incompetent. On the contrary, such risks arise even when the most responsible and competent scientists conscientiously struggle with the challenges presented to them in their respective disciplines and do their utmost to be fair.

### **The refractive qualities of lawyers**

Truth is also refracted by the human frailties of lawyers. Whatever the cogency of the available scientific evidence, it will be capable of influencing the outcome of the trial only to the extent to which it is presented. At this stage, it will be subjected to the influence of a second layer of underlying assumptions, sentiments and values and the degree of refraction may be increased by a number of factors.

These include the adversarial and/or partisan nature of the legal advocates' roles. The party seeking to rely on conclusions drawn from the evidence will obviously seek to present it in a manner that will be comprehensible and appropriately directed to the issues in the case, but counsel generally adopt a partisan approach<sup>38</sup> and endeavour to deal with

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<sup>38</sup> One classic formulation of an advocates' duty is as follows:

evidentiary issues in the manner that they believe will be in their clients' best interests. It is true that prosecuting counsel have an overriding duty of fairness<sup>39</sup>, but this does not absolve them from the need to present the Crown case firmly, even vigorously.<sup>40</sup> Furthermore, it has been suggested that psychological pressures on prosecutors arising from belief in the guilt of defendants may expose even the most ethical to subtle and sometimes unwitting temptations to breach this duty.<sup>41</sup> It is certainly true that prosecutors are advocates and that there is a potent cocktail of psychological factors which inevitably tend to evoke an adversarial approach, albeit one tempered to some extent by the duty of fairness. These factors include natural competitiveness, the drive for success, belief in the guilt of the accused, repugnance at the offences, sympathy for victims, and even an idealistic desire for justice. Hence, scientists may sometimes feel that they have ventured from the relative calm of their laboratories into a verbal battleground and fear that truth may be a casualty.

It has been argued that advocates are "not engaged much more than half the time - and then only coincidentally - in the search for truth."<sup>42</sup> Indeed, the adversarial system of justice has itself been derided as reflecting an assumption that "(t)wo prejudiced searchers starting from opposite ends of the field will between them be less likely to miss

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"Generally...it may be said that a lawyer may and should do for his client whatever the client could legitimately do for himself if he had the knowledge and ability to conduct his own case. It is not for the lawyer to determine the moral or legal merits of a client's case. Thus if the client can succeed on a technicality the lawyer may urge him on moral or other grounds not to rely upon it, but unless the client agrees to waive it he must take the technical point: if the law maintains the technicality it is not counsel's business to legislate privately against his client's legal right. It is also his duty to put the opposite side to full proof of their case, and not, unless it is to the client's interests to do so, or unless he knows that the fact is easily provable and cannot be disproved, to concede a fact merely because he knows it to be so. Again, he should not refrain from putting to the tribunal any part of his client's case merely because he considers that the facts or the law do not validly support it: he may be wrong, and whether he is right or wrong it is not his function to pass judgment. In arguing the law it is his duty to put to the Court any arguments that may possibly influence the Court in favour of his client, and not merely those which he himself believes to be correct: the judge might think differently, and it is his opinion that counts." Teece QC, R.C., *The Law and Conduct of the Legal Profession in New South Wales*, 2nd Ed., Sydney, Law Book Co., 1971, at 60.

<sup>39</sup> See Kenny, C.S., *Outlines of Criminal Law* (19th Ed.) Cambridge University Press, Cambridge, 1966, at 612-3; Halsbury's Laws of England, (3rd ed) Vol 10, par 761; *Roulston* (1976) 2 NZLR 644 at 654; *R v Edmunds* (1978) 45 CCC (2d) 104 at 116 Newfoundland CA; *McCullough* (1982) 6 A Crim R 274 at 285; Kidston QC, R.R., 'The Office of the Crown Prosecutor (more particularly in New South Wales)' (1958) 32 ALJ 148 at 154; and *Guidelines on the Role of Prosecutors*, adopted at the Eighth United Nations Congress on the Prevention of Crime and the Treatment of Offenders, Havana, 27 August - 7 September, 1990.

<sup>40</sup> See also the remarks of the Tasmanian Court of Criminal Appeal in *McCullough* (1982) 6 A Crim R 274 at 285.

<sup>41</sup> Jonakait, Prof., 'The Ethical Prosecutor's Misconduct', *The Criminal Law Bulletin* 23 (6) 1987, 550.

<sup>42</sup> Frankel, M. E., 'The Search for truth: an umpireal view', (1975) 123 *U. Penn L.R.* 1031 at 1035.

anything than the impartial searcher starting in the middle.”<sup>43</sup> There are a number of reasons for challenging the adequacy of this metaphor, though a review of the objectives and effectiveness of the adversarial system would plainly fall outside the scope of this paper. In most cases, of course, evidence in chief is given in a manner that is substantially unimpeded by inappropriate interruptions or tactical devices. However, it is true that victory does not always reflect the merits of the case: 'it sometimes goes to the wily warrior.'<sup>44</sup> This perception is encapsulated in Frankel's anecdote of the graffiti on the bulletin board of the trial lawyer's office: 'A jury is 12 people deciding who has the best lawyer.'<sup>45</sup>

Cross-examination, if not evidence in chief, will almost invariably be directed to undermining the validity or weight of evidence that has been adverse to the interests of the cross-examiner's client and/or eliciting other evidence that might assist that client. There can be little doubt that cross-examination is an effective tool and that, if it were not permitted, errors might remain unchallenged and, perhaps, even undetected. Furthermore, it would be difficult to find any other means of determining whether the issues had been approached honestly and in an unbiased and objective manner. Nonetheless, few scientists would suggest that the most effective means of accurately communicating difficult technical concepts to non-experts would be by answers to leading and perhaps aggressively worded questions asked by people trying to impugn the conclusions of the witnesses.

Whilst the risk of confusion or distortion being caused in this manner should not be discounted, greater dangers of injustice arise from counsels' limited understanding of the relevant scientific discipline and inability to address the relevant issues. This may give rise to real risks of injustice. Comments concerning a series of English cases, especially the successful appeals by the Birmingham Six, Guildford Four and Maguire Seven, have included expressions of concern about the shortcomings of police, scientists and, most relevantly, lawyers. Whilst such miscarriages of justice may have many contributory causes, there appear to be some parallels. In particular, it has been suggested that:

*The case histories....reveal three major failings. First, forensic scientists withheld vital evidence that would have cast doubt on the prosecution case. Secondly, the defence at the original trials did not have adequate forensic advice. And lawyers - including some of the most senior judges in the land - seemed unable to probe the limitations of such evidence.*<sup>46</sup>

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<sup>43</sup> Devlin, P., *The Judge*, Oxford University Press, Oxford, 1979, at 61.

<sup>44</sup> Gerber, Rudolph J., *Lawyers, Courts and Professionalism - The Agenda for Reform*, Greenwood Press, Westport, Connecticut, 1989, at 105.

<sup>45</sup> Frankel, Marvin E., *Partisan Justice*, Hill & Wang, New York, 1978, at 34.

<sup>46</sup> Hamer, M., *New Scientist*, 9 November, 1992 at 22.

These comments may reflect badly on the scientists concerned but they also highlight the danger of unjust conviction that may ensue if counsel are unable to adequately understand the available scientific evidence and deal with the issues posed by it. An inadequate approach to a complex case may produce a 'snowballing' effect. If the relevant documents are not obtained, whether under subpoena or otherwise, it may not be possible to obtain alternative opinions from independent experts. Hence, it may not be possible to gain sufficient knowledge of the technology to be able to understand the relevant techniques and question the conclusions drawn by the expert witnesses or suggested by the Crown.

Regrettably, the complexity of modern scientific evidence may often seem too daunting and, in consequence, it is often left unchallenged and unexplored. An English scientist has suggested that lawyers frequently admit that they 'switch off' during the scientific evidence and avoid detailed cross-examination for fear of asking 'one question too many'. He added 'Even the Appeal Court judges in their 1987 hearing of the Birmingham Six case seemed to lack any critical understanding of the scientific evidence.'<sup>47</sup> The latter point is scarcely surprising. The very nature of the judicial function usually means that a judge will be aware of the evidence actually adduced, but will be obliged to leave issues concerning the adequacy of the evidence to counsel involved in the case. Hence it must be the advocates who bear the primary responsibility for testing the evidence and the conclusions for which the opposing side contend.

One may be justly critical of lawyers who fail to conscientiously grapple with the relevant issues, but it can be extremely difficult for a non-scientist to plunge into some arcane technical field, aided only by a report expressed in terms of seemingly Delphic obscurity. In many cases, the only solution is to enlist the aid of another expert willing to spend some hours translating technical terms into the English of ordinary mortals, explaining the relevant concepts and answering questions about any apparent potential for error or inaccuracy. In essence the lawyer seeks a 'crash course' on any narrow sliver of expertise that appears to be relevant to the issues in dispute. Even then he or she will be a sparsely equipped protagonist seeking to challenge experts on their own grounds.

John Cook, writing in 1646, observed sadly 'the truth lies many times in such a deep well, that every lawyer hath not a bucket to draw.'<sup>48</sup> The succeeding centuries may have seen augury replaced by a new world of forensic science but this observation remains disturbingly true.

### **The refractive qualities of judges and juries**

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<sup>47</sup> The comment was made by Russel Stockdale of Forensic Access, a private firm engaged in forensic science consultancy. See Hamer, M., *op cit*, at 24.

<sup>48</sup> Cook, J., *The Vindication of the Professors & the Profession of Law*, Matthew Wallbancke, London, 1646, 8. An experienced contemporary barrister, Geoffrey Gibson, made the same point recently, observing that '...there is no such thing as absolute truth in litigation'. He added '...the truth is that you don't know the truth'. Gibson, G., 'The First Stone', *Victorian Bar News*, Winter 1995, 74 at 75.

Truth may also be refracted by the perceptions of the judge and/or jury hearing the evidence who not only share the human frailties of others, but have no opportunity for independent inquiry and are almost wholly dependent on the manner in which the case is presented to them by others.

In 1992 I attempted to provide some indication of the challenges facing juries by offering the following scenario:

*Imagine, if you would, a university course on a highly technical topic taught to students, who have no relevant background or interest and who have been chosen at random from the community. Imagine that the course is condensed into a few days and that the students are denied textbooks, the information being given only in answer to questions. Imagine that the questions are asked by two people, neither of whom has any relevant expertise and each of whom appears to be striving to support some predetermined position rather than seeking the whole truth. Imagine that when the questions are completed only those without expertise are permitted to present arguments ... Then imagine that the students are informed that all have to agree on the ultimate answer and that if they make a mistake an innocent person might have to spend a decade or more in prison or, on the other hand, a murderer might go free and perhaps kill again. That, in essence, is the method by which scientific evidence is presented to juries.*

During the ensuing decade there has been much discussion about scientific evidence and there have been some innovations as to the manner in which it may be dealt with in court<sup>49</sup> but this scenario still seems to describe the essential process by which it is presented to juries in criminal cases.

It is true that judges enjoy some advantages. In particular, they have usually had some exposure to scientific evidence during their legal and judicial careers and may have some general familiarity with the types of issues likely to arise in particular disciplines. They are more likely to take notes of potentially crucial passages in the evidence and are able to advert to a full transcript of the evidence as required. They are also likely to be less reticent about interrupting to seek explanation of esoteric terms or concepts. Perhaps most importantly, they tend to bring to their tasks a certain caution or even professional scepticism that militates against uncritical acceptance of contested propositions. Nonetheless, the implication of perceived advantages can be exaggerated and judges can also be mistaken.<sup>50</sup>

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<sup>49</sup> The *Federal Court Rules* now permit judges to engage court experts, and, even in relation to experts called or to be called by parties, has a wide discretion to require witnesses, to confer, produce documents identifying areas of agreement and dispute, file affidavits and give evidence in a certain manner or sequence, which may extend to concurrent cross-examination with different witnesses being asked the same question sequentially. See rules 34 and 34A. The Federal Court has no criminal jurisdiction.

<sup>50</sup> It has been suggested that both judges and juries may be mistaken in attempts to evaluate the cogency of expert evidence by assessment of the experts in the witness box. See, for example,

I ruefully recall one case in which I unsuccessfully objected to evidence from an accountant to the effect that he had formed a “general impression” that my client had misappropriated sums of money amounting to about \$50,000. In cross-examination, the witness conceded that he could not point to any calculation, extrapolation or apparent inconsistency in the financial records upon which this impression might have been based, but maintained that he was an expert and that “you get a feel for these things”. His Honour dismissed as unhelpful my questions about whether the feeling came to him spontaneously like mystic emanations from the ether or whether he was obliged to invoke them by some procedure, such as consulting the entrails of chickens. He also dismissed the contrary view of my client’s accountant, apparently on the basis that he had relied only on financial audit and analysis rather than seeking to sense some shift in the force.

Despite American studies using 'simulated juries',<sup>51</sup> little is known of the actual dynamics of jury deliberations, a deficiency which led Sir Allen Green, then the English Director of Public Prosecutions, to propose 'bugging' jury rooms.<sup>52</sup> However, it seems likely that Sir Malcolm Hilberry was correct in suggesting that they may well be influenced by emotions.<sup>53</sup> Whilst there may be no reason to suppose that jurors are any more prone to act emotionally than other members of the community, they do not have the familiarity with the human consequences of violence and depravity that is a regrettable corollary of a criminal advocate’s professional life and, perhaps, the lives of some expert witnesses. They may see and hear evidence which they may find confronting, even shocking.<sup>54</sup>

The emotional impact of such evidence may give rise to psychological reactions conducive to making jurors more ready to convict the accused. There may be a feeling that the enormity of the crime demands a response: that someone must pay for what has been done. There may also be a reluctance to confront the thought that if the accused is not guilty then the real perpetrator is still at large. The gravity of the proceedings, the apparent moral legitimacy of a prosecution in the name of the Queen, the presence of

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Porter C. & Parker R.W.R “The Demeanour of Expert Witnesses”, *Aust J of Forensic Sciences*, July-Dec 2001, Vol 33 No 2 at 45-50.

<sup>51</sup> See, for example, the cases discussed by O’Connell, J., & Kelly, C.B., *The Blame Game*, Lexington Books, Lexington Mass., 1987, at 14 et seq.

<sup>52</sup> The suggestion was made during discussion in a plenary session at the Heads of Prosecution Agencies Conference in Sydney in July, 1991. He conceded that the results should only be used for research purposes and proposed that the tapes be transcribed without any names or other references that might enable the trials to be identified. More recently, a study involving surveys of jurors with a view to ascertaining the extent of the understanding of scientific evidence has been undertaken by Ms Rhonda Wheat with the support of the Australian Institute of Judicial Administration and the approval of the Attorney-General.

<sup>53</sup> See paragraph 23, fn 28.

<sup>54</sup> I have had to excuse at least one juror from further participation in a trial because he was unable to bring himself to look at photographic evidence of the fatal injuries in order to assess disputed evidence as to their the causation.

sheriff's officers presumably to stop the jury from being suborned, a procession of police witnesses and, in some jurisdictions, even a dock to hinder escape may all tend to tip the scales against the accused. Feelings of anger or revulsion caused by evidence of serious injuries and/or sympathy for the victim may also contribute to this imbalance.

It is true that the accused enjoys certain advantages including the right to silence, the presumption of innocence and, of course, the principle that any charge must be proven beyond reasonable doubt. However, as Shakespeare demonstrated in the contrasting speeches of Brutus and Mark Antony, arguments based upon reason are not necessarily sufficient to outweigh the force of emotion. Furthermore, the fact that an accused person enjoys certain legitimate advantages does not negate any risk of wrongful conviction due to confusion and/or a predisposition to convict due to sympathy, anger and emotion.

Jurors are often warned that neither prejudice nor sympathy should be permitted to influence their decisions. I have no reason to doubt that they generally make a conscientious attempt to understand the evidence and to be fair to the accused. However, given the manner of presentation, it is difficult to wholly discount the potential for confusion as to the meaning and implications of complex expert evidence, and strong, and perhaps, unrecognised emotional responses may subtly colour a juror's interpretation.

### **Sceptical responses**

It is within the thickets of the forensic jungle I have sought to describe that advocates may be required to deal with expert evidence. The challenge may be daunting. It is not easy for a person with little knowledge of some field to challenge the opinions of a witness who has devoted his or her professional life to its mysteries. The challenge may also be hampered by lack of time and/or lack of funds to pay for the provision of alternative advice. Furthermore, the nature of any responses that may seem appropriate will obviously vary from case to case and there can be no substitute for the application of intellectual rigour to the particular problem in question. Yet some tentative suggestions can be made.

Whilst the relevant field of knowledge may be vast, only a narrow sliver will be relevant to the facts in issue. An adequate understanding of that sliver can often be obtained from a discussion with a suitably qualified expert retained to advise the opposing party and, if necessary, give evidence on his or her behalf. A report will usually be helpful but it will almost invariably be necessary to ask critical questions such as:

- How do we know that?
- What research has been undertaken to establish relevant premises or principles?
- What degree of accuracy was reported?
- How large, diverse and/or representative was the sample?
- What was the methodology?
- What controls were used?
- How does the research validate or support the opinions expressed?
- What are the logical limits of that validation or support?

- What are the crucial steps in the process of reasoning?
- Is any part of the reasoning dependent upon presupposition or assumption?
- What is the nature of the scientific test now relied upon?
- What is actually done?
- Is there scope for error?
- What does one actually see or hear that is interpreted as a positive or negative result?
- Are there artefacts or other phenomena that may mislead?
- Were the tests carried out correctly and with proper controls?
- Was there anything about the age or condition of the sample tested that differed from those used in the initial research?
- To what extent are the results dependent upon interpretation or opinion?
- Have there been other cases in which the results have been discredited or questioned?
- In relation to each crucial proposition, what if anything would the newly retained expert question if for some reason convinced that a mistake had been made?

If time and money do not permit the assistance of an independent expert, then one may have to assail the expert called by the opposing counsel with questions of this nature. That may involve forsaking the cardinal rule of cross-examination, not to ask questions unless one is confident of being able to deal with the answers, but desperate straits call for desperate measures and, if defeat seems otherwise inevitable, one must sometimes test the evidence, whatever the risks.

Can a non-expert lawyer ever really hope to show that well-qualified experts are quite wrong? That question was emphatically answered by a man named Les Smith who gave evidence at the Chamberlain Royal Commission. Les was a technician who worked in a factory and, whilst he had no significant scientific qualifications, he had a good practical approach. He became puzzled by the apparently damning evidence of a spray pattern on a square plate under the dashboard of the Chamberlain's car. A very senior forensic pathologist had described the pattern as a classic arterial blood spray of the kind that might have been expected if the baby's head had been severed or the throat cut and a forensic biologist had said that droplets from the pattern contained a concentration of foetal haemoglobin that could only have come from a baby. Scientists retained by the defence had questioned but been unable to wholly refute this evidence.

Les started with a simple proposition: a spray must have emanated from some source and if one extrapolated backwards from the lines in the pattern it should be possible to find the initial point of divergence. He found that corresponded to the position of a plenum drain hole in the side of the car. He put his head under the mudguard to see if anything was on the surface of the other side and found it covered by what appeared to be a similar substance. He rang GMH who turned up the records and told him they had used Dulux products on that model. He then rang Dulux, ascertained that they had a scientific laboratory and had them test other samples from the spray pattern. The results showed it was chemically identical to Dulux Dufin sound deadening compound. The Crown had proved that a mixture of paint and bitumen had come from the artery of a 3 month old baby.

Les then turned his attention to evidence from zoologists, odontologists and textile experts to the effect that the teeth of dingoes could not have caused the damage to the baby's jumpsuit. He had no relevant qualifications or experience but thought that it might be interesting to see what would happen if he put a doll wrapped in meat into a jump suit and threw it into a pen containing dingoes. There had been expert evidence that seven different actions would have been impossible for any dingo to perform. Yet the videotape Les obtained revealed dingoes performing all seven. There had also been expert evidence to the effect that the action of dingo teeth on fabric could not produce cuts and could not have accounted for tufts of fabric found at the scene. Les found cuts on the jumpsuit and swept up a collection of tufts from the floor of the pen. Another apparently impressive body of expert evidence had been shown to be baseless conjecture.

## **Conclusions**

Legal procedures have emerged from the superstition and barbarism of earlier ages and forensic science has provided hitherto unimagined avenues of discovering relevant facts. Yet whilst forensic science may be more reliable than augury, it does not involve direct personal revelation like St Paul's experience on the road to Damascus or even Archimedes' famous flash of inspiration in the bath. Truth does not emerge with pellucid clarity in the minds of jurors merely because procedures are carried out in a forensic science laboratory. Facts must be discovered or deduced by scientists, transmitted to lawyers, presented in a comprehensible manner to the jury and then understood, retained and applied by the jurors. Hence, truth is revealed as the culmination of a process in which it must pass through various hands. Even when all those involved are people of complete integrity, there may be a risk of refraction at each stage. At our present stage of development, neither science nor law can claim to have eradicated human fallibility. Yet error, no matter how understandable, may lead to grave injustice.

The consequences of unjust conviction may be personally devastating. The conviction alone may destroy a person's career and reputation. A sentence of imprisonment may not only involve confinement, often in a brutal environment, but loss of one's home, family life and income. The prisoner may be depressed, frightened and feel alienated from his former friends and society in general. He or she may be subjected to violence or even homosexual rape. Furthermore, as John Donne observed sadly, "no man is an island". The prisoner's family may also suffer greatly. His or her partner will be deprived of lover, confidant and friend. Many relationships do not survive. Children will be deprived of their mother or father and may have acute feelings of both loss and shame. If the prisoner has been the principal breadwinner the family may also lose their home and suffer financial hardship. The damage may irreparable. Even subsequent exoneration may not assuage the physical and psychological trauma which the prisoner has suffered, re-establish broken relationships or restore the emotional stability of his or her children.

It may be impossible to wholly avoid the risk of such human tragedies but one can, at least, approach one's task with intellectual rigour, sound judgment and a vigilance enhanced by due awareness of the potential for injustice.