CHAPTER 11

Proposals for Change

THERE ARE THREE changes that should now be compellingly obvious that would go a most substantial way towards ensuring the reliability and validity of expert opinion evidence offered in court.

USING SCIENCE AS A PRACTICAL LITMUS TEST FOR "EXPERTS"

SINCE THE CRUCIAL discriminating factor between good and bad expert opinion lies in methodology and not in content, knowledge of that methodology, as opposed to knowledge of any particular content, becomes the obvious litmus test to initially separate the good from the bad. Scientific literacy can, in fact, be used as the basic test to discriminate real experts from junk scientists. Knowledge of the methods of science can and should be used to determine in effect who is worth listening to in a courtroom.

The issues for all proposed experts could become:

- Are they scientifically literate?
- Do they know and appreciate the scientific method?
- Are they aware of illogical reasoning?

It is true that passing this test does not guarantee an absence of junk science: prominent and knowledgeable scientists can believe in astrology and worse. But

failing that test — being scientifically illiterate — virtually ensures the presence of junk science. It means the witnesses' purported knowledge almost certainly arises from their imagination or ideology or some other unreliable source, but not from reality because they are illiterate with regard to reading reality.

The significance of impressive-sounding credentials must be properly translated into an inquiry into the depth of the witness's knowledge about to "really and validly know" — scientific literacy, and not just an abdication of that judgment by relying on an apparently impressive educational background.

Applying this test ensures that witnesses allowed to pass into the evidentiary arena will at least be speaking the right language of science, so that their knowledge can be measured by appropriate standards and found wanting or not. For this reason, the initial content of any forensic scrutiny by knowledgeable lawyers is increasingly turning to an exploration of the witness's scientific literacy,[1] and this is why scientific literacy is an excellent guide to the appropriate test for the requisite judicial gatekeeping function regarding expert evidence as well.

USING SCIENCE AS A SOURCE FOR EXPERT EVIDENCE *PER SE*

THE SYSTEMATIC KNOWLEDGE described in this book should be recognized as a legitimate area for expert evidence in its own right. It meets all the requirements of expert evidence, but unfortunately is not commonly known —that is a serious reflection on society. This source of knowledge is extremely relevant, highly reliable, and absolutely necessary to ensure quality expert evidence in our courtrooms, and those same referenced books show an abundance of qualified experts quite familiar with the scientific method.

The second change I would recommend is the increased use of science framework evidence when other expert opinion evidence is sought to be adduced, to critique the proposed evidence and expose its failure to meet the standards of science, if such be the case. Instead of, or in addition to, a defence expert to dispute the merits of the substance of the fingerprint identifier's conclusion, an expert scientist should testify about the methodological flaws in fingerprint identification, its disguised subjectivity, its unproved assumptions, the potential for various biases to operate, and, in short, its unscientific and potentially unreliable nature.

---

1 *R. v. Olscamp* (1994), 95 C.C.C. (3d) 466 (Ont. Ct. Gen. Div.); *R. v. Kavanagh*, [2001] EWCA Crim 140.

An example of such an approach[2] is found in *R. v. Perlett*.[3] In this murder case, it was technically not expert evidence that was in issue, but rather evidence as to the observations of witnesses regarding an odour of gunpowder.

The evidence in issue involved "experiments" or tests conducted by the police to determine whether an odour of gunpowder should or should not have been detected by witnesses. The defence called expert evidence to describe the failings in the police test procedures.

> This is a motion by the defence to exclude evidence of what counsel have jointly referred to as the gunsmoke odour tests.
>
> . . .
>
> The information in general in the motion materials indicates that on March 22, 1996, an evening of double homicides, eight shots were fired in the residence occupied by the two deceased and the accused Mr. James Perlett, that four shots were fired upstairs and four shots were fired downstairs. No time of the firing of the shots was established. However, the police arrived within five minutes of receiving the 911 call to attend at the residence. During the course of their immediate investigation, no witnesses made any note of the presence or absence of any gunsmoke odour.

The Crown relied on the witness's nondetection of odour as probative of the falsity of the accused's story and hence inculpatory regarding the accused's guilt. For this logic to apply, however, the Crown had to show that the witnesses, if the accused's story were true, should have detected gunsmoke odour; hence, the police "tests."

> On May 7th, 1997, a series of tests was conducted in the same residence in an effort to determine how long the smell of gunsmoke would remain in the air after discharge of a firearm. Efforts were made to duplicate the physical set-up of the residence as it was on March 22, 1996: the same residence obviously was used; the same officers attended for the tests as had attended at the residence at the time of the homicides; the same type of ammunition was used; shots were fired in approximately the same location in the residence as the officers had been given information; the officers followed the same route within the residence as they had on March 22, 1996.
>
> Some problems with the police testing procedures were obvious:

---

2 Although not an example of such evidentiary use, clearly in the same spirit are the comments in *R. v. Corbett*, [1988] 1 S.C.R. 670 of Dickson C.J., who referenced scientific inadequacy in the context of jury studies. See extract in text at note 21 in chapter 9.

3 [1998] O.J. No. 6026 (Gen. Div.).

Other aspects had significant differences: no attempt was made to approximate the same inside or outside temperatures; the residence was furnished differently; the residence had been painted; a different type of weapon was used although a similar .22 calibre class of handgun; one of the officers involved in the test on May 7th had a nasal condition which he did not have March of 1996; no attempt was made at that time to determine the aspect of airflow and, in particular, air or heat registers.

Sergeant Maule, who was responsible for conducting the tests on May 7th, stated that the tests were not intended to be scientific but purely investigative. He acknowledged in cross-examination that, subsequent to that test, he determined that there were many factors which should have and could have been taken into account to increase the reliability.

Therefore, following the tests of May 7th, 1997, a second series of tests was conducted on March 4th and 5th of 1998. That date was chosen because the outside air temperature was then approximately the same as it had been on March 22nd of 1996. In an effort to further replicate the conditions of March 1996, furniture was placed in the residence in the same locations as it had been in March of 1996 although not all of the exact same furniture was used.

There were differences between the March 1996 and March 1998 tests. Without specifying all of the differences, I note the following: The deceased obviously were not in the room; bedding and personal items were no longer in the room; walls in the bedroom had been painted and many other areas in the residence had been painted; there were differences with respect to the location of ashtrays and the presence of cigarette butts; an attempt was made to put the windows and doors in the same open or closed position as in March of 1996; however, no effort was made to duplicate the effect of a broken glass window in the outside door.

. . .

The tests essentially consisted of shots being fired in the residence into a bucket filled with sand. The two officers waited outside for 20 minutes, then went into the residence to determine if they could smell gunsmoke odour. On March 4th, 1998, one smelled nothing, and the other detected a faint smell at the base of the stairs.

A second series of similar tests was conducted on March 5th, 1998, with the same officers following the same general procedure. They waited 15 minutes before entering the residence. At that time they detected different smells. One could not say it was gunsmoke. The other officer said he first smelled gunsmoke in the kitchen, more going up the stairs and a continuous odour going down the hallway to the master bedroom where the deceased had been sleeping. On completion of that test, doors and windows of the house were opened for eight minutes. A second test consisting of the same firings was done. The officers

> waited ten minutes on entering the house. Both detected gunsmoke odour on entering the kitchen which, although variable between the two officers, remained present and got stronger as they made their way up the stairs toward the master bedroom. The evidence is that the ten minute period was selected as the time-span from the 911 call to the first officer arriving at the scene was five minutes, and that time-span was doubled.

It was in response to that proposed evidence that the defence called an expert witness, one admitttedly inexpert regarding firearms, but extremely expert regarding the ways of good science:

> Doctor William Tilstone was called by the defence on other motions. . . . He was acknowledged by the Crown to be an expert in the field of Forensic Science qualified to give opinion evidence on (1) identifying describing the general principles of scientific testing and (2) to offer an opinion on what distinguishes reliable forensic testing from unreliable testing.

The defence adduced from Dr. Tilstone's evidence about good science and bad science, and why the police "tests" fell within the latter category:

> He was . . . asked:
>
> Do these tests and the observations and results form a reliable scientific basis to draw any conclusion about the correctness of the hypothesis?
>
> Doctor Tilstone clearly acknowledged that he is not a firearms expert. However, he raised a number of issues of concern to him. Without reviewing here all of the issues he raised, his opinion on the hypothetical is that no scientific conclusion can be drawn on the basis of this type of testing. He further noted that human cognitive studies are extremely difficult to replicate. His ultimate opinion is that the testing described can clearly not be characterised as true scientific tests.
>
> . . .
>
> The concluding and all encompassing submission of defence, as I understand it, is that there are numerous flaws in the way this testing was carried out; that both scientific witnesses agree it cannot be considered as valid scientific testing; that in any event the subsequent testing is incapable of any inferential connection to the date of the offence; further, that even though it ought not to be categorized as valid scientific testing, the evidence ought to be excluded as its probative value is outweighed by its prejudicial value. Again the argument is that it is far too unreliable to be placed before a jury since it cannot assist them in their fact finding process. In sum, counsel says it cannot be relevant because it is unreliable and unnecessary and cannot be placed within the category of proper science.

Ultimately, the court held as follows, based upon this evidence as well as comparable evidence from a Crown witness who agreed with the defence expert concerning the weaknesses in the "experimental" evidence:

> The threshold test for the admission of any evidence is relevance. I find the evidence in this case to be unreliable and unnecessary. Therefore, it is not relevant to assist the jury. Its probative value is minimal, and the potential for prejudice is significantly higher. Evidence relating to the experiments carried out May 1997 and March 1998, therefore, should be excluded.[4]

APPOINTING A SCIENCE DEVIL'S ADVOCATE

AS MENTIONED PREVIOUSLY, various reforms have been suggested to help the law cope with the burgeoning volume of expert evidence. All have their positive features, but also their drawbacks. For example, the suggestion for neutral court-appointed experts to eliminate the perceived inevitable partisanship and motivational bias on the part of the parties' experts may simply replace party allegiance with "own theory" allegiance.

I would suggest a third reform based upon science's major lesson: truth lies by engaging in a dedicated search for disconfirmation. The strongest establishment of a proposition comes not from marshalling evidence in support, but from the inability to marshall evidence to refute; not from all the arguments in favour, but from the lack of cogent arguments against.

Research on group decision making shows that the best decisions come not from a group brainstorming, but from a group that appoints one of its members to argue against its conclusions, pointing out weaknesses and overlooked problems. There is also a famous historical precedent: the Catholic Church's *advocatus diaboli*, or Devil's Advocate.

The Devil's Advocate was a Roman Catholic official whose duty was to examine critically the evidence on which a demand for beatification or canonization rested, to ensure a correct decision. Similarly, I suggest that improvement of expert evidence lies not in a court appointing its own experts, but in a court appointing a Science Devil's Advocate to testify regarding the scientific merit of the parties' expert evidence.[5]

---

4 *R. v. Perlett*, *ibid.* at para. 31

5 This may or may not differ from the proposal in Andrew Roberts, "Drawing on Expertise: Legal Decision-Making and the Reception of Expert Evidence" [2008] Crim. L. Rev. 443 at 461–62 of a court-appointed "expert advisor" because Roberts is unclear as to the scope of the "advisor's" office. It is hard to argue with Roberts' conclusion: "Satisfactory reform

This approach falls wholly within the scientific spirit of disconfirmation and reliance on vindication of the ways of good science, while leaving the initiative for the substance of the expert evidence to the parties where it belongs. Instead of the court becoming simply another party with a better expert, the actual parties to the litigation provide the expert evidence but the court has an independent assessor and insurer of the quality of that evidence in accordance with the scientific method.

The court-appointed Devil's Advocate would examine and critique the expert evidence to be presented by the parties. That report would be available to the parties in advance of the proceedings. Any criticisms could be reflected in better preparation or alteration of the expert evidence to be presented in court, or the parties could decide to stand pat and dispute the Advocate's conclusions and opinions. Instead of the scientific issues being debated implicitly and decided out of the reach of the parties in the court's decision, the scientific issues would be expressly and knowledgeably considered and debated in advance of the final decision, providing the court with the best-quality basis for a decision.

The court would not only have the views of the parties' experts to assess, but also the assistance of an expert critique by the Devil's Advocate to inform and assist that assessment, as well as the parties' responses and further consideration of the issues raised. The court's decision is more likely to become the best possible judgment in that environment than if the court only has the opposing experts' evidence to consider. The important added element is that the court is not only being informed by expertise as to the substance of the expert forensic issue, but is also being expertly informed about what — if anything — is wrong with the opinions being put forth regarding the substance of the expert forensic issue.

CONCLUSION

THERE CAN BE little doubt that the law's consumption of expert evidence will grow, if not accelerate. Concerns about junk science have brought home to the law the important insight that how we know, not what we know, is the key to real knowledge. This basic rule of science is the law's only reliable guidepost.

What is important is that the law demand of experts that they provide references to the data on which they rely, the theories and assumptions being

---

of the law may depend on an acknowledgement that the reception of expert evidence requires the use procedures [*sic*] which differ fundamentally from those through which law testimony is received" (at 462).

utilized, and can demonstrate logical reasoning based thereon. If the methodology by which the opinion was reached cannot be completely and transparently made clear, including examination of the underlying data, then there is something very wrong with the "experts" and thier approach to knowledge. In short, courts should demand that their expert witnesses be as scientific as possible. Anything less creates a grave risk of allowing valueless or erroneous pseudo-science to exist.

The reforms suggested here further the ends of science. Allowing witnesses to be questioned on their scientific literacy, and disallowing witnesses that cannot be relied on to form their opinions on an acceptable basis because they do not know how to do so, would, in and of itself, constitute a substantial step in the correct direction. Engaging Devil's Advocates to examine and report on proposed expert evidence would carry the law even further towards scientific literacy and ultimately to justice.

I hope that in the future, expert opinion evidence in our courtrooms will continue to grow more and more congruent with the lessons and demands of science. That approach will further the ends of justice immensely. As has been quoted earlier in this text, "Science is what human beings have learned to keep from fooling ourselves." I would add: "Making expert witnesses respect the rules of science is what will keep them from fooling judges and juries."