

SUPREME COURT OF SOUTH AUSTRALIA

(Court of Criminal Appeal)

30 August 2002

R v KARGER
[2002] SASC 294

Court of Criminal Appeal: Doyle CJ, Prior and Gray JJ

1. **DOYLE CJ:** I would dismiss the appeal. I agree with the reasons given by Gray J.
2. I wish to add some remarks in relation to the submission by Mr Wells QC, counsel for the appellant, that the Judge erred in failing to warn the jury against the danger of misusing the statistical evidence in this case. The statistical evidence to which I refer is the evidence interpreting or explaining the significance of the matches found in the DNA profile obtained from the material found on the deceased's blouse, and the DNA profile of the appellant. That statistical evidence was expressed in the form of a likelihood ratio and in the form of a match probability.
3. I add these remarks because of the practical importance of the issues raised by the submission. The issues are likely to occur in other trials.
4. I do not propose to summarise the relevant facts, the issues at trial, or the manner in which the prosecution case and the defence case were put at trial. All of these are adequately dealt with by Gray J.

The submission for the appellant

5. Mr Wells submitted that a warning against the misuse of the statistical evidence should have been given for a number of reasons. As I recall his argument, the terms of the required warning were not spelt out by him. I take it that the type of warning which he submits should have been given flows from the circumstances said to give rise to the need for the warning.
6. Mr Wells submitted that a warning was required as a matter of law when the prosecution relies on a statistical calculation, expressed as a mathematical probability, to interpret or to explain the significance of evidence about a match between DNA material linked to the commission of a crime (I will call this the incriminating DNA) and DNA material obtained from an accused. He submitted in the alternative that in most such cases, and in this case in particular, such a warning will be required as a matter of practice to discharge the judge's duty to give the jury such directions as are required to ensure that there is a fair trial and to avoid a miscarriage of justice.
7. The fundamental reason for requiring the warning is said to be that without it the jury will give undue weight to the evidence of a match between the incriminating DNA and the

accused's DNA. They are likely to do so because of the impact on them of the interpretative statistical evidence. Implicit in the submission is the acknowledgement that the danger arises when the likelihood ratio or match probability (see Gray J at [66] - [67]) are calculated and expressed as a ratio that is sufficiently high or low to suggest to the ordinary person something like certainty, or something sufficiently high or low to be what one might call distractingly impressive. It is not necessary in this case to explore when the ratio acquires that quality. It suffices to say that a ratio of 1 in 90 billion, the ratio of which evidence was given in this case, has the qualities to which I just referred.

8. Mr Wells submitted that the jury may give undue weight to such evidence because they will be unfamiliar with the science of statistics and with the proper use of mathematically expressed probabilities. For present purposes I agree that it is reasonable to assume that the statistical concept of a probability differs from the everyday concept of probability, and that at times everyday assumptions about improbability will differ from statistical probabilities: see, for example, *Perry v The Queen* (1982) 150 CLR 580 at 594 Murphy J.
9. Mr Wells further submitted that the jury were likely to regard the evidence about the DNA match, and the statistical evidence, as establishing something equivalent to a kind of "genetic fingerprint", when in fact it does not do so.
10. In short, he submitted, the jury were likely to be overwhelmed by the evidence through a combination of unfamiliarity with the statistical terminology and the meaning of statistical probabilities, and the impact of a very high or very low ratio.
11. The end result, or an alternative danger, is that the jury would substitute reliance on a mathematical expression of probability for an actual persuasion or felt persuasion of a matter that had to be proved beyond reasonable doubt as a step in their reasoning towards guilt, or even worse as a substitute for proof of guilt itself beyond reasonable doubt. If this occurred there would be a double error. First, the jury would have relied on the statistical evidence explaining the DNA match to the exclusion of other evidence in the trial. Secondly, the jury would have substituted a mathematical expression of probability for actual persuasion of a matter beyond reasonable doubt.
12. A further or alternative reason for requiring a warning was that if it is not given there is a real danger of the jury committing the so-called "prosecutor's fallacy": see Gray J at [183] - [185] *Doheny and Adams* [1997] 1 Crim App R 369 at 372-373 and *R v GK* [2001] NSWCCA 413; (2001) 53 NSWLR 317 at 328-329 Mason P. The risk is that the jury will reason that the evidence of the likelihood ratio or match probability expresses the probability that the incriminating DNA was the DNA of the accused. Properly understood, it does no such thing. Even worse is the risk that the jury will treat the likelihood ratio or match probability as expressing the probability that the accused is guilty.

The statistical evidence

13. The evidence is summarised by Gray J at [66] - [68].

14. Mr Pearman's evidence about the likelihood ratio was as follows:

"The likelihood ratio is becoming a more commonly used form of presenting not only DNA evidence but other forms of forensic evidence. It is based on the fact that, in a Court situation, generally, the Court is faced with two competing scenarios, or points of view; the prosecution point of view that the accused has left the crime stain, and the defence point of view, or hypothesis, which is that some other unrelated person has left the stain. The calculation we do doesn't estimate the probability that the person left the stain, but what we can do is estimate the probability that the crime stain and the reference sample match, if the accused left it, or if someone else left it. You can then weigh up those two competing probabilities in what is called the likelihood ratio...for this stain, we would say that the crime stain is greater than 90 billion times more likely to match the profile of the accused if he left it, rather than if an unknown, unrelated person left it."

Dr Buckleton 's evidence about the matter was as follows:

"[The figure, reported as a 'frequency', being] the chance that another person [as well as the appellant] would possess this profile is approximately one in 90 billion...[reported as a likelihood ratio] it is just the other way up. So the evidence is about 90 billion times more likely if Mr. Karger donated a sample than if a random person donated the sample."

15. Clearly enough, that evidence must be used with care. For the purposes of expressing the likelihood ratio, two factual hypotheses are compared. One is the prosecution hypothesis that the appellant was the source of the bloodstain and of the incriminating DNA. The other hypothesis is the defence hypothesis that an unrelated person is the source of the bloodstain and of the incriminating DNA. The statistical evidence calculates the probability of the occurrence, in either case, of the match found between the incriminating DNA and that of the appellant, and expresses the competing probabilities as a ratio.
16. The statistical evidence interpreting the significance of the DNA match is not evidence of the probability that the appellant was the source of the incriminating DNA. To so regard it would be to make an error. However, the statistical evidence interpreting the DNA match is expert evidence that the jury could use in deciding whether it was satisfied beyond reasonable doubt that the appellant was the source of the incriminating DNA. The statistical evidence is undeniably strong evidence pointing to a conclusion that the accused was the source of the incriminating DNA, but is not direct evidence of that fact. And, as is obvious, the statistical evidence must be considered in the light of other evidence in the case.
17. It is necessary for the jury to appreciate these points if they are to make proper use of the statistical evidence.

18. It is also necessary to avoid the so-called prosecutor's fallacy, if the evidence is to be properly used. Reasoning in the form of that fallacy involves, as I understand it, both the error just identified and an approach which would treat the statistical evidence as proof of guilt, rather than as evidence from which a conclusion on a matter which might in turn point to guilt could be reached.

The use to be made of statistical evidence

19. The evidence given by Mr Pearman and Dr Buckleton was expert evidence, placed before the jury to enable them to assess the significance of the match between the incriminating DNA and the appellant's DNA.
20. That evidence was to be treated like any other expert evidence in a criminal trial. It was for the jury to consider the evidence and to decide what significance and weight should be attached to the evidence. The jury were not obliged to act on the evidence. Nor should the jury allow any expert opinion put before them to be used as a substitute for their own satisfaction, to the appropriate degree of proof, of a matter required to be proved as part of the prosecution case. As Mr Wells submitted, proof of a matter, and in particular proof that the incriminating DNA came from the appellant, depended on the jury being actually persuaded of that fact. Proof could not be found in "a mere mechanical comparison of probability independently of any belief in its reality": *Briginshaw v Briginshaw* (1938) 60 CLR 336 at 361 Dixon J.
21. The proper approach to the issue of whether the incriminating DNA came from the appellant, and to the issue of guilt of the crime charged, was to treat the statistical evidence as evidence to be considered and weighed along with the other circumstantial evidence, not allowing it to displace or to overwhelm the consideration of all material evidence, but at the same time giving it such weight as the jury thought proper.

The Judge's directions

22. Gray J has set out several passages from the Judge's directions. As well, I have considered the summing up as a whole. It is a lengthy summing up, but in the circumstances that was unavoidable. In my respectful opinion it was thorough. The Judge marshalled and summarised the expert evidence in particular, in a manner that one cannot fault. This included his summary of the evidence relating to DNA and to the statistical evidence.
23. The Judge gave the jury an adequate general direction about the use of circumstantial evidence, and about the use of expert evidence.
24. The Judge referred on a number of occasions to the statistical evidence, and to its use. I will set out some of the more significant parts of the summing up. They are as follows:
- "1010 The next matter for you to consider is what is the proper use of this statistical evidence and calculation? It bears on the question of how common is the DNA profile of the accused? All of this DNA evidence might be interesting,

but of little practical use to you in reaching your conclusion if, say, every other person in the community had the same profile. As you heard, the purpose of this evidence is to enable you to give some weight to the DNA evidence of a match between the DNA of the accused and that on the stains on the blouse."

....

"1024 Mr Pearman told you that in the context of this trial this means that the crime scene stain, KO22.C, is greater than 90 billion times more likely to match the profile of the accused if he left it than if an unknown and unrelated person left it. Dr Buckleton put it this way. He said that it is about 90 billion times more likely if the accused donated the sample KO22.C than if a random person donated the sample. Dr Atchison put it another way. He said that it is the probability of getting that result, given that the stain or DNA did not come from the accused.

1025 Well, however it is expressed, you will get the full import from that evidence as to the significance of this calculation. It is to enable you to understand the weight that you can give to this match, and you might conclude that if you accept the evidence of Dr Buckleton and Mr Pearman and accept that this is the way that it is now done in most places in the world, it shows that this match is an extremely powerful piece of evidence in this case."

....

"1028 Ladies and gentlemen, it is for you to say what you make of all this evidence and whether you find that the evidence of Dr Buckleton and Mr Pearman assists you to give appropriate weight to the evidence of the match of the DNA of the accused with the DNA in the samples in the stains taken from the blouse, assuming, of course, that you reach that conclusion beyond reasonable doubt that the DNA testing has been accurate and reliable."

....

"1090 I would not like you to have any misunderstanding at all about my directions in law as to the approach you should take to the conflicting scientific evidence. I thought I had made this plain on a number of occasions, but in case I had not, I shall say it again. If you are to rely on an opinion, or the evidence given by a Crown expert, meaning an expert called by the Crown; Ms Tridico, Mr Pearman, Dr Buckleton, then you have to accept that opinion, and in the case of the DNA evidence itself, you have to accept the opinions of Mr Pearman beyond reasonable doubt. If you do not, then you put those opinions aside.

1091 When you come to consider the evidence of the defence experts, you do not have to accept those opinions. What you have to do is to decide whether you accept them as a reasonable possibility, because if you do, then you may rely on them for that purpose, and you would not be able to find the contrary opinions of the Crown experts proved."

....

"1106 I now just want to briefly summarise a couple of matters to you. What conclusions about the DNA evidence are you able to reach beyond reasonable doubt? This evidence is very important and you must not rely on any matter unless you have found it proved beyond reasonable doubt. Are you satisfied beyond reasonable doubt that the DNA profile of the accused is the same as the DNA profile found in KO22.B and KO22.C?"

1107 Having regard to the evidence of match probability, are you satisfied beyond reasonable doubt that it is about 90 billion times more likely if the accused donated those two samples than if some other random person donated them? If you do reach that conclusion, then it is a most important piece of circumstantial evidence to be considered along with all of the other circumstantial evidence in the case."

....

"1112 You might think, if you accept it, that the calculation of 1 in 90 odd billion gives you a realistic way of assessing the weight of the evidence of the match. It is fair to say that you may have regard to this evidence as a very powerful piece of evidence if you accept the opinions."

The Judge told the jury quite clearly that the evidence about the DNA material obtained from the back of the deceased's blouse was an important part of the case, as it clearly was. If the jury were satisfied beyond reasonable doubt that the incriminating DNA came from a bloodstain left by the appellant on the deceased's blouse, that conclusion was, in the circumstances, powerful evidence of guilt. In saying this I do not overlook the fact, as appears from the reasons of Gray J, that there was other evidence that the jury had to consider, and which the jury were likely to have treated as pointing towards guilt.

Statistical evidence about a DNA match

25. The understanding of, and proper assessment of, complex expert evidence can be difficult for a judge and for a jury. I accept that the statistical evidence was complex, and that it involved a form of analysis and discourse with which few in court, apart from the expert, would be familiar. It was admissible evidence nonetheless. As the Judge found, the statistical concepts used are a well established scientific method of explaining the significance of the match between the incriminating DNA and the appellant's DNA.

26. I accept also that the statistical evidence about probabilities used the concept of probability in the form of a prediction about a future hypothetical event, and that it speaks about a class of events or persons, and not any one event or person in the class. As Giles JA said in *R v Keir* [2002] NSWCCA 30 at [23]:

"...[T]he statistical probability within the relevant population does not translate to the same statistical probability for a given member of the population."

27. Those propositions reflect my own understanding of the position, based on the submissions put to us. I accept also the cautionary remarks made by King CJ in *The Queen v Duke* (1979) 22 SASR 46 at 48 when he said:

"There may be unusual cases in which the judge has reason to fear that the jury will be overawed by the scientific garb in which the evidence is presented and will attach greater weight to it than it is capable of bearing. It is to be remembered, however, that under our system, whatever criticisms of it there might be, the assessment of the weight to be attached to expert evidence, as to other evidence, is the function of the jury. That being the system, a trial judge must assume, in my view, that the jury is capable of understanding that it is not bound to accept the expert evidence, that it is capable of resolving conflicts of opinion amongst the expert witnesses, and that it will not be overawed by the scientific garb in which the evidence is presented to it."

As King CJ said, it is the function of the jury to determine issues of facts. In my view courts can be confident that, given proper guidance, juries can evaluate properly evidence such as was given in this case: *R v Lisoff* [1999] NSWCCA 364 at [49]; *R v GK* at 324-325 Mason P.

It is stating the obvious to say that the guidance that a jury requires, to ensure that a trial is fair and that there is no risk of a miscarriage of justice, will depend on the nature of the evidence, its significance, the manner in which the evidence is presented, and on the manner in which the trial is conducted.

28. As to the approach to be taken to expert statistical evidence interpreting evidence about a DNA match in particular, I gratefully refer to and adopt the general observations made by Mason P in *GK*. His Honour's reasons contain a valuable summary of the matters that call for consideration by a trial judge and by a court of appeal.

The need for a warning

29. I do not accept that there is a requirement, as a matter of law, for a warning to the jury about the danger of the misuse of statistical evidence about the significance of a DNA match, when that statistical evidence is expressed in terms of a likelihood ratio or as a match probability.

30. To begin with, as I think Mr Wells conceded, such a rule could exist only in relation to a case in which the ratio or probability was expressed as a ratio so high or so low that the number itself seems impressively persuasive.

31. But even then I do not consider that such evidence brings with it such dangers of misuse or misapplication by a jury as to require a warning in every case. I do not accept that a jury is necessarily likely to give such evidence undue weight, or that a jury will necessarily surrender their evaluative and decision making functions to the influence of an impressively high or low number or ratio.

32. There are other kinds of expert evidence that juries must consider which are equally complex. There are other cases in which expert opinions are likely to sound every bit as impressive as the ratio put before the jury in this case. But, so far as I am aware, Australian courts have not identified other categories of expert evidence as requiring, as a matter of law, a warning to the jury about the misuse of the evidence. Nor have other Australian courts held that the law requires a warning to a jury against the misuse of statistical evidence about the significance of a DNA match in every case in which such evidence is given: see, for example, *R v GK* at 324-325 Mason P; *R v Lisoff* [1999] NSWCCA 364 at [49].
33. I am of the same view in relation to the suggested tendency for a jury to "transpose the conditional", that is, to treat the ratio as an expression of the probability that the appellant was the donor of the incriminating DNA. As long as the evidence is given clearly, as seems to have been the case here, and is accurately explained by the Judge to the jury, as occurred here, that should suffice. Nor do I see any reason to require a warning against the so-called "prosecutor's fallacy" as a matter of law, even when the evidence has not been expressed in that fallacious form or put to the jury in that fallacious form; see *R v Galli* [2001] NSWCCA 504 at [89]-[90].
34. A perusal of the Judge's summing up, and in particular the passages set out by Gray J and in my reasons, indicates that evidence of the type now under consideration can be summarised for the jury in a manner that avoids these dangers, or at least minimises them, without resort to warnings.
35. And, as has been observed by judges on a number of occasions, it is undesirable to impose on trial judges the obligation, as a matter of law, to give warnings to a jury except when that is truly necessary. Any idea that there is no harm in giving a warning, and therefore that it is appropriate to make the warning obligatory, should be rejected. Each warning adds to the length of a summing up, and to the matters that a jury must consider. And there is a danger that the giving of too many warnings will undermine the impact of those warnings that are truly required, or will distract the jury from a straightforward consideration of the material before them: cf *KRM v The Queen* [2001] 8 HCA 11; 75 ALJR 550 at [37] McHugh J, at [108] - [110] Kirby J.
36. As long as the judge explains to the jury how the evidence may be used, and how it should not be used, there is no need for warnings against its misuse generally, or for a warning against misuses of the evidence that have not taken place in the trial.
37. I turn to the question of whether, in the circumstances of this case, a warning was called for. As I have said, the ratio given in evidence was impressive and striking. But the Judge's directions, in my opinion, carefully confined the statistical evidence to its proper place. In light of the directions given, I find no reason to think that there was a risk that the jury, having heard the ratio expressed, would have been seduced by that evidence into a conclusion that this was as good as proof of guilt beyond reasonable doubt. The Judge told the jury several times that the statistical evidence was but one part of the evidence to be considered. There was no suggestion by counsel that their task could be reduced to or

replaced by a mathematical computation. Nor do I consider that the jury were likely to have focused unduly on the DNA evidence, to the exclusion of the other evidence that called for consideration. The Judge went to great pains to guide the jury through the whole of the evidence, and to remind them of the need to consider the evidence as a whole. I set out two paragraphs only from the summing up where the Judge touched on these matters:

"484 Ladies and gentlemen, I want to turn to the DNA evidence, as I call it, which is the last piece of circumstantial evidence which the Crown says requires the inference that the accused committed the murder. And in that expression I include the statistical evidence which enables you, if you accept it, to place sensible weight upon the DNA evidence.

485 Ladies and gentlemen, a considerable part of this trial has been devoted to the DNA evidence but it is only one piece of circumstantial evidence in the Crown case. Although an important piece of evidence, it would be a mistake to think that it is the only important evidence. It must be considered along with all of the other evidence in the case, and the conclusion which you reach as to other circumstances may assist you to reach the correct conclusions about the DNA evidence and the statistical evidence."

38. The fact is that the DNA evidence was significant evidence, and was open to be treated by the jury as pointing strongly towards guilt. To give a warning of the kind suggested by Mr Wells carried with it other risks. One risk was that of further emphasising the probative force of the evidence. Another risk was that of wrongly detracting from its potential significance. My view is that the Judge dealt with the evidence appropriately. By giving the jury a careful summary of it, and by putting it in its appropriate context, the Judge adequately guarded against the dangers which Mr Wells submitted called for a warning. Warnings are not the only solution to the problem to which he averted. A careful and appropriate treatment of the evidence was equally good. That is not to say that the Judge would have been wrong, if he saw fit, to give some kind of warning. It is only to say that one cannot say that a warning had to be given.
39. It was not submitted that in this case the witnesses or counsel had misstated the effect of this statistical evidence by treating the relevant ratio as expressing the probability that the incriminating DNA was that of the appellant, or as expressing the prosecutor's fallacy. There was therefore nothing in particular that called for a warning or correction on either of these points. Obviously enough, if such an error was made in the course of the trial, a correction would be appropriate, but whether it would have to be expressed as a warning is another matter. In the present case there was nothing for the Judge to correct. I do not consider that there was such an inherent risk of the jury nevertheless lapsing into this form of reasoning that it was necessary for the Judge to warn them in terms against it. It was sufficient to give them clear guidance on how the evidence could be used. It was not necessary to warn them against this particular possible misuse of the evidence.
40. For all those reasons I do not accept the submission that the Judge erred in failing to warn the jury against the misuse of the statistical evidence.

Conclusion

41. For those reasons, and the reasons given by Gray J, I would dismiss the appeal.
42. PRIOR J I agree with the reasons given by Gray J and with the remarks added by the Chief Justice.
43. GRAY J Damon John **Karger** the appellant was charged with the murder of Kerryn Jean Ostendorf. He was convicted on the verdict of a jury. This is an appeal against the conviction.

The Crown Case - an outline

General

44. Mrs Ostendorf ("the deceased"), aged 41 years, died at her home in Campbelltown in the early hours of Saturday 17 January 1998. She had been out the previous night and drove the last of her friends home at approximately 3.45 am. Given the proximity of her home to that address she arrived home shortly after 4.00 am. The Crown case was that the deceased was murdered during the course of a sexual attack soon after she returned home.
45. The deceased's body was found by her daughter Rachel Rowlands soon after 7.30 pm on Saturday 17 January 1998. She was lying face down on her bed. She had been strangled with a camisole. Most of the clothing she had worn on the Friday night lay on the floor near the bed. Her knickers, skirt, bra and blouse were cut and torn. The deceased had bruising to her arms and legs, bruising to her eyes and mouth and grazes on her knees.
46. Dr Ross James the examining pathologist gave evidence about the injuries sustained and the cause of death. On examination he observed that the deceased's anus was markedly dilated or enlarged. This was inconsistent with normal post mortem appearance but could not be described as an injury. Dr James' opinion was that penetration by an object could not be excluded as the cause. If penetration had occurred he could not say whether it was before or after death.
47. The deceased was security conscious. There were no signs of forced entry to her home. There were no signs of disturbance other than in her bedroom. There were no signs of theft other than it appeared that her purse had been emptied. It was the Crown case that the deceased knew her attacker.
48. The appellant, aged 28 years had known the deceased for some years through her daughter, Mrs Rowlands. In more recent times, the appellant had visited the deceased when he returned to Adelaide on army leave. In January 1998 the appellant was staying with his parents at Paradise. This was a three minute drive or a ten minute walk from the deceased's home.

49. On the night of Friday 16 January 1998 and in the early hours of Saturday 17 January 1998 the appellant made nine unanswered telephone calls to the deceased. These calls were at 11.05 pm, 11.57 pm, 12.02 am, 12.12 am, 12.21 am, 12.32 am, 3.47 am, 3.50 am and 3.52 am. The appellant did not attempt to telephone the deceased after 3.52 am. She died shortly after that time. Her body was not found until soon after 7.30pm on Saturday 17 January 1998 and the media did not disclose the fact of her death until the Sunday afternoon.
50. The deceased had spoken about the appellant to her daughter and her friends in the week or so prior to her death. It was the Crown case that given what was said by the deceased on these occasions and the manner in which it was said, it was open to the jury to infer that she was upset with the appellant and that whilst he was a friend who would come into her home, she did not wish to have a sexual relationship with him.
51. The police interviewed the appellant on 21 January 1998 at his parents' home and then later at the police station. He denied any involvement in the murder. Taped records and transcripts of the interviews were tendered as part of the Crown case. In the police interview the appellant admitted that on one occasion he had made sexual overtures to the deceased. This occurred in the week prior to her death. These overtures were rejected. The appellant was also asked questions about his mobile telephone. He told the police that the deceased's number was programmed into his telephone.
52. Following the interview at the police station, the police returned to the appellant's residence to conduct a search. Whilst in the appellant's bedroom detective Cramer asked for his mobile telephone. The detective searched the mobile telephone for numbers. He then had a conversation with the appellant about the deceased's number. The appellant indicated that he had removed her number from the memory of his telephone after he heard about the murder. He also said that he had been placing the numbers in alphabetical order. Notes were made of that conversation but it was not recorded on audio or video tape.
53. As earlier observed, the deceased's clothes had been cut and torn. Inside the back of her blouse on either side of a pleat near where it had been cut or torn were two small blood-like stains. These stains KO22.B and KO22.C were tested using DNA technology.
54. KO22.B was tested in 1998. Its DNA profile matched the DNA profile of the appellant. KO22.C was tested in 1999. Its profile also matched the DNA profile of the appellant.
55. Fingernail scrapings from the deceased were also subjected to DNA testing. A minor DNA typing was located under the fingernails of her right hand. The appellant could not be excluded as the source of that typing. The chance of another unknown person unrelated to the accused having the same DNA profile was in the order of 1 in 13.
56. Two hairs were located on the back of the deceased's body. A comparison of these hairs with the appellant's chest hairs could not exclude him as the source.

DNA and the Stains

57. It was the Crown case that DNA is found in all living cells. DNA profiles have been described as "genetic blueprints". They differ between people. DNA is found in the cells of the human body. Half of a person's DNA is inherited from the father and half from the mother. Biological material can be extracted from blood, saliva and tissue and analysed to determine a DNA profile. DNA technology targets certain locations on a DNA strand. Each location is called a locus and is identified by a series of letters and numbers. At each locus, a person has two alleles. One allele comes from the mother and the other from the father. DNA technology measures the length of each allele. A DNA profile is essentially a string of numbers, two numbers for each locus targeted.
58. Various methods have been used at the South Australian Forensic Science Centre ("the Centre") to obtain DNA profiles. One of the earliest systems used was the D1S80 system. D1S80 targeted and therefore potentially obtained results for only one locus. The results could be seen using silver staining technology. The Centre began using the Quadruplex system in 1994. Quadruplex targeted and therefore potentially obtained results for four loci. The results were displayed using fluorescent technology. In 1998 the Centre began validating a new system, Profiler Plus. It began using this system for casework during February 1999. Profiler Plus targeted and potentially obtained results for 10 loci. All three systems were used by the Centre to obtain DNA profiles in this case.
59. The stain KO22.B was circular and 1mm in diameter. KO22.C was a more elongated smear and 3mm x 1mm in size.
60. On the Crown case there was a very strong inference that the stains on the blouse were blood. The stains had the appearance of blood and gave "a good sound positive reaction to the Sangur test". This test was used as an indicator of the presence of blood. Defence counsel did not cross examine the Crown DNA expert witnesses to suggest that the stains were other than blood. The cross examination did no more than suggest that a species test would have revealed whether the stains were human blood rather than the blood of higher primates.
61. In 1998 KO22.B was tested on both the D1S80 and Quadruplex systems. The DNA typing obtained was the same as that obtained from the appellant's reference sample. Consequently the appellant could not be excluded as a source of that stain. KO22.B was tested using Profiler Plus but no result was obtained.
62. In 1999 KO22.C was tested using both the Quadruplex and Profiler Plus systems. The DNA typing obtained was the same as that obtained from the appellant's reference sample. Consequently the appellant could not be excluded as the source of that stain.
63. The profile obtained for KO22.B from the Quadruplex system in 1998 matched the profile obtained for KO22.C from that system in 1999. The result obtained for KO22.C using the Profiler Plus system was the same as the result obtained for KO22.C and KO22.B using the Quadruplex system.

64. Christopher John Pearman a DNA expert witness called by the Crown gave evidence that after the 1998 testing and before the 1999 testing he advised the defence that a portion of the two samples was available for testing. He later advised the defence through the Director of Public Prosecutions that the Centre was going to test KO22.C. On 14 July 1999 the defence was advised that further tests would be conducted on K022.C. A defence expert was invited to observe the testing on both occasions. The defence did not take up either offer.
65. Combining the results of the Quadruplex and Profiler Plus systems for KO22.C led to a DNA profile being obtained for 10 loci. That profile matched the appellant's DNA profile at those 10 loci. To interpret that match a calculation was made using a recognised statistical equation known as the 4.10 equation.
66. Once this calculation was made, there were two ways to present the result, as a "match probability" and a "likelihood ratio". The figure of 90 billion was presented to the court in both ways. The match probability was the chance of a second person having the same profile as that of the stain. This was one in 90 billion.
67. The likelihood ratio is a ratio of two probabilities. The first is the probability of the appellant's DNA profile matching that of the crime stain if he left the crime stain. This was the number one as it was assumed for the purpose of the ratio. The second was the probability of the appellant's DNA profile matching the crime stain if the appellant did not leave the crime stain, but rather an unknown unrelated person left it. This is the match probability. In this case, that was 1 in 90 billion. The likelihood ratio allowed the conclusion that the stain was greater than 90 billion times more likely to match the profile of the appellant if he left it rather than if an unknown person unrelated to the accused left it.

Summary

68. The judge summarised the Crown case as follows:

"... I summarise the Crown's approach to the DNA evidence. It is of considerable significance. It is circumstantial evidence, if you accept it, from which, along with the other evidence in the case, you may draw the inference that the accused murdered Mrs Ostendorf. The two stains on the back of her blouse and the accused's blood reference sample were analysed in different systems. If you accept the evidence that they are the same stain separated because of the crease in the blouse, then the stain and the accused's blood reference sample were tested on three different systems and at different times. The consequence is that the accused cannot be excluded as the donor of that stain, if you accept this evidence, and I have reminded you of the evidence as to the statistical significance of that matter. I have reminded you of the statistical significance of the combination of Mrs Ostendorf's DNA and the minor profile in the right fingernail clippings.

So, it is the Crown case that the testing at the Forensic Science Centre is reliable and accurate, the systems of Quadruplex, Profiler Plus and D1S80 are widely used throughout the world and are accepted as reliable and accurate. Fluorescence technology using Quadruplex and Profiler Plus is very sensitive and discriminating and permits the reliable analysis of very low quantities of DNA. With suitably trained and competent scientists, correct interpretation will produce accurate results. These systems have been tested and validated in the hands of the Forensic Science Centre and, on the Crown case, you should have confidence in the results which have been produced.

On the Crown case, the contentions to the contrary are simply untenable. The errors and contamination are to be expected from time to time, although regrettable, and far too much has been made out of them in this case. They have no bearing on the tests in this case. They do not show sporadic contamination. Far from it. The evidence establishes that all controls, protocols and procedures have worked and appropriate action taken. There could not have been contamination of any of the samples. No basis for contamination of KO22.B or KO22.C by DJK1 has or could be shown as a reasonable possibility and must simply be rejected.

The reason for the presence of the 31 band in the D1S80 test is as explained by Mr Pearman, or possibly by Mr Taylor. It does not indicate a Genotype different from the accused and, therefore, cannot exclude him. You should consider the DNA evidence in the context of all of the other evidence in the case. On the Crown case, all of the other facts and circumstances, when considered together, lend strong support to a conclusion that the accused donated the stain on the blouse and, therefore, assists in the conclusion that there has been an accurate and reliable testing and no contamination. Having accepted this evidence, you can give the weight to the match in accordance with the calculations and opinions of Dr Buckleton and Mr Pearman. So, the Crown says that you should accept the Crown case on DNA analysis and the weight to be given it as having been proved beyond reasonable doubt.

...

The Crown case is that, upon considering all of the facts and circumstances, only one inference is open; the accused murdered Mrs Ostendorf. He was interested in her sexually but she was not interested in him in that way, if at all. He became obsessed with her, perhaps, as is indicated by telephone calls. He went to her home in the early hours of the morning, perhaps around 4 a.m. or just before, she let him in, and he killed her. On the Crown case there is compelling evidence to establish that he is the murderer when all of the evidence is considered together. He had the opportunity and the sexual interest in her. You should conclude that he left two chest hairs on her or on her bed and blood on her blouse from all of the evidence, including the DNA evidence.

The statistical evidence enables you to give due weight to the DNA evidence and you should accept the evidence of Mr Pearman and Dr Buckleton. Upon doing so, there is no reasonable possibility that anybody else could have left the stain.

The accused did not telephone Mrs Ostendorf on the Saturday or Sunday, on the Crown case, because he knew she was dead. He removed her number from his telephone memory to distance himself from her. He was not forthcoming and truthful when he was questioned by the police. It is likely that he sustained a bruise to his chest during his attack on Mrs Ostendorf, on the Crown case. The lack of evidence of other injuries to his body, or hands, or deposits on his clothes is understandable, on the Crown case, in the circumstances, and is explained on evidence. The incident at The Glynde Hotel has no significance.

So, ladies and gentlemen, the Crown says that when you consider the combined force of all of these circumstances, there is only one inference that can be drawn; the accused murdered Mrs Ostendorf and you should find him guilty as charged."

The Defence Case - an Outline

69. The defence case was that the appellant did not commit the murder.
70. The defence called two expert witnesses whose evidence addressed the DNA issues. They challenged the evidence of the Crown DNA experts. It was said that the real possibility of laboratory error could not be excluded. It was also said that the likelihood ratio was of no relevance and had no application in this case. Other evidence included evidence from Rosa Baldino. She said she witnessed an incident on the Wednesday prior to the murder when the deceased was threatened by an adult male, a person other than the appellant. The appellant did not give evidence at trial.
71. When addressing the DNA evidence the judge discussed the respective cases as they related to each relevant issue. Other aspects of the defence case were also addressed in detail.
72. The judge summarised the defence case as follows:

"The defence case is that you cannot place reliance upon the DNA evidence. You cannot reach the conclusion that the accuracy and reliability of the DNA tests and results have been proved beyond reasonable doubt, it has not been established that the Forensic Science Centre was operating at appropriate reporting levels of RFU, the levels of 100 and 75 are not borne out by the validation studies and, therefore, that is the end of the matter.

The errors and contamination in the Forensic Science Centre in the testing in this case, the errors in the testing of the Profiler Plus database and the failure to use appropriate reagent blanks at times do not permit you to accept the accuracy and reliability of the testing. The possibility of inaccuracy or contamination is reasonable and cannot be excluded. The presence of the 31 allele in the D1S80 testing raises, as a reasonable possibility, that the typing is not that of the DNA of the accused, with the consequence that it is a reasonable possibility that the accused is excluded as the donor of the stains on the blouse. Consequently, you should not go any further. You should reject the DNA evidence.

If you were to go further, the evidence of Mr Pearman and Dr Buckleton as to the use of the two databases and the equation 4.10 on the defence case should not be accepted. It is necessary that the Profiler Plus database have independence, according to Dr Atchison, between alleles at each locus and between the loci, and that has not been proved. You should accept the evidence of Dr Atchison. The consequences that the statistical result produced by equation 4.10 is meaningless.

The other evidence in the case does not assist you in reaching conclusions about the accuracy and reliability of the DNA tests in this case. On the defence case, you cannot draw an inference of guilt from the other evidence and it cannot assist you to reach any conclusion about the DNA evidence. Ladies and gentlemen, you will reach your conclusions about that important part of the case.

...

The defence case is that no such inference is open on the evidence. It is a reasonable possibility that the accused did have a friendship with Mrs Ostendorf of the nature he described to the police and that she allowed persons, including men, into her home in the early hours of the morning. It is reasonably possible that she let her attacker in and was then murdered. He could have gained entry with her as she got home. The attacker could well have had an acquaintance with Mrs Ostendorf, but not necessarily so, and in any event, her lifestyle was such that she had many acquaintances. The hairs cannot be shown to have come from the accused, even if you accept the evidence that he cannot be excluded as the donor. The DNA tests have not been shown to be reliable, and the evidence should be rejected.

The light of suspicion having been cast upon the accused tends to give a sinister glow to each fact and circumstance which is not justified in the circumstances. It is the suspicion, on the defence case, which gives the sinister glow, not the circumstances themselves, as you find them to be. There is no reason to conclude that the accused did not stay at home on the night of the murder. Why would he go to Mrs Ostendorf's home when his telephone calls have been unanswered? There is no evidence of injury to his hands or body, except the bruise and, on the defence case, that occurred during lovemaking with his girlfriend, or at least that is a reasonable possibility.

There was nothing on his clothes to incriminate him. There was an incident at The Glynde Hotel, which is some evidence to suggest that someone else could have wanted to harm her. Each of the matters in the Crown case which the Crown says point to guilt, when considered individually, amount to nothing. They can all be explained by there being an unusual relationship between the accused and Mrs Ostendorf. When considered together, they amount to no more. If they amount to anything, it is mere suspicion, falling a long way short of proof beyond reasonable doubt.

On the defence case, the accused had a friendship with Mrs Ostendorf, which involved late night phone calls in bursts and his seeing her at times at her home.

There was no sexual activity between them. Her lifestyle was such that she could have come into contact and made an acquaintance of any number of persons in the even short-term and, so, given the features of her lifestyle which had been established, it cannot be said that the evidence in allowing the attacker into her home, if that is the inference you draw, necessarily points to the accused. The accused, when approached by the police, answered their questions. When asked to donate samples and when not obliged to do so, he co-operated.

...

It is the defence case that when considering all of the facts and circumstances, it is simply not possible to draw the inference beyond reasonable doubt that the accused killed Mrs Ostendorf. It is not possible to exclude, as a reasonable possibility, that he did not kill her."

The Issues on Appeal

73. The grounds argued may be conveniently grouped under three headings albeit with some overlap. Complaints were made about the admission of evidence. It was also said that the judge's summing up contained misdirections, inadequate directions, lacked balance and was unfair. Finally it was said that the jury's verdict was unsafe and unsatisfactory.

Inadmissible Hearsay

The Conversations

74. The appellant complained about the admission of evidence of conversations the deceased had with a number of witnesses. It was said that each included inadmissible hearsay. In the alternative, it was said that if admissible the evidence should have been excluded as a matter of discretion. Its prejudicial effect was said to outweigh its probative force. It was contended that the judge failed to explain to the jury how the evidence of the conversations could be used in assessing the weight to be given to what the accused had told the police about his relationship with the deceased.

75. The deceased telephoned Mrs Rowlands about one week prior to her death. The deceased spoke about the appellant. Mrs Rowlands' evidence included:

"Q. Did she say what he said to her.

A. She said that he had been a bit of a sleaze.

Q. Did you say anything to that.

A. I said, 'In what way?'; I wasn't sure.

...

Q. When you asked her that, did she reply in what way.

A. Yes. She said that he wanted to go to bed with her.

Q. Did she say what, if anything, she had said, or done, when the accused had said that.

A. She said she was really tired, and just wanted to go to bed by herself.

Q. Did you say anything to that.

A. No. I told her that she should have told him to go away, and come back at a decent hour.

Q. Did she reply to that.

A. Yes.

Q. What did she say to that.

A. She said 'Yeah, I know, but'...

...

Q. How did you mother sound when she was talking to you about this.

A. She sounded a bit shocked at it."

The deceased told Ms Rowlands that the accused had telephoned her at home at about 4.00am.

76. Lydia Hietanen had been a friend of the deceased for approximately 14 years. She lived nearby and they met regularly. Mrs Hietanen was at the deceased's home on the Monday before her death. The deceased raised the topic of the appellant with her:

"Q. Can you tell us when she raised the topic, what she said.

A. What she told me?

Q. Yes.

A. She told me initially that Damon's feelings towards her had changed.

Q. Did she say how.

A. No, she didn't elaborate.

Q. Did she continue.

A. Yes, she did.

Q. What did she say.

A. She said that Damon had rung her very early one morning when she just got home and she just got into bed, and when she answered the phone, she told him that she was in bed, and he said to her 'Well, don't worry, I'll join you'.

Q. Did she say what, if anything, she had replied to him.

A. No.

Q. What was her demeanour like when she was talking to you about this.

A. She was very upset at the time.

Q. You told us that the conversation occurred in her house.

A. That's correct.

Q. Whereabouts in her house.

A. Actually I was sitting at her kitchen table, and Kerry was walking, like pacing next to me, next to the table.

Q. Pacing as she was talking.

A. Yes.

Q. For about how long did the conversation last.

A. Approximately ten minutes."

77. Antonietta Christina DeCorso had been a neighbour of the deceased for six years. They visited each other's homes and maintained frequent contact. Mrs DeCorso recalled a conversation that she had with the deceased about two weeks prior to her death:

"Q. What did she say.

A. That she was sick and tired of him ring - Damon ringing up - ringing her up and coming around all the time.

Q. Did she tell you if she had said anything back to him about that.

A. She told him not to come around any more, or ring up.

Q. Did she mention a specific occasion that she said he had come around.

A. Yes.

Q. What did she say about that.

A. She told me that he rang about 5, 5.30 in the morning, that he wanted to come around, but she told him not to because she was tired and wanted to go to bed.

Q. Did she tell you what happened.

A. Yes, she did. She said that - he said to her that he is already at the door.

Q. Did she tell you what happened from there.

A. What do you mean?

Q. Whether she said something to him, he said something to her, or that they did anything.

A. Yes, she made him a coffee and then asked him to leave.

...

Q. When she told you about him ringing up and turning up, did she say whether she told him anything about that.

A. She told him not to, not to ring her up and come over again.

Q. When you were having this conversation about him ringing up, how did she appear.

A. Angry and pissed off.

Q. When she was talking about a specific occasion that he came around, again, how did she appear.

A. Can you repeat that again please?

Q. Sure. When she spoke about the particular occasion that he came around - you remember you've told us about a particular occasion - how did she appear when she was talking about that.

A. Again, pissed off with that.

Q. Is that something that you've observed, or something she said, or both.

A. Both.

Q. Did she actually say what her attitude was.

A. She was stick and tired of him coming around and ringing up."

78. Dr Peter Kubler was a friend of the deceased. He had known her for about five years. At one time they had been in a relationship. He gave evidence of two conversations in early January 1998:

"A. No, Kerry raised the topic of [the appellant] visiting her.

Q. What did she say about that.

A. She said 'You know, it's a funny thing that happened the other night or was it last night?', and she said that 'I just got home and I had a telephone call from Damon and within a few seconds, within about 10 seconds, he was suddenly at my front door, which surprised me', she said.

...

A. The next time she mentioned him was perhaps a few days after this one. It was in my living room again.

Q. Sorry, your living room.

A. In my living room, yes. She said that Damon had - the same scenario was that she had just got home very late, you know, 3 o'clock in the morning, or something like this, and he rang her up and he had come around and called on her again. But she said to him that, you know, something like 'Damon, look I'm very tired. Go home, I want to go to bed'.

Q. Did she say what he said to her.

A. She told me that he replied to her 'That's all right. I wouldn't mind coming back to bed as well'. She said 'Don't be stupid, go home.

...

Q. Her demeanour. How did she appear during the first conversation.

A. I thought she behaved more nervous. She had this way of giggling when she was nervous and that sort of alerted it to me. When she said not to worry about it, I said 'You know the bloke, I don't.

Q. The second conversation, how did she appear during that conversation.

A. She seemed more concerned that time than about the previous incident.

Q. You took that from her demeanour or something she said.

A. Again, when you know someone, and they are nervous about something, you know it, or if they feel concerned about it from what they said, and I got the impression she seemed much more concerned and worried about the incident. Certainly much more concerned about the incident than what she talked about previously."

The Judge's Directions

79. The judge gave extensive directions with respect to each conversation^[1]. The directions covered the use that could and could not be made of the evidence if accepted. The judge directed the jury that the evidence could be used for the purpose of considering the deceased's state of mind and to assess the weight that could be given to what the appellant had told the police about his relationship with the deceased. The judge repeatedly informed the jury that the evidence could only be used for the limited purpose of establishing what the deceased had said and not whether what she had said was true.

80. In regard to the conversations the judge's directions included:

Mrs Rowlands

"The evidence of what Mrs Ostendorf told her daughter is placed before you for a limited purpose, namely, as evidence of her state of mind at the time of the conversation. It is not evidence of the truth of what she said. It is not evidence that the accused is bit of a sleaze. Indeed, that is not what Mrs Ostendorf said, if you accept Mrs Rowlands' evidence. She said that he had been a bit of a sleaze, and I expect you will very likely accept that that was her way of describing his conduct when he said he wanted to go to bed with her, if that is what happened.

So the statement must not be used as any reflection upon the accused or his character. This evidence of the conversation is not evidence that the accused did go to Mrs Ostendorf's house in the early hours of the morning, be it 4 a.m. or any other time, that he said that he wanted to go to bed with her, that she told him that she was really tired and wanted to go to bed by herself.

It would be quite wrong to use the evidence for any of those purposes, because if you did so, you would be acting upon second-hand or hearsay evidence which is not permissible. The evidence can only be used for the limited purpose of establishing what Mrs Ostendorf said, not that what she said was true."

Mrs Hietanen

"... you will remember my directions to you about this type of evidence. It cannot establish that the person Damon had changed his feelings towards her, that he telephoned her early in the morning after she had arrived home and got into bed, or that he said that he would join her. The evidence is put before you so that you may decide if you are prepared to draw the inference from the statements, if she made them, that Mrs Ostendorf was of the state of mind that she did not want sex with the accused."

Mrs DeCorso

"... you will remember the directions I have given you. That evidence cannot prove that those events occurred, and it is placed before you only for the limited purpose of establishing the state of mind of Mrs Ostendorf in relation to the accused, if you are able to draw the inference that, when mentioning a person called Damon who was in the army, she was referring to the accused."

Dr Kubler

"Again, that evidence is not placed before you for the purpose of establishing that those events related by Mrs Ostendorf actually occurred, but only that she had said those things to Dr Kubler.

...

So, ladies and gentlemen, so far as those conversations with Dr Kubler are concerned, you must decide whether they occurred and then whether they do, in fact, reflect the state of mind of Mrs Ostendorf and, if so, what, in fact, was that state of mind."

Submissions On Appeal

81. Counsel for the appellant stressed that in each conversation the deceased spoke of earlier conversations that she had had with the appellant. It was said that no conclusion could be drawn from those parts of the conversations unless an assumption was made about the truth of their contents. As the truth had not been established it was said that evidence of those parts of the conversation was inadmissible hearsay. If the evidence of those parts of the conversations was admissible for any purpose, direction was required as
81. to its limited use. It was contended that the judge's directions fell short of providing an adequate direction.
82. Counsel for the appellant did not complain about the admissibility of the remainder of each of the conversations. That evidence was accepted as relevant, probative and admissible to establishing the deceased's state of mind towards the appellant. The only parts of the conversation under challenge were those parts where the deceased recounted conversations that she had had with the appellant.
83. Counsel for the Crown submitted that the conversations in their entirety were relevant and probative and were properly admitted. The evidence was circumstantial and enabled the jury to infer certain facts about the deceased's state of mind towards the appellant, their relationship and whether she would ever have had sexual intercourse with him. It was further submitted that the evidence was relevant as it explained how the appellant could have entered the deceased's home in the absence of forced entry. The evidence demonstrated that the deceased did not want to have sexual contact with the appellant and that she would have resisted his demands. It was also said that the evidence could be used to negate the appellant's description of the nature of his relationship with the deceased.

Consideration of the Issue

84. In *Walton v The Queen*^[2] the court concluded that conduct from which a state of mind can be inferred is circumstantial evidence and admissible if relevant and probative to an issue in the case. *Wilson, Dawson and Toohey JJ* said:

"When a person's state of mind is relevant, evidence tending to prove that fact is admissible. That evidence may, of course, take the form of conduct on the part of the person whose state of mind is in question from which the state of mind might be inferred. But it might also take the form of statements made by the person or by another from which a similar inference might be made.

...

But in other cases a person's statements about his state of mind will only have probative value if they are truthful and accurate and to rely upon them is to rely to some extent upon the truth of any assertion or implied assertion contained in them. To that extent an element of hearsay may be said to be present. This case is an example. But the element of hearsay need not necessarily preclude evidence of that kind being treated as conduct from which an inference can be drawn rather than as an assertion which is put forward to prove the truth of the facts asserted.

The distinction between the two approaches is one which can be fine, but it is one which in principle ought to be drawn."

85. The conversations in this case are properly characterised as conduct on the part of the deceased. The relevant conduct was the fact of the conversations and included the recounting of conversations between the deceased and the appellant to third persons. The conduct permitted inferences to be drawn about her state of mind toward the appellant. The evidence of each conversation in its entirety was relevant, probative and admissible.
86. The evidence of the recounted conversations between the deceased and the appellant was not admissible to prove the truth of the contents of those conversations. The judge gave clear and explicit directions both generally and then with respect to each of the conversations. These directions were appropriate and adequate.
87. In *Walton Wilson, Dawson and Toohey JJ* observed^[3]:

"However, as we have said, not all conduct involving an assertion, expressed or implied, is treated as hearsay and held to be inadmissible in evidence. If it were, the available evidence in many cases would be seriously depleted. The distinction to be drawn is that to which we have referred, namely, the distinction between evidence of conduct which, even though it may contain an assertion, is tendered as a relevant fact or a fact relevant to a fact in issue and is therefore admissible and evidence of conduct which has no probative value other than as an assertion and is therefore not admissible."
88. In the present case the witnesses' evidence of statements made by the deceased was relevant and probative. This is especially so given the proximity of the conversations to the time of death.
89. The evidence could be used to establish the state of mind of the deceased and whether she would have had a sexual relationship with the appellant. This was a relevant fact. If satisfied that the conversations with the witnesses took place, it was for the jury to say whether they were prepared to draw the inferences the Crown sought.
90. The evidence may be understood as part of the context in which the appellant's statements to the police were to be assessed by the jury.
91. Evidence of conversations with a deceased from which conclusions may be drawn about the state of mind of a deceased towards an accused, if accepted by a jury, form part of the context in which an accused's statement to the police about the accused's relationship with the deceased can be considered. That evidence may tend to contradict an accused's assertions about the deceased's attitude to or relationship with the accused.
92. In *R v Georgatsoulis*^[4] King CJ discussed the admissibility of evidence of statements made to witnesses by the deceased:

"Objection was taken at trial to the admissibility of evidence given by Stillitano, the deceased's mother Dianne Mazzone and her fiancé Mr Ressler, as to statements made to them by the deceased. The evidence was admitted over those objections. It was argued on the appeal that the evidence was wrongly admitted. Some of the statements deposed to were admitted to show the deceased's state of mind with respect to the appellant's attentions. It is true of course, as argued by counsel, that what was most significant was not her true state of mind but her words and actions in the presence of the appellant [as relevant to the provocation defence]. Nevertheless I think that her true state of mind had relevance. It was part of the context in which the jury had to assess the weight to be attached to the appellant's evidence as to what occurred at the relevant times and the true nature of the relationship between him and the deceased. The evidence was not hearsay but was original evidence of contemporaneous statements made by the deceased indicating her then state of mind.

...

Stillitano gave evidence of a conversation with the appellant in which he told the appellant 'not to touch Lisa any more or there'll be trouble'. The appellant did not respond. That conversation was admissible evidence as part of the context in which the appellant's attitude to the deceased was to be assessed."

93. The evidence of the conversations was also relevant and admissible to rebut assertions made by the appellant in his police interview about his relationship with the deceased. Evidence of the deceased's state of mind towards the appellant could be used to infer that the relationship between them may not have been as described by the appellant.
94. The judge directed that the evidence could be used to assess the weight to be given to the appellant's statements to the police. This direction was entirely appropriate. Put more directly, the evidence could be used to rebut the appellant's statements. The judge also gave clear and adequate directions about the nature of circumstantial evidence, the way that it should be assessed and how it could be used. Those directions were given generally and also specifically with respect to the evidence of the conversations.
95. The judge was correct to admit the evidence of the conversations. Each piece of evidence was a strand of circumstantial evidence relevant and probative to the deceased's state of mind towards the appellant. It was relevant to the nature of the relationship between the deceased and appellant.
96. The submission of counsel for the appellant that the prejudicial effect of the evidence of the conversations outweighed its probative force must be rejected. The submission that the directions given by the judge as to the impermissible uses of the evidence were inadequate may also be rejected.

Unrecorded Conversation between the Police and the Appellant

97. It is necessary to set out the relevant provisions of the Summary Offences Act 1953 (SA):

"74C. In this Division (sections 74C to 74G)-

"interview" includes-

- (a) a conversation; or
- (b) part of a conversation; or
- (c) a series of conversations;

"investigating officer" means-

- (a) a member of the police force; or
- (b) a person authorised under an Act to investigate offences and arrest suspected offenders.

74D. (1) An investigating officer who suspects, or has reasonable grounds to suspect, a person ("the suspect") of having committed an indictable offence and who proposes to interview the suspect must ensure the following requirements are complied with:

- (a) if it is reasonably practicable to record the interview on videotape, a videotape recording of the interview must be made;
- (b) if it is not reasonably practicable to record the interview on videotape but it is reasonably practicable to record the interview on audiotape, an audiotape recording of the interview must be made;
- (c) if it is neither reasonably practicable to record the interview on videotape nor reasonably practicable to record the interview on audiotape-
 - (i) a written record of the interview must be made at the time of the interview or as soon as practicable after the interview; and
 - (ii) as soon as practicable after the interview, the record must be read aloud to the suspect and the reading must be recorded on videotape; and
 - (iii) when the videotape recording begins (but before the reading begins) the suspect must be invited to interrupt the reading at any time to point out errors or omissions in the record; and
 - (iv) if the suspect in fact interrupts the reading to point out an error or omission, the suspect must then be allowed a reasonable opportunity to do so; and
 - (v) at the end of the reading, but while the videotape recording continues, the suspect must again be invited to point out errors or omissions in the record and allowed a reasonable opportunity to do so; and
 - (vi) if the investigating officer agrees that there is an error or omission in the record, the officer must amend the record to correct the error or omission and if

the officer does not agree that there is an error or omission in the record, the officer must nevertheless make a note of the error or omission asserted by the suspect in an addendum to the record of interview.

(2) If the suspicion, or a reasonable ground for suspicion, arises during the course of an interview, the investigating officer's obligations under subsection (1) arise at that point and apply to the interview from that point.

(3) In deciding whether it is reasonably practicable to make a videotape or audiotape recording of an interview, the following matters must be considered:

(a) the availability of recording equipment within the period for which it would be lawful to detain the person being interviewed;

(b) mechanical failure of recording equipment;

(c) a refusal of the interviewee to allow the interview to be recorded on videotape or audiotape;

(d) any other relevant matter.

(4) As soon as practicable after a videotape or an audiotape recording is made under this Division, the investigating officer must give the suspect a written statement of the suspect's right-

(a) if a videotape recording was made-

(i) to have the videotape played over to the suspect or the suspect's legal adviser (or both); and

(ii) to obtain an audiotape recording of the sound track of the videotape; or

(b) if an audiotape recording (but no videotape recording) of the interview was made-to obtain a copy of the audiotape.

(5) Arrangements must be made, at the request of a suspect, for the playing of a videotape at a reasonable time and place to be nominated by an appropriate investigating officer.

(6) A suspect must be provided, on request and on payment of the fee fixed by regulation, with-

(a) an audiotape of the soundtrack of a videotape recording of an interview with the suspect under this Division; or

(b) a copy of an audiotape recording of an interview with the suspect under this Division.

74E. (1) In proceedings for an indictable offence, evidence of an interview between an investigating officer and the defendant is inadmissible against the defendant unless-

(a) the investigating officer complied with this Division; or

(b) the court is satisfied that the interests of justice require the admission of the evidence despite the investigating officer's non-compliance.

(2) If, in the course of a trial by jury, the court admits evidence of an interview under subsection (1)(b), the court must-

(a) draw the jury's attention to the non-compliance by the investigating officer; and

(b) give an appropriate warning in view of the non-compliance,

unless the court is of the opinion that the non-compliance was trivial."

98. Defence counsel objected to evidence to be led from detective Cramer, an investigating officer of a conversation with the appellant at the appellant's residence. The judge heard evidence on the voir dire and ruled against the objection. The evidence was admitted at trial. The judge's reasons for admitting the evidence have been provided as part of his report to this court.

99. The investigating officer's account was not the subject of cross examination or other comment. There was seemingly no contest about the accuracy of his evidence either on the voir dire or at trial. No submission was put to this court that the account was other than accurate.

100. On the morning of 21 January 1998 detective Cramer and another officer went to the appellant's home. The detectives told him that they were investigating the deceased's murder. He was cautioned. He was questioned about his use of his mobile telephone on the night of the death. He gave the detectives his mobile telephone number. The conversation was recorded on audiotape. The appellant was then taken to the police station. The interview that occurred was recorded on videotape. The appellant was told that he was a suspect. He said that he was happy to answer questions. He was cautioned again. The appellant was then asked questions about his attempts to speak with the deceased on his mobile telephone. He said that he tried to contact her a number of times but not again after that night. The appellant explained that he stored numbers, including the deceased's number in his telephone. The appellant was not under arrest at this time. At the conclusion of the interview he was taken to a medical officer to enable samples to be taken. He was then taken to his home. Police officers searched his bedroom in his presence. Clothing and personal items were seized and photographs were taken. The appellant produced his mobile telephone when requested. He instructed detective Cramer how to scroll through the numbers stored in the memory. detective Cramer then scrolled through the numbers and noted the name of each person and their number. The deceased's name and number were not found. Detective Cramer then had the following conversation with the appellant:

"Detective Cramer: 'Damon, where is Kerry's number?'

The appellant: 'I took it off, I'm putting everything into alphabetical order.'

Detective Cramer: 'When did you do that?'

The appellant: 'After I heard that she had been murdered.'

101. The detectives had a portable audiotape recorder in the police vehicle. However this was not used at the time of the conversation or later to enable the appellant to make any comment about this conversation. The investigating officer said that at the time he was aware of his obligation to record an interview with a suspect and had done so earlier in the day. However he said that he did not record this conversation because he thought that it was "more of a passing comment whilst conducting the search". He said that he did not direct his mind to obtaining the audiotape. Later in his evidence he said that he was aware of the provisions of section 74D but that he did not give any thought to the legislation. He made notes of the conversation at about 5:00 pm. He said that he did not consider that section 74D applied to the conversation as he was not questioning the appellant about an indictable offence.

102. On appeal counsel for the appellant did not dispute the accuracy of this history.
The Judges Reasons

103. Having recorded the relevant provisions of section 74E of the Summary Offences Act, the judge referred to the decision in R v Nayda[5] where the word "conversation" was said to encompass any verbal dialogue between two people where each is seeking to communicate with the other. However it did not necessarily extend to gratuitous unassociated comments. The judge expressed his reservations:

"It may be seen that there is some purpose required. Also, a purpose is to be found in s 74D(1) where the words used are 'who proposes to interview the suspect'. I took the view that if Parliament had intended that s 74D was to apply to every conversation, it is to be expected that the expression "at any time an investigating officer speaks to a suspect" or a similar expression would have been used."

The judge then said:

"The evidence on the voir dire did not establish that Detective Crameri proposed to interview the appellant. Having been told by the appellant during the interview earlier in the day that Ms Ostendorf's name and telephone number had been installed in his telephone, Detective Crameri was not able to find them when scrolling through the memory of the telephone and hence his enquiry. I did not regard this conversation as having different status from a conversation to elicit information for a specific purpose such as 'In which house do you live?', 'Which room is yours?' or 'Are these your clothes' and the like.

...

I did not regard this conversation between Detective Crameri and the appellant as an interview within the meaning of s 74C and 74D and consequently the evidence was admissible as s 74E had no application."

The judge then considered the alternative position:

"I considered that if I was wrong in that conclusion, it was in the interests of justice that the evidence be admitted. I did not think that the consideration of the interests of justice is restricted to matters favourable to the appellant. It includes the admission of evidence relevant to a fact in issue which could assist the jury to arrive at the truth of the matter. In the circumstances the questions by Detective Crameri were reasonable and the answers were capable of assisting the jury to correctly resolve a fact in issue, namely the significance, if any, of the appellant attempting to contact Ms Ostendorf on the night she was murdered and not thereafter. At no time during the voir dire was there any suggestion that the evidence of Detective Crameri as to what was said was inaccurate. The appellant did not give or call evidence.

Section 74E does not create a discretion for the exclusion of evidence. It is concerned with admissibility. In my view, all of the circumstances must be considered when deciding whether the interests of justice require the admission of the evidence. In *R v King & Pitson (No 2)* (1998) 199 LSJS 111, Cox J considered that the public at large is entitled to expect that police will comply strictly with statutory safeguards for suspected persons and that police must not take a casual attitude about such matters: 115. I accept that consideration must be given to those matters. Detective Crameri was aware of s 74D but did not think it applied to this brief conversation. He did not take a casual view about the matter. Given the caution which was apparently understood by the appellant, the previous answers of the appellant as to his telephone and the fact that the name and telephone numbers were no longer in the telephone could be proved by other evidence of Detective Crameri, I considered that the interests of justice required the admission of the evidence. Furthermore, there was no suggestion that the responses of the appellant were not voluntary or that there was any doubt about reliability and accuracy of the evidence. The police had not taken the tape recorder into the house because they had gone to the appellant's home to search the premises. The conversation occurred whilst the appellant was co-operating with the police officers."

The judge concluded:

"When Detective Crameri gave evidence before the jury he related what had occurred at the appellant's house regarding his mobile telephone and related the impugned conversation. There was no suggestion in cross-examination that his evidence was not correct. The appellant did not give evidence at the trial. There was no suggestion in the evidence that the conversation did not occur or that Detective Crameri's evidence was inaccurate or unreliable.

I did not give a direction to the jury about the conversation and the lack of audio or video recording of it. There is no appeal about that matter. I took the view that s 74D did not apply. If I was wrong and the evidence was to be admitted pursuant to s 74E(1)(b), I considered that no direction or warning to the jury was required because the evidence was not in dispute. I was not asked to give any direction or warning."

104. The appellant submitted that the impugned conversation was an interview within the meaning of section 74C. The investigating officer suspected the appellant of having committed an indictable offence. As an experienced officer he must have been aware that the appellant would be spoken to in the course of the search. It was said that there had been non compliance with section 74D. The interview was inadmissible unless the power within section 74E was exercised.
105. It was further said that the interests of justice did not require the admission of the evidence of the impugned conversations for the following reasons:
- there were no operational reasons why the provisions of section 74D could not have been complied with as there was a tape recorder in the police vehicle;
 - a tape recorder had been used at the appellant's home during an interview earlier that day;
 - the question was asked for the purpose of obtaining evidence and was not merely incidental to a search of the premises;
 - the Crown could have sought to obtain the same information by an examination of the appellant's mobile telephone.
106. Counsel said that the appellant had been deprived of the opportunity to have the evidence excluded. It was further contended that the judge failed to direct the jury in accordance with section 74E. The judge should have explained that the appellant was unable to discredit the assertions of the investigating officer other than by giving evidence himself.
107. Counsel for the Crown acknowledged the width of the definition of "interview" in section 74C but contended that not every conversation could be defined as an interview. It was said that the investigating officer's evidence had been accepted. He did not intend to interview the appellant. The obligations under section 74D had not arisen. In the alternative it was said that if section 74D applied the conversation would inevitably have been admitted in the interests of justice. It was said there had not been a deliberate breach. The appellant had been repeatedly cautioned earlier that day during a police interview. The accuracy and reliability of the conversation were not challenged. Having regard to the seriousness of the charge the interests of justice compelled its admission.
108. Counsel said that a warning pursuant to section 74E was not required given that any non compliance was trivial. The purpose of a warning was to make the jury aware of the consequences of the failure to record a conversation in circumstances where the accuracy of the conversation was disputed and the accused was unable to challenge the evidence. Neither of those circumstances arose. There was no dispute about the accuracy of the evidence. The appellant willingly answered questions and sought to cooperate with the police.

109. Subsequent to the judge's ruling this court considered the interpretation of section 74C-E in R v Byster[6] and R v Day[7]. In Byster, the court concluded that the consequence of non compliance with section 74D rendered an interview inadmissible. A more detailed discussion of the provisions and procedures are to be found in Day. The issue arising in the present case is the meaning of the word "interview". This was not the subject of any detailed discussion in Byster or Day.
110. Section 74E provides that evidence of an "interview" is inadmissible against a defendant unless either of two conditions are met. Has there been compliance with section 74D(1)? Should the judge exercise the power to admit the evidence in the interest of justice?
111. Section 74D(1) requires an investigating officer in specified circumstances to ensure that there is compliance with section 74D(1). The investigating officer must suspect or have reasonable grounds to suspect a person of having committed an indictable offence and must propose to interview the suspect.
112. It was accepted by the Crown that the investigating officer suspected the appellant of having committed an indictable offence. During the search he proposed to have a conversation with the appellant. Was this a proposal to interview the appellant within the meaning of section 74D(1)?
113. "Interview" is defined by section 74C to include a conversation. It follows that evidence of a conversation between an investigating officer and a suspect may be inadmissible by reason of the provisions of section 74E.
114. Counsel for the Crown was unable to identify any criteria by which an assessment could be made of whether the intended conversation was a proposal to interview. Counsel said that it was a question of fact, circumstance and degree. There was no guiding criterion. It was said that if Parliament had intended the provisions to apply to every conversation between an investigating officer and a suspect then it would have said so. It was contended that the provisions could not have been intended to apply to all words spoken between an investigating officer and a suspect and that the meaning of "interview" must necessarily be restricted.
115. There is no reason in principle why the legislative provisions should not have a broad application or why "interview" as used in section 74D(1) should be accorded a restricted meaning. A broad interpretation of the definition of interview does not appear to be contrary to the legislative intention.[8] Having regard to the mischief being addressed by section 74C-E there is every reason to give a broad interpretation to the legislative scheme. In the event that recording equipment is not available the obligation of the investigating officer is to make a written record as soon as practicable of the conversation. There is no requirement for a verbatim record. On the ensuing videotape recorded interview the written record must be read to the suspect who then has the opportunity to point out any error or omission. Such a procedure is not unduly

burdensome. It is directed towards meeting the concerns of the court in McKinney & Judge[9]. The submission that the meaning of "interview" should necessarily be restricted must be rejected.

116. A proposed conversation that relates to a relevant suspicion and to an investigation being undertaken in relation to that suspicion is an "interview" within the meaning of section 74D. The investigating officer proposed to have a conversation with the appellant to further his enquiries. He was investigating the appellant as a suspect with respect to the indictable offence of murder. He was following up a matter arising from previous interviews with the appellant. It was at least a possibility that the proposed conversation may have led to the disclosure of important evidence. The fact that the investigating officer may not have appreciated this at the time is not to the point.
117. In this case there was a failure to comply with section 74D(1). Although the investigating officer made handwritten notes of the conversation he did not later follow the procedure prescribed. The evidence was inadmissible unless one of the two pre-conditions for admissibility referred to in section 74E existed.
118. The interests of justice were overwhelmingly in favour of admission. The evidence, given non compliance with section 74D(1) was admissible in the interests of justice. The judge accepted the investigating officer's evidence that the breach was not deliberate. The evidence was relevant and probative circumstantial evidence. As there was no challenge to the accuracy of the investigating officer's evidence, no warning was required.[10]. The judge's alternative conclusion was correct. The evidence of the conversation was properly admitted.

Rebuttal Evidence

Evidence at Trial

119. As earlier observed Mrs Baldino was a defence witness. She said that on Wednesday 14 January 1998 she was at the Glynde Hotel at about 3.30 pm. She observed an argument between a person she believed to be the deceased and an unknown male. She said that the deceased had won money on a poker machine. A man grabbed her arm. Mrs Baldino heard the deceased say "Let go of my arm, you are hurting me." The man replied "This is only the beginning." Mrs Baldino identified the deceased from photographs she had seen in the paper following the deceased's death. Mrs Baldino had known the deceased previously.
120. This evidence was said to be relevant because it showed that there was a person who bore ill will against the deceased. This was suggestive of motive and indicative of someone other than the appellant being the perpetrator of the crime.
121. Over objection the Crown was permitted to lead evidence from Mrs Rowlands in rebuttal. She said that on Wednesday 14 January 1998 she went to see the deceased at about 1.00 pm and left at about 2.30 pm. She returned to the deceased's home at about 3.30 pm to 4.00 pm. During the time that she was away her children were with the

deceased. This evidence was relevant to establish that the deceased could not have been at the Glynde Hotel at or about 3.30 pm on that day.

122. The Crown was also permitted to lead evidence that Mrs Rowlands provided a statement consistent with this evidence to the police on an earlier occasion. The Crown were concerned to rebut an inference of recent invention said to arise from the fact that Mrs Rowlands, to the observation of the jury, was in court while Mrs Baldino gave evidence and that she was seen to leave with counsel for the Crown.

123. The appellant submitted that the judge erred in permitting the rebuttal evidence. It was said that there had been no direct challenge by the Crown to Mrs Baldino's assertion of the identity of the deceased or the date. It was further contended that the circumstances advanced by the Crown were insufficient to justify the reception of the evidence of the prior consistent statement.

124. The Crown submitted that the movements of the deceased on 14 January 1998 were not relevant at the time of the presentation of the Crown case. They only became relevant as a consequence of Mrs Baldino's evidence.

Consideration of the Issues

125. Defence counsel did not seek to recall Mrs Baldino when the Crown raised the issue of rebuttal evidence. The defence could have sought permission to recall Mrs Baldino to give further evidence if there was a concern that the Crown had failed to meet its obligation to put Mrs Rowlands' account to Mrs Baldino. Such a course is sanctioned by authority. In *The Queen v Killick*[11] Wells J, with whom King CJ and Williams J agreed observed:

"Another kind of case where rebuttal evidence is likely to be appropriate, and which is encountered far too often in practice, is to be found where one side has failed to comply with the rule of practice and common fairness usually identified by the description 'the rule in *Browne v Dunn*'. In such a case, it will emerge that one side has failed to put part of its case to a witness, called by the other side, who is concerned with that part, and has then led evidence from its own witness or witnesses as to the matters not put. When this occurs, the party whose witness has been thus wronged usually has the clear right to recall that witness in order to enable him to deal specifically with the matters not previously put to him."

126. Mrs Rowlands was cross examined at some length when first giving evidence about the deceased's relationship with a number of men. However nothing was put concerning Mrs Baldino's evidence of her observations at the Glynde Hotel. The Crown were not on notice of Mrs Baldino's evidence. The Crown were not told that Mrs Baldino would be a witness or of her identity until the day before she was called as a witness. It was said that in these circumstances the leading of rebuttal evidence was appropriate and that the judge's permission to do so was correctly given.

127. Generally a prior consistent statement is not admissible in the absence of an imputation that evidence given was reconstructed or a matter of recent intervention. The

imputation may be implicit rather than explicit. It must be such that proof of the prior consistent statement which the evidence is led to establish would tend to answer the imputation[12]:

128. Whether evidence of a prior consistent statement may be admitted is a matter for the discretion of the judge. In *The Nominal Defendant v Clements*[13] Dixon CJ said:

"The judge at the trial must determine for himself upon the conduct of the trial before him whether a case for applying the rule of evidence has arisen and, from the nature of the matter, if there be an appeal, great weight should be given to his opinion by the appellate court. It is evident however that the judge at the trial must exercise care in assuring himself not only that the account given by the witness in his testimony is attacked on the ground of recent invention or reconstruction or that a foundation for such an attack has been laid by the party but also that the contents of the statement are in fact to the like effect as his account given in his evidence and that having regard to the time and circumstances in which it was made it rationally tends to answer the attack."

129. In *Transport and General Insurance Co Ltd v Edmondson*[14] McTiernan, Taylor and Menzies JJ referred to the above remarks from Clements and observed:

"What should be observed is that it is for the judge to determine for himself whether the credit of the witness has been impugned in the relevant sense and it is not to the point to enquire whether it would be open to the jury, or to some member of it ... to infer that a suggestion of recent invention had been made. If, according to the view of the learned trial judge such a suggestion is made it raises a subsidiary issue in the case and it is for the judge, having so decided for himself, to instruct the jury how they should deal with it; if in the view of the judge no such suggestion is made it is for him to instruct the jury appropriately."

130. The Crown was prejudiced by the unusual manner in which the evidence and the issue as to the deceased's movements on 14 January 1998 arose. The judge accepted that the Crown could not reasonably have foreseen Mrs Baldino's evidence. It was important to have the evidence of Mrs Rowlands before the jury.

131. The jury was able to observe Mrs Rowlands in the body of the court when Mrs Baldino gave her evidence and was able to observe Mrs Rowlands leave the court with counsel for the Crown. The jury may have considered the possibility that Mrs Rowlands' rebuttal evidence was reconstructed or a matter of recent invention.

132. It was within the judge's discretion to allow the rebuttal evidence to be led. No error in the exercise of that discretion has been demonstrated.

Direction Concerning Anal Penetration

133. The Crown case was that there was a sexual motive and that this motive was not dependant upon proof of anal penetration. This was said to be apparent from a

combination of factors including the position of the deceased's body on the bed, the condition of her anus and the manner in which her clothes had been removed. It was submitted that it was not necessary to establish penetration to prove that the deceased was murdered by the appellant.

134. Dr James the pathologist expressed the view that penetration could not be excluded. However if it had occurred he could not identify the means of penetration or whether it would have occurred before or after death.

135. The judge directed the jury:

"You will remember the abrasions on her knees which you see in photograph 86, which Dr James said could be called carpet burns. According to Dr James, the bruises on the arms were consistent with forceful handling of the arms by the hands of the attacker.

You will remember the evidence of the bruises to her face, her eyes and her mouth, which you see in photograph 81, her right arm in photographs 87 and 84, and her left arm in photograph 82. Dr James told you that the bruises on the face were consistent with having been caused by punches and more than once. Was she punched in the kitchen and then dragged by her arms to the bedroom on her knees? Had there been a sexual advance which she rebuffed and was then attacked?

You may conclude that she was put on the bed, strangled and her clothes cut off. It may be that she was sexually assaulted by anal penetration. But you may not know in what order those things occurred.

There are a number of matters which you might consider significant. There are the bruises to her legs which might suggest some rough handling of her legs. There is no faecal staining on any of the clothes, the panties, the skirt and, in particular, on the blouse. There are no marks on her buttocks or back consistent with a struggle when clothing was cut away, even though there are cut marks on some of the clothing.

...

You will remember the evidence of Dr James that in cases of strangulation there is a rising in the level of carbon dioxide in the blood shortly before death, and loss of bowel and bladder control can occur at that stage. He told you that the faecal staining was extensive on the bed and her abdomen. So, ladies and gentlemen, if you accept the evidence of Dr James, Mrs Ostendorf was alive at that stage, but she may have been unconscious or near unconscious.

Dr James told you that there were no injuries to the genital or anal tract and the only abnormality was that the anus was markedly dilated or enlarged. He went on to say that although dilation of the anus is quite common, normally rigor mortis will affect all muscles, including the anus. He saw the dilation of the anus in the condition of full rigor mortis and he felt that the dilation was not simply due to

death. He said he could not exclude some penetration by something such as a blunt object, which could be a finger or a penis.

You will remember the evidence that no semen was found at the house or in the faeces or in the anus or on Mrs Ostendorf's clothes. There was no faecal staining on the clothes which were removed from her. Testing showed that a condom had not entered her anus.

You may conclude that, at least the lower clothing, the panties and the skirt, were removed before she died and before she was strangled, because it is likely that it was at that time that there was a loss of bowel control. If her anus was penetrated you might think that it occurred before she was strangled and before she defecated, but after the clothes were cut off, which may well be the case if the two hairs found on the back of her body are significant. Did her attacker knock her virtually senseless, drag her into the bedroom and onto the bed, interfere with her clothing, sexually abuse her or not, as the case may be, and then strangle her? It would appear that she was not unconscious when the ligature was applied. Her own scalp hair was found in her hand, which suggests that she was trying to interfere at the back of her neck with the ligature as it was applied."

136. Counsel for the appellant made no complaint about any of these observations. However it was said that the judge should have warned the jury that the evidence did not establish beyond reasonable doubt that penetration had occurred.
137. Penetration was not a necessary part of the Crown case. As such it did not have to be proved beyond reasonable doubt. The judge was not obliged to direct the jury in these terms. The jury was entitled to consider the whole of the evidence surrounding the circumstances of the crime in determining whether there had been anal interference.
138. There was a body of circumstantial evidence that could have led to the conclusion that the crime was sexually motivated and that there had been interference with the deceased's anus. There was no obligation on the trial judge to give the jury any further direction.

DNA Issues

General

139. A number of complaints concerning the judge's treatment of the DNA evidence were raised.
140. An extensive voir dire was conducted^[15]. The judge concluded that the proposed evidence of the Crown DNA experts was admissible. The judge's findings included:
- . the Quadruplex system and the Profiler Plus system for DNA analysis were recognised and accepted by the relevant scientific community as reliable.
 - . Mr Pearman [a Crown DNA witness] had sufficient expertise to use these systems and to assess the results produced by them. The procedures adopted by him in using these forms of analysis are recognised and accepted by the relevant scientific community as reliable.

. Mr Pearman had sufficient expertise to express opinions as to the degree of probability of a match of the DNA profiles of the blood of the accused and KO22.C occurring through chance or coincidence.

. The two databases were valid for the purpose of expressing opinions as to the degree of probability of a match.

. Mr Pearman had sufficient expertise to express opinions about the validity of the database or databases and to correctly interpret them for the purpose of expressing their opinions.

141. At trial the defence presented evidence from a DNA expert Dr Alan Atchison. Counsel sought to lead evidence that the likelihood ratio was invalid and irrelevant. It was said that no account had been taken of the possibility of laboratory error. During the voir dire Dr Atchison gave evidence on the topic of a laboratory error rate. He was given numerous opportunities to explain what he meant by error rate, how it should be calculated and how it should be incorporated into the likelihood ratio. Ultimately his evidence was that it was logically impossible to determine an error rate "because we're talking about errors we don't know about".

142. The judge ruled on the voir dire that the proposed evidence of Dr Atchison was inadmissible. Notwithstanding this ruling evidence to this effect was led at trial from Dr Atchison. However this evidence did not support the submission that the figure may have been reduced to one in a hundred or one in a thousand or one in a million. His evidence also could not support the submission that the use of a laboratory error rate would make the figure more realistic. No laboratory error rate was advanced.

143. Counsel for the appellant acknowledged that it was not being suggested by Dr Atchison that there was any particular rate of laboratory error that could be introduced into the likelihood ratio. In the absence of a laboratory error rate it was contended that the likelihood ratio was meaningless and of no weight.

144. The Crown submitted that Dr Atchison's evidence could be of no assistance to the jury and had no probative value. It was said that his opinion demonstrated why the inclusion of an error rate in the statistical calculation was contrary to generally accepted scientific principles.

145. It was the Crown case that the likelihood ratio was a statistical presentation built on the hypothesis that there was no laboratory error. The jury had to be satisfied beyond reasonable doubt that the laboratory processes had been properly conducted and that there was no reasonable possibility of error. Once satisfied, the jury could have regard to the result produced by the likelihood ratio.

146. The judge considered that the likelihood ratio was admissible statistical evidence. However the jury had first to be satisfied beyond reasonable doubt that they could exclude any reasonable possibility of laboratory error. The jury had to be satisfied beyond reasonable doubt that the laboratory results were accurate and reliable.

147. At trial Dr Atchison volunteered evidence about the significance of laboratory error and its impact on the likelihood ratio. This was done despite the judge's ruling on the voir dire. In his summing up the judge directed the jury:

"That is the question for you to answer; has the Crown proved beyond reasonable doubt, taking into account all of the evidence in this case, and not just the DNA evidence, that the accused left those stains on the blouse?

...

The question for you is whether any errors in the Forensic Science Centre could reasonably possibly have resulted in inaccurate and unreliable results in this case.

Ladies and gentlemen, it is the defence case that due to the matters that have been put to you, reliance cannot be placed upon the DNA testing in this matter. It has not been shown that the RFU levels adopted by the Forensic Science Centre are reliable and, indeed, it is the defence case that its own validation studies indicate to the contrary. The errors and contamination in the laboratory, as revealed in the evidence, give cause to reject the testing by the Forensic Science Centre as reliable and accurate. Without the use of the initial reagent blanks through the testing of reamplified samples, the tests cannot be regarded as accurate and reliable and if they have not been run through samples also that have not been reamplified. Do you accept these contentions or regard them as reasonably possible? If you do, then you must disregard the DNA evidence. In considering this matter, as I say, you must look at all of the DNA evidence and all of the tests and all of the other evidence in the case. In these tests, do you see consistency and reproducibility? When the particular criticisms are put in context, do you doubt the accuracy and reliability of the testing? If there was contamination, do you accept that it was identified and resolved, or otherwise shown to be irrelevant, to the testing in the present case? Do you accept Mr Pearman as a competent and reliable expert who undertook his work thoroughly and expressed his opinions with care and restraint? Are you prepared to accept what he has told you? Do you have confidence in him? Does the DNA evidence of the tests and profiles fit in with the other evidence in the case which you find acceptable? Have you found Mr Taylor and/or Dr Atchison to be competent and careful when reaching conclusions and expressing opinions? Do you have confidence in either of them? Do you find their evidence to be acceptable?"

148. The judge directed the jury in regard to the statistical evidence at some lengths. His directions included this summary:

"I now just want to briefly summarise a couple of matters to you. What conclusions about the DNA evidence are you able to reach beyond reasonable doubt? This evidence is very important and you must not rely on any matter unless you have found it proved beyond reasonable doubt. Are you satisfied beyond reasonable doubt that the DNA profile of the accused is the same as the DNA profile found in KO22.B and KO22.C?"

Having regard to the evidence of match probability, are you satisfied beyond reasonable doubt that it is about 90 billion times more likely if the accused donated those two samples than if some other random person donated them? If you do reach that conclusion, then it is a most important piece of circumstantial evidence to be considered along with all of the other circumstantial evidence in the case ...".

149. Counsel for the appellant accepted that as a matter of logic the jury could only consider the statistical evidence once it was satisfied beyond reasonable doubt that the DNA tests were accurate and reliable and that the appellant's DNA profile matched the profile of the stains on the blouse. However it was submitted that the judge's direction overlooked the difference between statistical probability and the concept of probability generally used in the courts. It was said that it would be a breach of principle to calculate a likelihood ratio without reference to the mathematical probability that a match between the crime scene stain and the appellant's profile was due to an undetected laboratory error rather than the two DNA profiles being the same. It was said that the judge failed to distinguish between the nature and function of statistical probability and the nature and function of inductive or inferential reasoning.

150. As earlier observed, the conclusion from the 4.10 equation can be presented in two ways as a match probability and as a likelihood ratio. The match probability in this case was that the chance of another unrelated person having the same DNA profile as that obtained from the stain KO22.C was approximately one in ninety billion. The Crown submitted that this conclusion was derived from a known and accepted statistical equation and was admissible. The likelihood ratio was an alternative way of expressing the results from the 4.10 equation. The Crown submitted that the likelihood ratio was an appropriate way to express a relevant conclusion to the jury. It was said that evidence in this form had been accepted in courts both in Australia and elsewhere.

Consideration of the Issue

151. There was a substantial body of statistical evidence addressing the nature and relevance of the likelihood ratio. It is well accepted that statistical evidence is admissible as a form of expert evidence^[16]. The likelihood ratio was an established and accepted method of expressing a statistical opinion^[17]. By its nature it had the capacity to assist the jury. The likelihood ratio itself was not a ratio that had any regard to laboratory error. The making of the calculation proceeded on the assumption that the laboratory results were accurate and reliable. It was necessary for accuracy and reliability to be established.

152. The judge took the view that the Crown had to prove the reliability and the accuracy of relevant laboratory processes beyond reasonable doubt. Extensive evidence was placed before the jury by the Crown. The matter was subjected to vigorous testing and additional evidence was proffered by the defence. This was dealt with by the judge in his directions.

153. The defence mounted a challenge to the processes followed by the Centre and suggested both scientific and laboratory errors. These were canvassed both on the voir dire and at trial. The judge was thorough in his treatment of each challenge and directed the jury with respect to each complaint advanced at trial. On appeal the attack by the defence was primarily directed towards the existence of laboratory error and to the proposition that the likelihood ratio could not be fairly advanced without factoring in the possibility of error.
154. No error in the approach of the judge has been demonstrated. His ruling on the voir dire was sound as was his evidentiary DNA rulings during the course of the trial. The Crown had to exclude the possibility of laboratory error beyond reasonable doubt. If the jury were satisfied of this then regard could be had to the likelihood ratio. The judge's approach was correct.

The Proper Approach to DNA Evidence

155. In *Doheny and Adams*[18] the court observed the need for procedures to be adopted with respect to the reception and presentation of DNA evidence and directions concerning that evidence:

- "- The scientist should adduce the evidence of the DNA comparisons between the crime stain and the defendant's sample together with his calculations of the random occurrence ratio.
- Whenever DNA evidence is to be adduced the Crown should serve on the defence details as to how the calculations have been carried out which are sufficient to enable the defence to scrutinise the basis of the calculations.
- The Forensic Science Service should make available to a defence expert, if requested, the databases upon which the calculations have been based.
- Any issue of expert evidence should be identified and, if possible, resolved before trial. This area should be explored by the court in the pre-trial review.
- In giving evidence the expert will explain to the jury the nature of the matching DNA characteristics between the DNA in the crime stain and the DNA in the defendant's blood sample.
- The expert will, on the basis of empirical statistical data, give the jury the random occurrence ratio - the frequency with which the matching DNA characteristics are likely to be found in the population at large.
- Provided that the expert has the necessary data, it may then be appropriate for him to indicate how many people with the matching characteristics are likely to be found in the United Kingdom or a more limited relevant sub-group, for instance, the caucasian, sexually active males in the Manchester area.
- It is then for the jury to decide, having regard to all the relevant evidence, whether they are sure that it was the defendant who left the crime stain, or

whether it is possible that it was left by someone else with the same matching DNA characteristics.

- The expert should not be asked his opinion on the likelihood that it was the defendant who left the crime stain, nor when giving evidence should he use terminology which may lead the jury to believe that he is expressing such an opinion.
- It is inappropriate for an expert to expound a statistical approach to evaluating the likelihood that the defendant left the crime stain, since unnecessary theory and complexity deflect the jury from their proper task.
- In the summing-up careful directions are required in respect of any issues of expert evidence and guidance should be given to avoid confusion caused by areas of expert evidence where no real issue exists.
- The judge should explain to the jury the relevance of the random occurrence ratio in arriving at their verdict and draw attention to the extraneous evidence which provides the context which gives that ratio its significance, and to that which conflicts with the conclusion that the defendant was responsible for the crime stain.
- In relation to the random occurrence ratio, a direction along the following lines may be appropriate, tailored to the facts of the particular case: "Members of the jury, if you accept the scientific evidence called by the crown this indicates that there are probably only four or five white males in the United Kingdom from whom that semen stain could have come. The defendant is one of them. If that is the position, the decision you have to reach, on all the evidence, is whether you are sure that it was the defendant who left that stain or whether it is possible that it was one of that other small group of men who share the same DNA characteristics."

These recommended procedures form a useful benchmark against which to measure the way in which the DNA evidence was addressed in this case.

156. The procedures followed by the Crown expert witnesses in this case generally accord with these procedures. A review of the presentation of evidence by the Crown DNA experts shows no material departure from the procedures. The judge's directions also accorded.

Other Complaints about the Summing Up

Failure to put the Defence Case

157. Counsel for the appellant submitted that the judge had not fairly put the defence case and had not put the defence case in its "best light". The summing up was unbalanced. It was said that there was an appreciable risk that the jury failed to properly consider the defence case. This was said to have led to a miscarriage of justice.

158. There were substantial challenges to the expertise of the defence and Crown expert witnesses. The case involved lengthy and complex evidence about DNA. It involved an understanding of the methods used to extract and analyse DNA. It included an assessment of the results of the DNA analysis and their statistical presentation and comparison. The defence case contained suggestions of error in the scientific methods undertaken. There was also criticism about the statistical evidence led by the Crown.
159. The approach that the judge took to the scientific and statistical evidence was to briefly address the Crown evidence, to outline the processes followed, to identify the issues raised, to put the defence evidence and contentions and then to identify the Crown's response. The defence case was a critique of the methods adopted by the Crown experts. The defence case did not include evidence of any tests or analysis carried out by the defence experts. The judge identified each point in the critique and addressed the relevant answering material advanced by the Crown as he dealt with each point. When addressing the topics with which particular witnesses dealt, the judge considered the evidence relating to their expertise.
160. The judge gave an overview of both cases. He identified the substance of each case and crystallised the issues. The last thing the jury heard was a concise summary of the defence case.
161. Part of the appellant's complaint was that the defence arguments should have been presented separately from the Crown's answering material. This would have made the jury's task more difficult. The arguments would have been separated from the criticisms. It would have been more difficult for the jury to understand the critiques. The summing up would have been more lengthy, more complicated and disjointed.
162. The submission that the defence case should have been dealt with separately must be rejected. There was no obligation on the judge to present the summing up in the form suggested by the defence. The judge's summing up proceeded appropriately.
163. The submission that the defence case was swamped by the judge's presentation of the Crown case must also be rejected. To the extent that the judge identified matters advanced by the Crown that might have appeared more substantial than those advanced by the defence, this was a result of the nature of the evidence before the court and not of the judge's approach. The judge identified for the jury the points made by the defence. To the extent that those arguments appeared to lack substance that was not the result of their treatment by the judge. It reflected the state of the defence case.
164. Defence counsel did not submit that the judge was wrong in fact, that any particular comment he made was incorrect or that he acted in a way that was not properly open to him. Counsel complained that when the judge made a comment, it was usually favourable to the Crown and adverse to the defence. However a review of the summing up demonstrates that such comments as the judge made were open to him. It cannot be said that there were significant comments in favour of the defence case that should have been made but were omitted.

165. Counsel for the appellant complained that the summing up suggested that the defence case relating to the DNA analysis and statistics was not strong. This submission must be rejected. The judge put the material fairly to the jury. The judge was not required to put the defence case separately, and then deal with answering material later, so that the jury had the opportunity to hear the defence case unsullied by the identification of any inherent problems. On a number of occasions the judge indicated that the jury might well reach a certain conclusion. These were conclusions favourable to the Crown case. However these comments were open to the judge. The summing up as a whole did not lack balance.

166. Counsel for the appellant complained that when the judge dealt with the qualifications and expertise of the DNA experts he posed questions that implied or expressed a criticism of the defence experts. Although he made comparisons between the experts that favoured the Crown, counsel was unable to identify any error. The comments made by the judge were open to him. This complaint has no substance.

Failure to Leave a Reasonable Possibility

167. It was complained that the judge did not leave to the jury as a reasonable possibility the hypothesis that the DNA found on the deceased's blouse was the result of an innocent and accidental transfer, on some other occasion.

168. It was said that the judge misdirected the jury as to the significance of the absence of a substrate control test. This was relevant to whether the jury could be satisfied that the DNA profile from the stains on the blouse came from a bloodstain as opposed to some other substance. This complaint formed part of a broader complaint that the judge failed to direct the jury about the possibility that the DNA could have been deposited by the appellant on some earlier occasion.

169. The Crown submitted that this was an entirely speculative issue not advanced as part of the defence case.

170. Substrate is the material upon which a stain is located. The purpose of a substrate control test is to take a portion of the substrate not including the stain and determine whether it is in fact the substrate producing the result. Substrate tests were conducted by forensic scientists before the availability of DNA analysis when blood groupings were being performed. This was because some fabrics gave a positive result for particular blood groupings, however substrates do not give a DNA result.

171. The appellant argued that there could have been another source of the DNA profile under the stain such as saliva. However, Crown expert evidence was given to the effect that testing the substrate away from the stain gives no indication of what may have been underneath the stain. In addition, the area tested revealed only a single DNA typing excluding the possibility of another DNA profile existing in the same location.

172. During argument before addresses defence counsel made the submission that as a haemoglobin test and a substrate control test had not been performed the Crown could not prove beyond reasonable doubt that the DNA profile from K022.C came from the stains as opposed to something else. The judge indicated that he would not prevent the defence from making this submission to the jury. Defence counsel did raise the issue. However, the judge mentioned this possibility to the jury.
173. The appellant's submission is speculative and hypothetical. No foundation was laid for the suggested possibility. There was no evidence that there had been opportunities prior to the time of death for the appellant's saliva or other cellular material to reach the inside of the deceased's blouse on or near the visible stain and then remain there in order to be subsequently detected. The only account of contact between the appellant and the deceased came from the appellant's interview. The appellant stated that he had contact with the deceased on the Monday and possibly on the Wednesday prior to her death. There was no evidence suggesting contact between the appellant and the deceased on those occasions to explain the presence of his DNA. There was no evidence that the appellant had physical contact with the deceased on those occasions, that she was wearing the particular blouse on those occasions, or that the appellant had ever been in the vicinity of the blouse prior to the death. There also remained for evaluation the coincidence that if there was saliva or other cellular material giving the DNA result that it was positioned on the precise part of the blouse where there were bloodlike stains.

Other Scientific Opinion

174. Counsel for the appellant complained that the judge erred in admitting evidence about peer review and his consequent direction. The evidence related to peer review by two scientists arising from the laboratory practice of results being "second read" before conclusions were reached. The two scientists engaged in the peer review process were not called to give evidence. The evidence was admitted as relevant to establishing the practices followed and standards adhered to at the Centre. In summing up the judge did not suggest any wider use for this evidence. It was said that this evidence was wrongly used to support the evidence of the Crown experts. The defence also led evidence of a similar practice as relevant to the qualification of its own experts. The evidence was properly admitted. No error has been identified.

Esoteric Knowledge

175. A further complaint was that the judge left it open to the jury to consider whether the appellant's statements to the police indicated that he had esoteric knowledge of the death. The appellant complained about one of the passages referred to by the judge. In that passage the appellant said that he knew that the deceased "liked younger men" and "was into kinky things". It was said that this reference to the appellant's knowledge of the deceased's interest in perverted practices should not have been highlighted to the jury. It was further contended that defence counsel had no opportunity to anticipate that this matter would be referred to in the summing up and that it was unfair for the judge to refer to that evidence.

176. As earlier observed it was the Crown case that the motive for the crime was sexual. A number of circumstances including the position of the body, the cut and torn clothing, the state of the deceased's anus and the cause of death may be said to suggest perverted conduct. The statements of the appellant would allow the inference of esoteric knowledge. It was for the jury to weigh this evidence with all of the other evidence.

177. The entire police interview was before the jury. Defence counsel had the opportunity to comment during its address about any aspect of the police interview. The judge directed the jury about the content of the appellant's interview. He was right to do so. The content of the interview was not dealt with unfairly. This submission must be rejected.

Independent Testing

178. The Defence legal representatives were offered the opportunity to observe the DNA testing being undertaken by the principal Crown DNA expert. The legal representatives were also offered samples with which to perform their own tests. These offers were not accepted. In the course of his summing up the judge said:

"What then, if any, is the significance of these offers? The significance, ladies and gentlemen, and it is for you to say, is that it may tell you something about Mr Pearman. It may tell you whether he is the sort of scientist who is prepared to lay his work out and have it tested or evaluated by other experts even though we know, in relation to the sample KO22.B, that unbeknown to him, when the offer was made, there was no DNA left in it, which was subsequently ascertained. So, it may tell you something about that.

Of course, the prosecution, as a matter of law, is obliged to provide all relevant information to the defence in a criminal case. So perhaps it is not a matter of great moment, as things have turned out, but, at all events, you know that these offers were made and these facilities were made available. There is another matter which you might think is significant and that is that, because Mr Pearman and the prosecution undertook these processes, it cannot be suggested that there was any unfairness to the defence. So really that is the only significance of those matters."

179. Counsel for the appellant submitted that these comments were unfair and left the jury with the impression that the defence had something to hide. It was further submitted that the onus of proof was subverted by the implicit suggestion that the defence should have undertaken some counter testing if they wished to maintain that the Crown testing was inaccurate. At the very least a direction should have been given to warn against this impression and process of reasoning.

180. Counsel for the Crown submitted that it was clear that the defence was going to challenge the expertise and competence of the principal Crown DNA expert, the general competency of the Centre and the DNA results. Challenges included allegations of recurring patterns of error, misloadings, sample mixups, general and specific

contamination of the laboratory, a failure to use controls, failure to properly undertake experiments, inappropriate laboratory set up, inadequate internal validation studies and generally bad scientific practices. It was said that the evidence was relevant and admissible to establish that the Centre and the Crown DNA experts were prepared to have their results checked either by way of observation or retesting by an independent scientist.

181. This evidence was relevant for the reasons advanced by the Crown. The judge made it clear that the evidence had limited use. No unfairness arose.

182. It was further complained that the judge failed to give a general warning against the dangers of misusing statistical evidence. The submission went so far as to suggest that a general warning was always required. This submission must be rejected. There may be cases where the particular circumstances call for a special direction or warning but this will necessarily depend on the particular facts and circumstances in any given case.

The Prosecutor's Fallacy

183. Counsel for the appellant contended that a warning was required to counter the danger of the jury adopting a process of reasoning described as the prosecutor's fallacy.

184. A clear summary of what is known as the "prosecutor's fallacy" is to be found in the English Court of Criminal Appeal decision of Phillips LJ in *Doheny and Adams*^[19]:

"It is easy, if one eschews rigorous analysis, to draw the following conclusion:

Only one person in a million will have a DNA profile which matches that of the crime stain.

The defendant has a DNA profile which matches the crime stain.

Ergo there is a million to one probability that the defendant left the crime stain and is guilty of the crime.

Such reasoning has been commended to juries in a number of cases by prosecuting counsel, by judges and sometimes by expert witnesses. It is fallacious and it has earned the title of 'The Prosecutor's Fallacy' "

185. The judge's summing up was devoid of any language that would lead to such a process of reasoning. This complaint must be rejected.

The Significance of DNA Evidence

186. In *Doheny and Adams*^[20] Phillips LJ observed:

"The significance of the DNA evidence will depend critically upon what else is known about the suspect. If he has a convincing alibi at the other end of England at the time of the crime, it will appear highly improbable that he can have been

responsible for the crime, despite his matching DNA profile. If, however, he was near the scene of the crime when it was committed, or has been identified as a suspect because of other evidence which suggests that he may have been responsible for the crime, the DNA evidence becomes very significant. The possibility that two of the only 26 men in the United Kingdom with the matching DNA should have been in the vicinity of the crime will seem almost incredible and a comparatively slight nexus between the defendant and the crime, independent of the DNA, is likely to suffice to present an overall picture to the jury that satisfies them of the defendant's guilt.

The reality is that, provided there is no reason to doubt either the matching data or the statistical conclusion based upon it, the random occurrence ratio deduced from the DNA evidence, when combined with sufficient additional evidence to give it significance, is highly probative. As the art of analysis progresses, it is likely to become more so, and the stage may be reached when a match will be so comprehensive that it will be possible to construct a DNA profile that is unique and which proves the guilt of the defendant without any other evidence. So far as we are aware that stage has not yet been reached.

The cogency of the DNA evidence makes it particularly important that DNA testing is rigorously conducted so as to obviate the risk of error in the laboratory, that the method of DNA analysis and the basis of subsequent statistical calculation should - so far as possible - be transparent to the defence and that the true import of the resultant conclusion is accurately and fairly explained to the jury."

187. The jury was directed that the DNA evidence was but one part of the evidence in the case and that the statistical evidence was only directed to the analysis and presentation of the DNA evidence. The jury was also directed to consider the DNA evidence as a piece of circumstantial evidence together with all of the other evidence in the case in deciding whether the appellant's guilt had been proved beyond reasonable doubt. There was no need for any further direction.

188. The judge directed the jury on all relevant aspects of the DNA evidence including the limited conclusions that could be drawn from the statistical analyses performed. As observed the jury was instructed that the DNA evidence formed only one part of the evidence that they had to consider and that the evidence as a whole must be reviewed. The judge's directions were appropriate and adequate. No further warning was required.

Bayes Theorem

189. Bayes Theorem has been described as a way of looking at non statistical matters in statistical terms. Bayes Theorem is a useful tool for statisticians and other experts seeking to establish a mathematical assessment of probability. However the theory can only operate by giving to each separate piece of evidence a numerical percentage. These percentages represent the ratio of the improbability of circumstance A and the probability of circumstance B given the existence of that evidence. The percentage chosen is a matter

of judgment. The apparently objective numerical figures used in the theory may conceal the element of judgment on which it entirely depends.

190. The use of Bayes Theorem has been firmly rejected by the courts. In Adams[21] Rose LJ said:

"More importantly for present purposes, however, whatever the merits or demerits of the Bayes Theorem in mathematical or statistical assessments of probability, it seems to us that it is not appropriate for use in jury trials, or as a means to assist the jury in their task. In the first place, the theorem's methodology requires, as we have described, that items of evidence be assessed separately according to their bearing on the accused's guilt, before being combined in the overall formula. That in our view is far too rigid an approach to evidence of the type that a jury characteristically has to assess, where the cogency of (for instance) identification evidence may have to be assessed, at least in part, in the light of the strength of the chain of evidence in which it forms part. More fundamentally, however, the attempt to determine guilt or innocence on the basis of a mathematical formula, applied to each separate piece of evidence, is simply inappropriate to the jury's task. Jurors evaluate evidence and reach a conclusion not by means of a formula, mathematical or otherwise, but by the joint application of their individual common sense and knowledge of the world to the evidence before them. It is common for them to have to evaluate scientific evidence, both as to its quality and as to its relationship with other evidence. Scientific evidence tendered as proof of a particular fact may establish that fact to an extent which, in any particular case, may vary between slight possibility and virtual certainty. For example, different blood spots on an accused's clothing may, on testing, reveal a range of conclusions from 'human blood' via 'possibly the victim's blood' to 'highly likely to be the victim's blood'. Such evidence is susceptible to challenge as to methodology and otherwise, which may weaken or even, in some cases, strengthen the impact of the evidence. But we have never heard it suggested that a jury should consider the relationship between such scientific evidence and other evidence by reference to probability formulas. That such a course would in any event be impossible of sensible achievement by a jury, at least so far as the use of the Bayes Theorem is concerned, is demonstrated by the practical application of the stage of that theorem's methodology that involves numerical assessment of the various items of evidence. Individual jurors might differ greatly not only according to how cogent they found a particular piece of evidence (which would be a matter for discussion and debate between the jury as a whole), but also on the question of what percentage figure for probability should be placed on that evidence. Since, as we have pointed out, the translation of an assessment of cogency into a percentage probability of guilt is entirely a matter of judgement and the conferring of a percentage probability of guilt upon one item of evidence taken in isolation is an essentially artificial operation, different jurors might well wish to select different numerical figures even when they were broadly agreed on the weight of the evidence in question. They could, presumably, only resolve any such difference by taking an average, which would truly reflect neither party's view; and this point leaves aside the even greater difficulty of how 12 jurors,

applying Bayes as a single jury, are to reconcile, under the mathematics of that formula, differing individual views about the cogency of particular pieces of evidence. Quite apart from these general objections, as the present case graphically demonstrates, to introduce Bayes Theorem, or any similar method, into a criminal trial plunges the jury into inappropriate and unnecessary realms of theory and complexity deflecting them from their proper task."

191. Counsel for the appellant submitted that the judge should have excluded the evidence of the match probability and the likelihood ratio. It was said that this evidence was part of Bayes Theorem and as a result was inadmissible. However the court's rejection of the use of Bayes Theorem is not based on the fact that it is a statistical equation. The rejection arises because Bayes Theorem involves subjectively attaching numerical values to evidence and usurps the role of the jury. This submission must be rejected. As earlier observed the judge was not in error in admitting evidence of the match probability and the likelihood ratio.

Unsafe and Unsatisfactory Verdict

192. The appellant submitted that having regard to all of the grounds of appeal the jury's verdict was unsafe and unsatisfactory.
193. The question is not whether the court of appeal entertains a doubt about the appellant's guilt but rather whether on the evidence it was open to the jury acting reasonably to be satisfied of the appellant's guilt. As the High Court has observed a jury's verdict is unsafe and unsatisfactory:
- "if the court of appeal concludes that the jury, acting reasonably, must have entertained a sufficient doubt to have entitled the accused to an acquittal":[\[22\]](#)
194. The judge regularly reminded the jury that the facts were for them to decide. The verdict was fully justified by the evidence. The verdict was neither unsafe nor unsatisfactory.

Conclusion

195. The appeal must be dismissed.