JUDICIARY OF
ENGLAND AND WALES

THE RT. HON LORD JUSTICE BIRSS
DEPUTY HEAD OF CIVIL JUSTICE

# CHANCERY BAR ASSOCIATION ANNUAL LECTURE:
# NUMBERS, SCIENCE AND THE LAW – NO CAUSE FOR DIVISION

## SPEAKING NOTES

**ASHWORTH CENTRE, LINCOLN'S INN**
**TUESDAY 16 NOVEMBER 2021**

**Introduction**

1. Good evening and thank you for that kind introduction. And thanks also to the Chancery Bar Association for inviting me to give the annual association lecture.

2. Now I have to start by getting a few things off my chest.

3. As many of you probably know, I did a science degree, and I worked in computers straight after university for a couple of years. I only came to the law after that, by what is now called the PGDL. Like all of us, my experience and education has coloured my perspective.

4. For me that background was a world of numbers and science before I was ever in the law.

5. When I was at the Inns of Court School of Law I began to realise, for the first time, that I was in a different world. It was in a big lecture hall in a lecture on civil procedure about the awarding of interest on damages. It was not even compound interest, just simple interest. The arithmetic is trivial and I do mean trivial. An engineer friend of mine and I talked about the lecture beforehand and wondered whether to skip it and spend the afternoon in the pub next door, the Cittie of York. But we were diligent students so we went. We sat and watched the barrister lecturer. Early on he made the most elementary numerical blunder in his lecture to us. He was calculating a daily interest rate. The mistake is called truncation. He was carefully but, as it turned out, blindly following a method he had obviously been given to show us what to do. Having made the mistake he continued, unaware of what he had done, until he got to the end

and found that the result of his worked example did not accord with the model answer. He looked back over what he had done and couldn't understand what had happened even though it was glaringly obvious. I must confess I did wonder if I should have gone to the pub instead.

6. The second experience was something which has recurred through my career in the law. It is the remarkably poor mental arithmetic of many barristers. Now I know not everyone has to be good at mental arithmetic. And I was good at maths at school, but I am no mathematical whizz. In fact mental arithmetic in particular was never my strong suit. My teachers were always disappointed in it. It has always been poor by the standards of people who did do maths at A-level. But spend a bit of time arguing about costs and you soon see that an awful lot of lawyers do not just avoid mental arithmetic like the plague – which does not really matter – but what I think does matter is that many lawyers have very little feel for the magnitude of the quantities they are arguing about. If you are handling numerical information in your daily life it is a bit odd not to have that grasp of quantity.

7. Now before I go any further, I need to make it clear that there are very many highly numerate lawyers and judges. But there are perhaps not as many as there could be. And I suggest that matters.

8. To illustrate what I am driving at, I would like to tell you a story about nuclear weapons.

9. There is a technique called Fermi estimation which everybody should know about. It is named after the famous Italian physicist Enrico Fermi. He built the first nuclear reactor under the stands of the Chicago University football field in 1942. In 1945 Fermi wanted to estimate the strength of the atomic bomb to be detonated in the Trinity test – the first detonation of a nuclear weapon. He did it by simply by dropping a few pieces of paper from his hand during the blast and looking at how far they travelled. The estimate he made that way turned out to be remarkably accurate. His estimate was well within an order of magnitude of the correct answer.

10. Now part of the point of this story is that very often that sort of accuracy is all you need to know.

11. Fermi estimation is just another name for the exercise of making back of the envelope estimates. You do it by multiplying together a few numbers which are very rough guesses - estimates - of quantities you ***do*** know. The purpose is to get a feel for what an answer ought be. What you are trying to do is get an idea of the ***size*** of the answer.

12. And we all know what an estimate is, but what many of us have forgotten, if they were ever taught it at all, is just how useful this technique of estimation is. The technique and its power are re-taught to all maths and science students, particular physical science students, very early in their careers.

13. One significant use of the technique is to detect errors. Before you embark on a complex calculation which is going to produce a numerical result, if you start with a Fermi estimate then, when that complex process produces an answer you will immediately be on the alert if its answer is wildly different from the estimate. And equally you can take heart if the complex result is within an order of magnitude of the estimate.

14. There is actually a mathematical proof of why Fermi estimation works as well as it does. That does not matter. What does matter is that it is still effective even when done very crudely and by making radically simplified assumptions in order to make the arithmetic easy enough to be done mentally.

15. Many engineers and scientists do this instinctively and automatically, learning as they do that often the estimate is all you actually need. But when you step into the legal world, it is noticeably absent.

16. Now I can hear you thinking - what has Enrico Fermi go to do with civil justice? Well this phenomenon comes up at the end of every hearing, when we look at costs.

17. What is striking about dealing with costs is that you notice the absence of the instinct I have referred to. Lawyers will tap away at a calculator and announce an answer with great authority, which might, if you have done a rough Fermi guesstimate in your head, just sound wrong. The lawyer then looks at you like you're a wizard when you say – but surely the answer should be around 30K not £96,324. This experience is very common.

18. Now in fact, an awful lot of civil justice is actually about numbers, whether those numbers represent damages, costs or other quantities, or whether they are statistics and probabilities.

**Having talked about the field of numbers, I would like to mention a different field - science and technology**

19. Many disputes today involve science and technology. The most obvious examples are the cases in the Technology & Construction Court and the Patents Court but it is by no means confined to those courts or to cases of that kind. Just as an example, a notable relatively recent international case raising questions of great sensitivity which involved complex scientific evidence was the Award of the Court of Arbitration of Sport on 30 April 2019 in the case concerning the IAAF Eligibility Regulations for Female Classification[1] (the Caster Semenya case).

20. Now of course the way this is done is by using expert evidence, which in practice does two things. It contains an explanation of what is unfamiliar territory for the court and it expresses opinions which bear on the issues the court is going to have to decide.

[1] https://www.tas-cas.org/fileadmin/user_upload/CAS_Executive_Summary__5794_.pdf

21. Now it is well settled that when there is a dispute, what actually carries weight is the reasoning not the conclusion. This has been well understood for a long time. Fairly recent authoritative statements can be found in 2016 both in *Kingley v Brudenell*[2] (per Lewison LJ citing an earlier judgment of Robin Jacob J as he then was) and in the same year in the Scottish appeal case before the SC : *Kennedy v Cordia* [3] (all recently highlighted again in *Griffiths v TUI* [4] – see e.g. Nugee LJ at pr 83).

22. I know aspects of that recent *Griffiths v TUI* decision have attracted some attention and comment. I will come back to that case on an aspect on which all three judges were unanimous.

**<u>As well as the fields of numbers and science, a third field, related to them both, is the world of data – particularly statistical data</u>**

23. It may not be as immediately obvious to most of this audience, but reliable data in terms of understanding what is going on in the civil justice system as a whole is quite hard to come by. For what it is worth, I think part of the reason why that has been allowed to happen over the years is because law people are wary of numerical data and statistics. They don't believe in them. The most common phrases uttered by lawyers which include the word statistics are the clichés about "lies, damned lies and statistics" or "how to lie with statistics".

24. However may I suggest that a notable side effect of the Covid pandemic is an appreciation of the power of statistical data to actually work out what is going on.

25. The numbers may be open to challenge and debate, but they are the best we have. You need to do the stats to find out which drugs actually work and which do not. Anecdotal evidence is misleading.

26. If you are not aware of it, can I put in a plug for the work being done by the Royal Society[5] in bridging the gap between science and law. So far the work is mostly focussed on crime but in its generality, it is equally applicable to civil justice. Since 2017 the Royal Socs have produced excellent primers for the courts on various topics including forensic DNA analysis, ballistics, and gait analysis. Last year they produced a primer on the use of statistics in legal proceedings. I cannot improve on the first sentence of that primer, which says this:

    "*Reasoning about data is increasingly recognised as an essential skill for modern life*"

27. Part of what I am trying to do this evening is to convince you of the truth of that observation as it applies to legal practice in the broadest sense (by which I mean not just the practice of lawyers but the practice of judges and the courts).

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[2] [2016] EWCA Civ 980
[3] [2016] UKSC 6 at 48
[4] [2021] EWCA 1442
[5] And the Royal Society of Edinburgh.

28. Now as it happens I am not the first former judge of the Chancery Division to give a lecture about numbers/data and the law this summer. Lady Rose gave a lecture in July 2021 to the Admin Law Bar Assoc (ALBA) entitled "A Numbers Game? Statistics in Public Law Cases)".

**So – what is the problem with these fields of numbers, science and data?**

29. I think there is a common theme that the legal system does not naturally pay the material in these fields *the right kind of attention.*

30. Now there are many examples of good practice. However too often I suggest the approach seems to veer between one of two extremes – too little weight or too much. One extreme is non-engagement and the other is uncritical deference. Each can lead to error and misunderstanding, which I suggest could and should be avoided.

31. My plea is to aim for somewhere in the middle. The legal system as a whole ought to be capable of doing the more challenging thing, engaging with the concepts, using the material and evaluating it with confidence.

32. I would now like to give you some examples to illustrate the points.

*(1) Numbers need to be construed just like words*

33. In *Napp v Dr Reddy*[6] Arnold J had to decide what was meant by 10. The issue was the meaning of "10%-wt buprenorphine base". The material "buprenorphine base" was the active part of a skin patch used for pain relief. In essence the patch had to have 10% by weight of the pain relief compound. But how much leeway was there?

34. One side argued that 10 % included any weight % of the material between 9.5% and 10.5%. The other side argued that it covered 7.5% to 12.5% (i.e. everything within a margin of 5% of the total weight %).

35. To decide this question the court applied reasoning explained by the Court of Appeal in *Convatec v Smith & Nephew*[7] that numbers fell to be construed just as words do.

36. Now when this principle was applied in *Napp*, the court decided that the answer on the facts of that case was that 10% meant between 9.5% to 10.5%. Nevertheless the submission that it meant from 7.5% to 12.5% was arguable and so Napp was given PTA on the issue, albeit the decision was upheld on appeal.[8]

37. Now the law is by no means that one simply goes for the narrower definition of what the numbers mean. That is illustrated by the *Convatec* case itself, which was about whether 0.77% fell within 1 to 25. The judge held no, the lower limit was not 0.5%, it was 0.95% and so 0.77% was outside the range.

[6] [2016] EWHC 1517
[7] [2015] EWCA Civ 607 para 17 per Kitchin LJ
[8] [2016] EWCA Civ 1053

38. However in that case on appeal the Court of Appeal disagreed and decided that the lower limit was 0.5% and so 0.77% was indeed within the range 1 to 25.

39. The result was summed by Christopher Clarke LJ in *Convatec* itself. He said this:
*To a person not possessed of the relevant common general knowledge and not skilled in the art, in which category I would until now have placed myself, the proposition that 0.75 (or 0.5) falls between 1 and 25 appears obviously incorrect. To jump to that conclusion would, however, ignore the fact that figures, no less than words, may take their meaning from the context in which they are used. A linguist may regard the word "one" as meaning "one" - no more and no less. To those skilled in the art it may, however, in context, imply a range of values extending beyond the integer.*

40. The message of these cases is simply this. You need to know that the answer to the question of what a number means is not necessarily obvious. Just like words, numbers have to be interpreted and understood in context.

*(2) Precision is different from accuracy*

41. Although in court these words are often used synonymously, when applied to numbers, they have very different meanings. And it is necessary to understand the difference. Precision refers to the level of detail with which a measurement is expressed. Accuracy refers to how close to the right answer a measurement is.

42. The conventional way to explain this is using a dart board. Imagine throwing darts at a dart board aiming for the bull's eye. Each dart could represent a single measurement. If all the darts are on the bull's eye, those measurements together represent a result which is both precise and accurate. Now imagine instead that all the darts are clustered tightly on the triple 20. That is very precise – because all the darts are close together, but not very accurate – because they are not on the bull's eye. This shows that high precision is not the same thing as high accuracy. In fact, it also indicates that there is a systematic error in the measurement technique.

43. Now imagine the darts are scattered around the board, and assume that when you work out the average of the positions of all the darts, it is the bull's eye. In that case we have a set of measurements which are not very precise, but the resulting average is really quite an accurate measure of the bull's eye overall.

44. How does this work in legal practice? Well imagine counsel opening the case. They say "*My Lord this is a claim for 1 million, 351 thousand, 321 dollars and 23 cents*" ($1,351,321.23). It sounds very precise and accurate. However this is an advocacy technique. The numbers are stated that way to sound authoritative. It sounds like a careful calculation has been made.

45. But when you know that that number is actually a loss estimated at one million pounds sterling but expressed using the USD exchange rate at a moment in time (on 8th

November 2021 at 12 noon on Bloomberg), you realise that the apparent precision is a mirage.

46. All that precision does not make it very accurate at all. It is no more accurate than saying my claim is for "a million pounds" expressed in dollars.

47. There is a name for this – it is spurious accuracy. Take my word for it, this happens quite often in court although it is hard to find examples.[9]

48. So next time someone comes at you with a number expressed to a large number of insignificant figures. Beware. Being expressed precisely does not mean it is highly accurate.

49. This problem comes up elsewhere too. Consider this: if you want to express the area of a field by multiplying its length by its width, there is little point using its length down to the nearest metre if you only know its width to the nearest kilometre.

50. Imagine you know that the width of the (rectangular) field is 2 km+/- ½ km (in other words two to the nearest whole km) and you know that the length is, say, 3,345 metres. The temptation is to simply multiply 2 times 3.345, get 6.69 $km^2$ and state that as the area of the field. This kind of maths is very common in litigation. However, properly stated the area is literally anywhere between about 5 $km^2$ to just over 8.4 $km^2$.

51. Now at least what one should do is not state the area as 6.69 $km^2$. Rather it should be stated as simply 7$km^2$, or if you prefer "about 7$km^2$", which conveys the uncertainty in a broadly appropriate way. That is more honest. 6.69 is actually misleading because someone later might take it as a statement that the area really is known to that level of precision, when it is not.

52. Now in some cases the uncertainty may not matter, but in other cases it may matter a very great deal.

53. Let me give you an example in which this kind of maths is carried out routinely in court. It is issue-based costs orders.

54. We start with sums in costs expressed to the nearest pound. In a big trial this may be a sum in the millions of pounds.

55. We then determine factors which are estimates of how much of the costs a particular issue represents. These numbers are multiplied together. They produce figures for payments on account (which in practice often lead to the settlements on that basis). And they can be used to make final orders, e.g. when trading off one party's costs against the other.

[9] One is in *Unwired Planet v Huawei* [2017] EWHC 705 (Pat) at [231].

56. I won't wade through a numerical example to prove the point. The point is that given the uncertainties associated with the factors being applied, most of the digits in the costs numbers are irrelevant. That kind of detail was never going to be useful in the first place if factors of that sort are going to be applied.

57. Costs orders of this kind are, I believe a good thing, however they could be simpler. It is like spending hours making an intricate plasticene model with a lot of twiddly bits, only then to push it through a choice of three different sized holes. They will shave off all the detail so that only the round number diameter of the hole is left.

58. Now judges by their training are taught to make a decision and plump for a number in these circumstances. But the point I am making is that we ought to be more explicit in our reasoning about the uncertainty associated with that number, because it will set you free. It is a culture issue because people think more digits means more accurate, but it does not. A numerically confident approach to this kind of calculation would be to recognise that and – I rather think – would only produce numbers with two digits: 1.2 million rather than 1,234,567 or 34000 rather than 33,789.

*(3) The time value of money gives cause for hope*

59. I mention this topic to show that it is not all doom and gloom. The time value of money is numerically quite complicated but I would say almost all personal injury lawyers understand it. In order to work out the value *today* of money received *tomorrow*, you need to use the techniques for determining a net present value of future money using a discounted cash flow – a sort of backwards compound interest. That is why there is a discount rate which is used in damages awards and it is why the discount rate is very important. Witness the discussions when the discount rate was changed.

60. The fact that more or less a whole branch of legal practice can embrace this aspect of mathematics gives me real hope that numerical concepts can be applied throughout the law, if the need is identified.

*(4) Mathematical thinking is useful*

61. I would like to persuade you that mathematics can be positively useful in the law.

62. There is an irony to this. Everyone should read a beautiful (and short) book called *A Mathematicians Apology* by G H Hardy. He was English mathematician in the early 20th century and famously said:

> "*real mathematics … is almost wholly useless*"

63. His was trying to show that mathematics was beautiful rather than useful, and so ought to be valued in the same way as art. Ironically , although he didn't know it, his area of maths now underpins commerce on the internet and mobile telephony[10].

[10] See J. Borwein "Aesthetics for the Working Mathematician" 2001.

64. So to misquote William Morris, by using maths you can have something which you do *know to be useful* and can also *believe to be beautiful.*

65. Let me tell you about fractals. These are lifelike patterns generated by mathematics. A famous one is the Mandlebrot set. The equation defining the set is very simple: $Z_{n+1} = Z^2_n + C$. That simple equation defines a boundary – just as laws do. But when you apply this equation in practice, the boundary turns out to be complex. Something you thought might be on one side of the line, turns out to be on the other. And the really amazing thing is that you can look more and more closely but it is still just as complex. No matter how far you zoom in, you cannot get rid of the complexity. Searching for a bright line is an endless and impossible task. One has to accept the simple statement in the equation and know that it will always be complicated to apply it.

66. I hope you see the similarity with some laws. It is easy to define a line in the law but when you apply it to real cases, it turns out to be endlessly complex. And we can get drawn into an endless mass of complexity which does not really add anything. Perhaps we need to take a lesson from fractal maths and resist the impossible task of trying endlessly to codify every factor to be considered in the application of a given simple legal test.

67. Let me give you an example of this in the law. The form N5 to bring a normal possession claim is 4 pages long. The Accelerated Possession scheme was brought in to be a simple and quick improvement on the normal possession procedure. Accelerated possession is based on the form N5B. But over the years since accelerated possession started, that form has now grown to 20 pages long. So the procedure which was meant to be simple and quick needs a 20 page form. That form is positively fractal. Perhaps an understanding of mathematics can serve as a warning. Some simple rules are better left as they are without an attempt to cover every detail.

*(4.1) Another parallel*

68. Of course legal practice is not the only domain in which there are laws. Maths and science have laws, and they also have laws about laws. Constitutional laws if you will.

69. One of them is something called Gödel's Incompleteness Theorem. This is a mathematical law about systems of laws. Without getting too deep into the theory, what Gödel demonstrated in the 1930s was that there is a limit to what you can prove using a formal system of axioms. He showed that any system of axioms either has internal inconsistencies or it contains statements which can't be proved. It was a bit of a shock. Until then everyone assumed that maths was an internally consistent tool for proving or disproving any mathematical statement. But it turns out that that is not possible.

70. Now I suggest there is a parallel to draw with our legal system. Gödel's theorem is a formal proof that logic alone cannot answer every question arising in a legal system. No matter how sophisticated the system of laws is, logic alone will not do it. Now I

think we all know from our experience as judges and lawyers that the human element is crucial in the practice of the law. But what Gödel shows is that that is not just an insight borne of experience, it is an inherent property of a logical system.

71. And that, I suggest, is empowering. No matter how extensive our system of laws is, it is an illusion to think that every problem has a solution which can be found only by the application of remorseless logic. There will be some problems which do not yield to a solution in that way.

72. Let me turn to a more direct area in which maths is useful in legal practice.

73. Of course in fraud cases forensic accountants work on the numbers. And in those case one might expect the legal team to be able to sub-contract numerical insights to those people. But there are other cases – which do not involve forensic accounts – in which an understanding of numerical concepts will be vital in uncovering crucial evidence, but it needs the lawyers themselves to have an understanding of some numerical concepts in order to kick the whole thing off.

74. The example I want to use here to show the utility of maths in the law is the concept of what randomness looks like. In some cases there is evidence consisting of numerical data. And maybe that data looks random. And if so you may think there is no point in looking at it. But there is, as long as you know what randomness looks like.

*(4.2) Randomness and psychology*

75. If you ask people to write down a series of random numbers, they almost always get it wrong. They write down 2 3 5 7 2 8 3 6 3 6 4 1 and so on. But that is not random because you never get repeated digits. Everyone does it this way. If you roll a dice repeatedly, once you have done 36 rolls you would expect 6 repeats, 6 doublets. 6 out of 36. A twelfth of the pairs.

76. In a case called *Scanchem v Nutrinova*[11] there was data produced by a factory. The data was supposed to prove that the factory used a legitimate (good) process instead of an unlawful (bad) one. The factory produced sheets of two years' worth of daily data.

77. Looking at the data sheets – the lawyers realised there were no repeats. At that point the legal team approached an expert statistician. He did the calculations properly, and expressed the opinion that the data was faked.

78. Now in fact there was a bit more to it than that, which was the clincher. When you compared the value at the bottom of one page with the value on the next day at the top of the next page. Bingo. For these pairs, across two pages, there were some repeats. And the frequency was the correct one for random data. In other words the

[11] [2001] FSR 42 p797

people faking the data had written down strings of made up numbers on the sheets themselves. Hence there were no repeats on a page. But since going from one sheet to another was genuinely random, the correct random pattern emerged there.

79. The trial judge Pumfrey J held that the statistical numbers were bogus for those reasons and the fakers lost the case. At the risk of labouring it, the point is that the statistics expert would never have become involved unless the lawyers saw a reason to ask them. You don't need the lawyers to do all the work but you do need them to have enough of an insight to start the ball rolling.

*(4.3) Another aspect of randomness it is worth knowing about is Benford's Law*

80. Benford's law is an observation about large sets of random numbers which span several of orders of magnitude – i.e. 10s, hundreds, thousands.

81. In data like that the incidence of the leading digits is not random. There are more numbers beginning with 1 than beginning with 9. To give a simple example – say there are a set of random values between zero and 650. In that set, there will be more numbers which start with a 1 than with a 7.

82. If a data set does not obey this law then it is not likely to be random. This law is something forensic accountants are aware of, as far as I know. But try as I might I have not managed to find a single case on Bailii in which it is mentioned. Surprising.

83. My point again is that this is an example of an available tool. And the thing about tools is that unless you know they are in the tool box, they are unlikely to be used.

*(5) Numbers are powerful and so errors can be serious*

84. The example I wish to refer to is the tragic case of Sally Clark. [12] It is well known but nevertheless bears mentioning. I note that Lady Rose also referred to it in her lecture.

85. Sally Clark was prosecuted for the murder of her two baby sons. It was at a time when Sudden Infant Death Syndrome (cot death) was in the news. At trial the expert was asked about the risk of there being a single SIDS in a family. He said it was 1 in 8543. And he was asked about the risk to two SIDS on one family and he said you have to multiply the numbers together, which gives 1 in 73 million. This was translated into once in a century.

86. Now there were all sorts of problems with these numbers. The 1 in 8543 probability was itself challenged on the facts. But there were two problems which I would characterise as numerical.

[12] [2003] EWCA Crim 1020

87. The first is that it is basic mathematics that you can't multiply two probabilities together like that unless you assume that the incidences are truly independent. And there was no justification for that assumption.

88. The second is the problem of headline numbers like that. It is also called the prosecutor's fallacy. One way of explaining that fallacy is as follows– if you bring a court case when the unlikely event happens, then even if the event only happens once in 100 years, knowing how rare the event it just tells you how rare the court case is. Once you are in the rare court case itself, the number does not tell you anything useful and is positively misleading.

89. But the numbers went to the jury. And Sally Clark was convicted (and the first appeal was refused). On the second time the case went to the CA, the court noted that the 1 in 73 million figure very likely grossly overstates the chances of two sudden deaths in the same family. The court identified that one cannot say what effect this figure had on the jury but that it was tantamount to saying that regardless of any other evidence one could be "just about sure" that it was murder (para 175). The conviction was overturned. But it remains a tragic example of the risks of allowing figures to be given too much credence. It goes to show that numbers can have real power as advocacy tools.

90. However the wrong response to a tragic example would be to keep probabilities and statistics out of civil cases altogether. The right approach, in the civil context, to this sort of probabilistic or statistical evidence should be that its introduction should involve some case management before trial. That is how it is done in trade mark cases – see e.g. *Interflora v Marks & Spencer* [13] – as well as in competition law cases. And that is the subject of Lady Rose's lecture to ALBA.

**A parallel with scientific concepts**

91. I mentioned the recent case of *Giffiths v Tui* at the start. The issue in that case was about whether and in what circumstances the court can reject an expert's report which was described as "uncontroverted". The case was about gastric illness on holiday. At trial the claimant had relied on an expert's report to show that the illness of the claimant was caused by contaminated food. The defendant had not relied on any expert evidence at trial on that topic.

92. The trial judge dismissed the claim holding she was not satisfied on the evidence that illness was caused by contaminated food. The judge examined the reasons the expert gave and found they did not convince her that causation was proved.

93. The matter came to the Court of Appeal. The outcome is a majority decision of Asplin and Nugee LJJ which upheld the trial judge's decision to dismiss the claim and to hold that the expert evidence did not make out the claim. There was a firm dissent from Bean LJ on the footing that there ought to have been cross-examination of the expert

[13] [2012] EWCA Civ 1501

before that result would be fair. Now the specific issue on which there is disagreement was about the process and about whether the defendant could withhold criticisms of that sort until end of case. I will not say anything about that. It is not the focus of this lecture.

94. But what I think that case does throw up is an issue about the role of the judge in the context of expert evidence.

95. In this respect it was common ground between all three judges in the CA that if the material which the judge had found inadequate was indeed all there had been *after* the expert had been cross-examined, then it was open to the court to dismiss the claim. (see Bean LJ at para 89).

96. That is important. The decision as a whole shows that provided the proper process is followed, the court is right and entitled to engage with the reasons the expert has given for their opinion and to evaluate their cogency. The problem about incubation periods was something a trial judge – no expert on disease pathology – would be right to evaluate (assuming per Bean LJ the XX had been carried out).

97. We all know that the court should never be subcontracting the decision to the expert. However the only way to avoid that problem is to engage with the reasons and evaluate them.

98. It is appropriate– as all three CA judges held – for a judge to find that the reasons do not convince the court that the answer is correct. In fact that is not only an appropriate exercise, it is a necessary task.

**So where do we go from here?**

99. I am going to deal with three time scales – the future, the next ten years and today.

*The future*

100. Well, one way of thinking about this is to ask what the legal landscape of 2040 will look like? Bear in mind that the judges of 2040 are probably coming into practice now.

101. In future there will be more and more data, and there will be more and more tech. Contracts will be made and negotiated online. Signatures will be electronic. What we call "E-commerce" today will be just *commerce*. What I am talking about is not just a load of paper contracts stored as Word documents. It is quite different. Relationships – and the obligations which form part of them – will be encoded into the IT. One aspect of this is what has been called *smart* contracts but it is wider than that. And while this has already started in the context of business relationships, it will apply to relations between individuals and businesses too, and no doubt more besides. If we can have smart contracts, why not smart wills or AI powers of attorney?

102. Another illustration of the application of this is the justice system itself. We are already encoding the process of justice in civil, family and tribunals into computers. For some civil cases the computer already knows the date when the judge has directed that evidence is due to be filed. We are building the next bit – in which it will be the computer which monitors the file, notices if the directions have been complied with or not and takes appropriate action.

103. Important records – registers like the land register and share holding registers – will not just be online in the sense of being like a Word document accessible on the web, their nature will change in that they will be encoded electronically – using techniques like distributed ledgers – the blockchain.

104. Think about road traffic accidents – there will be data relating those events because the onboard computers in the vehicles (and cameras) – even if the AI is not driving – will have a record of whether the car was what speed and so on.

105. In order to make sure we have the right judges for handling the disputes that arise in the future, we need the lawyers coming into the professions today to be thinking along these lines. We should be thinking now about the education of those coming into the law. Perhaps the professional education of practising lawyers should take this into account?

106. My experience is that academics often tell me there is not so much academic study of patent law because the cases are difficult to understand. If that is a difficulty then I suggest the problem is going to get worse in future. The risk is that there will be more and more cases in which the subject matter is challenging for someone with the traditional legal education, so they will study something else. That can only be detrimental for the development of the law.

*The next 10 years*

107. Coming closer to home and looking to the next 10 years, I would like to make two points.

108. First - it should not feel radical to suggest that numeracy skills ought to be something expected of anyone working in the civil legal system. After all most cases involve damages and costs. Numeracy should not be something done at school and forgotten about.

109. Second I suggest what is going to happen is that the trend for specialisation is only going to accelerate. It is pretty clear that today the way we handle these issues is by specialisation. There are Personal Injury specialists who understand the maths of discount rates, Pensions specialist who deal with actuarial tables, there are Medical Negligence specialists who understand medical science, lawyers practising in the TCC who understand the technology of the construction industry. The list can go on.

110. However the curiosity is that today our judges are, by and large, generalists. There are exceptions – such as the TCC and the Patents Court – but they are just that, exceptions. The issues I have described seem to me to be likely to lead to pressure to have more specialisation in the judiciary. Do we want that? I can say from my own point of view that one of the rewarding aspects of becoming a judge has been to widen my legal horizons. If we want that to continue, we may have to resist the pressure I am referring to. And in order to do that, perhaps we need to help judges be able to handle the wider range of work.

111. Now there is already a very significant effort in judicial training by the Judicial College. In civil justice it focusses on the major common areas of work which civil judges might encounter, which makes sense, of course. However I wonder if we should think through the long term consequences of specialisation if we wish to hold on to model of civil justice based on generalist judges?

*Things we can do today*

112. The immediate proposals I would like to make fall into three categories:
    a) Case management;
    b) Forensic numeracy and its kin;
    c) A 21st century approach to (small p) policy making in civil justice.

***(a) Case Management***

113. The right way to handle difficult scientific or numerical evidence is with good case management. Now we have Part 35 and the court's duty to control expert evidence. But I would like to suggest we should go a little further.

114. At the risk of repetition, I suggest that thought should be given to applying the case management approach to statistical evidence which is taken in competition law and IP (e.g. *Interflora*) to cases in private law civil justice. I hope Lady Rose will forgive me for adopting her suggestion that we do that in public law and suggesting it for civil justice in general.

115. In the same vein, another case management technique I would like to draw attention to is the rigorous approach of the Patents Court to evidence based on experimental scientific tests. This regime is the notice procedure in CPR PD 63 paragraphs 7.1-7.3. It allows the court to control experimental evidence. The party seeking to rely on the experiment may be required to perform it in the presence of the other party. Or reliance on the experiment may be refused altogether. Or perhaps the evidence will be admitted without the witnessed repeat because the Notice to Admit aspect of the procedure, with an obligation to have already given a full explanation of what the experiment is, allows the other party to agree that the experiment will produce result X but deny that that result establishes the relevant proposition.

116. This procedure is a good discipline, working along side Part 35. I do not suggest that the full rigour of this approach is right for every case, far from it. Indeed the full rigour

of the approach is not always necessary in the Patents Court. However the fact these rules exist means that the court can retain a measure of control before a lot of hares are set running. It is a useful concept, there for others to use if they see fit.

***(b) Forensic numeracy and its kin***

117. Part of what I am trying to do is encourage people to know what is possible – and to appreciate the techniques which are available.

118. I believe there is such a thing as *forensic numeracy*. It is the collection of mathematical skills and concepts which lawyers and judges ought to have or at least be aware of[14]. In fact one can go a bit wider and include some aspect of science and technology too.

119. Some of the concepts I have mentioned already are candidates for inclusion in a forensic numeracy syllabus:
    - Estimation techniques and their utility;
    - The difference between precision and accuracy;
    - The fact that randomness has characteristics which can be checked for.

120. And perhaps along with this we could take another look at the mathematics of issue-based costs orders. We might actually save money on the cost of costs.

121. If we expect judges to engage with the reasons given by an expert, perhaps we need to codify what areas of scientific and technical evidence a judge can be expected to have to grapple with. There is currently no list of the topics about which expert evidence can be given. The law's approach is open ended.[15] I do not mean to say that is wrong, but I wonder if a list of common topics would be valuable to help judges, and those training judges, to focus on what is required.

122. Going one stage further, the idea of even classifying judges by their technical expertise is not as new or strange an idea as it might sound. In fact the Patents Court since the 1990s has operated a successful system which does this. Every case is given a technical difficulty rating (1 to 5) and every judge who sits in the Patents Court is either someone who can be expected to handle the Category 4-5 cases (in fact they do all of 1 to 5 but there is enough high tech work to mean they mostly handle category 4-5 cases), or else, for the less experienced judges, they are only expected to handle categories 1-3.

123. This system works well. Perhaps something like it will be needed in other parts of civil justice as disputes get more complex.

[14] For a lighter look of all this, I can recommend two fairly recent books - *Humble Pi* by Matt Parker and also *How to Make the World Add Up* by Tim Harford.

[15] See e.g. *R v Bonthyon* (1984) 38 SASR 45 in South Australia (esp King CJ at [46]-[47]), cited in *Kennedy v Cordia* at [43].

### *(c) A 21st century approach to (small p) policy making in civil justice*

124. Although capital P policy is for government not judges, what I mean by "small p policy" is a reference to the process of thinking about what civil procedure should be. Government is clearly concerned about this but it is not just their concern, it is also the concern of bodies the CPRC and CJC, and also a concern of lawyers generally and law associations like the Law Society and the Bar Council.

125. There are two aspects which I would like to highlight:
    (1) There is not enough *data based* consideration of the options;
    (2) The future of procedure is in code.

*(1) We need to get used to using data to make decisions*

126. As I have tried to explain, the law generally is quite a data free zone. That has to change. The amount of data available to show what is going on in the courts is only going to increase. It is one of the aims of the HMCTS Reform programme and it is a worthy aim. One aspect of this is the existence of a Civil MI (Management Information) working group – a partnership between HMCTS and the judges – to look at exactly these questions.

127. In terms of decisions about what civil procedure ought to be, the choices should be more data driven than they are.

128. Let me give you an example. The CPR has a number of aspects with a clear purpose, but what is less clear is whether the feature achieves the purpose for which it was implemented. Consider CPR Part 36 as an example. It is uncontroversial to say that Part 36 is designed to encourage both the Claimant and Defendant to settle the claim (*Gibbon v Manchester City Council*[16]).

129. So, one might think, if the purpose of this provision is to encourage settlement, does it actually do that? And as far as I know, no-one knows the answer. Anecdotally, I must say it does not feel as though more cases are settling today than they did before Part 36 was introduced, nor do we know whether the reforms to Part 36 in 2015 had any effect on the settlement rate. But an anecdotal feeling is not good enough. I would love to know. If it has achieved that then that's great – maybe we should then adjust it to increase the incentives to settle even more. If it hasn't then maybe the "cost" in terms of overhead in dealing with it, is not worth the candle.

130. Let me give you another example – the use of data in possession.

131. Before the pandemic housing and possession cases represented a major part of the business of the civil justice in the County Courts. (They still do). As a result of Covid there was a clear need to monitor the number of those cases in a manner which was not captured in a timely fashion by the normal processes. We now have reasonable

[16] [2010] EWCA Civ 726 per Moore Bick LJ

data on that, thanks in no small part to the work of MR's Working Group which was chaired by Mr Justice Robin Knowles starting in the summer of 2020.

132. Once possession cases started again in the autumn of 2020, one part of the response to Covid (and only one part) was to introduce an early hearing called a Review or R hearing. One advantage of it was that it was an opportunity to get early legal advice and assistance for defendants in possession cases. Plainly that is a good idea.

133. Once it was introduced there were very mixed views but the picture was unclear.

134. Now we ran a survey[17] of the work of judges in the county court as a joint "*data month*" shared by the family and the civil courts. The survey produced all sorts of useful insights. Just as examples:
    (1) It seems that in the county court in civil, on average estimated trial lengths are 50% longer than actual trials (4.5 hrs average estimate vs 3 hrs average length).
    (2) For salaried District Judges (with multiple tickets such as civil and family), 75% of their days involve a mix of work and only 25% of days are civil only.

135. Now in each case you might say that you might have expected something like that, but there is a world of difference between a vague statement that you think judges do a lot of mixed days and the figure of 75%. (That statistic is particularly relevant since other data suggests one can neatly divide the work of the county court into civil days and family days, but this supports the anecdotal view that the picture is more complex.)

136. What did it show about possession and the R hearing? Well the *data month* data also showed that in the time taken to do the R hearings, if that time had been spent doing final possession hearings instead, the number of cases which could have been handled would nearly have doubled. The factor is 1.8 not 2 but it is a big factor. And the data also showed that R hearings did not lead to many cases settling. So the R hearing was not achieving enough for the cost in terms of resources to be worth it. And from the end of October 2021 it is no longer mandatory.

137. The broad point I am making is to illustrate the power of using data to make decisions about how civil justice itself should be configured. Part of the point is that data does not have to be perfect to be useful to make effective decisions of this sort. It is another instance of the two extremes I have mentioned before. Having no data at all is unhelpful, but so is putting too much store by perfection and thereby waiting for the result of an 18 month review. There is a sweet spot in between the two in which we can make the best use of data to make decisions about what civil procedure should be.

*(2) The future of procedure is in code*

138. Within a very short time all of the procedural parts of civil justice will take place through the medium of integrated computer systems. As I have said, it is happening already. A consequence of this is that those who want to influence developments in civil procedure have to be able to talk to the geeks, the coders who actually build it.

[17] The first one (May 2020) had been introduced by Terence Etherton MR. This one ran in May/June 2021.

139. The conversations are already taking place in which the legally trained person says – the civil process should do X, but the computer people say – that would be very difficult but we could do Y. Surely Y is good enough? We can't leave it to the coders alone, but we need to speak their language to have the debate.

**Finally**

140. I would like to conclude by emphasising what I am not saying. I am not arguing for the mathsification of the law.

141. For example, I have never been persuaded by those who argue that the fact the civil standard of proof includes a reference to the word "probability" justifies a rigorous probabilistic approach to proof. The so called Blue Bus problem[18] illustrates why a just outcome in court has more to it than numerical probabilities.

142. This first thing you learn when you become a judge is how human the process of judging is. That is a good thing.

143. However I do suggest that law is and should be an interdisciplinary exercise. Lawyers do not have to become scientists or mathematicians.

144. It can sometimes feel as though the law is an instance of the two cultures identified by CP Snow in the 1950s – with words and Shakespeare on one side; and numbers, science and the 2nd Law of Thermodynamics on the other side.

145. But I firmly believe that the law is not like that in reality, and ought not to feel like that in practice. But we must not be complacent. We ought to continue to have conversations about these issues.

146. That is not least because, for the practice of civil justice in the modern world, it is necessary and desirable to have a facility with both.

Thank you

[18] See Hunt & Mostyn J, The Int. Jnl of Evidence and Proof (2019).