COMMENT

AN APPLICATION OF LOGIC TO THE LAW

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According to traditional legal principles a plaintiff may be without relief if the evidence is insufficient to allocate blame. This situation could have resulted in a recent action under the Compensation to Relatives Act 1897 (N.S.W.): T.N.T. Management Pty Ltd *v.* Brooks. *In that case, Murphy J. agreed with the majority of the High Court but had very different reasons for reaching the just result. He afforded a remedy to the plaintiff by using probability theory to satisfy the civil onus of proof. The authors discuss the bases of this approach and its possible application in the future.*

I INTRODUCTION

In recent times, there has been considerable academic discussion about the meaning and effect of the burden of proof in civil cases. Traditionally, courts demand that the "balance of probabilities" test is one to be satisfied by the adduction of evidence. This means that if a plaintiff, even through no fault of his own, is unable to adduce sufficient evidence to persuade the court that his version of the events is more probable than not, he will fail. Thus parties with real grievances may go uncompensated. In order to arrive at a degree of belief sufficient to justify the verdict a quite different and radical approach to the traditional method of weighing the available and admissible evidence has long been mooted. That is, add together the *logical possibilities* inherent in the proven facts to arrive at a decision on the *probabilities*. Indeed, this was the approach adopted by Murphy J. in the High Court of Australia in *T.N.T. Management Pty Ltd* v. *Brooks*.[1]

The appeal in *T.N.T.* v. *Brooks* arose out of a collision between a pantechnicon, driven by a servant of the appellant company, and a semi-trailer, driven by the husband of the plaintiff. Both drivers were killed and there were no eye witnesses. Mrs Brooks commenced her action under the Compensation to Relatives Act 1897 (N.S.W.). By virtue of the Law Reform (Miscellaneous Provisions) Act 1965 (N.S.W.), no action for damages under the Compensation to Relatives Act may be defeated by the fault of the deceased person nor shall the damages recoverable be diminished by reason of such fault.[2]

At the trial, slight evidence was adduced suggesting that the vehicle driven by the husband of the plaintiff was on its correct side of the

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[1] (1979) 53 A.L.J.R. 267.
[2] S. 10(4).

road at the time of the collision. On the basis of that evidence the trial judge gave judgment for the plaintiff and his decision was affirmed by the Court of Appeal. In the High Court, the majority[3] adopted the traditional approach and held that the evidence, albeit slight, was sufficient to sustain a finding that the collision had been caused or contributed to by some negligence on the part of the pantechnicon driver. Murphy J. agreed with the result achieved by the majority, but for very different reasons.

II THE NEW APPROACH

It had been argued for the defendant/appellant that the accident had been caused by either:

(i) the negligence of the semi-trailer driver, or

(ii) the negligence of the pantechnicon driver, or

(iii) their combined negligence.

It had been further argued that because the evidence was equivocal the plaintiff/respondent had failed to discharge her onus on the balance of probabilities.

His Honour accepted the first limb of the argument for the appellant. However, whilst agreeing that the evidence as to liability may have been equivocal, His Honour was of the view that the evidence not only permitted but required a verdict for the plaintiff.[4] This was because "the plaintiff may combine the possibilities which entitle him to succeed, and he should succeed if he shows it is more likely than not that either one or the other has occurred".[5] The following proposition of logic is fundamental to the approach of His Honour:

$$P(A) + P(B) + P(A+B) = 1$$

That is, if the probability of one is taken as equalling certainty that an event has occurred in a particular way, it can be said that there are only three possible explanations for the cause of the accident. The accident was caused either by the sole negligence of driver A, the sole negligence of driver B, or by their combined negligence. On this basis the argument of His Honour proceeded as follows:

1. The probability that the van driver was solely to blame equals the probability that the trailer driver was solely to blame (and as this is the only circumstance in which the van driver was not to blame) equals the probability that the van driver was not to blame at all.

2. The probability that the van driver was to blame (because he was solely to blame or both were to blame) exceeds the probability

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[3] Gibbs J.; Stephen, Mason and Aickin JJ., concurring.

[4] Note 1 *supra*, 270.

[5] *Id.*, 272.

> that he was solely to blame and therefore exceeds the probability that he was not to blame. This not only permits but requires a verdict for the plaintiff.[6]

This may be expressed more simply in the following form:

$$P(B) + P(A+B) > P(A)$$[7]

That is, the only situation in which the plaintiff A would fail was if A was solely to blame. He succeeds if he can show either that B was solely to blame or partially to blame. Because it is proper to add probabilities,[8] it follows that, in this case, it is more probable than not that B was in some way negligent. Therefore the plaintiff is entitled to succeed. The mathematical logic of the reasoning of His Honour is irresistible provided that its underlying assumptions are valid. The two most important assumptions are $P(C) = O$[9] and $P(A) = P(B)$.

1. *The Assumption P(C) = O*

(a) *The Problem*

His Honour emphasised that the likelihood of such an accident being caused by a supervening event, not involving negligence on the part of either driver, was "so slight . . . that it should be ignored".[10] Strictly speaking, this is not correct. Accidents are not always caused by driver negligence. There can be other causes such as steering failure, tyre blow out and heart attack. It may be that common experience shows these accidents to be rare, but nevertheless they do occur. It follows that $P(C)$ must be greater than zero, although the infrequency of such events will be reflected in the value given to $P(C)$. It may be small, but never zero.

One of the reasons for the failure of mathematical probabilities to gain favour with lawyers is the difficulty in initially quantifying the probability of the occurrence of an event. Provided that the mathematical laws are obeyed the application of probability theory will always achieve a logical result. However, where quantification of the chances is necessary the meaningfulness of the result will depend upon the accuracy of that quantification.

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[6] *Id.*, 270.

[7] $P(A)$ is the probability of the semitrailer driver (A) having been the sole cause of the accident; $P(B)$ is the probability of the pantechnicon driver (B) having been the sole cause of the accident; and $P(A+B)$ is the probability of both drivers (A+B) having contributed to the accident in some measure. Note that ($>$) means "greater than", so that the expression $x > y$ means that x is greater than y.

[8] R. Eggleston, *Evidence Proof and Probability* (1978) 13.

[9] Where $P(C)$ is the probability of neither driver causing the accident. That is, the accident was due to another cause. If $P(C)$ does not equal zero, the statement becomes:

$$P(A) + P(B) + P(A+B) + P(C) = 1$$

In other words, there would be four, not three, possibilities.

[10] Note 1 *supra*, 270.

(b) *The Solution*

It is apparent that His Honour recognised this difficulty but that he considered it to be irrelevant in the circumstances of this case:

> On the assumptions, this simple application of the probabilities does not depend upon any particular quantification of the chances of the accident being caused solely by one driver or by both.[11]

The mathematical problem thereby raised is overcome by the application of the rules of evidence. That is, although P(C) may have some small statistical value which is greater than zero, in this case the failure of the parties to adduce evidence as to the existence of such a possibility permits the value of P(C) to be treated as zero. Thus, one may conclude that an inference will only be a "real" possibility (and therefore have a probability which is greater than zero) if there is some evidence to support it. The court will not entertain evidence of the probability of an event occurring which is based only on a statistical analysis of chances.

(c) *An Example*

The importance of this was recently demonstrated in *Godwin* v. *Nominal Defendant*.[12] In that case a truck driven by the plaintiff overturned. As a result of his injuries the plaintiff was unable to remember anything of the accident. The only available witness was a passenger in the truck who testified that an oncoming and unidentified car had been travelling on the wrong side of the road. He further testified that Godwin had swerved onto the gravel to avoid the car, whereupon the truck overturned. This evidence was consistent with certain wheel marks at the side of the road and with his statement to the police made shortly after the accident. The trial judge held that "the probabilities are that it [the accident] happened in one of three ways":[13]

(i) there had been an unidentified car driving on the wrong side of the road;
(ii) there had been no unidentified car and the plaintiff had driven negligently;
(iii) there had been an unidentified car but the accident had been caused by the negligence of the plaintiff.

He went on to say:

> But the plaintiff carries the onus of persuading me upon a balance of probabilities that the accident happened in the way described and for the reasons given in the evidence of his witnesses. If there are valid reasons for taking the view that that evidence may not

[11] *Ibid.*
[12] (1979) 54 A.L.J.R. 84.
[13] *Id.*, 86.

> be correct, I ought not to be satisfied to the requisite standard that his case is made out.[14]

On appeal, however, the High Court held that His Honour should have confined the inquiry

> to the question whether the plaintiff had satisfied the onus of establishing that it was more probable than not that the accident was caused by the negligence of the driver of an unidentified vehicle.[15]

The plaintiff had adduced evidence supporting his claim, in the form of the testimony of a witness which in turn had been confirmed by the evidence as to tyre marks. It was *not* the duty of the plaintiff to adduce evidence in support of the alternative hypotheses as to the cause of the accident. His was a positive, not a negative, burden. There was no evidence in support of those alternative hypotheses and therefore they could not properly be considered as possibilities.

(d) *Where P(C) > O*

Of course, alternative hypotheses will not always have an evidentiary value of zero. Therefore, one must consider whether the approach of Murphy J. is useful where there is some evidence to indicate that P(C) does not equal zero. For example, assume that in the *T.N.T.* v. *Brooks* situation an autopsy on the driver of the pantechnicon (B) had revealed that he had suffered a heart attack at some time proximate to the accident. Assume further that the evidence had been equivocal as to whether the heart attack was the sole or contributory cause of the accident, or whether the accident caused the heart attack. These circumstances may be analysed in the following manner:

Where: A being solely negligent = P(A)
(and there being no other contributory factor)
B being solely negligent = P(B)
(and there being no other contributory factor)
A + B being both negligent = P(A+B)
B's heart attack being the sole cause = P(C)
B's heart attack and A's negligence both being contributing causes = P(C+A)

Then the first assumption becomes:

$$P(A) + P(B) + P(A+B) + P(C) + P(C+A) = 1$$ [16]

Thus, for A to succeed he must show that:

$$P(B) + P(A+B) > P(A) + P(C) + P(C+A)$$

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[14] *Ibid.*

[15] *Ibid.*

[16] Note that the sixth possibility, that B was both negligent and suffered a heart attack, is subsumed within P(B).

Even accepting the assumption of His Honour that $P(A) = P(B)$ A cannot succeed, for to do so he would need to establish a quantitative relationship between $P(A+B)$, $P(C)$ and $P(C+A)$. This need may be illustrated by removing from the above expression those probabilities which are equal; that is, $P(A)$ and $P(B)$. The expression then becomes:

$$P(A+B) > P(C) + P(C+A)$$

This is meaningless unless one can quantify the possibilities or alternatively make further assumptions, for example, $P(A+B) = P(C)$. Quantification is impossible and there are no grounds upon which further assumptions may be based.[17] Thus, one may conclude that the assumption that $P(C) = O$ is essential to the meaningfulness of His Honour's approach. Any evidence that would tend to rebut that assumption will disentitle the plaintiff from relying on this approach.

2. *The Assumption that P(A) = P(B)*

When $P(A) = P(B)$ and $P(A+B) > O$ (whether $P(A+B)$ is a large or small number) the plaintiff must always succeed.[18] To attempt the numerical evaluation of such possibilities is acknowledged to be meaningless.[19] However, so long as the evidence admitted in a case permits the above assumptions to be made, a finding for the plaintiff will follow, irrespective of the impossibility of any quantification of individual chances. Thus, a key assumption of the analysis of His Honour is that $P(A) = P(B)$.[20]

In the *T.N.T.* case the Court found that there was no evidence to show that one or other driver had been *solely* to blame. But does this mean that the probability that one driver was solely to blame equals the probability that the other driver was solely to blame (that is $P(A) = P(B)$)? In reality, as distinct from law, many factors may be important in determining the probability of driver negligence. For example, driving history; the condition and type of vehicle; influence of alcohol; driver fatigue; road surface and camber. Some such matters would be almost incapable of proof. Others, even if they could be proved, would not be admissible as evidence and, even if admitted, their relative causational influence would be difficult to determine. Even so, it is the combination of all such factors which determines the real chance of a particular driver being negligent at any particular time and place.

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[17] Indeed it makes no difference whether the heart-attack was suffered by the plaintiff or the defendant. If it was the semi-trailer driver (A) who had suffered the heart-attack, then to succeed he must show that $P(A+B) + P(C+B) > P(C)$. Again, there is no way of making such an evaluation and A must fail.

[18] Note 1 *supra*, 270-271.

[19] Glanville Williams, "The Mathematics of Proof — 1" [1979] *Crim.L.R.* 297, 301.

[20] Where $P(A)$ is the probability that the plaintiff was solely at fault and $P(B)$ is the probability that the defendant was solely at fault.

We are thus faced with a lacuna between logical relevance and legal relevance, for as Gibbs J. acknowledged, it is impossible to draw inferences based upon ". . . general considerations as to the likelihood of negligent conduct occurring in the conditions which existed at the time and place of the collision".[21] The validity of this legal exclusionary approach is shown by the impossibility of making inferences as to particular driver negligence without quantifying the various factors operative in the crash. Such quantification is impossible.[22]

By way of example let us reassess the hypothetical situation prescribed by His Honour in which three employees were travelling in a vehicle which was involved in an accident. All three were incinerated beyond recognition. His Honour suggested that the probability of each employee having been the passenger is two chances in three thus entitling each plaintiff to succeed. This is correct only where the possibility that each traveller was the driver is equally probable. Factors such as the common practice (if there is one) that one particular person would normally drive, or that another would never drive, will affect the chances of each person having been the driver. The chances will only be equally probable where there is either no evidence of such practice or where there is no such practice.

We can therefore conclude that whilst in logic, the assumption that $P(A) = P(B)$ can be made only in circumstances where there is no relevant information about either driver or the circumstances surrounding the incident, at law the ability to make that assumption is dependent upon the absence of admissible, rather than relevant, information. If that is correct, a defendant may rebut the assumption by adducing some evidence that tends to affect the probability of his liability.[23]

III THE NEW *VERSUS* THE TRADITIONAL APPROACH

1. *The Need for "Belief"*

The traditional approach to the satisfaction of the civil standard of proof was stated by Dixon J. in *Briginshaw* v. *Briginshaw*:

> [W]hen the law requires the proof of any fact, the tribunal must feel an actual persuasion of its occurrence or existence before it can be found. It cannot be found as a result of a mere mechanical comparison of probabilities independently of any belief in its reality.[24]

[21] Note 1 *supra*, 269, citing *Jones* v. *Dunkell* (1959) 101 C.L.R. 298, 305 *per* Kitto J.

[22] Note 19 *supra*.

[23] "Statistical probabilities are valid only on the assumption of the facts on which they are based. As soon as one takes account of particular facts not included in the statistic . . . the statistical observation fails to provide sure guidance. The same is true of ordinary observational probabilities": Glanville Williams, note 19 *supra*, 302.

[24] (1938) 60 C.L.R. 336, 361 (see also the texts cited therein).

In other words Dixon J. was demanding that the standard of proof be satisfied by a belief induced by evidence.[25] This requirement was stated more recently by Kitto J. in *Nesterczuk* v. *Mortimore*:[26]

> Thus where the question at issue is whether A or B or both have been guilty of negligence the law neither requires nor permits the tribunal of fact to hold that both A and B were negligent unless the evidence engenders a belief "at least in some low degree", a "feeling of probability", that that is the truth of the matter . . .
>
> The tribunal may of course reason from the material before it, drawing all logical inferences while refraining from speculation. In particular, by comparing that which is proved to have occurred with that which according to general experience is to be expected when a particular condition has been fulfilled, it may conclude that the condition was not fulfilled in the case before it—*res ipsa loquitur*. By this process of reasoning many a case is decided in which the fact sought to be proved is that in a particular situation a person did not conduct himself with reasonable care and skill; *but the utility of the process in the present case has been exhausted when the conclusion has been reached that there was a lack of reasonable care on the part of one or other or both of the drivers.*[27] Because of the meagreness of the evidence, general experience[28] provides no basis or belief enabling a choice to be made between the three possibilities by a tribunal acting judicially.

Mr Justice Murphy agreed that the only standard of proof in civil cases is the "balance of probabilities". It is submitted that His Honour would also require "some evidence". However, on occasions he would permit that evidence to be processed in a different manner. Thus, if the evidence adduced is of itself persuasive no recourse will need be had to any non-traditional analysis. However, where the evidence is equivocal the application of belief based traditional principles may not achieve a just result. His Honour argued that equivocal proof does not necessarily require a verdict for the defendant, for by way of alternative, the plaintiff may satisfy the civil burden by a quasi-mathematical comparison of

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[25] J. Gobbo, D. Byrne and J. Heydon, *Cross on Evidence* (2nd Aust. ed. 1979) 100: "If the party who bears the legal burden of proof on a given issue is to succeed on that issue, the weight of the evidence adduced by him must be greater than that of the evidence adduced by his adversary". See also *Helton* v. *Allen* (1940) 63 C.L.R. 691, 701 (*per* Starke J.).

[26] (1965) 115 C.L.R. 140, 149-150.

[27] Emphasis added. Murphy J. would disagree that the choice to be made by the tribunal is between the three possibilities posited by Kitto J. in *Nesterczuk* v. *Mortimore id.* Rather, he would see it as a choice between *two* possibly liable parties. That is, a defendant will be held liable because he is more likely than not to be to blame, either because he was solely to blame or because he and the paintiff were both to blame.

[28] However, note the importance of general experience in determining the probability of an event. "Empirical (frequently called inductive) probability results from our experience of past (and present) events. It is based upon a noting of actual occurrences of an event (phenomenon) as compared with the opportunities for it to occur": Glanville Williams, note 19 *supra*, 297-298.

probabilities, independent of the traditional quantitative and qualitative evidential demands.

2. *Issue Estoppel and* Res Judicata

The conflict between "belief based" and "probability based" analyses is highlighted by the forensic hurdles of *res judicata* and issue estoppel. For instance, in the hypothetical concerning the three travellers who are killed no question of issue estoppel arises because there is no identity of parties. Each widow in turn will sue the executors of the other travellers and each will succeed in turn. However, if instead of being killed in the accident, the travellers had been concussed and suffered complete loss of memory there would be an identity of the capacity of the parties and issue. (These facts are quite distinguishable from those of *T.N.T.* v. *Brooks* or any hypothetical presented therein.) Why should subsequent actions not be barred? It is submitted this is one of the greatest limitations of the "Murphy approach". It may be possible to argue that *res judicata* and issue estoppel are simply inapplicable to the "Murphy approach" because both concepts are based upon the precept that the preceding case was correctly decided whereas the new approach is not based upon the assumption that the factual issues are settled in the first action. Rather, a determination of probability has been made which in the particular circumstances must result in a victory for a plaintiff. An alternative approach might be to avoid these difficulties by a consolidation of actions. But whilst this procedure is attractive to the plaintiff, a defendant could perhaps defeat it by arguing that it embarrassed his defence and applying for severence.

3. *Precise Allocation of Liability*

The approach of His Honour will be most useful in those situations in which the facts allow the tribunal of fact to assume the existence of negligence. The critical question in every case will be *who* was negligent. This highlights another major difficulty facing any application of the process since the common law requires that before blame may be fixed on a particular party evidence must be adduced which affirmatively connects that party with the doing of the act.[29] For example, in the hypothetical of His Honour concerning the three travellers, one might ask why both defendants should be found liable when there is no evidence to suggest that they were joint tort-feasors. There is no compromise between these conflicting attitudes.

4. *Damages*

In *T.N.T.* v. *Brooks*[30] no problems arose as to the translation of a logic-based system of liability determination into a measurable quantum

[29] See Glanville Williams, note 19 *supra*, 305.
[30] (1979) 53 A.L.J.R. 267.

of damages. The Compensation to Relatives Act 1897 (N.S.W.) under which the action was brought provides that the entitlement of a person to damages shall not be reduced by reason of the contributory negligence of the deceased.[31] However, to ascertain the general utility of this new approach one must ask how damages will be apportioned when the provisions of this Act do not apply.

In most situations a finding that a plaintiff has been contributorily negligent will not be a bar to success. It may diminish the quantum of damages according to the respective degrees of fault of the parties but will not bar their award. As is usual, the party alleging the contributory negligence would bear the burden of its proof. To satisfy this, some evidence of contributory negligence must be adduced.[32] If such evidence is available the situation may be more suited to the application of traditional analyses, for as has already been shown, the quantification of such chances is impossible. Whereas contributory negligence is usually assessed by an evaluation of the evidence adduced, such an apportionment of fault could have little or no evidentiary basis where the decision as to liability has been achieved by the addition of probabilities.

This problem was considered by Denning L.J. (as he then was) in *Baker* v. *Market Harborough Industrial Co-operative Society Ltd*:

> The natural inference . . . is that one or other was, or both were, to blame. The court will not wash its hands of the case simply because it cannot say whether it was only one vehicle which was to blame or both. In the absence of any evidence enabling the court to draw a distinction between them, it should hold them both to blame, and equally to blame.[33]

Lord Denning chose the route of public policy. He suggests that where $P(A) + P(B) + P(A+B) = 1$ the traditional modes of allocating liability and damages are valueless. Further, as a matter of public policy the injuries should not go uncompensated but each party should be deemed to be equally responsible and therefore although both would recover both would suffer a 50 per cent reduction in damages. Of this Murphy J. commented:

> In my view the statement is incorrect if it means that the court should hold that the accident happened by combined negligence. But it is correct if it means both are held liable because each driver is more likely than not to be to blame (either because he was solely to blame or because both were to blame).[34]

That is to say, whenever one can describe a factual situation as $P(A) + P(B) + P(A+B) = 1$ (that is, where $P(C) = O$), it will always be

[31] Law Reform (Miscellaneous Provisions) Act 1960 (N.S.W.) s. 10(4).

[32] *I.e.*, if P(C) is going to be greater than zero.

[33] [1953] 1 W.L.R. 1472, 1476.

[34] *T.N.T.* v. *Brooks*, note 30 *supra*, 273.

true to say that, if A and B are the parties concerned, each plaintiff will succeed in turn. This is because plaintiff A will be able to establish in his case that $P(B) + P(A+B) > P(A)$; while plaintiff B will be able to establish in his case that $P(A) + P(A+B) > P(B)$. Thus, each party will eventually succeed and each will receive damages amounting to his actual loss. That is, the damages to be awarded is the total loss suffered by each party.

By way of example, assume that two vehicles collide. There is some evidence of the existence of negligence, but the evidence as to whose negligence caused the accident (or as to the degree of combined negligence involved) is equivocal. One driver incurs a minor whiplash injury whilst the other suffers a broken spine and consequently quadraplegia. Each party, as plaintiff in turn, will recover the full compensation for assessed damage. One, a small sum, the other a large sum. There is no basis in logic for the suggestion of Lord Denning that each party should be deprived of 50 per cent of their respective awards.

Although application of the probabilities approach may not be restricted to motor accident cases, it is submitted that it is in such cases that the approach would have most value because the parties involved will usually be insured. Thereby, the approach of Murphy J. provides the community with a convenient and equitable means of loss distribution in circumstances in which the application of traditional principles would often deprive a party of any compensation for damage suffered.

IV CONCLUSION

The approach adopted in *T.N.T.* v. *Brooks* by Murphy J. was a creative, even sensational, attempted solution of two very old and related problems:

(i) How does one apply the civil standard of proof?

(ii) How can the courts compensate a party for very real damage suffered when that party is unable to provide convincing evidence of how the damage was incurred?

Of late, the idea of adding logical possibilities to arrive at a finding of probability has been much discussed in academic circles. We must be grateful to His Honour for taking so bold a step as to apply what was hitherto mere intellectual conjecture to a case before the highest Court in the land. It is an approach which needs considerable explanation, amplification and refinement before it gains general acceptance. However, to reject the concept as primitive and patently artificial is both premature and shortsighted.