
Risk Exposure as Injury: Alleviating the Injustice of Tort Causation Rules

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Increasingly, courts are faced with cases involving injuries stemming from exposure to risk. Our scientific knowledge of sources of disease, and our ability to correlate exposure and injury, are increasing. However, standard causation rules are inadequate in situations involving the indeterminate defendant, the indeterminate plaintiff, and loss of a chance patterns.

The author argues that a "risk as injury" approach will resolve problems associated with causal indeterminacy. The "all or nothing" requirement of current tort principles frequently causes injustice. However, a risk-based theory is compatible with general objectives of tort liability. Moreover, probabilistic evidence may be as adequate as particularistic evidence.

The "risk as injury" theory has been applied by American courts in cases involving DES. The author argues that the approach taken in decisions such as *Sindell* may be extended to other fact patterns involving indeterminacy. The case of *Janiak* shows that Canadian courts may be ready to accept risk-based liability as a method which resolves causal indeterminacy yet maintains the integrity of the causation requirement.

De plus en plus, les tribunaux doivent traiter de cas où un dommage corporel résulte de l'exposition d'une personne à un risque. Nos connaissances scientifiques des origines des maladies et notre aptitude à mettre en corrélation exposition et risque ne font qu'augmenter. Toutefois, il s'avère que les règles traditionnelles en matière de causalité sont devenues caduques aux fins de régler les causes impliquant des demandeurs ou des défendeurs indéterminés ou encore des évaluations de pertes de chance.

Selon l'auteur, l'approche prônant l'équivalence entre le risque et le préjudice devrait permettre de résoudre les problèmes relatifs à l'imprécision causale. Le critère actuel, en délits, du « tout ou rien » est souvent la cause d'injustice. Pourtant, une théorie basée sur le risque est compatible avec les objectifs de la responsabilité délictuelle. De plus, une preuve de probabilité peut être tout aussi probante qu'une preuve particulière.

La théorie du « risque équivaut préjudice » a été appliquée par les tribunaux américains dans des cas relatifs au DES. L'auteur suggère que l'approche adoptée dans des décisions comme telle que *Sindell* peut être transposée à d'autres situations de faits en matière d'imprécision causale. L'affaire *Janiak* indique que les tribunaux canadiens semblent disposés à accepter la responsabilité basée sur le risque. Cette approche est la seule qui puisse résoudre les problèmes de causalité tout en maintenant l'intégrité de cet impératif.

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Introduction

Scientific developments in this half century have had an impact on tort causation in two unique but interrelated ways. First, populations are being exposed to hazardous substances more often and in greater intensity than ever before. Second, knowledge is constantly increasing as to the sources of disease and other mysterious injuries. This new knowledge, however, is frequently insufficient to link a particular defendant's conduct with a particular plaintiff's injury in the eyes of the law.¹ The difficulty is that there is a substantial difference between medical causation and legal causation. While scientists make predictive statements based on observations of repetitions of events, our courts treat a submission which is probably true as if it were a certain fact. In the result, the standard causation inquiry is inadequate to deal with the increasingly complex circumstances which are confronting it. This article postulates a "risk as injury" thesis as an answer to this inadequacy.

The problem arises primarily in three contexts. They are known as the "indeterminate defendant", "indeterminate plaintiff", and "loss of a chance" patterns.² In each case the plaintiff generally will be denied recovery because of his or her inability to show a connection (in the eyes of the law) between the defendant's tortious conduct and the injury he or she has suffered.

¹There are exceptions. For example, scientists are able to point to asbestos as the "cause" of various forms of cancer, because when asbestos causes an injury it carries a "signature." D.A. Farber, "Toxic Causation" (1988) 19 Land Use and Environment L. Rev. 557 at 589-90.

²It will be argued that these patterns are more accurately described as "sub-patterns" and they will be referred to as such.

There has been some litigation³ and considerable commentary⁴ in each of these contexts. The American courts and academics have been the most active, and in fact have dominated the dialogue. One of the goals of this article is to bring a Canadian perspective to the discussion, although many of the principles and precedents involved are common to the American and Commonwealth systems. The major difference is found more in judicial attitude; the U.S. courts have taken the lead in resolving the injustice of causal indeterminacy.

More important than relating the issue to Canadian law is the task of providing a unified approach to the indeterminate defendant, indeterminate plain-

³See, for example, the following cases involving indeterminate defendants: *Sindell v. Abbott Laboratories*, 607 P.2d 924 (Cal. 1980) (DES) [hereinafter *Sindell*]; *Collins v. Eli Lilly & Co.*, 342 N.W.2d 37 (Wis. 1984) (DES) [hereinafter *Collins*]; *Martin v. Abbott Laboratories*, 689 P.2d 368 (Wash. 1984) (DES) [hereinafter *Martin*]; *Hardy v. Johns-Manville Sales Corp.*, 509 F.Supp. 1353 (1981) (rev'd on other grounds) (asbestos); but see, *Payton v. Abbott Labs*, 437 N.E.2d 171 (Mass. 1982) (DES) [hereinafter *Payton*]; *Starling v. Seaboard Coast Line R. Co.*, 533 F.Supp. 183 (1982) (asbestos) [hereinafter *Starling*]. For cases involving an indeterminate plaintiff, see *In re "Agent Orange" Product Liability Litigation*, 565 F.Supp. 1263 (1983) [hereinafter *Agent Orange*]; *Ayers v. Jackson Township*, 525 A.2d 287 (N.J. 1987) (various toxins contaminating region's well water) [hereinafter *Ayers*]. Cases involving loss of a chance include *Herskovits v. Group Health Co-operative of Puget Sound*, 664 P.2d 474 (Wash. 1983) (reduction in patient's chance of survival due to physician's failure to make timely diagnosis) [hereinafter *Herskovits*]; *Chaplin v. Hicks*, [1911] 2 K.B. 786 (C.A.) (loss of chance to compete for prize in beauty contest) [hereinafter *Chaplin*]; but see also *Hotson v. East Berkshire Health Authority*, [1987] 1 A.C. 750 (H.L.) (delay in treating injury) [hereinafter *Hotson*].

⁴See, for example, N. Sheiner, "DES and a Proposed Theory of Enterprise Liability" (1978) 46 *Fordham L. Rev.* 963 [hereinafter cited as *Fordham Comment*]; G.O. Robinson, "Multiple Causation in Tort Law: Reflections on the DES cases" (1982) 68 *Virg. L. Rev.* 713; T.T. Currie, "Risk Contribution: An Undesirable New Method for Apportioning Damages in the DES Cases" (1985) 10 *J.Corp. L.* 743; R.W. Wright, "Causation in Tort Law" (1985) 73 *Calif. L. Rev.* 1737 at 1813-1826; J.G. Fleming, "Probabilistic Causation in Tort Law" (1989) 68 *Can. Bar Rev.* 661.

See also D. Rosenberg, "The Causal Connection in Mass Exposure Cases: A 'Public Law' Vision of the Tort System" (1984) 97 *Harv. L. Rev.* 851; R. Delgado, "Beyond *Sindell*: Relaxation of Cause-In-Fact Rules for Indeterminate Plaintiffs" (1980) 70 *Calif L. Rev.* 881; S. Gold, "Causation in Toxic Torts: Burdens of Proof, Standards of Persuasion, and Statistical Evidence" (1986) 96 *Yale L.J.* 376; G.O. Robinson, "Probabilistic Causation and Compensation for Tortious Risk" (1985) 14 *J.Legal Stud.* 779; B. Pardy, "Risk, Cause, and Toxic Torts: A Theory for a Standard of Proof" (1989) 10 *Adv. Q.* 277; M.C. Andruess, "Proof of Cancer Causation in Toxic Waste Litigation: The Case of Determinacy Versus Indeterminacy" (1988) 61 *S. Calif L. Rev.* 2075; Farber, "Toxic Causation", *supra*, note 1.

See also J.H. King, "Causation, Valuation, and Chance in Personal Injury Torts Involving Preexisting Conditions and Future Consequences" (1981) 90 *Yale L.J.* 1353; S.F. Brennwald, "Proving Causation in 'Loss of a Chance' Cases: A Proportional Approach" (1985) 34 *Cath. U.L. Rev.* 747; K. Cooper-Stephenson, "Assessing Possibilities in Damage Awards: The Loss of a Chance or the Chance of a Loss" (1973) 37 *Sask. L. Rev.* 193; B. Coote, "Chance and the Burden of Proof in Contract and Tort" (1988) 62 *Austral. L.J.* 761; R.W. Wright, "Causation, Responsibility, Risk, Probability, Naked Statistics, and Proof: Pruning the Bramble Bush by Clarifying the Concepts" (1988) 73 *Iowa L. Rev.* 1001 at 1067-77; R.A.B. Bush, "Between Two Worlds: The Shift From Individual To Group Responsibility in the Law of Causation of Injury" (1986) 33 *UCLA L. Rev.* 1473.

tiff, and loss of a chance cases. That unified approach may be described as a "risk as injury" thesis. This involves application of a "probabilistic increased-risk concept",⁵ under which exposure to risk is classified as an actual injury worthy of redress. Liability for risk exposure will permit the plaintiff to recover in some circumstances when he or she previously would have been barred; however, the award will be discounted to the extent that it is likely that the plaintiff's injury was caused by risk factors other than the defendant's negligence. Thus, it is also referred to as "proportional recovery". A simple example of proportional recovery might run as follows. It is established that there is a thirty percent chance that the defendant caused the plaintiff's injury (but a seventy percent chance that the defendant had nothing to do with the injury). As will be explained, traditional causation law would deny any recovery to the plaintiff. Proportional recovery would award thirty percent of the plaintiff's damages against the defendant. Such an award most precisely reflects the risk created by the defendant and the damage suffered by the plaintiff through that risk.

The need for a unified approach arises from two distinct sources of confusion. First, commentators have generally not attempted to resolve all three patterns at once; most have chosen instead to tackle only one or at most two. The result has been a patchwork of theories and proposals. In one instance, for example, the consequence has been that the writer, while calling for some form of proportional recovery, simply failed to realize the potential breadth of application of his theory,⁶ at other times commentators have been unable to get beyond the technical aspects of the particular approaches they were criticizing in order to apprehend the existence of any underlying principle.⁷ Second, advocates of proportional recovery have travelled differing theoretical routes in arriving at their conclusions.⁸ At times this leads to differences in practical application.⁹

⁵Wright, "Causation in Tort Law", *ibid.* at 1814.

⁶See Delgado, *supra*, note 4 at 889; see also, Rosenberg, *supra*, note 4 at 876; Robinson, "Probabilistic Causation", *supra*, note 4 at 796-97, where it is argued that proportional liability will have only limited application to sporadic accidents.

⁷Much of the early criticism of attempts to introduce some form of proportional liability failed to realize that market share liability was simply the manifestation of a higher principle; and moreover that the form utilized to solve, i.e., the DES problem should be considered as nothing more than a structure for applying that principle to a particular fact pattern. See, for example, J.B. Newcomb, "Market Share Liability for Defective Products: An Ill-Advised Remedy for the Problem of Identification" (1981) 76 *Northwestern L. Rev.* 300.

⁸See Bush, *supra*, note 4 at 1487-91 for a detailed discussion of how the commentators differ in their approaches. Bush's own theory is unique as well. Yet another proposal (awarding the bulk of the compensation to the "most likely victim" of the defendant's negligence) can be found in Farber, *supra*, note 1.

⁹Perhaps the most marked division among commentators is in reference to whether to permit individual plaintiff suits. See Bush, *supra* note 4, at 1487-91.

This article argues that risk-based liability is necessary to resolve the dilemma created by causal indeterminacy. Part I establishes that injustice inevitably flows from the "all or nothing" requirement of current tort principles. In Part II, the all or nothing and risk-based liability approaches are examined in the context of the underpinnings of tort liability. Part III discusses statistical methods of proof. Part IV demonstrates that a single integrated thesis underlies all three sub-patterns such that the sub-patterns are merely extensions of each other. Parts V through VII discuss the sub-patterns, and their application to risk-based liability. In trying to solve the indeterminate defendant problem, the important case of *Sindell v. Abbott Laboratories*¹⁰ provided the first explicit recognition of a form of risk-based liability. Part V examines the principles embodied in that case and how they evolved in subsequent decisions. Part VI illustrates how such analysis is properly applied to the indeterminate plaintiff sub-pattern. Part VII begins with a discussion of loss of a chance paradigms, and suggests that the future foundation for risk-based liability rests on two decisions, *Herskovits v. Group Health Co-op*¹¹ and *Janiak v. Ippolito*.¹² *Herskovits* provides firm support for the loss of a chance approach in the United States, while the unanimous decision of the Supreme Court of Canada in *Janiak* is capable of significant and exciting expansion in Canada. Part VIII very briefly examines whether the court system is the proper forum for the undertaking of such potentially momentous reforms. Finally, this article concludes that risk-based liability is the only method which can fairly resolve causal indeterminacy and yet maintain the integrity of the causation requirement.

Before embarking on this discussion, three points must be made. First, the consequence of the risk-based liability approach is to make the causation requirement relatively easy to satisfy. The integrity of the causation inquiry is maintained because risk *is* injury, and there is a resulting shift in the focus of the analysis to damages assessment.¹³ Cases such as *McGhee v. National Coal Board*¹⁴ illustrate that the causation inquiry is unsuited to the task of unravelling the riddle of causal indeterminacy. Our law has long required a "yes or no" answer to the issue of factual causation, and seems incapable of moving from that. Where there is causal indeterminacy, the result is ineffective, muddled, and unfair law, which has finally led to a severe backlash.¹⁵ The distinction made in focusing on damages instead of causation involves more than semantics; put simply, the courts need to use tools appropriate to the task at hand. The damages

¹⁰*Supra*, note 3.

¹¹*Supra*, note 3.

¹²[1985] 1 S.C.R. 146, 16 D.L.R. (4th) 1 [hereinafter *Janiak* cited to S.C.R.].

¹³Nonetheless, it is the obstacle of causation which needs to be overcome, so the terminology of this article will generally be causation-oriented.

¹⁴[1972] 3 All E.R. 1008 (H.L.) [hereinafter *McGhee*].

¹⁵See *Wilsher v. Essex Area Health Authority*, [1988] 1 All E.R. 871 (H.L.) [hereinafter *Wilsher*]. For a discussion of this case and *McGhee*, see *infra*, notes 182-93.

inquiry does not suffer from some of the logical restraints which bind causation, and has the theoretical flexibility to master the complexity of risk-based liability cases. The shift to a focus on damages assessment is thus an integral feature of risk-based liability.

Second, the "indeterminate defendant", "indeterminate plaintiff", and "loss of a chance" sub-patterns are truly only *labels* for general fact patterns which parallel one another on a theoretical level. They are "three sides of the same coin", and each should generally be treated in an identical fashion.¹⁶

Finally, a brief comment should be made on the proper scope of the risk as injury thesis. Richard Wright argues that risk exposure has its place on the "frontiers of tort liability",¹⁷ but his view of the theory's potential breadth may be somewhat narrow. For example, it may have application in some sporadic accident circumstances.¹⁸ But while it might be possible for risk exposure theory to move to the mainstream of tort litigation, such a development is highly improbable for the foreseeable future. More likely, the theory will find use where ambiguous causal relationships exist. In other words, it will be used where it is useful, and those circumstances are limited at present.

I. The Source of Injustice — The All or Nothing Approach

The specific obstacle to recovery which critics of the traditional causation requirements are attempting to surmount is the "all or nothing" standard for recovery. Under this standard, if the plaintiff meets the burden of proof (generally the balance of probabilities) regarding all the elements of the tort (including, specifically, causation), then the court will treat the defendant's causal responsibility as a certainty.¹⁹ Conversely, if the plaintiff fails to meet the burden, it will be considered a certainty that the defendant's actions imposed no harm upon the plaintiff.

The flaws of the all or nothing approach are exposed in the increased risk cases. In practical terms, the approach's most glaring weakness is its denial of recovery to almost all increased risk plaintiffs. For example, in the industrial waste context, it is virtually impossible for an individual to show that her injuries have been caused by the defendant. In many cases she can prove that the defendant negligently disposed of the dangerous substance, that she was within the area of risk, and that she suffered some injury. But under traditional Canadian tort law she must also be able to show, on the balance of probabilities,

¹⁶See *infra*, notes 87-92 (Part IV).

¹⁷Wright, "Causation in Tort Law", *supra*, note 4 at 1813.

¹⁸See *infra*, notes 143-44.

¹⁹Courts have, however, found ways to discount awards on other grounds — in essence applying the all or nothing standard to causation in all cases, but not always to the issue of damages. In awards for loss of sight, for example, life expectancy will be calculated into the measure.

that the defendant's negligent conduct was the legal cause of her injuries. Considerable controversy exists as to what is the threshold for the standard of proof,²⁰ but assume for argument's sake that the plaintiff must show that it is more likely than not (*ie.*, greater than fifty percent chance) that the defendant caused her injury.²¹ While the plaintiff may be able to show some connection between the dangerous substance and the cancer through epidemiological evidence, she will rarely be able to recover under traditional tort principles. Unless she can show that there is a greater than fifty percent chance that the defendant's negligence led to her injuries, she will fail.²² This fact pattern is known as the "indeterminate plaintiff" problem: although it is certain the defendant must have caused *some* injuries, the plaintiff is unable to show under traditional causation principles that she was one of the defendant's victims. While a representative action might be of assistance, access to such procedures is severely limited in Canada.²³

The industrial waste plaintiff's problems are mirrored in other contexts. Consider the injured person who goes to a doctor for treatment on her leg. Assume that if the doctor correctly diagnoses and treats the injury, there is a thirty percent chance the leg can be saved.²⁴ However, the doctor is negligent, and the patient loses her leg. Under the analysis applied in the industrial waste context, she can not recover from the doctor because it was more likely than not (seventy percent) that the leg would have been lost anyway. This is a case of "loss of a chance." It might also be referred to as a problem of "indeterminate harm," because it is unknown whether the plaintiff has been injured at all by the defendant's negligence.²⁵

²⁰See *infra*, notes 67-70.

²¹The plaintiff's case will likely rest on epidemiological studies which compare the rates of cancer, for example, of the group exposed to the dangerous substance (of which the plaintiff is one) to those of the larger population base which was not exposed. The increase in the incidence of cancer will be attributable to the defendant's negligence.

²²It is impossible for most plaintiffs to demonstrate this, as they would be required to produce evidence to the effect that the defendant's negligence more than doubled the cancer rate in the area of risk.

²³See *infra*, notes 205-12.

²⁴In such a case, the chance the patient will heal fully is calculated in much the same manner as is used in epidemiological studies — thirty out of one hundred people with a similar injury could be expected to heal fully.

²⁵The plaintiff is trying to establish that a beneficial future event would have occurred if not for the defendant's negligence. Assuming that such an occurrence was not a certainty, there exists the possibility that the event would not have occurred and that the defendant's negligence has not actually cost the plaintiff any benefit.

This situation is paralleled where the plaintiff has been exposed, for example, to toxic waste, but has yet to manifest any injury; epidemiological studies may be able to accurately determine the plaintiff's chance of contracting disease in the future as a result of that exposure. See *infra*, notes 194-201.

The third context in which the plaintiff might encounter similar difficulties with the causation requirement also involves mass torts. United States courts have already considered the “indeterminate defendant” question in a number of jurisdictions. The diethylstilbestrol (DES) drug litigation poses the problem of identifying which defendant company manufactured the particular drug taken by the plaintiff’s mother.²⁶ The drug was distributed under a generic label.²⁷ Again, the plaintiff may be unable to prove on a balance of probabilities that any single defendant caused her injury.

The all or nothing approach works reasonably well in the context of the ordinary sporadic accident case “in which causal indeterminacy arises randomly and always signifies a substantial chance that the defendant in fact harmed no one.”²⁸ In adjudication of sporadic accidents, all or nothing is possessed of a number of virtues, not the least of which is efficiency. The all or nothing rule interacts well with the traditional presumptions of tort law — for example, that the plaintiff carries the burden of proof. The combination of the placing of the burden and the all or nothing rule are the law’s solution to fact indeterminacy.²⁹ Unless the plaintiff can overcome this obstacle, the court will refuse to intervene; but because of the nature of causal indeterminacy, the plaintiff will virtually never succeed — neither the plaintiff nor the defendant possesses sufficient information to satisfy the burden of proof.³⁰ At issue is a policy question concerning the kinds of interests the law should be protecting; and despite that it appears that maintenance of the all or nothing rule may be a display of “healthy judicial conservatism,”³¹ a choice in favor of doing nothing to change the rule

²⁶See *infra*, notes 94-136.

²⁷For a detailed description, see *Collins, supra*, note 3 at 44.

²⁸Rosenberg, *supra*, note 4 at 858. But circumstances may arise where the all or nothing approach is inadequate to deal with sporadic accidents. See the hypothetical *infra*, note 141.

²⁹Cooper, *supra*, note 4 at 215.

³⁰Early commentary on *Sindell* focused on that case’s roots in *Summers v. Tice*, 199 P.2d 1 (Cal. 1948), particularly with respect to the shifting of the burden of proof of causation to the defendants. Robinson, “Multiple Causation in Tort Law”, *supra*, note 4 at 729.

The danger of the emphasis on the placement of the burden in cases of causal indeterminacy is that in these cases *neither* party will be able to satisfy the burden — its placement, “as a practical matter, is dispositive.” *Ibid.* at 728-36.

³¹J. E. Coons, “Approaches to Court Imposed Compromise — The Uses of Doubt and Reason” (1964) 58 Northwestern U.L. Rev. 750 at 756.

is in fact a choice.³² The issues need to be confronted openly.³³

Efficiency and consistency are the primary virtues of the all or nothing rule. Neither, however, provides sufficient justification for its application across the board. They are desirable and necessary for dispensing justice, but expedience cannot be substituted for fairness on a scale such as the one involved in this problem.³⁴ The increased risk cases, in all forms, represent substantial numbers of claims for substantial awards; and the cost of errors against plaintiffs, many of whom have suffered catastrophic injuries, is high.

II. Tort Objectives and Causal Indeterminacy

It is thus necessary to consider the all or nothing rule and the probabilistic increased risk approach in the context of the objectives of tort law. The most important of these are compensation and deterrence. Each of these, and some objectives of lesser importance, favors the classification of risk as an injury.

A. Compensation

Compensation is fundamental to tort law's operation.³⁵ In the indeterminate defendant cases there is no doubt that the plaintiffs' injuries resulted from negligence, so an approach based upon probability can comfortably award full compensation; the all or nothing rule would usually leave the plaintiff without a remedy (at least in the DES and asbestos cases). If applied in the form of a modification of the causation rule, proportional recovery in an indeterminate plaintiff case (i.e., toxic tort) operates in a rough and ready fashion. Critics charge that proportional liability, in subverting the causation requirement, gives a

³²Coons argues that where both parties offer equally strong arguments and the case is decided on the basis of which party carries the burden of persuasion, "the all-or-nothing judgment appears an arbitrary preference of one litigant over another." *Ibid.* at 758. This needs to be taken one step farther. In cases of causal indeterminacy, irrespective of how strong the respective parties' arguments are, the all or nothing rule constitutes an arbitrary preference for the party which is able to assemble its case in the traditional manner (rather than relying upon probabilities). For a discussion of the virtues of probabilistic and particularistic types of evidence, see *infra*, notes 65-86.

Robinson argues in the DES context that where the defendants' conduct has been negligent and the plaintiff has suffered injury, the law may recognize a policy favoring liability even though the plaintiff cannot prove which defendant caused the injury. See "Multiple Causation in Tort Law", *supra*, note 4 at 736.

³³Wright, "Causation in Tort Law", *supra*, note 4 at 1815.

³⁴"[M]ere ease of administration and simplicity are no excuse for injustice." Cooper, *supra*, note 4 at 217, referring to *Chaplin*, *supra*, note 3, and to the principle that difficulty in assessing damages is no bar to an award.

³⁵Compensation is particularly important considering the nature and severity of the injuries suffered by many of the plaintiffs who are prejudiced by the all or nothing rule. For a detailed description of a DES daughter's injuries, see H.S. Abrahams and B.J. Musgrave, "The DES Labyrinth" (1981-82) 33 S.Carolina L. Rev. 663 at 664-9.

windfall to the plaintiff.³⁶ This fear is strongest in the context of loss of a chance and indeterminate plaintiff cases, and is particularly acute when recovery based on future risk of contracting disease is contemplated.³⁷ The argument is that some members of the plaintiff class (those who were in fact injured by the defendant) will be undercompensated, while the rest (those who suffered no injury at the defendant's hands) will be overcompensated.³⁸

This criticism is accurate, however, only if recovery is granted with resort to a blurring of the causation requirements (in order, for example, to compensate a future injury).³⁹ The risk exposure thesis *preserves* the causation requirement rather than relaxing or subverting it. The crucial point to understand is that the risk as injury approach reformulates or expands the concept of damage to embrace tortious exposure to risk as a legal injury. A new legal interest worthy of protection is recognised. The plaintiff must always show on the balance of probabilities that the defendant caused her exposure to the risk. There is *never* a windfall, because in each case where compensation is awarded the plaintiff will have suffered a legal injury.⁴⁰ The fairness of a particular award will not depend upon the ultimate development of disease, which, in the risk exposure cases, is *not* the injury being litigated.⁴¹ This approach is perfectly consistent with the desire to conduct an overt (rather than covert) analysis of policy and principle to resolve the causation dilemma. There is no sleight of hand here.

³⁶Of course, the question of windfalls depends upon which party has the stronger case. Where the defendant is likely to succeed under the all or nothing analysis, he or she will object to the introduction of proportional liability because it will confer a windfall.

³⁷See "Proof of Cancer Causation", *supra*, note 4 at 2107. Andruet writes:

"[I]nherent in the use of statistical analyses is the very real possibility that a plaintiff will *never* develop cancer. Any present recovery of damages for an injury which never materializes creates a windfall recovery for the plaintiff."

Ibid. at 2107. See also Wright, "Causation, Responsibility, Risk", *supra*, note 4 at 1072.

³⁸Delgado, *supra*, note 4 at 892. See also D.S Pegno, "An Analysis of the Enhanced Risk Cause of Action (Or How I Learned to Stop Worrying and Love Toxic Waste)" (1988) 33 Villanova L. Rev. 437 at 461. See also *Anderson v. W.R. Grace & Co.*, 628 F. Supp. 1291 (D. Mass. 1986). The *Anderson* court cites at 1232 a passage from *Arnett v. Dow Chemical Corp.*, No. 729586 (Cal. S.C., Mar. 21 1983), which states that "[t]o award damages based on a mere mathematical probability would significantly undercompensate those who actually do develop cancer and would be a windfall to those who do not."

³⁹Pegno, *ibid.* at 461 n.146.

⁴⁰As well, the choice of remedy can help to prevent over-compensation. *Perfect* compensation (or as near it as can ever be possible) can be ensured by awarding to the risk exposure plaintiff who is claiming for future injury the cost of premiums for insuring against the eventual occurrence of that injury. This argument will be developed further at a later point: see *infra*, notes 213-23.

⁴¹Of course, in assessing damages the award is discounted by the chance that the defendant's negligence did not cause the plaintiff's physical or economic loss. This is the only point in the inquiry at which the physical or economic loss is relevant; the plaintiff's liability has already been established as well as her legal injury — exposure to a tortious risk.

The real danger of windfalls exists under the traditional causation approach. Suppose, in a toxic tort case, that each of ten plaintiffs can show a seventy percent likelihood that the defendant caused their injuries. The defendant will be liable for the full damages suffered by each plaintiff; three of the plaintiffs have probably recovered a windfall. In an opposite case, none of the plaintiffs will be able to prove their cases, and the defendant will receive a windfall.

B. Deterrence

Concomitant with the fear of windfalls is a belief that proportional recovery will over-deter defendants and discourage socially desirable activity.⁴² Optimal deterrence is achieved when the precise amount of accident costs created by the defendant is passed on to him or her.⁴³ As David Rosenberg states:

The threat of tort liability should induce rational actors to take 'optimal care' — that is, to reduce the chance of accidents to the point at which the cost of any further accident prevention measures would exceed the injury losses they would prevent. Optimal care thus minimizes the sum of accident costs.⁴⁴

Liability for risk creation provides a perfect fit from the defendant's perspective, because it is the injury to the class of plaintiffs which is important.⁴⁵ That injury reflects the whole of the risk created by the defendant, so liability for risk creation indeed achieves optimal deterrence.⁴⁶ The key is that liability is attached to the defendant's conduct (the creation of the risk) rather than to its impact (the resultant injury).⁴⁷

In the context of causal indeterminacy, the all or nothing approach fails to deter the creation of unreasonable risks.⁴⁸ Glen Robinson writes that:

Normally, of course, deterring the risk will deter the harm; nevertheless legal rules that are forced on only the latter may not deter the former effectively. The DES cases illustrate this point. To insist that a particular injury be linked to a particular manufacturer's product is to invite undeterrence of the *risk* in every case where there is no proof of specific causation.⁴⁹

⁴²D.A. Fischer, "Products Liability — An Analysis of Market Share Liability" (1981) 34 Vand. L. Rev. 1623 at 1629. See also L.J. Chastain, "Market Share Liability and Asbestos Litigation: No Causation, No Cause" (1986) 37 Mercer L. Rev. 1115 at 1129.

⁴³Of course, the defendant will in turn transfer these costs to the public through insurance or higher prices. This sort of loss-spreading is also a function of tort law. See Delgado, *supra*, note 4 at 893; Robinson, "Probabilistic Causation", *supra*, note 4 at 785.

⁴⁴Rosenberg, *supra*, note 4 at 861-62.

⁴⁵Delgado, *supra*, note 4 at 893.

⁴⁶As it will even if risk exposure is not treated as an injury. For deterrence purposes it is only necessary that liability equal the total of injuries caused.

⁴⁷Delgado, *supra*, note 4 at 893.

⁴⁸Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 740.

⁴⁹*Ibid.* at 740. Parallels exist in the loss of a chance and indeterminate plaintiff contexts. A doctor treating a patient who has only a thirty percent chance of survival is not deterred from negligence by the all or nothing rule because he or she can never be made liable. Likewise, a company

Of course, not all risk creation will render the defendant liable. The law is only concerned with deterring unreasonable risks. Defendants must be negligent for the causation inquiry to have any relevance; and while this seems an obvious prerequisite for all tort liability, the point seems to have escaped some commentators and courts.⁵⁰ That only tortious conduct will attract liability is particularly significant in light of the complaint that acceptance of liability for risk exposure will have the effect of discouraging socially desirable activity.⁵¹

Is tort liability an effective deterrent? Detractors of liability for tortious risk creation are clearly convinced that it operates as a deterrent — otherwise there would be no reason for them to oppose it in fear of overdeterrence. Rosenberg also believes that the threat of liability has deterrence value: “[b]oth the theory of profit maximization and recent (though tentative) empirical data indicate that firms are becoming increasingly sensitive to the prospect of tort liability.”⁵² Moreover, liability for risk creation will provide for defendants the motivation *and the ability* to determine and minimize “the degree of excess risk attributable to their activities.”⁵³

negligently disposing of toxic waste need not fear liability as long as the background risk for the plaintiff class exceeds the risk it is creating.

⁵⁰See the discussion in Robinson, “Multiple Causation in Tort Law”, *supra*, note 4 at 741 n.106. See also, Rosenberg, *supra*, note 4 at 867 n.68 (although he discusses this in the context of strict liability). In tort law, a firm taking optimal care will be relieved of liability because it has met the requisite standard of care.

⁵¹This argument is advanced in Fischer, *supra*, note 42 at 1629 & 1653-54 and in Chastain, *supra*, note 42 at 1140. Fischer argues at 1654 that the deterrent effect of potential mass liability will influence manufacturers to forego marketing risky new products, and that this may result in the withholding of ultimately harmless products with great social utility.

The response is that a burden is properly placed upon the manufacturer to carefully test the product and to balance the potential risks to the public against the perceived benefits. If, at the time the decision to market is made, that decision is reasonable under this formula (which is no more than the equivalent of the Learned Hand formula), then the defendant will not be found negligent. Thus, if proper care is taken in the testing and the decision to market, the risk exposure approach will not lead to overdeterrence; rather the effect is to encourage the defendant to exercise precisely the care necessary to avoid liability.

Finally, while Fischer fears the imposition of crushing liability on defendants, it must be remembered that they have the ability to spread their losses; plaintiffs who have suffered *crushing injuries* will often have no other recourse. I do not raise this to promote deep pocket liability, but to show that the defendant’s interest in avoiding a “crushing” loss is no greater than that of the plaintiff.

⁵²Rosenberg, *supra*, note 4 at 862 n.51.

⁵³*Ibid.* at 877. This statement holds true only for cases where the defendant possesses considerable resources and/or knowledge, such as, for example, where the defendant is the manufacturer of a drug causing birth defects or a doctor treating a patient. There is no logical reason, however, why liability for tortious risk exposure should not extend to cases in the sporadic accident field (see *infra*, notes 143-44); it seems unlikely that *any* theory of causation will have a considerable practical deterrent effect in such circumstances.

C. *Other Objectives: Knowledge and Justice*

Risk-based liability should have the effect of generating knowledge. Under the all or nothing approach no incentive exists for defendants to conduct research into injury causation;⁵⁴ liability for risk exposure will encourage defendants to examine their own activities afresh in order to discover exculpatory evidence.⁵⁵ Such research may uncover more efficient methods of reducing risk, and should reduce injuries over time.

Which approach will provide more accurate results? If one considers manifested injuries to be the interest to be protected, proportional recovery will minimize errors in the long run.⁵⁶ It is argued, however, that our justice system requires that the interests of individuals not be undermined in favor of fewer errors over the long term.⁵⁷ In individual cases, the all or nothing rule will produce fewer numerical errors and pay out a smaller amount of money damages in error.⁵⁸ But the types of errors created must also be considered — in particular, the number of large errors promulgated under each approach. Arguably, large errors are more dangerous because they are more likely to inflict a crushing result upon a party. Proportional liability will create significantly fewer large errors.⁵⁹

The criticisms directed at proportional recovery in the context of minimizing errors have been predicated on the assumption that the interest protected is the actual physical injury suffered by the plaintiff.⁶⁰ The approach proposed by this article dispenses with such analysis, and advocates the protection of the plaintiff against risk creation. The injury is exposure to the risk. As such there are no errors created, because in all cases the plaintiff is compensated for precisely that injury. Thus, in the sense of minimizing errors, liability for risk exposure is far superior to the all or nothing rule.

Risk-based liability should carry the benefit of encouraging fairer settlements for plaintiffs. Under the all or nothing rule, defendants have no incentive to settle for more than a nominal sum. Negative publicity is the only risk to

⁵⁴Delgado, *supra*, note 4 at 894.

⁵⁵*Ibid.* This point also rebuts arguments that liability under risk exposure should be imposed in the indeterminate defendant context where a defendant can show that he was not or could not have been responsible for the plaintiff's injuries. To impose liability in these situations would clearly destroy the incentive to generate knowledge.

⁵⁶M. Dant, "Gambling on the Truth: The Use of Purely Statistical Evidence as a Basis for Civil Liability" (1988) 22 Columbia J. Law & Soc. Problems 31 at 49.

⁵⁷*Ibid.* at 49-50. Bush, *supra*, note 4 is devoted almost entirely to refuting arguments such as this.

⁵⁸Brennwald, *supra*, note 4 at 779.

⁵⁹*Ibid.* at 781 (writing in the context of loss of a chance cases).

⁶⁰See, for example, Fischer, *supra*, note 42.

which they are exposed in proceeding to trial: there is virtually no chance of an adverse judgment in most cases. The new theory will grant some recovery to many more plaintiffs, so it enhances their bargaining positions for settlement negotiations. Where plaintiffs and defendants make similar estimates of the probability of causation, settlements will be encouraged; where estimates vary widely, the question will likely end up in the courts.⁶¹ In either instance, the plaintiff is no longer being forced to accept a settlement imposed on the defendant's terms.

It is also argued that proportional recovery is unfair to defendants, because it is no more than an application of a "deep pocket" theory of liability, fastening liability on defendants, presumably because they are rich".⁶² No doubt, plaintiffs will be the primary beneficiaries of risk-based liability. It is fallacious, however, to presume that the relative wealth of the parties bears on the theory's validity. Arguably, risk-based liability is capable of application in sporadic accident cases, where defendants may be average individuals no better equipped to bear the loss than a corporate defendant. Moreover, "rich" defendants may invoke the theory to reduce their liability. In *Hardy v. Johns-Manville Sales Corp.*,⁶³ the defendant asbestos manufacturer successfully applied to court for leave to file cross-actions against other manufacturers for contribution under market share theory.

In summary, it is clear that the tort objectives of compensation and deterrence are satisfied through the imposition of liability for risk exposure. In addition, the generation and accuracy of knowledge should be enhanced. The present all or nothing causation requirements fail to achieve these objectives. Defendants are permitted to avoid liability in circumstances where their conduct has caused statistically demonstrable losses.⁶⁴ Justice demands the acceptance of liability for risk exposure, which permits plaintiff recovery without unduly prejudicing defendants or deterring valuable activity.

III. The Problem of Statistics: Probabilistic v. Particularistic Evidence

The remaining objection to the acceptance of proportional recovery is based on hesitancy regarding statistical evidence. It should be readily apparent that "causation"⁶⁵ arguments in risk-based liability cases depend heavily on pro-

⁶¹Rosenberg, *supra*, note 4 at 897-98. But the court's attention should be focused on this issue of valuation, which may increase the efficiency of trials.

⁶²*Sindell*, *supra*, note 3 at 941 (in Richardson J.'s dissent).

⁶³509 F.Supp 1353 (1981) (rev'd on other grounds).

⁶⁴King, *supra*, note 4 at 1377.

⁶⁵The evidence led to show "causation" does not really pertain to causation at all; in truth, to show causation under risk-based liability it is only necessary to establish that the defendant created a tortious risk to which the plaintiff was exposed, without reference to any actual injury. The bulk of the evidence led will pertain to valuation, or assessment of damages.

probabilistic and statistical evidence, particularly epidemiological studies. The majority of these plaintiffs' cases will fail, even with risk as a protected interest, if probabilistic evidence is excluded. Whether to admit such evidence for the purpose of demonstrating causation has been the source of a heated academic debate.⁶⁶

Unfortunately, the participants in the debate are so polarized that it is nearly impossible for an unbiased newcomer to choose a position without resort to simple intuition. This is perhaps appropriate, because at the core of the controversy lies a question which begs an intuitive response: what is the probative value of statistics?

The question arises because of uncertainty as to what constitutes the "balance of probabilities" or "more likely than not" threshold. Some argue that the plaintiff must establish that there is a greater than fifty percent probability that her submissions are true.⁶⁷ Others have argued for an "actual belief"⁶⁸ standard; this has been criticized as demanding too much from the plaintiff.⁶⁹ In its place has been suggested a non-probabilistic requirement that jurors be "inclined" to believe the truth of the plaintiff's allegations.⁷⁰

Critics of statistical evidence have attempted to demonstrate its unreliability through the use of various hypotheticals.⁷¹ One of the most famous of these is the "Blue Bus" case.⁷² Suppose Helen is struck by a bus driven negligently.

⁶⁶Among those favoring the use of statistical evidence are J. Brook, "The Use of Statistical Evidence of Identification in Civil Litigation: Well-worn Hypotheticals, Real Cases, and Controversy" (1985) 29 St. L. U.L.J. 293; Rosenberg, *supra*, note 4 at 869-74; Gold, *supra*, note 4 at 379-92; D. Kaye, "The Limits of the Preponderance of the Evidence Standard: Justifiably Naked Statistical Evidence and Multiple Causation" [1982] Am. B. Found. Research J. 487.

Others argue that liability should not be based solely on statistical evidence. See Dant, *supra*, note 56; Wright, "Causation in Tort Law", *supra*, note 4 at 1821-25; L.H. Tribe, "Trial by Mathematics: Precision and Ritual in the Legal Process" (1971) 84 Harv. L. Rev. 1329; L.R. Jaffee, "Of Probativity and Probability: Statistics, Scientific Evidence, and the Calculus of Chance at Trial" (1985) 46 U. Pitt. L. Rev. 925.

⁶⁷Dant, *ibid.* at 33.

⁶⁸Wright, "Causation in Tort Law", *supra*, note 4 at 1823-26.

⁶⁹The requirement that the trier of fact be "convinced" or have an "actual belief" that the alleged facts are true "is more than the preponderance standard should demand if it is to be distinct from the competing standards of... 'beyond a reasonable doubt.'" Dant, *supra*, note 56 at 59.

⁷⁰*Ibid.*

⁷¹See, for example, the Gatecrasher case: L. Cohen, "Subjective Probability and the Paradox of the Gatecrasher" [1981] Ariz St. L.J. 627. Only four hundred of one thousand attendees at a rodeo have paid. If there is no other evidence, can the management pick one person, A, and sue for non-payment on the basis that there is a 60% probability that A did not pay? See Dant, *supra*, note 56 generally and at 40, 52 & 54-58; Brook, *supra*, note 66 at 310-23 & 330-31.

⁷²This hypothetical is presented by commentators with different variations in the facts, but the principal at issue is always the same. See Brook, *ibid.* generally and at 298, 324-29 & 345-49; Dant, *supra*, note 56 at 34, 40 & 42 (red cabs). See also *Smith v. Rapid Transit, Inc.*, 58 N.E.2d 754 (Mass. 1945).

She sues the Blue Bus Company, whose buses are blue in color, for the injuries she suffers. At trial she offers no evidence as to the color of bus that struck her (nor any other evidence regarding the particular bus or driver). She bases her claim on the fact that eighty percent of the buses which use that street are blue buses belonging to the Blue Bus Company, believing she has proven causation on the balance of probabilities. The defendant complains that there is no evidence to link its buses to the accident.⁷³

Many commentators would require the presentation of "particularistic" evidence that a blue bus injured Helen, *ie.*, an eyewitness account. Statistical evidence provides no information about the buses in particular, but merely the proportion of blue buses to grey buses on the road.⁷⁴ On the other hand, if a witness were to testify to having seen a blue bus cause the accident,⁷⁵ this particularistic evidence would identify blue buses specifically. While probabilities assist in predicting the statistical likelihood of an event occurring over the long run, only particularistic evidence provides a "rational basis for forming beliefs about individual events."⁷⁶

While it cannot be denied that probabilistic evidence fails to focus on the particular defendant, the necessity of such a requirement can be questioned.⁷⁷ According to Rosenberg:

[T]he entire notion that "particularistic" evidence differs in some significant qualitative way from statistical evidence must be questioned. "Particularistic" evidence...is in fact no less probabilistic than is the statistical evidence that courts purport to shun. All knowledge of past as well as future events is probabilistic. Inevitably it rests on intuitive or more rigorously acquired impressions of the frequency with which similar events have occurred in like circumstances.⁷⁸

For example, if a person is witnessed slipping while walking on a patch of ice, one naturally concludes that the ice caused the fall. That conclusion, however,

⁷³Brook, *supra*, note 66 at 298.

⁷⁴Dant, *supra*, note 56 at 40. See also L.L. Jaffee, "Res Ipsa Loquitor Vindicated" (1951) 1 Buffalo L.Rev. 1 at 3-4.

⁷⁵Probabilists question the perceived reliability of such particularistic evidence. "[T]he eyewitness account...is among the most unreliable forms of proof." Rosenberg, *supra*, note 4 at 872.

⁷⁶Dant, *supra*, note 56 at 46.

Brook sets out to discover why most people are made uncomfortable by the use of statistics to impose liability in the Blue Bus case. He argues that it is the very "nakedness" of the statistical evidence which militates against its use: that no other evidence (*ie.*, of a particularistic nature, such as an eyewitness account) is being presented. He writes that:

If the situation is such that we could reasonably expect the plaintiff to have other, more traditional types of evidence if his factual contentions are correct, then his failure to bring such other evidence into the courtroom understandably adds to our doubt that the facts are actually as the plaintiff would have us believe.

Supra, note 66 at 324.

⁷⁷Brook, *supra*, note 66 at 333-40; Rosenberg, *supra*, note 4 at 869-73.

⁷⁸Rosenberg, *ibid.* at 870.

is arrived at from past experience which tells us that the frequency of falls increases under icy conditions.⁷⁹ It is a probabilistic inference based on observations of the frequency of falls under different conditions.⁸⁰ So, it is argued, if all evidence is ultimately probabilistic, why should explicitly probabilistic evidence be excluded?

If the commentators are divided on the general use of statistical data, they are agreed that it is appropriate for use in a toxic tort or *Sindell*-type situation.⁸¹ There, every defendant has engaged in tortious conduct,⁸² and each will have to pay out the equivalent of the total damages it caused.⁸³ In contrast, there is a distinct possibility that the Blue Bus Company has done nothing wrong.⁸⁴

Additionally, the preceding discussion is largely moot in the context of risk-based liability. Mary Dant suggests that, in arriving at a decision, the trier of fact is searching for the *best explanation*, and as such needs only to believe the plaintiff's explanation over that of the defendant in order to find for the plaintiff (or vice versa).⁸⁵ In risk as injury cases, that explanation relates not to whether the defendant actually caused the plaintiff's injury, but to whether the defendant imposed a tortious risk which could have led to the injury. Once tortious risk creation is shown, the statistics are used to measure the plaintiff's compensable loss.⁸⁶ Regarding the causation issue, the statistics merely assist in making an inference to causation. In a toxic tort case, for example, there will be additional evidence as to the defendant's negligence, and the type and magnitude of risk the release of toxic substances is likely to create. Thus, in risk as injury cases, the statistics will not be used to prove that the defendant was negligent.

⁷⁹*Ibid.* at 870 n.77.

⁸⁰The response is that the trier of fact does not reach a conclusion based on inferences from statistics, but rather is searching for the best or most plausible explanation. Thus if more evidence (such as eyewitness testimony, or evidence that no other company's buses were in the area at the relevant time) were provided in the Blue Bus case, the best explanation might be that a blue bus did indeed strike Helen. The proper role of statistics is to assist in inferring to the best explanation. Dant, *supra*, note 56 at 53-56.

⁸¹*Ibid.* at 61-68; Brook, *supra*, note 66 at 341-51; Rosenberg, *supra*, note 4 at 869-73; Wright, "Causation in Tort Law", *supra*, note 4 at 1825.

⁸²Brook, *ibid.* at 346-48.

⁸³Dant, *supra*, note 56 at 68. This merely restates the point that risk-based liability creates perfect deterrence for each defendant.

⁸⁴This unwillingness to impose liability upon a potentially innocent defendant is reflected in *Sheffield v. Eli Lilly and Co.*, 192 Cal.Rptr. 870 (App. 1983) [hereinafter *Sheffield*]. See *infra*, notes 142-44.

⁸⁵See *supra*, notes 70 & 80.

⁸⁶Brennwald, *supra*, note 4 at 786.

IV. Risk Factors: Binding the Patterns Together

As stated earlier, "indeterminate defendant", "indeterminate plaintiff", and "loss of a chance" are no more than convenient labels used to designate classes of circumstances which fall within one larger pattern. Each of the classes, or sub-patterns, possesses distinct features the details of which require individual treatment; nevertheless, the overall approach to each must be identical.

Thus, it is necessary to examine how they interact. In the past, where there has been any attempt to link the subpatterns, the relationships between them have been largely misunderstood. A typical approach is to treat the indeterminate defendant sub-pattern as the direct inverse of the indeterminate plaintiff sub-pattern. In the former pattern, a single plaintiff knows she has suffered injury at the hands of one of a number of potential defendants, but does not know which caused her actual injury. For the indeterminate plaintiff, the scene is reversed. Now, the plaintiff is one of a number of "victims", some of whom have been injured by a defendant's negligence, but "who are unable to determine which among them has suffered injury at the defendant's hands."⁸⁷

Yet, such an approach is misleading. Richard Delgado states that the uncertainty in the indeterminate defendant problem occurs at the "origin or the starting point of causation".⁸⁸ Conversely, the uncertainty for the indeterminate plaintiff occurs at the "terminus"⁸⁹ of causation. While this characterization appears correct on the surface, the statement is an incorrect description of the patterns' interrelationship.

To illustrate that the sub-patterns operate within the same parameters, consider the following hypothetical. If a worker in a factory containing asbestos products develops cancer, but cannot prove which manufacturer produced the asbestos, he has an indeterminate defendant problem. If he also cannot prove conclusively that the cause of the cancer was asbestos exposure (*ie.*, if he does not develop a "signature disease") he is an indeterminate plaintiff. If his disease prevents him from pursuing an employment opportunity (which he *might* have secured) then he is also a loss of a chance plaintiff. Thus, the sub-patterns are simply *extensions*, rather than *inversions*, of one another.

Consider how one's analysis of an indeterminate defendant problem would be altered if it were shown that background risks existed (*ie.*, that there was a chance that the injury occurred irrespective of any negligence).⁹⁰ All non-tortious risks must be accounted for. Each "victim's" injury is the consequence of exposure to *risk factors*. Those risks may be entirely natural, they may be the

⁸⁷Delgado, *supra*, note 4 at 882.

⁸⁸*Ibid.* at 883.

⁸⁹*Ibid.*

⁹⁰See *infra*, note 142.

result of non-tortious human conduct, or they may arise from negligence. In the DES cases (indeterminate defendant) it is clear (because of the unique nature of the injuries suffered) that the injuries were caused by negligence. Thus it is unnecessary to consider other risk factors. The plaintiff simply does not know which defendant created the risk which caused the actual injury. In the indeterminate plaintiff sub-pattern, the plaintiff does not know which *risk factor*, negligent or natural, caused the actual injury. In the loss of a chance sub-pattern, the plaintiff's "condition"⁹¹ might not have been bettered even if the defendant's negligence had not occurred. There were risk factors operating to prevent the plaintiff from achieving success, some tortious and some not. No one knows which of these was the operating factor.

The solution to all of these sub-patterns is to compensate for tortious exposure to risk. The risk as injury inquiry consists of identifying and quantifying as well as possible the sources of risk (risk factors), and compensating the plaintiff for exposure to those arising from negligent conduct;⁹² no compensation will be forthcoming for non-tortious risk factors.

V. The Indeterminate Defendant

A. *The DES Dilemma*

The extension of liability for risk exposure has been largely misunderstood in the indeterminate defendant context. Plaintiffs first made inroads toward recovery in *Sindell*, where the "market share" theory was created.⁹³ But while that case represented a significant advance toward the recognition of exposure to risk as a protected interest, it failed to account sufficiently for the existence of a broader underlying principle. As a result, *Sindell* itself was fundamentally flawed, and it spawned much criticism. Subsequent cases attempted to remedy *Sindell*'s flaws, but again usually fell short of achieving a satisfactory solution.

The classic case of the indeterminate defendant problem arose in the DES cases (of which *Sindell* was one). DES is a man-made estrogen synthesized by British scientists in the 1930s.⁹⁴ Originally, the drug was intended for use in treating certain female disorders believed to stem from low estrogen levels.⁹⁵ In 1947 the U.S. Food and Drug Administration (FDA) approved the use of DES

⁹¹In this context "condition" is used in the broadest sense to connote the plaintiff's overall state of well-being, rather than in reference to any particular medical condition.

⁹²It will be remembered that once causation of some degree of risk is established (that being the injury), the detailed portion of this inquiry is conducted under the measure of damages heading, where risk as injury is an accepted notion. See K.D. Cooper-Stephenson & I.B. Saunders, *Personal Injuries Damages in Canada* (Toronto: Carswell, 1981) c. 3. See also *supra*, notes 13-15.

⁹³*Supra*, note 3.

⁹⁴*Collins, supra*, note 3 at 43.

⁹⁵Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 718.

to prevent miscarriages.⁹⁶ From that time until 1971, DES was manufactured by scores of drug companies,⁹⁷ and prescribed to up to three million women.⁹⁸ In 1971 the drug was banned for use by pregnant women in response to studies linking it to the development of a rare form of cancer (vaginal adenocarcinoma) in the users' daughters.⁹⁹

DES daughters were confronted by a number of obstacles to recovery, primarily that they were unable to prove which manufacturer produced the drug that caused the cancer in any single case. The drug was marketed generically,¹⁰⁰ meaning that the mother likely did not know whose DES she was consuming. Moreover, the cancer does not manifest itself for at least ten to twelve years,¹⁰¹ and DES was likely not recognised as the cause of the condition until somewhat later. The combination of these delays resulted in the destruction of records necessary to prove the plaintiff's case under traditional principles.¹⁰²

The problems of proof presented by the latency periods were compounded by the number of DES manufacturers. In the *Collins* case it was alleged that between 1957 and 1958 at least one hundred and twenty companies marketed DES in a particular dosage.¹⁰³ Hundreds of suits were filed against drug manufacturers as a consequence of DES use,¹⁰⁴ but only a few have been successful.¹⁰⁵ The successes all resulted from relaxation of the causation requirement. The most famous of these cases is *Sindell*, which imposed liability on defendants according to their respective market shares.

Although the methods used to impose liability in the successful DES cases are different in a number of ways from the theory proposed in this article, it is instructive to examine those decisions. They reveal the weight of judicial concern and the policy considerations underlying that concern, and they show the evolution of market share theory toward liability for risk creation.

⁹⁶Fordham Comment, *supra*, note 4 at 963.

⁹⁷Estimates of the number of manufacturers range from ninety-four to three hundred. See *ibid.* at 964 n.3.

⁹⁸*Ibid.* at 965 n.6. The author notes that the number of DES daughters may be as low as half a million, but this is considered a "conservative estimate".

⁹⁹*Ibid.* at 964-66 and n.5-12.

¹⁰⁰*Collins*, *supra*, note 3 at 44.

¹⁰¹*Sindell*, *supra*, note 3 at 925.

¹⁰²Fordham Comment, *supra*, note 4 at 972 n.26.

¹⁰³*Collins*, *supra*, note 3 at 44. Five or six manufacturers, however, accounted for up to ninety percent of the market for the drug. See Fordham Comment, *ibid.* at 977.

¹⁰⁴Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 718-19.

¹⁰⁵*Sindell*, *supra*, note 3; *Collins*, *supra*, note 3; *Martin*, *supra*, note 3; *McCormack v. Abbott Laboratories*, 617 F.Supp. 1521 (D.C. Mass. 1985) [hereinafter *McCormack*].

B. *Sindell: Risk as Injury in its Infancy*

The decision in *Sindell* was prompted by the persuasive Fordham Comment. Market share theory modified the approach used in *Summers v. Tice*,¹⁰⁶ a case virtually identical in facts and reasoning to *Cook v. Lewis*.¹⁰⁷ *Summers* and *Cook* shifted the burden of proof regarding causation to the defendants to show that they were not responsible for the harm suffered by the plaintiff. The shift was justified because both defendants were negligent toward the plaintiff, their very negligence was the cause of the plaintiff's inability to identify who caused the injury, and if the court did not take action, it was likely that both defendants would escape liability.¹⁰⁸

The fact patterns in *Sindell* and *Summers* bear striking similarities.¹⁰⁹ Nevertheless, the *Sindell* court was unwilling to follow *Summers* because only five of approximately two hundred companies manufacturing DES were joined in the action; it was highly possible that *none* of the defendants joined made the DES which caused the injury.¹¹⁰ The court also declined to follow a number of other approaches, such as enterprise liability, proposed by the plaintiff.¹¹¹

Instead, the court created the market share theory, which required the plaintiff to join a "substantial share of the appropriate market".¹¹² Once the plaintiff showed a complete cause of action in all other respects, and met the requirements of the exception,¹¹³ the direct causation requirement would be waived. Liability would be apportioned to market share. The court anticipated that, with

¹⁰⁶*Supra*, note 30.

¹⁰⁷[1951] S.C.R. 830, [1952] 1 D.L.R. 1. In each of these cases the plaintiff was injured when two hunters shot negligently in his direction. The plaintiff was unable to show which hunter had fired the shot that actually caused the injury, but in each case the court held both defendants jointly and severally liable for the whole of the damages.

¹⁰⁸*Sindell*, *supra*, note 3 at 928.

¹⁰⁹Fordham Comment, *supra*, note 3 at 987:

In each situation, all defendants are tortfeasors owing a duty of care to the injured plaintiff. In both the DES cases and *Summers*, the tortious nature of each of the defendants' conduct was identical and created the same type of risk. Neither the plaintiff in *Summers* hit by a bullet nor the DES daughter who developed cancer is at fault for being unable to identify the one who caused his injury. In both cases the defendants created the conditions which caused the plaintiff's inability to identify — by shooting simultaneously in *Summers* and by manufacturing a single drug under a variety of trade names in the DES cases.

¹¹⁰*Sindell*, *supra*, note 3 at 931.

¹¹¹*Ibid.* at 928-935. See also Abrahams & Musgrave, *supra*, note 35 at 677-83; Currie, *supra*, note 4 at 747-51 & 755-60.

¹¹²*Sindell*, *supra*, note 3 at 937.

¹¹³*Supra*, note 109. Regarding the requirement that the defendants' conduct be identical and create the same type of risk, courts have often required that the goods be "fungible". See, for example, *Starling*, *supra*, note 3 at 191.

a substantial share of the market represented, each defendant's liability would equal approximately the damages caused by the DES it had manufactured.¹¹⁴

The court justified its departure from traditional causation requirements in a number of ways,¹¹⁵ but most compelling was the need for flexibility:

In our contemporary complex industrialized society, advances in science and technology create fungible goods which may harm consumers and which cannot be traced to any specific producer. The response of the courts can be either to adhere rigidly to prior doctrine, denying recovery to those injured by such products, or to fashion remedies to meet these changing needs.¹¹⁶

The case provided an ingeniously fair and simple solution; nevertheless, it was not without its detractors, for the *Sindell* court failed to address many of the subtle and complex difficulties raised by market share liability. Some courts flatly rejected *Sindell*,¹¹⁷ others saw the theory as unrefined but important, and capable of (or receptive to) improvement.¹¹⁸

C. *The Evolution of the Theory*

The courts following *Sindell* showed an increased understanding of the principles underlying market share theory. In *Martin*,¹¹⁹ another DES case, the Supreme Court of Washington found for the plaintiff for the same policy reasons as the court in *Sindell*,¹²⁰ but declined to follow market share theory as formulated in that case. The court had two primary concerns. First, the *Sindell* court failed to define the term "substantial" share of the relevant market. Compounding this omission, the court did not specify what would occur if the plaintiff joined less than one hundred percent of the market. The implication is that the defendants would have to pay one hundred percent of the damages regardless.¹²¹ To do so would "distort"¹²² liability by forcing each of the joined defendants to pay more than would be attributable to the risk it created.

The *Martin* court rejected the "substantial share" requirement altogether, because it did not alter the probability that any particular defendant caused the injury.¹²³ Instead, upon proving the necessary elements, the burden would shift

¹¹⁴*Sindell*, *supra*, note 3 at 937-38.

¹¹⁵*Ibid.* at 936.

¹¹⁶*Ibid.*

¹¹⁷See, for example, *Payton*, *supra*, note 3; *Starling*, *supra*, note 3.

¹¹⁸See *Collins*, *supra*, note 3; *Martin*, *supra*, note 3; *McCormack*, *supra*, note 105. In *Sheffield*, *supra*, note 84, the court approved of the theory, but declined to use it because the circumstances were not appropriate.

¹¹⁹*Ibid.*

¹²⁰*Ibid.* at 382.

¹²¹*Ibid.* at 380-81.

¹²²*Ibid.*

¹²³*Ibid.* at 382.

to each defendant to establish its market share.¹²⁴ Each defendant would have the opportunity to exculpate itself by establishing that it *could not* have been their DES which the mother ingested.¹²⁵ Any defendants unable to exculpate themselves would be presumed initially to have equal shares of the market. Each would be entitled to rebut this presumption by establishing its actual share of the relevant market.¹²⁶ Defendants would be able to implead third party defendants to reduce their presumptive shares, and if all defendants were able to establish a share, any shortfall would be borne by the plaintiff.¹²⁷ The plaintiff is thus induced to account for as much of the market as possible, or risk being unable to recover a potentially substantial portion of her damages.

The *Martin* court's reasoning was wholeheartedly supported by the Massachusetts District Court in *McCormack*,¹²⁸ which was particularly significant because a Massachusetts court had previously rejected the pure *Sindell* approach.¹²⁹ Garrity J. conceded it was inevitable that defendants would be held liable to plaintiffs whose injuries they did not cause, but argued that:

[U]nder market-share theory, a plaintiff must first prove that a defendant acted tortiously before any liability may be imposed. Consequently, a defendant who erroneously is held liable to a particular plaintiff can not be considered wholly innocent of wrongdoing. Such defendant, by engaging in the conduct found to be negligent, contributed to the risk of injury to the public in general and consequently shares some degree of culpability in producing or marketing DES.¹³⁰

The modifications made in *Martin* and *McCormack* brought market share theory closer to liability for risk exposure. No longer would fewer than one hundred percent of potential defendants be held liable for the whole of a plaintiff's damages, and a plaintiff would not be required to name more than one defendant in the action.¹³¹

¹²⁴*Ibid.*

¹²⁵*Ibid.* A defendant might argue, for example, that it did not distribute the drug during the time it was prescribed to the mother, or that it did not market the drug in the relevant geographical area.

¹²⁶*Ibid.* at 383.

¹²⁷*Ibid.* The *Martin* approach would operate in the following manner. If X and Y are defendants who are unable to exculpate themselves, and the plaintiff's damages are \$100,000, the initial presumption is that each is liable for \$50,000. If X can show it held only twenty percent of the relevant market and Y fails to prove its market share, X will be liable for twenty percent of the damages (\$20,000) and Y will be liable for the remaining eighty percent (\$80,000). If X establishes a twenty percent market share and Y a forty percent market share, X will again be liable for \$20,000 and Y for \$40,000. The plaintiff will be unable to recover the remaining \$40,000 because she failed to account for forty percent of the market.

¹²⁸*Supra*, note 105.

¹²⁹*Payton, supra*, note 3 at 189. The court chose not to follow *Sindell's* lead for largely the same reasons as offered in *Martin*. See text accompanying notes 120-23.

¹³⁰*McCormack, supra*, note 105 at 1527.

¹³¹A plaintiff is, of course, putting herself at risk in naming only one defendant. If the plaintiff is unable to prove her case against that defendant, or the defendant turns out to be judgment-proof,

Collins represented an attempt to understand the link between market share liability and risk creation. In that case, since the market was fluid and many companies did not have adequate records,¹³² the court redefined the role of market share in apportionment (it was to be considered a “relevant factor”¹³³). There was brief discussion of Robinson’s argument that “the critical point is the *creation of a risk* that society deems to be unreasonable, not whether anyone was injured by it.”¹³⁴ Nevertheless, the court was somewhat unsettled by that approach and was not prepared to see risk creation as a protected interest. The court in *Collins* wrote:

Although we find Robinson’s ‘risk contribution’ theory sound to the extent that it recognizes that all DES drug companies contributed in some measure to the risk of injury, we do not agree that this is a sufficient basis in itself for liability. We still require it be shown that the defendant drug company reasonably could have contributed in some way to the actual injury.¹³⁵

Despite its discomfort, the court proposed a mode of apportionment closely approximating that which would result if risk creation were considered the key to recovery. Liability would be apportioned according to comparative negligence principles — the liability of each defendant would mirror the percentage of causal negligence attributable to it.¹³⁶

D. *Extending Sindell*

Simple market share liability is limited. It is an adequate method of apportionment in the DES cases, but has virtually no practical application otherwise. It can only work in product liability cases where there is in fact a “market” and the defendants have created the same type of risk. It works in the DES context

the statute of limitations may expire before the plaintiff can explore alternatives for recovery. *Collins, supra*, note 3 at 51.

¹³²*Ibid.* at 48.

¹³³*Ibid.* at 49.

¹³⁴Robinson, “Multiple Causation in Tort Law”, *supra*, note 4 at 739.

¹³⁵*Collins, supra*, note 3 at 49 n.10.

¹³⁶*Ibid.* at 53. The court offered the following factors as important in determining each defendant’s proportion of liability:

[W]hether the drug company conducted tests on DES for safety and efficacy in use for pregnancies; to what degree the company took a role in gaining FDA approval of DES for use in pregnancies; whether the company had a small or large market share in the relevant area; whether the company took the lead or merely followed the lead of others in producing or marketing DES; whether the company issued warnings about the dangers of DES; whether produced or marketed DES after it knew or should have known of the possible hazards DES presented to the public; and whether the company took any affirmative steps to reduce the risk of injury to the public.

Ibid. While these factors represent an attempt to more accurately gauge the quantum of risk created by each defendant, many are not relevant to this task. See *infra*, notes 148-50.

because the resultant apportionment of liability generally reflects contribution to risk.

Sindell-type liability cannot be extended without a broader theoretical foundation. To date, courts have been unwilling to expand market share liability beyond DES cases.¹³⁷ When liability is tied to risk creation, and exposure to risk treated as an actual injury, far more flexibility is permitted and the criticisms directed at *Sindell* are easily answered. It becomes obvious that only one plaintiff need proceed at one time, and that a substantial proportion of potential defendants need not be joined. Most importantly, a theory based on risk as injury should assist plaintiff recovery in many more cases.

As noted, market share liability only functions when the defendants have created the same type of risk. Liability for risk creation allows for much greater flexibility as long as each defendant's liability is in proportion to the magnitude of risk created by his or her activity.¹³⁸ Logically, the risk liability rule must be considered to extend to "cases involving multiple and *different* risk-creating activities."¹³⁹ Robinson examines this problem in detail and creates a hypothetical in which Horace Tumor develops cancer, having been exposed to asbestos, toxic waste, and negligently manufactured medication.¹⁴⁰ The source of each is known, but it is not known which caused his cancer. However, it is possible to estimate their respective contributions to the risk of cancer as forty percent, thirty-five percent, and twenty-five percent respectively.¹⁴¹ Horace will likely fail on any theory in arguing that any *one* of these defendants caused his injury. Moreover, each risk is qualitatively distinct. But if the risk imposed by each

¹³⁷Most of these instances have occurred in asbestos litigation. See, for example, *Starling, supra*, note 3, in which the court denied recovery under market share for injuries allegedly caused by asbestos. It concluded at 191:

[A]sbestos products are not fungible commodities. The injuries caused by asbestos exposure are not restricted to asbestos products — other products, such as cigarettes, may have caused or contributed to the injury. Additionally, products containing asbestos are not uniformly harmful — many products contain different degrees of asbestos Thus 'the total risk created by any manufacturer would be a function of both its share of the market and the relative harmfulness of its products'; but a company's market share could not be adjusted for the latter relation.... Neither could it be adjusted for the possible harmful effect of nonasbestos products.

Risk-based liability answers all of these concerns.

It should be noted that asbestos litigation has not been a real issue in Canada. One reason for this is that most asbestos exposure occurs at the workplace, and there is extensive Workman's Compensation legislation in place. See Ontario, *Report of The Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario* (Toronto: Queen's Printer, 1984) (Chair: J. Stefan Dupre).

¹³⁸Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 750. See also Bush, *supra*, note 4 at 1498 (analyzing group responsibility).

¹³⁹Robinson, *ibid.* at 750.

¹⁴⁰*Ibid.*

¹⁴¹I have altered the percentages used in Robinson's example.

defendant is viewed as an actual legal injury, and it is possible to estimate the contribution by each to the total risk,¹⁴² there is no reason to deprive Horace of recovery, irrespective of the fact that the risks are of different types.

Robinson has also argued that risk-based liability is not useful in the context of sporadic accidents, such as automobile collisions.¹⁴³ In the average case involving a collision he may be correct, but sporadic accidents may generate situations in which liability for risk creation is required to solve causal indeterminacy. Imagine a situation where:

[A]n individual drove carelessly down a street where a pedestrian stood on the curb waiting to cross. Just as the driver reached the point where the pedestrian stood, a careless tree-trimmer working directly over the pedestrian's position dropped a tree limb. Simultaneously, a large, unleashed dog ran past the pedestrian. At that moment, something — the pedestrian could not afterward say what — caused the pedestrian to fall, and he suffered a serious head injury.¹⁴⁴

It will be difficult to estimate each causal agent's respective contribution to risk, but no more so than if a court were faced with one defendant (*ie.* the driver) and forced to make an all or nothing determination. In any case, a court would be forced to make such estimates if it were found that the plaintiff were contributorily negligent. Thus, while the task of estimating each defendant's contribution to risk may seem imposing, no court should refrain from use of risk-based liability by reason of that obstacle alone.

E. The Significance of Breach in Risk-based Liability

Tort principles require that no liability be imposed unless it is established that the defendant has acted tortiously.¹⁴⁵ Consequently, risk-based liability cannot be used to resolve causal indeterminacy in cases of intermittent torts. Such circumstances might arise where a defective unit of an otherwise safe generically marketed product is distributed and injures a person. Liability could be

¹⁴²Later in the article it will become apparent that this example is simplistic: for example, what are we to do if it is discovered that the drug, although a potential cause of the cancer, was *not* manufactured negligently (the drug company met the standard of care)? Alternatively, how does the theory deal with risks which are known to exist, but cannot be attributed to any defendant (*ie.*, background risks)? With regard to the first question, no liability can be imposed against a defendant who has not been shown to have acted tortiously. With regard to the second, the solution under an integrated theory of liability for risk exposure is simple. These non-tortious risks must be accounted for in apportionment, as would be done in a loss of a chance or indeterminate plaintiff case; see Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 759-64. Thus, Horace's recovery will be discounted to the extent to which it is possible that a non-tortious source of risk could have caused his injury. This problem did not arise in *Sindell* because of experts' ability to link adenocarcinoma to DES.

¹⁴³"Probabilistic Causation", *supra*, note 4 at 797.

¹⁴⁴Bush, *supra*, note 4 at 1499.

¹⁴⁵See, for example, Wright, "Causation, Responsibility, Risk", *supra*, note 4 at 1075.

imposed on each manufacturer of the product "in proportion to the manufacturer's risk contribution as measured by its long-run accident (or defect) rate."¹⁴⁶ To do so, however, would be to extend risk-based liability beyond its proper bounds: risk would be measured as an average over a series of transactions, rather than in terms of a single transaction. Defendants who were creating no risk at the time the plaintiff was injured could be held liable; one necessary justification for recognising risk exposure as a category of injury is that innocent defendants will never be exposed to liability.¹⁴⁷

The nature or existence of the defendant's breach of duty is important in yet another context. The *Collins* court listed factors which might be considered in determining risk contribution in the DES cases.¹⁴⁸ Among those factors were the defendant's role in gaining FDA approval for the drug, whether the defendant was an industry leader in producing or marketing the drug, and whether it took affirmative steps to reduce the risk to the public. The last of these factors can have an impact in two ways. If the steps taken succeed in reducing the level of risk created by the defendant, its liability should be reduced accordingly; if those steps are sufficient to meet the standard of care imposed on the defendant, it will be exculpated of any liability. This involves no more than application of standard tort principle.

The first and second factors point to a different problem. Suppose a DES manufacturer is exculpated because it was able to show that it did not manufacture the DES taken by the plaintiff's mother (for example, that she used a different dosage than that produced by the manufacturer). One commentator argues that under the *Collins* formula this would not mean the manufacturer did not contribute to the risk of injury, particularly if it had been an industry leader.¹⁴⁹ If so, it would be wrong to exculpate a defendant simply on the basis that he or she did not directly contribute to the plaintiff's risk.

It seems a formidable obstacle, yet the solution is quite simple. Causation must be relevant to the alleged tortious conduct. In the DES cases the plaintiffs are claiming that the manufacturers negligently failed to adequately test the drug and then negligently marketed it.¹⁵⁰ They can only be held responsible for consequences attributable to these acts. Whether the defendant was an industry leader is irrelevant in measuring the risk created, because the plaintiff's claim

¹⁴⁶Rosenberg, *supra*, note 4 at 868.

¹⁴⁷The California Court of Appeal took this view in *Sheffield*, where recovery was denied to a plaintiff injured by a defective polio vaccine which was made from a safe uniform formula. The court was not prepared to use *Sindell* causation to "furnish a key to unlock a treasure chest of a shared liability indiscriminately imposed on manufacturers of safe and defective products of the same nature." *Supra*, note 84 at 878.

¹⁴⁸See *supra*, note 136.

¹⁴⁹Currie, *supra*, note 4 at 763-64.

¹⁵⁰*Sindell*, *supra*, note 3 at 932.

does not involve negligence as an industry leader. Thus these factors do not belong in the causation inquiry.

F. The Operation of Risk-based Liability

How will liability for risk exposure operate in the context of the indeterminate defendant? To begin with, the plaintiff must establish that the defendant's conduct was tortious. The plaintiff should not be required to join a substantial share of potential defendants,¹⁵¹ but he or she will be induced to join as many as possible because each defendant's liability will be limited to its share of the entire risk.¹⁵² In addition only factors relevant to the alleged breach of duty may be considered in measuring each defendant's risk contribution. A more difficult issue arises in deciding how to determine a defendant's contribution. It is important to understand how risk-based liability operates. Contrary to what has been suggested, there is no relaxation of the causation requirement,¹⁵³ nor is the burden of proof shifted to the defendant.¹⁵⁴ The integrity of the causal link requirement is maintained.¹⁵⁵ Consequently, the *Martin* method, which presumes that all defendants created an equal share of the risk and permits them to rebut the presumption by establishing a lesser share, is unfair.¹⁵⁶ Undoubtedly the plaintiff would benefit, and the process of measuring risk might be simplified. But risk is treated as an injury to relieve plaintiffs of the injustice of factual indeterminacy. As such it is no more than another protected interest, and no further departure from traditional tort principles is warranted. So where the plaintiff is faced with risk indeterminacy, the burden of proof should not be shifted to defendants.¹⁵⁷ Instead, both plaintiffs and defendants should present evidence relating to risk contribution,¹⁵⁸ and the courts will determine defendants' respective contributions in a manner similar to that used in cases of contributory negligence.

¹⁵¹See *Martin*, *supra*, note 3.

¹⁵²*Collins*, *supra*, note 3 at 57. See also *Currie*, *supra*, note 4 at 765.

¹⁵³See Robinson, "Multiple Causation in Tort Law", *supra*, note 4 at 726 n.54.

¹⁵⁴*Sindell*, *supra*, note 3 at 937.

¹⁵⁵Wright, "Causation in Tort Law", *supra*, note 4 at 1815.

¹⁵⁶See *supra*, notes 124-27.

¹⁵⁷While it may be tempting to do so on the basis that the defendants are in possession of superior resources and knowledge, one must remember that not all defendants have such an advantage. For example, to place such a burden upon defendants in the DES cases might impose inordinately large shares of risk on small companies possessed of lesser knowledge because they were unable to reduce their presumed shares.

¹⁵⁸Information should be available to plaintiffs through normal discovery procedures, and courts should be vigilant to ensure that parties comply fully with procedures.

VI. The Indeterminate Plaintiff

A. *Redress for the Mass Exposure Victim*

On the surface, the indeterminate plaintiff and loss of a chance sub-patterns might be thought to be more closely connected to each other than to that of the indeterminate defendant. While that is not the case, they do occasionally share issues not prevalent in indeterminate defendant problems. These relate primarily to the types of evidence admissible to show causation.¹⁵⁹ Still, they deal primarily with different fact patterns, the causation difficulties arise in different ways, and each raises unique technical obstacles. Thus, they warrant separate treatment.

Toxic tort cases form the typical indeterminate plaintiff pattern. Agent Orange,¹⁶⁰ PCBs,¹⁶¹ radon,¹⁶² and potentially hundreds of other substances,¹⁶³ often working in concert,¹⁶⁴ pollute the air,¹⁶⁵ and our waters,¹⁶⁶ putting millions at risk of disease at any one time.¹⁶⁷ It is certain that many more hazards, present and future, have yet to be discovered.¹⁶⁸

The nature of the hazards makes it impossible for most victims to establish that the toxic or radioactive waste was the cause of their injuries.¹⁶⁹ Most of the resulting diseases (*ie.*, cancer) leave no physical "trail" to the inducing agent, so observation of symptoms is often of little help in identifying the cause;¹⁷⁰ The injuries may remain latent for years.¹⁷¹ They can "occur at background levels

¹⁵⁹Such as epidemiological studies. See *infra*, notes 194-201.

¹⁶⁰See, for example, *Agent Orange*, *supra*, note 3.

¹⁶¹See Pardy, *supra*, note 4.

¹⁶²L.L. Gonsalves, "Probability of Causation in Radiation Tort Litigation" (1989) 24 *Tulsa L.J.* 479 at 482-83.

¹⁶³See Delgado, *supra*, note 4 at 884 n.16; M. Mellon *et al.*, *The Regulation of Toxic and Oxidant Air Pollution in North America*, (A joint project of the Canadian Environmental Law Research Foundation, Toronto and the Environmental Law Institute, Washington, D.C.) (Don Mills, Ont.: CCH Canadian Ltd., 1986) at 16-28; Law Reform Commission of Canada, *Workplace Pollution* (Working Paper No. 53) (Ottawa: 1986) at 91-93.

¹⁶⁴See Ayers, *supra*, note 3; and Andruess, *supra*, note 4 at 2075.

¹⁶⁵See *Regulation of Toxic and Oxidant Air Pollution*, *supra*, note 163.

¹⁶⁶See Ayers, *supra*, note 3; Pardy, *supra*, note 4.

¹⁶⁷By 1981, asbestos exposure had increased the risk of contracting cancer for as many as twenty-seven million people. See Rosenberg, *supra*, note 4 at 853 n.7.

¹⁶⁸*Ibid.* at 854 n.19.

¹⁶⁹The plaintiff's first step is to identify the toxic agent as capable of inducing her injury. For a detailed analysis of this process, see generally Andruess, *supra*, note 4 at 2078-98.

¹⁷⁰Gold, *supra*, note 4 at 379.

¹⁷¹The minimum latency period for most cancers arising from exposure to radioactivity is ten years. See Gonsalves, *supra*, note 162 at 495.

without any apparent cause.¹⁷² Moreover, the victim usually is unaware when the toxic exposure is occurring:¹⁷³ the exposure event is inconspicuous,¹⁷⁴ and there will be no identifiable irritation or traumatic injury to signify exposure.¹⁷⁵

Given the widespread and crushing nature of the injuries toxic tort victims can suffer, the practical need for deterrence in this particular context is intensified. "[M]ass exposure torts are frequently products of the deliberate policies of businesses that tailor safety investments to profit margins."¹⁷⁶ No threat of liability means no economic incentive to invest in safety.¹⁷⁷ As a result, some producers of industrial waste feel no compunction about dumping wastes where those wastes will inevitably and permanently scar the environment and its ability to support healthy life.¹⁷⁸

There does not seem to have been any reported toxic tort litigation to date in Canada. Bruce Pardy's article¹⁷⁹ is one of few examples in Canadian literature to indicate that anyone has even considered the possibility.¹⁸⁰ Doubtless, plaintiffs have been deterred by obstacles such as establishing causation, running a class action, and obtaining sufficient damages to make a suit economical.¹⁸¹ Obstacles to recovery also have the effect of placing defendants in superior bargaining positions in settlement discussions, and victims have likely been forced to accept reduced compensation because of the negligible chance of success at trial.

B. McGhee Overturned

In *McGhee v. National Coal Board*, the House of Lords adopted an approach which might have assisted plaintiff recovery in these circumstances.¹⁸² In general terms, Lord Reid¹⁸³ and Lord Wilberforce¹⁸⁴ were prepared to shift the burden of disproving causation to the defendant in certain cases of factual inde-

¹⁷²Gold, *supra*, note 4 at 376.

¹⁷³Pegno, *supra*, note 38 at 443.

¹⁷⁴Rosenberg, *supra*, note 4 at 856.

¹⁷⁵B. Black & D.E. Lilienfeld, "Epidemiologic Proof in Toxic Tort Litigation" (1984) 52 *Fordham L. Rev.* 732 at 744.

¹⁷⁶Rosenberg, *supra*, note 4 at 855.

¹⁷⁷Gonsalves, *supra*, note 162 at 507.

¹⁷⁸*Ibid.*

¹⁷⁹*Supra*, note 4.

¹⁸⁰See also, Fleming, *supra*, note 4; L. Nissen, "Class Actions in Canada: An Environmental Perspective" (1984) 48 *Sask. L. Rev.* 29.

¹⁸¹"Highly Toxic Chemicals: Detection and Protection Methods" in *Proceedings of a Symposium*, H.B. Schiefer, ed. (Saskatoon: Toxicology Research Centre, University of Saskatchewan, 1985) at 92-97.

¹⁸²*Supra*, note 14.

¹⁸³*Ibid.* at 1010-11.

¹⁸⁴*Ibid.* at 1011-13.

terminacy. Lord Wilberforce, whose reasoning has garnered the most Canadian support,¹⁸⁵ argued that the defendant's negligence caused the factual indeterminacy and that the defendant should not escape liability because of the plaintiff's inability to show cause. That interpretation has since been discredited by the present House of Lords. Lord Bridge states in *Wilsher v. Essex AHA* that *McGhee* "affirmed the principle that the onus of proving causation lies on the pursuer or plaintiff."¹⁸⁶ His Lordship argues that Lord Wilberforce was the only member of the House of Lords in *McGhee* to advocate a burden shift and that the majority opinion was actually expressed by Lord Reid, who made a "legitimate inference of fact that the defenders' negligence had materially contributed to the pursuer's injury."¹⁸⁷ *McGhee*, therefore, laid down no new principle of law.

One can easily understand Lord Bridge's aversion to the common interpretations of *McGhee*. Lord Wilberforce's approach represents precisely the sort of falsification of causation requirements which risk-based probability is intended to replace. To shift the burden to the defendant is simply to decide for the plaintiff, for the defendant has no greater knowledge.¹⁸⁸ On the other hand, Lord Reid chose to relax the burden upon the plaintiff, arguing that there is "no substantial difference between saying that what the [defendants] did materially increased the risk of injury to the appellant and saying that what [they] did made a material contribution to his injury."¹⁸⁹ With respect, such a difference clearly does exist. Lord Reid's approach severs the connection between conduct and liability such that accurate compensation and deterrence can not be achieved.

While *McGhee* is flawed, Lord Bridge's argument that it broke no new ground is difficult to accept. For over fifteen years Canadian courts¹⁹⁰ and academics¹⁹¹ have seen *McGhee* as *precisely* laying down a new principle of law. Moreover, it can be questioned whether the facts of *McGhee* are susceptible to the kind of analysis which Lord Reid is supposed (by Lord Bridge) to have conducted.¹⁹²

¹⁸⁵See *Nowasco Well Service Ltd. v. Canadian Propane Gas and Oil Ltd.* (1981), 7 Sask. R. 291, 122 D.L.R. (3d) 228 (C.A.); *Letnik v. Metropolitan Toronto (Municipality)*, [1988] 2 F.C. 399, 49 D.L.R. (4th) 707 (C.A.).

¹⁸⁶*Supra*, note 15 at 881.

¹⁸⁷*Ibid.* at 881-82.

¹⁸⁸Parry, *supra*, note 4 at 288. See also *supra*, note 30.

¹⁸⁹*Supra*, note 14 at 1011.

¹⁹⁰See *supra*, note 185.

¹⁹¹See, for example, A. Linden, *Canadian Tort Law*, 4th ed. (Toronto: Butterworths, 1988) at 101-103; Cooper-Stephenson & Saunders, *supra*, note 92 at 653.

¹⁹²Professor Fleming explains:

...Lord Bridge sought to justify *McGhee* as having been based on an inference that the defendant's fault not merely increased the risk of dermatitis but had actually cumulatively to the causation of dermatitis. This explanation is weakened, however, by the

In any event, *Wilsher* ought not to have a significant impact upon the risk exposure thesis. In terms of substantive law, Lord Bridge's analysis is confined to *McGhee* and its interpretations. Any broader influence is likely to result from the court's *attitude* as illustrated in the case, and that attitude is better articulated in *Hotson*, where their Lordships were not prepared to compensate for loss of a chance.¹⁹³

C. Epidemiological Evidence

Once again, the solution is to classify risk as a type of injury. The plaintiff would be required to show that he or she was exposed to the toxic substance, that exposure to the substance caused an increased risk of disease, and the extent of the increased risk.¹⁹⁴ The plaintiff will rely primarily on epidemiological evidence to provide the link between exposure and disease.¹⁹⁵ "[E]pidemiology involves the study of human disease processes within population groups."¹⁹⁶ "It seeks to establish associations between alleged causes and effects by one of two methods: either comparing the incidence of disease across exposed and unexposed populations, or comparing the incidence of exposure across sick and healthy populations."¹⁹⁷

In the context of all or nothing causation, the probative value of epidemiological studies is limited: they cannot be used to prove causation conclusively in any individual case.¹⁹⁸ Under risk-based liability, however, epidemiology provides precisely the sort of evidence the plaintiff needs. Epidemiologists can estimate the magnitude of the association between the risk factor and the disease.¹⁹⁹ They can describe in percentages both the proportion of disease incidence attributable to background risks,²⁰⁰ and the increase in incidence resulting from the defendant's negligence.²⁰¹

absence of any reason for drawing an inference of cumulative rather than alternative causation.

Supra, note 4 at 670.

¹⁹³See *infra*, notes 235-38.

¹⁹⁴Pegno, *supra*, note 38 at 456; see also Gonsalves, *supra*, note 162 at 504.

¹⁹⁵See generally, Black & Lilienfeld, *supra*, note 175 at 755-61. Some commentators believe that epidemiological studies are the only evidence adequate for this purpose. See, for example, Rosenberg, *supra*, note 4 at 856; Andruess, *supra*, note 4 at 2089. But see Gold, *supra*, note 4 at 393-94, where he argues that the classes of evidence admitted in these cases need to be broadened to include, for example, animal and *in vitro* experiments.

¹⁹⁶Andruess, *ibid.* at 2088.

¹⁹⁷Gold, *supra*, note 4 at 380. See also Andruess, *ibid.* at 2089-92.

¹⁹⁸Gold, *ibid.* at 380; Andruess, *ibid.* at 2094; Rosenberg, *supra*, note 4 at 857.

¹⁹⁹Black & Lilienfeld, *supra*, note 175 at 757.

²⁰⁰The admissibility of statistical evidence for these and similar purposes has been disputed. See *supra* at notes 65-86.

²⁰¹See Black & Lilienfeld, *supra*, note 175 at 757-61; Rosenberg, *supra*, note 4 at 857; Pegno, *supra*, note 38 at 457. For the study to have validity, the epidemiologist must show a "statistically significant relationship" between the disease and the alleged cause; in effect, that the difference in

D. Calculating Awards

Treating risk as an injury necessarily involves discounting the plaintiff's recovery according to the chance that his or her injury was not caused by the defendant's negligence. One commentator has suggested that while the all or nothing standard should be abandoned, awards should be discounted intuitively without attempting to arrive at an exact probability estimate.²⁰² To prefer a purely scientific calculation, *ie.* to seek a "mystically precise probability that would determine the proportional recovery", is to "embrace the myth of the magic number."²⁰³ The argument has some merit, but the dispute may ultimately be one of semantics. Generally the defendant can be expected to present its own evidence as to the magnitude of the risk created, and it will be the task of the court to determine how the award should be discounted. The final award may be the result of compromise where there is little to choose between the opposing experts' opinions. In all cases, that final award must be calculated with reference to the plaintiff's total injuries, and as such will constitute a percentage of those injuries. Thus, the award will always reflect the court's legal determination of the proportion of total risk which was created by the defendant. Stating that the final award is arrived at through intuitive, rather than scientific, reasoning cannot be said to enhance the validity of that award, even if the scientific estimate cannot be one hundred percent accurate.²⁰⁴

E. The Unavailability of Class Actions

The risk as injury approach may be of particular importance to the indeterminate plaintiff in Canada, for whom the option of a class action appears to be unavailable. While United States courts have attempted to resolve the difficulties of ensuring just compensation for each class member,²⁰⁵ the Canadian response in *Naken v. General Motors of Canada Ltd.*²⁰⁶ was to define restric-

incidence rates does not arise from chance. Black & Lilienfeld at 757. Even then, it may be difficult to make exact percentage estimates. Pegno, at 457.

²⁰²Gold, *supra*, note 4 at 399.

²⁰³*Ibid.* at 397.

²⁰⁴Additionally, because Gold's approach does not recognize risk as a type of injury (if the defendant's conduct is found to be a substantial potential cause of the plaintiff's injury, the link will be considered close enough to warrant liability: *ibid.* at 395-96), it may be vulnerable to the charge that there is an insufficient connection between the conduct and injury in individual cases.

Another theory for apportionment has been suggested in Farber, *supra*, note 1. The most likely victim (MLV) approach awards nothing to those plaintiffs whose injuries were least likely to have been caused by the defendant, and fully compensates the injuries of those with the highest causation probabilities. See at 559 & 581-89.

²⁰⁵See Delgado, *supra*, note 4 at 901 n.97. But courts have shown some reluctance to certify class actions. See Rosenberg, *supra*, note 4 at 908 n.224.

²⁰⁶[1983] 1 S.C.R. 72, 144 D.L.R. (3d) 385 [hereinafter *Naken* cited to S.C.R.].

tively the meaning of "same interest" in Rule 75 of the Ontario Rules of Practice, which reads:

75. Where there are numerous persons having the same interest, one or more may sue or be sued or may be authorized by the court to defend on behalf of, or for the benefit of, all.

In *Naken*, the plaintiffs attempted to file a class action suit for breaches of warranty involving up to four thousand and sixty-two Firenza automobiles. The Supreme Court dismissed the class action on the basis that the evidentiary difficulties outweighed the expedience of allowing such an action.²⁰⁷ Estey J. was unsettled by problems in identifying members of the class²⁰⁸ and the conduct of discovery procedures and ordering of costs (because members of the class were not parties to the action).²⁰⁹ The Ontario Law Reform Commission's proposed *Class Actions Act* illustrates that these difficulties are not insurmountable.²¹⁰ The effect of *Naken*, however, is to preclude use of class actions where damage claims of class members must be assessed individually.²¹¹

In a toxic tort action, indeterminate plaintiffs will always require such separate assessment. Under any theory of proportional recovery other than "risk as injury", plaintiffs, forced to proceed one at a time, are vulnerable to the argument that epidemiological studies cannot be used to prove causation in individual cases.²¹² In fact, it appears that an indeterminate plaintiff relying upon epidemiological evidence to show causation must argue a theory of risk-based probability in order to succeed.

F. *No Manifested Injury: Is Accurate Compensation Possible?*

Up to this point this section has dealt with the case in which the indeterminate plaintiff has manifested a physical injury. Recovery appears to depend on classifying risk exposure as a legal injury. But if exposure to risk constitutes an injury, is it necessary to require the plaintiff to have developed the threatened disease in order to justify compensation? Suppose, for example, that it is more probable than not that the plaintiff will never contract the disease. If the plaintiff is awarded compensation, he or she might then be said to enjoy a windfall.²¹³ Additionally, if the disease does manifest itself, the plaintiff may then have been

²⁰⁷Nissen, *supra*, note 180 at 45.

²⁰⁸*Naken*, *supra*, note 206 at 98-99.

²⁰⁹*Ibid.* at 99-100.

²¹⁰See Ontario Law Reform Commission, *Report on Class Actions* (1982) at 861, ss 3, 4, 7, 21, and 31. See generally the *Report* for the policies behind these provisions.

²¹¹Nissen, *supra*, note 180 at 46.

²¹²See *supra*, note 197.

²¹³Andrues, *supra*, note 4 at 2107. But "the windfall so created must be set against the windfall to risk creators under the present system by escaping all liability for tortiously creating risks". Robinson, "Probabilistic Causation", *supra*, note 4 at 786.

undercompensated — the recovery will have been insufficient to redress the actual loss suffered.²¹⁴ One commentator, moreover, argues that such an extension of liability would undermine recovery for indeterminate plaintiffs who *have* suffered physical injuries by invalidating the standards of recovery.²¹⁵

It cannot, however, be argued that the plaintiff who has yet to manifest injuries has suffered no loss.²¹⁶ Exposure to the excess risk attributable to the defendant's conduct "devalues" the victim.²¹⁷ Additionally, there are real costs associated with exposure to a risk of disease. Victims of risk exposure may wish to undergo medical treatment to prevent or monitor possible development of disease; such treatment would constitute a real and justifiable expense.²¹⁸

A victim may also choose to purchase insurance against the development of disease. Why not ensure that any injury he or she suffers is fully compensated by awarding the cost of premiums? Any discomfort created by awarding damages to plaintiffs who have yet to manifest physical injuries should be counterbalanced by the consideration that the plaintiff's purchase of insurance is no more than an attempt to mitigate the risk exposure inflicted; it is a legitimate expenditure for which the defendant should be liable to reimburse the plaintiff.

²¹⁴Robinson, *ibid.* at 786.

²¹⁵Andrues, *supra*, note 4 at 2104. The author suggests, at 2111-16, that other types of measures would be more appropriate for protecting the rights of the victim who has yet to develop disease, such as preventing the triggering of statutes of limitations until the manifestation of disease, and permitting plaintiffs to separate components of their claims. The latter would entail "suing on some injuries in the present while preserving the right to recover for future injuries later." *Ibid.* at 2112.

²¹⁶Is the present injury requirement fair? Consider the following hypothetical: suppose a drug company negligently makes and distributes a carcinogenic drug.

[L]iability awaits only an injured victim. Two such victims appear: A, who has contracted cancer as a result of taking the drug, seeks recovery for all losses suffered at the time of trial plus the present value of estimated future losses (future medical expenses, work losses, pain and suffering); B, who is at risk from having taken the drug, seeks compensation for the present, actuarial value of the possible future losses. Practical problems aside, is there any *moral* difference in these claims? Put somewhat differently, what moral argument would [the drug company] have against B that it does not have against A?

Robinson, "Probabilistic Causation", *supra*, note 4 at 790.

One commentator argues that there is already precedent in Canada for the application of risk-based liability to possible future losses. See Pardy, *supra*, note 4 at 291.

²¹⁷The devaluation might be reflected if the victim were negligently killed in an auto accident shortly after the toxic exposure. In awarding damages against the driver, a court might discount the victim's life prospects by the chance of death or disability created by the exposure. "The excess risk would therefore devalue the entitlements of the automobile accident victim in a very real sense." Rosenberg, *supra*, note 4 at 886.

²¹⁸See *Ayers, supra*, note 3 (allowing recovery for cost of medical surveillance, but not for risk itself). Early detection of diseases such as cancer can reduce the likelihood that contraction will be fatal. *Ibid.* at 458-59.

Moreover, awarding the cost of premiums may soothe fears that defendants will be swamped with speculative and spurious claims.²¹⁹

Such an award maintains the integrity of the risk as injury classification. "If insurance is available at an actuarially fair rate, the premiums charged will equal the potential injury loss discounted by its probability..."²²⁰ The plaintiffs are allowed to insure themselves fully against the eventuality of contracting disease, so there is no windfall or shortfall;²²¹ and the cost of that insurance should exactly match the total sum which would be properly awarded to all those who do eventually suffer injury, so there should be perfect deterrence.

The preceding approach is formulated to alleviate discomfort associated with awards to plaintiffs who may never suffer physical injury. Risk-based liability in its pure form is untroubled by such considerations, because risk exposure is a protected interest. If the theory advanced in this article is accepted, liability for risk of future losses is an inevitable consequence.²²² In fact, there is support for the proposition that Canadian courts have already moved in this direction.²²³

VII. Loss of a Chance

In the loss of a chance or indeterminate harm cases, the plaintiff is suing for the destruction of an opportunity to better, or to avoid a worsening of, her overall condition.²²⁴ Medical negligence is the most common such circumstance. For example, by negligently failing to diagnose or properly treat a progressive disease the doctor deprives the patient of a chance to halt the advance of that disease.²²⁵

To recover under an all or nothing standard, the plaintiff must show that the disease probably would have been halted or slowed with proper care. The *Herskovits* court recognized that adoption of this approach would constitute "a blanket release from liability for doctors and hospitals any time there was less than a fifty percent chance of survival, regardless of how flagrant the negligence."²²⁶

²¹⁹Andrues, *supra*, note 4 at 2104-05; Pegno, *supra*, note 38 at 460.

²²⁰Rosenberg, *supra*, note 4 at 886.

²²¹At the risk of stating the obvious, there would be no payout if the plaintiff never develops the disease.

²²²For a formula for calculating awards for future losses, see *infra*, notes 252-53.

²²³See Cooper, *supra*, note 4 at 90-96.

²²⁴See generally King, *supra*, note 4. See also, Brennwald, *supra*, note 4; Cooper, *ibid.* For an opposing viewpoint, see Coote, *supra*, note 4.

²²⁵See Brennwald, *ibid.* at 749-51. See also *Herskovits*, *supra*, note 3; *Hotson*, *supra*, note 3.

²²⁶*Ibid.* at 477.

Joseph King further illustrates the necessity of moving to risk-based liability with the following hypothetical:²²⁷ Suppose there is a jar which, it is established, probably contains some pennies. It is estimated that the jar contains forty coins, so the jar's value would be forty cents. If the jar were negligently lost, its owner would recover forty cents under the more likely than not standard.

Now suppose a plaintiff is deprived of a chance to pick one coin from a jar holding one hundred coins, forty of which are worth one dollar, and sixty of which are worth nothing. Anyone picking one coin at random will have a forty percent chance of finding a dollar. Thus the estimated value of such a chance to take a coin is forty cents, identical to the value of the first jar. The traditional causation standard would deny recovery to the second plaintiff because it is probable that a valueless coin would be drawn from the jar; such an analysis, however, ignores that forty people in a group of one hundred would have found a dollar.²²⁸ Where a chance is lost, one cannot know whether an actual injury was suffered, so each plaintiff should be compensated for the risk of loss created by the defendant.

Recovery for loss of a chance has been accepted by a number of courts. The classic example is *Chaplin v. Hicks*,²²⁹ where damages were awarded for the loss of a chance to compete for a prize in a beauty contest.²³⁰ More recently, in *Herskovits*, the Supreme Court of Washington was faced with circumstances where the defendant doctor negligently failed to diagnose lung cancer in the decedent, reducing the latter's chance for survival from thirty-nine percent to twenty-five percent.²³¹ The *Herskovits* court rejected the suggestion that the plaintiff must fail without a showing that Herskovits had a fifty-one percent

²²⁷*Supra*, note 4 at 1376-77. See also, Brennwald, *supra*, note 4 at 773-74. I have simplified the hypothetical.

²²⁸Brennwald, *ibid.*

²²⁹*Supra*, note 3.

²³⁰The injury addressed was the loss of the opportunity to win a prize, rather than the loss of the prize itself. *Chaplin*, *ibid.* at 791, 795 & 798. See also Cooper, *supra*, note 4 at 197-99.

The award in *Chaplin* does not seem to have been probabilistically connected to the plaintiff's actual likelihood of winning a prize but the commitment to compensation for lost chances is undeniable; see Brennwald, *supra*, note 4 at 769 n.195.

For other cases where loss of an economically valuable chance was redressed, see Coote, *supra*, note 4 at 767-68; Cooper, *ibid.* at 199-201.

²³¹*Supra*, note 3 at 475. Thus, it was likely the decedent would not have survived even with proper treatment.

Epidemiological evidence is used to calculate risk contribution in medical negligence cases. For example, the progression of cancer is classified according to the three developmental stages of the disease. Cancer statistics are based on survival rates for each stage, representing how long victims have "survived after a given date, whether it be the date of diagnosis or of the beginning of treatment." Estimates are phrased, for example, in terms of what percentage of Stage One victims of a particular cancer will survive for five years (the standard testing period). Brennwald, *supra*, note 4 at 749 n.23-24.

chance of survival with proper treatment,²³² concluding that "the loss of a...chance [should be recognized] as an actionable injury."²³³

In *Hotson v. East Berkshire Area Health Authority*,²³⁴ the Court of Appeal permitted a plaintiff whose hip was injured and negligently treated, resulting in permanent deformity, to recover for the loss of a twenty-five percent chance that the permanent injury could have been averted with proper treatment.²³⁵ The House of Lords reversed that decision, but on the specific point that there was *no chance* of avoiding the permanent injury.²³⁶ Their Lordships declined to decide whether an action could lie for loss of a chance,²³⁷ but Lord Mackay considered *Herskovits* at length and treated it with some sympathy.²³⁸

A. *Janiak: The Foundation for Risk-based Liability*

The Supreme Court of Canada was confronted in a unique context with an argument that it should recognize the value of a chance. In *Janiak v. Ippolito*,²³⁹ the plaintiff was negligently injured by the defendant in a car accident. It was estimated that surgery to correct his back injuries carried a seventy to seventy-five percent chance of success, but the plaintiff refused to undergo the operation. In doing so, he was unreasonably failing to mitigate his losses.²⁴⁰ The court was asked to decide whether the plaintiff could still claim recovery for the possibility that the remedial measures would have failed.

Madame Justice Wilson was not prepared to treat the seventy to seventy-five percent chance of success as a legal certainty, and compensated the plaintiff for the remaining risk of continuing loss.²⁴¹ In doing so, she was influenced by a statement of Lord Diplock in *Mallet v. McMonagle*:

In determining what did happen in the past a court decides on a balance of probabilities. Anything that is more probable than not it treats as certain. But in assessing damages which depend upon its view as to what will happen in the future or would have happened in the future had something not happened in the past, the court must make an estimate as to what are the chances that a particular thing will or would have happened and reflect those chances, whether they are more or less than even, in the amount of damages it awards.²⁴²

²³²*Herskovits, ibid.* at 479 & 486-87.

²³³*Ibid.* at 487. The majority explicitly adopts King's approach at 486-87. See also *Waffen v. United States*, 799 F.2d 911 (4th Cir. 1986).

²³⁴*Supra*, note 3.

²³⁵*Ibid.* at 761, 764 & 768-69.

²³⁶*Ibid.* at 782, 789-90 & 782.

²³⁷Lord Bridge did note that he saw "formidable difficulties" in sustaining an analogy between the circumstances in *Chaplin, supra*, note 3 and *Hotson, ibid.* at 782.

²³⁸*Ibid.* at 786-89.

²³⁹*Supra*, note 12.

²⁴⁰*Ibid.* at 15-52.

²⁴¹*Ibid.* at 169-72.

²⁴²[1970] A.C. 166 (H.L.) [hereinafter *McMonagle*] at 176.

Put simply, Lord Diplock is explaining that courts must discount awards for future loss by the chance that the loss will not occur. This principle cannot be limited to mitigation of damages, but speaks to future contingencies of any nature. Madame Justice Wilson's decision, and her endorsement of Lord Diplock's statement, must be seen as indicating support on the part of the Supreme Court for a probabilistic approach to future loss. Pardy makes the point even more strongly, arguing that as a result of *Janiak*, "proportional recovery for a risk of future loss...is now the law in Canada."²⁴³

Such a development carries with it consequences which affect the whole risk exposure thesis. *Janiak* speaks to future loss, but what if the event (or injury) in question has already occurred?²⁴⁴ It would be anomalous for courts to compensate for risk of future loss, as in *Janiak*, but not for negligently imposed risk which possibly created a present loss. This may be more easily understood by examining the toxic tort (indeterminate plaintiff) cases, where recovery for as yet unmanifested injuries (the paradigm of risk of future loss) is much more controversial than recovery where the injuries have actually been suffered by the plaintiff.²⁴⁵ It is logical, then, that the *McMonagle/Janiak* principle be extended to permit a proportional approach to damages assessment for not only future but also existing injuries and losses.

One could argue that Wilson J. explicitly precludes such a conclusion with the following statement in *Janiak*:

[T]he balance of probabilities test is confined to determining what did *in fact* happen in the past. In assessing damages the Court determines not only what will happen but what *would have* happened by estimating the chance of the relevant event occurring....²⁴⁶

But while it appears that she is upholding the all or nothing standard for past events, she does recognize that "[t]he potential for over or under compensation is...a pervasive difficulty with the present 'once and for all' method of awarding

²⁴³Pardy, *supra*, note 4 at 291. See also *Schrump v. Koot* (1977), 18 O.R. (2d) 337, 82 D.L.R. (3d) 553 (C.A.); *Hearndon v. Rondeau* (1984), 54 B.C.L.R. 145, 29 C.C.L.T. 149 (C.A.). See also Cooper-Stephenson and Saunders, *supra*, note 92, c. 3.

The Quebec Court of Appeal recently permitted recovery for loss of a chance of obtaining proper care as a result of the physician's failure to advise of biopsy results. See *Laferrière v. Lawson* (1988), 49 C.C.L.T. 309 (leave to appeal to the Supreme Court of Canada granted June 8, 1989).

²⁴⁴Such circumstances would include not only the medical negligence scenario, but also the entire mass exposure pattern. It is worth repeating that the "indeterminate defendant", "indeterminate plaintiff", and "loss of a chance" sub-patterns are merely classes of circumstances falling within the one broad pattern of risk exposure cases, and the analysis in this section is applicable to all of the sub-patterns. In other words, establishment of a theoretical foundation for any one of the sub-patterns validates the other two sub-patterns *and* the entire risk exposure pattern.

²⁴⁵See *supra*, notes 205-07.

²⁴⁶*Supra*, note 12 at 170-71.

tort damages.”²⁴⁷ Moreover, the court was not asked to review that standard in a general sense. Most importantly, one must remember the all or nothing standard is to be used under the risk exposure thesis and specifically, to what it is to be applied. Whether the plaintiff was actually exposed to a tortious risk (and thus made the victim of a legal injury) must still be established on the balance of probabilities. Quantification of the risk is reserved for damages assessment, where probabilistic analysis logically extends to future *and* existing losses. Thus, it is submitted that *Janiak* represents the foundation for the future development of risk-based liability in Canada.

B. *Valuing the Loss of a Chance*

In the indeterminate plaintiff context, Steve Gold argues that risk exposure should be estimated subjectively by the trier of fact.²⁴⁸ The simplicity of this method, however, is outweighed by the desire to measure as accurately as possible the extent of the risk created by the defendant, particularly where medical evidence of survival rates is available.²⁴⁹ A better approach is to “measure a compensable chance as the percentage probability by which the defendant’s tortious conduct diminished the likelihood of achieving some more favorable outcome.”²⁵⁰ This “simple probability” method of valuation awards damages proportionally to the chance lost by the plaintiff.²⁵¹ If a defendant negligently denies a plaintiff a thirty percent chance of healing his injured arm, the court would assess the value of a healthy arm, and discount that value by seventy percent.

The simple probability method is ideal for determining awards where all chance of achieving a beneficial result has already been lost, such as in a *Chaplin* or *Hotson* situation. Where the case is one of prospective future loss, King has developed a still more accurate method of valuation, the “weighted mean” method.²⁵² He distinguishes its operation from that of simple probability in the following example. The defendant’s negligence creates a thirty percent chance that a healthy plaintiff will become blind in the future. Most likely, if blindness does result, it will be at age fifty. The value of the plaintiff’s eyesight at age fifty is \$100,000. Under simple probability the court would award \$30,000, which is thirty percent of \$100,000.

The weighted mean method takes into account the possibility that blindness might develop earlier or later than at age fifty. Suppose it is established that the plaintiff’s chances of becoming blind are twenty-five percent at age fifty,

²⁴⁷*Ibid.* at 172.

²⁴⁸*Supra*, notes 202-03. This was the approach used in *Chaplin*, *supra*, note 3.

²⁴⁹Brennwald, *supra*, note 4 at 783.

²⁵⁰King, *supra*, note 4 at 1382.

²⁵¹Brennwald, *supra*, note 4 at 783.

²⁵²King, *supra*, note 4 at 1384.

four percent at forty, and one percent at thirty. There is still a thirty percent chance that the plaintiff will be blind by fifty. The value of the plaintiff's vision at age fifty is \$100,000; at forty, \$200,000; and at thirty, \$300,000. Under the weighted mean method, the total loss would be arrived at by "aggregating [each of] the possible outcomes discounted to reflect their degree of likelihood."²⁵³

The intricacy of the preceding method is justifiable. At this point in the analysis the paramount goal is to reduce the number and size of errors in valuation. More complex testimony will be required than for the subjective approach; but more important than the potential complexity is the danger that the court will be forced to arrive at an award without meaningful guidance.²⁵⁴

VIII. Judicial or Legislative Reform?

Some argue that solutions such as the risk as injury thesis involve radical departures from traditional notions of individual justice, and that where "such a break from the whole tradition of our culture" is at stake, it is the place of legislatures only, and not the courts, to intervene by introducing reform.²⁵⁵ The answer to this is now almost a legal cliché, for (as must have been argued by practically every freshman tort law student at one time or another) if this argument had been given weight by Lord Atkin in deciding *Donoghue v. Stevenson*, the face of tort law would look rather different today.

This is not to say that legislative reform would not be welcome. Rosenberg, a strong advocate of proportional liability, has undertaken a thorough examination of how public law mechanisms (such as class actions and insurance fund judgments) could be utilised in the causal indeterminacy context.²⁵⁶ But while he has concerns that judicial (as opposed to legislative) reform might impair the productivity and efficiency of the justice system,²⁵⁷ Rosenberg also recognises that:

In effect, legislatures have declined the invitation to formulate a comprehensive administrative solution — in part because, at least for the foreseeable future, such a solution seems politically infeasible. Thus the problem of the tortious use of

²⁵³*Ibid.* To calculate, add \$25,000 (twenty-five percent of \$100,000), \$8,000 (four percent of \$200,000), and \$3,000 (one percent of \$300,000) to reach a total of \$36,000. Here the award is higher than under simple probability, but that is merely a product of the probabilities and dates used.

²⁵⁴*Ibid.* at 1385. Moreover, "[t]he calculations involved... are no more complex than those undertaken in a sophisticated claim for lost future wages, where future bonuses, benefits, and promotions must be factored into a final damages award." Brennwald, *supra*, note 4 at 784.

²⁵⁵Fleming, *supra*, note 4 at 669.

²⁵⁶*Supra*, note 4 at 905-24.

²⁵⁷The common assumption is that a rule of proportional recovery would invite a flood of litigation. This may well be true, but Rosenberg argues that exactly the opposite might occur. He suggests that lawyers will profit little from risk exposure claims, and that proportional recovery will actually reduce the volume of mass exposure litigation by making claims less marketable. Rosenberg, *supra*, note 4 at 887-905.

toxic agents is unavoidably on the tort system's doorstep; the personal and social dimensions of the problem are simply too momentous to allow the courts to abdicate authority altogether.²⁵⁸

In addition to political infeasibility, legislatures may be faced with another obstacle. While the three sub-patterns operate under the same broad theoretical umbrella, the actual circumstances which they deal with tend to be extremely varied — from toxins in the environment to negligent diagnosis of an injury depriving the victim of a chance of recovery.²⁵⁹ It must be questioned whether a legislative scheme can be designed which can at once both give effect to the risk exposure principle, and adequately and efficiently answer all the specific practical demands of the sub-patterns.

Courts are much more experienced than legislatures in the creation and application of broad principles. Thus it appears that they have a vital responsibility to attempt to resolve the injustices imposed upon victims of causal indeterminacy.

Conclusion

This article has had three primary objectives. First, it has established the unity of the three sub-patterns. This having been accomplished, it follows (along the lines of basic principles) that any developments in the jurisprudence regarding any one or more of the sub-patterns ought to be capable of immediate extension to the others. Second, this article has demonstrated that the risk exposure thesis is the only tort solution to causal indeterminacy which can operate within traditional causation requirements and still provide accurate compensation and deterrence (while never imposing liability upon a non-negligent defendant). And third, it has provided a Canadian perspective to the causal indeterminacy problem and shown, through *Janiak*, that there is a foundation in Canadian jurisprudence for recovery based upon risk exposure.

By now it should be clear that it is necessary to classify risk as an injury to maintain the integrity of the causation inquiry. Courts have explored alternative methods of compensating plaintiffs,²⁶⁰ but too often the solution involves relaxing proof requirements. The unsatisfactory nature of this approach is best illustrated by *McGhee*,²⁶¹ where Lord Wilberforce shifts the onus to the defend-

²⁵⁸*Ibid.* at 926. Even Fleming realises that legislative intervention is not forthcoming, describing it as "unlikely": *supra*, note 4 at 663.

²⁵⁹Or any number of lost chance circumstances. For the broad range of examples, see Cooper, *supra*, note 4.

²⁶⁰See Brennwald, *supra*, note 4 at 758-59; T.M. Dworkin, "Fear of Disease and Delayed Manifestation Injuries: A Solution or a Pandora's Box?" (1984) 53 *Fordham L. Rev.* 527.

²⁶¹*Supra*, note 14.

ant to disprove causation notwithstanding that the defendant was in no better position to carry the onus than the plaintiff.²⁶²

Risk-based liability recognizes modern reality and dispenses with the fiction of searching for certainty where none exists. The balance of probabilities test is still applied, but to an issue which is quite capable of an either/or determination. Rather than asking the plaintiff to point out a particular defendant as the cause of his or her injury, the law should in appropriate cases require only that each defendant be identified as creating a risk to which the plaintiff was exposed. Risk as injury is the only theory flexible enough to permit broad application.

There has been very little litigation in Canada of the patterns discussed in this paper, but this does not mean that risk-based liability will operate in a vacuum. Traditional causation principles have prevented disputes from even reaching the courts, so the problem is less apparent than it might be.²⁶³ If courts move to resolve the dilemma facing risk exposure plaintiffs, many more claims will come to light. In order for this to occur, it is time for the law to fall in line with other disciplines in recognizing the reality of how causal relationships are established.

²⁶²See *supra*, notes 182-91.

²⁶³Rosenberg, *supra*, note 4 at 893.