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Indeterminate Causation and Apportionment of Damages: An Essay on Holtby, Allen, and Fairchild

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Abstract—*Holtby*, *Allen* and *Fairchild* are both recent and revolutionary decisions that address an important aspect of the indeterminate causation problem that frequently arises in tort litigation. In *Holtby* and *Allen*, the Court of Appeal departed from the traditional binary approach, under which a tort claimant either recovers compensation for his or her entire injury or is altogether denied recovery—depending on whether his or her case against the defendant is more probable than not. *Holtby* and *Allen* substituted this approach by the proportionate recovery principle, under which the defendant compensates the claimant for a fraction of his or her injury that represents the defendant's statistical share in that injury. This article analyses this development within the particular domain of indeterminate causation, over which the proportionate recovery principle has been licensed to exercise control. The article claims that this development would constitute an improvement of the law from the perspectives of both optimal deterrence and corrective justice, if the courts properly formulate its scope. First, the proportionate recovery principle needs to be explicitly confined to cases that deal with recurrent wrongs. Second, determination of the defendant's share in the claimant's injury ought to be grounded on the (*ex post*) probability of causation, rather than the (*ex ante*) risk of inflicting that injury. Third, judges must not apply unarticulated intuitions in determining the magnitude of the relevant risk or probability: their decisions in that area would be better informed by the statistical principle of 'insufficient reason', also known as the 'indifference principle'. Fourth, courts are yet to relieve the doctrinal tension between the proportionate recovery principle, as recognized in *Holtby* and *Allen*, and the previous rejection of that principle by the House of Lords. Subsequently, the article analyses the House of Lords' decision in *Fairchild*—yet another instance of indeterminate causation in which proportionate recovery is preferable to the 'all or nothing' approach. In this case, the House of Lords allowed the claimants full recovery. This holding was grounded in the Law Lords' innovative approach to indeterminate causation, and the article unfolds the problematics of this approach. Finally, the article offers an adoption of yet another legal mechanism—the 'evidential damage doctrine'—that replaces liability under uncertainty with liability *for* uncertainty.

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The article demonstrates that the evidential damage doctrine satisfies the demands of both optimal deterrence and corrective justice, and that it would resolve the indeterminate causation problem better than would any of its competitors. Furthermore, application of this doctrine need not be limited to cases featuring a recurrent wrong. The article demonstrates these advantages of the doctrine by applying it to *Holtby*, *Allen* and *Fairchild*.

1. *Introduction*

Several wrongdoers independently expose a victim to identical risks of sustaining physical injury. Subsequently, the victim sustains the injury associated with those risks. There is, however, no evidence causally ascribing the injury, or a particular fraction thereof, to any one of the wrongdoers. Although it is practically certain that *at least one* of the risks to which the wrongdoers exposed the victim materialized into the victim's injury, the producer of this risk is unidentifiable, which makes it impossible for the victim to establish his or her case against any particular wrongdoer on a balance of probabilities. Is the victim nevertheless entitled to recover from the wrongdoers full or partial compensation for his or her injury?

Another victim sustains injury after being exposed, twice, to the risk of sustaining that injury. One of these exposures originates from a negligent wrongdoer. The other exposure is non-wrongful: there is no person or entity upon whom this exposure can be blamed so as to become actionable in torts. Is the victim nevertheless entitled to recover from the wrongdoer full or partial compensation for his or her injury?

These issues are variants of the general problem, known as indeterminate causation. For obvious reasons, resolution of this problem is important for the implementation of the law of torts.[1] The indeterminate causation problem is pervasive. Indeed, it is one of the salient characteristics of modern torts. Medical treatment of patients is a paradigmatic example of this problem. In numerous cases, patients admitted by doctors and hospitals for diagnosis and treatment already suffer from a health deficiency that may or may not be cured. For any such patient, proper medical treatment can offer only a prospect, rather than full assurance, of recovery. Consequently, when the doctors commit malpractice and the patient does not recover, the resulting damage can be attributed to both the malpractice and the patient's pre-existing condition.

An essentially similar problem arises in cases involving a harmful drug separately produced by several manufacturers and marketed under its generic, rather than brand, name. Because the resulting harm can be attributed to any manufacturer of the drug, the afflicted person would typically be unable to identify his or her wrongdoer.[2]

[1] As acknowledged in *Holtby* v *Brigham & Cowan (Hull) Ltd* [2000] 3 All ER 421 at 423 (CA) (hereafter cited as '*Holtby*').

[2] Cf. *Sindell* v *Abbott Laboratories*, 607 P 2d 924 (Cal. 1980).

Another paradigmatic example of the problem involves an employee who contracts cancer after being wrongfully exposed to a carcinogenic substance (say, asbestos) by his two separate employers. The employee's disease has a non-cumulative aetiology: it is only one employer that actually brought about this disease. However, the identity of that employer is unknown.[3]

This evidential void has been labelled 'indeterminate wrongdoer', to separate it from another type of evidential void, branded as 'indeterminate victim'. The 'indeterminate victim' problem arises in cases in which numerous people are wrongfully exposed to a toxic or otherwise hazardous substance and subsequently contract a disease. An unidentified fraction of these people develop the disease as a result of the exposure. None of these people can credibly identify himself or herself as a victim of the tort.[4]

In two recent decisions, *Holtby* v *Brigham & Cowan (Hull) Ltd*[5] and *Allen* v *British Rail Engineering Ltd*,[6] the Court of Appeal has resolved the indeterminate causation problem in an innovative way that amalgamates pragmatism and principle. In the domain of principle, the Court held that wrongdoers should assume liability for physical injuries even when the issue of causation is indeterminate. The Court further held that the extent of this liability should be proportionate to the risk of injury to which each wrongdoer exposed the claimant. In the domain of pragmatism, the Court allowed trial judges to handle the assessment of the relevant risks of injury as a 'jury question'. Specifically, the Court held that trial judges should apply their common sense and estimate such risks even when the evidence is scarce; and it further indicated—both by treating the issue as a jury question and by upholding the decisions on appeal in the two cases—that an intuitive assessment of the relevant risk of injury would normally pass appellate muster.[7]

Holtby and *Allen* are revolutionary decisions. Previously, courts have treated an infliction of personal injury as causally indivisible. Correspondingly, courts have decided personal injury cases under the traditional binary principle 'the winner takes all'. If the evidence identified the wrongdoer's action—on a balance of probabilities—as the dominant cause of the victim's injury, the wrongdoer would then have to compensate the victim for his or her entire injury; and if the evidence failed to provide such an identification, the victim would be altogether denied recovery.[8] For causally indeterminate cases, courts have devised a supplementary doctrine of 'material contribution' that allows the victim to recover compensation for his or her entire injury even when he or she fails to satisfy the 'dominant cause' requirement. Under this doctrine, if the wrongdoing qualifies

[3] *Fairchild, et al* v *Glenhaven Funeral Services Ltd,* et al [2002] 3 WLR 89 (HL).

[4] For a well-known American case exemplifying this group of cases see *In re 'Agent Orange' Product Liability Litigation,* 597 F Supp 740 (EDNY 1984), *aff'd,* 818 F 2d 145 (2d Cir. 1987).

[5] Above n 1.

[6] [2001] PIQR Q101, [2001] EWCA Civ 242, [2001] ICR 942 (CA) (hereafter cited as '*Allen*').

[7] *Holtby* at 426–27, 429; *Allen* at 108–10, 113.

[8] *Fitzgerald* v *Lane* [1987] 2 All ER 455 (CA); *Dingle* v *Associated Newspapers Ltd* [1961] 2 QB 162 (CA). See also H.L.A. Hart & T. Honoré, *Causation in the Law* (2nd edn, 1985) at 227–29.

as a 'material contribution' to the victim's injury, the victim would be entitled to full recovery.[9] No guidelines have been articulated for separating between wrongdoings that qualify as 'material' and those that do not. Yet, courts had to choose between awarding the victim full recovery or no recovery at all. The victim's entitlement to all or to nothing thus depended on variables that are factually indeterminate and on judicial evaluations that are normatively opaque.

Fairchild[10] is the latest House of Lords' decision featuring the mysteries of the 'material contribution' analysis. This case involved an unusual factual setting: an aetiology that was deemed generally known, but specifically unknowable. One of the claimant's former employers was deemed to have precipitated the claimant's disease—mesothelioma—by exposing the claimant to asbestos;[11] yet, because the claimant also worked for other employers, who committed the same wrong, that employer was unidentifiable. The House of Lords decided that each employer is fully responsible for the claimant's affliction because it negligently exposed the claimant to the risk of contracting mesothelioma. Because the case was argued within the bounds of the 'all or nothing' approach, the Law Lords explicitly refrained from delving into the merits of proportionate recovery.[12]

The traditional 'all or nothing' approach cannot easily be discarded because it also has merits. The strength of tradition itself, as a factor that maintains stability in the legal system, is amongst these merits. Traditionally, courts were accustomed to processing cases through indivisible legal categories such as 'negligence', 'causation' and 'damage'.[13] Only in the middle of the 20th century courts started to develop a more refined framework of rules that apportion liability in particular types of cases, such as those that involve contributory negligence.[14] Factual uncertainty, however, even though it is inherent in litigation, has never been regarded as a sufficient reason for apportioning liability. According to this viewpoint, facts may be chaotic, but legal outcomes ought to be determinable and reasonably predictable. Judges exercise no control over empirical facts and therefore cannot impose order on factual indeterminacy. Their rulings on liability, however, can rest on the fixed categories of 'yes' and 'no' (with some limited exceptions, such as the partial defence of contributory

[9] See *McGhee* v *National Coal Bd.* [1972] 3 All ER 1008 (HL); *Bonnington Castings Ltd* v *Wardlaw* [1956] 1 All ER 615 (HL).

[10] *Fairchild*, above n 3.

[11] As acknowledged by the House of Lords, 'The mechanism by which asbestos causes mesothelioma being unknown, the transformation of a normal mesothelial to a cancerous cell could be due to the action of a single fibre, a few fibres or multiple fibres'. *Fairchild*, above n 3 at 131*f–g*. Yet, it was common ground in *Fairchild* that 'any cause of [the claimant's] mesothelioma other than the inhalation of asbestos dust at work can be effectively discounted'. *Fairchild*, ibid, at 92*g–h*. Jane Stapleton observes that this common ground had no scientific foundation; as such, it 'seems more to reflect what an acceptable basis of apportionment or contribution might be than to be based on the scientific evidence available to the parties'. J. Stapleton 'Lords A'leaping Evidentiary Gaps', (2002) 10 *Torts LJ* 276 at 281.

[12] *Fairchild*, above n 3 at 120*e–g*.

[13] R. Dworkin, *A Matter of Principle* (1986) at 119–21.

[14] Winfield & Jolowicz, *On Torts* (15th edn, by W.V.H. Rogers, 1998) at 233–34.

negligence).[15] Apart, therefore, from maintaining stability in the legal system, this approach enhances the social acceptability of judicial verdicts.[16] Arguably, it also provides both practicable and equitable solutions for cases that involve a single injurious event. In the long run of such cases—and as long as judges conscientiously ground their decisions on the balance of probabilities—this approach would generate the greatest possible number of correct decisions.[17] Arguably, these benefits offset the occasional injustice that this approach produces in some individual cases.

This justification, however, does not apply to cases featuring a pattern of recurrent transgression.[18] In such cases, the dichotomous framework of 'yes or no' may lead to a systematic rather than merely occasional distortion in allocating losses in society. This distortion would occur in a group of similar cases that exhibit an asymmetry between the cases in which the 'all or nothing' approach favours the wrongdoers and the cases in which this approach favours the victims. In such cases, if judges were to confine their rulings on liability to the dichotomous framework of 'yes or no', the injustice and inefficiency that factually wrong decisions would produce would be systematic rather than occasional. Settling a single liability issue by either 'yes' or 'no' is not the same as settling one thousand liability issues by a thousand 'yes's' or 'no's'. In a single-event category of cases, the injustice and the inefficiency are merely a statistical possibility that materializes sporadically in a world far removed from the judge's desk. In a recurrent-event category, the judge's signature certifying 'yes' or 'no' also certifies the level of concrete injustice and inefficiency in the immediate reality.

Unsurprisingly, the factual settings of both *Holtby* and *Allen* belong to the latter category of cases. Mr Holtby was one of the numerous workers who developed asbestosis and related diseases following their consecutive exposure to asbestos by different employers. Mr Allen was one of the numerous workers who developed a vibrating white finger syndrome after working with percussive tools. The judges explicitly considered both cases as test cases with general importance.[19] Application of the 'all or nothing' approach in cases similar to *Holtby* and *Allen*, therefore, would lead to a systematic dismissal of lawsuits, that is, to a large-scale denial of compensation to tort victims and to a massive escape of

[15] Another exception is the doctrine that awards partial recovery for chances eliminated by a breach of contract. See *Chaplin* v *Hicks* [1911] 2 KB 786. In the US, some courts have applied the same doctrine in medical malpractice litigation as a substitute remedy for a claimant who failed causally to attribute his or her affliction to his or her doctors' negligence. See, for instance, *Herskovits* v *Group Health Cooperative of Puget Sound*, 664 P 2d 474 (Wash 1983); *Wendland* v *Sparks*, 574 NW 2d 327 (Iowa 1998); *Mays* v *United States* (1985, DC Colo) 608 F Supp 1476, rev'd on other grounds (CA10 Colo) 806 F 2d 976, cert den 482 US 913; *Alberts* v *Schultz*, 975 P 2d 1279 (NM 1999); *Jorgenson* v *Vener*, 616 NW 2d 366 (SD 2000); *Smith* v *Washington* 734 NE 2d 548 (Ind 2000). English and Canadian courts resolve similar problems by applying the 'all or nothing' approach. See *Hotson* v *East Berkshire Area Health Authority* [1987] 2 All ER 909(HL); *Lawson* v *Laferriere*, 78 DLR (4th) 609 (1991).

[16] Cf. C. Nesson 'The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts', 98 *Harvard L Rev* 1357 (1985).

[17] A. Porat & A. Stein, *Tort Liability under Uncertainty* (2001) at 18–22.

[18] S. Levmore 'Probabilistic Recoveries, Restitution and Recurring Wrongs', 19 *J Leg Stud* 691 at 705–10 (1990); Porat & Stein, ibid at 125–29, 133–38.

[19] *Holtby* at 423; *Allen* at 102.

wrongdoers from liability in torts. At its other extreme, this approach would lead to both excessive compensation of victims and excessive liability of wrongdoers. This outcome would amount to both injustice and inefficiency with regard to the types of wrongdoings represented by the two cases. The *Fairchild*'s 'all or nothing' approach would engender more or less similar problems.[20]

This article analyses the *Holtby* and *Allen* decisions and compares them with other solutions to the problem at hand. Section 2 outlines the two decisions together with their doctrinal background and the relevant policy concerns. Specifically, it identifies the change in the law of torts brought about by these decisions and the impact of that change on both deterrence and corrective justice. We demonstrate that risk-based apportionment of liability for injuries will contribute not only to the optimal deterrence of wrongdoers, but also (in cases involving recurrent transgressions) to corrective justice. Section 3 contrasts *Holtby* and *Allen* with the idea of imposing liability for lost chances, rejected by the House of Lords in *Hotson* v *East Berkshire Area Health Authority*.[21] This discussion examines the tension between *Holtby* and *Allen*, on the one hand, and *Hotson*'s 'all or nothing' approach, on the other. Section 4 unfolds two different criteria for apportioning liability for injuries in indeterminate causation cases: the risk criterion and the probability-of-causation criterion. In both *Holtby* and *Allen*, the courts did not distinguish between these two criteria, an omission liable to result in distortions in future cases. As demonstrated in section 4, the probability-of-causation criterion is preferable to that of the risk of injury from the perspectives of both optimal deterrence and corrective justice. Section 5 examines the pragmatic aspect of *Holtby* and *Allen*, namely, the licence to exercise intuitive judgement in appraising the risks of injury that the two decisions bestowed on trial judges. We examine this licence by juxtaposing its costs and benefits and demonstrate that the former outweigh the latter. Section 6 applies our approach to the *Fairchild* type of cases and demonstrates the superiority of this approach over that of full recovery (and the consequent imposition of joint and several liability on the defendants). This section of the article also demonstrates that the *Holtby-Allen* doctrine remains unaffected by the *Fairchild* decision (because the *Holtby-Allen* approach extends to a different type of causal uncertainty; and also because the prorated recovery possibility was not raised before and, consequently, not adjudicated by the House of Lords). Section 7 turns to a new solution of the problem, which we call 'the evidential damage doctrine'. This solution offers a shift from liability under uncertainty to liability *for* uncertainty. Under the evidential damage doctrine, a wrongdoer would have to pay compensation for his or her victim's evidential incapacitation, that is, for the expected value of the information of which the wrongdoer wrongfully deprived the victim. We demonstrate that this doctrine would provide the best solution

[20] The qualifier 'more or less' refers to a possibility of mitigating those problems. We discuss this possibility in section 6.

[21] Above n 15.

to the causal indeterminacy problems dealt with in *Holtby, Allen* and *Fairchild.* Section 8 closes this article by summarizing its principal conclusions.

2. *Holtby, Allen, and the Objectives of the Law of Torts*

In *Holtby,* the claimant developed asbestosis after inhaling asbestos dust throughout his employment as a marine fitter by several employers. He sued one of those employers, for whom he worked for about 12 years—approximately half of the total period of his work with asbestos materials—alleging that this employer was responsible for his injury. The claimant's allegation of wrongdoing, as directed against this particular employer, was grounded on negligence and breach of statutory duty. This allegation was well-founded, as opposed to that of causation. The issue of causation was hopelessly indeterminate. Indeed, other employers, for whom the claimant worked in the past, also exposed him to asbestos, and there was no evidence that could single out the defendant's asbestos as the 'but-for' cause of the claimant's illness. Nor was it possible to split the illness into separate segments and causally associate each segment with the claimant's exposure to asbestos by each separate employer. The claimant's illness developed progressively, but was ultimately indivisible.

In *Allen,* the claimant developed the Vibration White Finger condition (VWF) as a result of using vibrating tools in the course of his employment by the defendant. This condition involved periodic blanching of the fingers due to deprivation of blood during spasm of the blood vessels. The claimant's action for compensatory damages attributed his affliction to the defendant's negligence. The claimant contended that the defendant ought to have conducted surveys to assess the incidence of VWF amongst employees who regularly worked with vibrating tools. The claimant further contended that such surveys would have yielded knowledge about the relevant risk, which would have required the defendant to minimize this risk both by warning the claimant that work with vibrating tools may cause VWF and by reducing the volume of the claimant's work with such tools. The claimant grounded these contentions on the 'reasonably prudent employer' standard.

The trial judge in the *Allen* case accepted these contentions as valid only with respect to a particular period of the claimant's employment by the defendant, namely, from the point in time at which the knowledge about VWF as a possible industrial disease had become available. Prior to this pivotal point in time, the defendant had no reason to investigate the incidences of VWF. Consequently, the claimant's exposure to the VWF risk that occurred prior to this point in time was not wrongful and thus did not constitute an actionable tort. Moreover, it was far from certain that the claimant would have given up his work with vibrating tools even if he were warned about the risk. The resulting indeterminacy of the causation issue was further aggravated by the claimant's work for another employer that also involved vibrating tools. Chronologically, the claimant's

indivisible affliction could thus be attributed to the defendant's non-wrongful, but nonetheless damaging, conduct; to the defendant's subsequent wrongful conduct; to the claimant's attitude to life that included wilful assumption of work-related risks; and to the presumptively wrongful conduct of his second employer.

In both *Holtby* and *Allen*, the court could have dismissed the claimant's action after certifying his failure to establish his case on a balance of probabilities. Indeed, if none of the relevant causal scenarios is more probable than not, then none of them can be adopted as a factual basis for a verdict. This decision, however, would have been too harsh to the innocent claimant and too lenient to the blameworthy defendant. Furthermore, since it was established that the defendant in *Holtby* wrongfully exposed the claimant to the risk of contracting asbestosis, dismissal of the action would have left this and similarly situated wrongdoers without deterrence. Aware that they would be exempted from liability when the damage they produce merges with other damages, such wrongdoers would not take adequate precautions to protect potential victims. Finally, because it was also apparent that the claimant's lawsuit against the remaining employers would fail, dismissal of the action would have left this, and similarly situated claimants, without redress. This outcome would be at odds with corrective justice: although it is clear that the victim suffered a wrongful loss, the victim would not be compensated; and although the wrongdoers who inflicted that loss are identified, they would not be required to pay for their actions. Indeed, because the case involved a recurrent wrong that systematically inflicts the same type of injury in numerous cases, dismissal of the claimant's action posed a threat to the fundamental objectives of the law of torts. If this and similar actions were to be defeated, then both deterrence and corrective justice would be defeated as well.[22]

The same line of reasoning obviously applies to *Allen*. Dismissal of Mr Allen's action could not be considered a viable possibility, if the court's decision were to promote deterrence and corrective justice. As noted by the Court of Appeal at the outset of its decision, *Allen* was one of four cases 'chosen as lead or test cases for hundreds of cases involving similar points'.[23]

Another possibility available in both *Holtby* and *Allen* was to invoke the *McGhee-Bonnington* principle[24] and identify the defendant's wrongful conduct as a 'material contribution' to the claimant's injury. This principle applies in cases in which it is established, on a balance of probabilities, that the defendant wrongfully contributed to the claimant's injury; that the claimant sustained the injury associated with this wrongful contribution; and that this contribution was

[22] For corrective justice as a moral foundation of tort liability, see E.J. Weinrib, *The Idea of Private Law* (1995) at 145–70; J. Coleman, *Risks and Wrongs* (1992). For deterrence-based rationales, see G. Calabresi, *The Cost of Accidents* (1970); R.A. Posner 'A Theory of Negligence', 1 *J Leg Stud* 29 (1972); G. Calabresi & T. Hirschoff 'Toward a Test for Strict Liability in Torts', 81 *Yale LJ* 1055 (1972).

[23] *Allen* at 102.

[24] *McGhee* v *National Coal Bd*, above n 9; *Bonnington Castings Ltd* v *Wardlaw*, above n 9.

'material'. In any such case, the claimant would be awarded full recovery even if he or she fails to satisfy the stringent 'but-for' causation requirement by proving on a balance of probabilities that his or her entire injury had actually resulted from the defendant's wrongful conduct.

This principle, however, is too harsh to the defendant and too generous to the claimant. Allowing the claimant full recovery would force the defendant to pay the claimant an excessive amount of compensation relative to the loss that the defendant actually caused the claimant. In *Holtby*, for example, this holding would have forced the defendant to pay, not only for the loss that resulted from its wrongful conduct, but also for the losses inflicted by others. By forcing defendants to pay for damages that they did not inflict, the *McGhee-Bonnington* principle would result in excessive deterrence.[25] This principle would also violate corrective justice. An affront to corrective justice would be particularly serious in cases such as *Allen* that involve claimants who were exposed to a number of risks of injury, some wrongful and some non-wrongful. Under the *McGhee-Bonnington* principle, such claimants would receive compensation in amounts that they clearly do not deserve.

Thus, in cases similar to *Holtby*, wrongdoers would pay excessive amounts of compensatory damages, while victims would receive compensation that exactly covers their wrongful losses. By contrast, in the *Allen* type of cases, wrongdoers would still pay excessive liability amounts, while victims would receive compensation that exceeds the wrongful losses that they actually sustained.[26] Violation of corrective justice would be more severe in the *Allen* type of cases than in cases similar to *Holtby* for an additional reason. Normally, in the *Holtby* type of cases, a wrongdoer who compensates the victim for his or her entire loss would have an indemnification claim against other wrongdoers who contributed to the loss. In the *Allen* type of cases, no such claim would be available (and it would be available only partially when contributors to the victim's loss, some wrongful and some non-wrongful, include more than one wrongdoer).

The decisions reached by the trial judges and the Court of Appeal in both *Holtby* and *Allen* stem from some of these concerns. As emphasized by the Court of Appeal in both cases, a tort doctrine ought to apportion damages in a way that does justice not only to the victim, but also to his or her wrongdoer. The Court anchored this approach doctrinally in the important refinement of *Bonnington* and *McGhee*, introduced by Mustill J (as he was then) in *Thompson* v *Smiths Shiprepairers (North Shields) Ltd.*[27]

The *Holtby* and *Allen* courts, therefore, have declined to arrive at both the zero-compensation outcome, dictated by the burden-of-proof doctrine, and the full-compensation outcome, allowed by the *McGhee-Bonnington* principle.

[25] Note, however, that indemnification claims among the wrongdoers may ameliorate this problem.

[26] Full recovery may still be reconciled with corrective justice if each wrongdoing were to be treated as a contribution to the synergetic operation of all causal forces that brought about the injury. In this framing of the event, any such contribution would qualify as a 'but-for' cause of the entire injury. See Porat & Stein above n 17 at 79–80.

[27] *Thompson* v *Smiths Shiprepairers (North Shields) Ltd* [1984] 1 All ER 881.

The courts consequently discarded the 'all or nothing' approach, previously prevalent in cases that involve indivisible physical injuries. In *Allen*, the Court of Appeal also summarized the law, as it now stands, by stating five propositions that combine pragmatism and principle. Three of these propositions are particularly relevant to the present discussion.[28] First, the amount of the employer's liability will be limited, in principle, 'to the extent of the contribution which his tortious conduct made to the employee's disability'.[29] Second, the trial court 'must do the best it can on the evidence to make the apportionment and should not be astute to deny the claimant relief on the basis that he cannot establish with demonstrable accuracy precisely what proportion of his injury is attributable to the defendant's tortious conduct'.[30] Finally, 'the amount of evidence which should be called to enable a judge to make a just apportionment must be proportionate to the amount at stake and the uncertainties which are inherent in making any award of damages for personal injury'.[31]

In *Holtby*, the trial judge held the defendant liable for seventy five per cent of the claimant's injury. In the absence of cross-appeal, the Court of Appeal approved this decision, despite its finding that the trial judge 'erred on the side of generosity to the claimant'.[32] In the Court of Appeal's view, it would have been more appropriate for the trial judge to determine the defendant's liability for the claimant's exposure to asbestos and for the consequent injury on a time-share basis. Under this criterion, the defendant's liability should have been reduced to fifty per cent. The Court of Appeal gauged that the trial judge would, indeed, have adopted the time-share criterion for apportioning liability for damages had the claimant's other employers been impleaded in the case as defendants or third parties.

In *Allen*, the trial judge reduced the defendant's responsibility for the claimant's affliction more substantially. Based on the fact that the defendant's fault was accompanied by other causal factors associated with that affliction, the judge introduced the appropriate deductions into her calculation of the claimant's compensation. In total, those deductions amounted to approximately two-thirds of the claimant's damage. One of those deductions derived from a contentious finding made by the judge with respect to the counterfactual scenario in which the defendant acts as a reasonably prudent employer, obtains the relevant knowledge about VWF when it becomes available, warns the claimant about the risk of developing VWF, and offers him the opportunity to reduce the volume of his work with vibrating tools. The judge determined that, in this counterfactual scenario, the claimant, 'a fairly stoical man' with a good job, would have continued to use his occupational skills by working with some vibrating tools,

[28] The other two propositions summarize the 'material contribution' and the joint liability principles: *Allen* at 109–10.
[29] Ibid at 109.
[30] Ibid at 110.
[31] Ibid.
[32] *Holtby* at 431.

although not to the same extent as he did in reality. The Court of Appeal held that the judgment delivered by the trial judge falls squarely within her discretion, and dismissed the appeal.[33]

Both *Holtby* and *Allen* have used the *risk of injury* to which the defendant wrongfully exposed the claimant as a criterion for apportioning liability for injuries. In *Holtby*, the Court's adoption of the risk criterion came close to an explicit affirmation of the principle. In this case, the Court of Appeal analogized its preferred apportionment of the compensation duty to the calculations made by underwriters in pricing insurance policies.[34]

This article demonstrates that the *risk of injury* principle may have different meanings. At this stage, we assume that this principle holds each wrongdoer liable for his or her statistical share in the claimant's loss. This broad definition of the principle accommodates all its meanings (for our present purposes, at the expense of accuracy).

The *Holtby-Allen* approach would facilitate optimal deterrence of wrongdoers. Every prospective wrongdoer would know in advance that he or she would not be able to hide in the shades of uncertainty when the outcomes of his or her actions merge with other losses. Each wrongdoer would, therefore, expect to pay damages for all the losses associated with his or her wrongdoing. Indeterminate causation would no longer be a barrier to establishing the wrongdoer's liability. Consequently, a prospective wrongdoer would take the contemplated action only when its benefits outweigh the costs and would not take the action only when its costs are greater than the benefits. In both cases, society would be better off—a direct outcome of a liability regime that aligns individual and social interests.

The *Holtby-Allen* approach appears to be at odds with corrective justice. Under corrective justice, a wrongdoer should pay only for the damage that he or she wrongfully inflicted, and the victim should recover compensation only for the damage that he or she actually sustained—neither more, nor less. Arguably, the apportionment approach adopted by both *Holtby* and *Allen* violates this principle.

This, however, is only seemingly so because cases such as *Holtby* and *Allen* are special. These cases are special because they feature a recurrent pattern of damage-infliction. As explained at the outset, dismissal of the claimant's lawsuit is not an attractive possibility for cases featuring this pattern. This pattern poses a special problem that the *Holtby-Allen* approach attempts to resolve. This approach creates a mechanism for collecting payments from wrongdoers and for allocating

[33] *Allen* at 110–14.

[34] As the Court explained: 'This method of dividing responsibility on a time exposure basis is, I understand, adopted among insurers in such cases as these. In the absence of some unusual feature, such as for example periods of exposure to a particularly dangerous blue asbestos during some periods, that seems to me to be not only the sensible, but correct approach in law. In practice, many years afterwards, such distinctions are likely to be impossible to prove'. *Holtby* at 431.

those payments amongst the wrongdoers' victims. Is this mechanism consistent with corrective justice?

We begin with the *Holtby* type of cases. In the long run of such cases, the aggregate payment extracted from every wrongdoer would be equal to the damage that he or she had inflicted. In parallel, the payment that each victim would receive would match the losses that he or she had wrongfully sustained. In its traditional form, corrective justice demands that each wrongdoer compensate his or her victim both directly and personally for the losses that he or she caused the victim. This demand, however, is not essential for the achievement of corrective justice. *Corrective justice is justice in the outcome, not in the procedure.* In our view, therefore, corrective justice requires that each wrongdoer pays damages in the amount of the losses inflicted by his or her wrongdoing; that each victim receives compensation for his or her wrongful losses; and that each wrongdoer facilitates the compensation of his or her victim.[35] From this perspective, any compensatory mechanism satisfying these three demands would be consistent with corrective justice. Corrective justice would, therefore, ratify a legal mechanism that forces wrongdoers to contribute the right amounts of compensatory payments to a fund from which their victims receive the right amounts of compensation. Equally, corrective justice would justify the mechanism created by *Holtby*. In the long run of cases, *Holtby*'s compensatory mechanism would allocate damages in a way that fulfils the three demands of corrective justice: each victim would be fully compensated for his or her wrongful losses; each wrongdoer would pay for the losses that he or she wrongfully inflicted; finally, by his or her forced participation in this mechanism, each wrongdoer would facilitate the full compensation of his or her victims. From the corrective justice perspective, the attractiveness of this solution is reinforced by the absence of a better alternative. As explained above, in the present type of cases, both no-liability and full-liability rulings would generate intolerable distortions in the allocation of damages among wrongdoers and victims.

Now, we turn to *Allen*. To recall, the crucial difference between *Holtby* and *Allen* is this: in *Allen,* part of the victim's loss was non-wrongful, while in *Holtby* the victim's entire loss was inflicted wrongfully. Under corrective justice, this difference has no bearing on the wrongdoers' proportionate liability. Because the wrongdoers are repeat transgressors (in light of the recurrent-wrong feature, expounded earlier in this article), the aggregate amount that the law would extract from them in the form of compensatory damages, in the long run of cases, would correspond with the losses of their respective victims. This difference, however, does bear on the victims' compensation. In the *Allen* type of cases, the wrongdoer's proportionate liability would either over-compensate or under-compensate the specific victim. Unlike the wrongdoer, the victim is not a repeat participant in recurrent transgressions. Unlike the wrongdoer, therefore,

[35] Cf. Porat & Stein, above n 17 at 132–36.

the specific victim would be unaffected by the long-term adjustment of compensatory payments.

In cases similar to *Holtby*, in which all the losses sustained by the victims are wrongful, this problem does not exist. Nonetheless, *Allen*'s liability mechanism could still be justified under corrective justice as a second-best. First, this mechanism does not impose excessive or insufficient compensation duties on wrongdoers (assuming that these are repeat transgressors). Second, among all the options available to judges, this mechanism holds the best prospect of adequately compensating the victims.

3. *Holtby, Allen, and Recovery for Lost Chances*

In England, a person's wrongful exposure to a risk of injury and the corresponding reduction of his or her chances of remaining uninjured are not actionable in torts. In *Hotson* v *East Berkshire Area Health Authority*,[36] the House of Lords made a principled holding to this effect. The risk-based liability regime installed by *Holtby* and *Allen* faces an uneasy relationship with this holding. To understand this relationship, consider the following adaptation from *Hotson*.

The Thigh Case

The claimant was hospitalized with a thigh injury, and his doctors negligently failed to detect the gravity of his condition until it was too late. The claimant sustained permanent disability, which could have had a 25 per cent chance of being prevented had the claimant's dangerous condition been properly diagnosed. Arguably, the doctors' negligence deprived the claimant of his 25 per cent chance of recovery. Under *Hotson*, the claimant has no cause of action against his doctors and the hospital. Yet, under *Allen*, the claimant is seemingly entitled to recover compensation from his doctors and the hospital. The amount of this compensation would equal 25 per cent of the claimant's damage. In *Allen*, the claimant was exposed to both wrongful and non-wrongful risk of sustaining injury, and his wrongful exposure to that risk was held to be actionable in torts as a statistical contributor to the injury. In the *Thigh* Case, the claimant was exposed to the risk of not recovering from an injury. As in *Allen*, the claimant was exposed to that risk both wrongfully (by his doctors) and non-wrongfully (by misfortune). His wrongful exposure to that risk also qualified as a statistical contributor to the injury (his non-recovery). The House of Lords, however, decided the case against the claimant.

Arguably, *Hotson* is an authority that only rejects the imposition of risk-based *liability* for damage, as opposed to a risk-based *apportionment* of the damage for

[36] Above n 15.

which the defendant was found liable under the general law.[37] Indeed, courts are generally more willing to adopt flexible measures in determining the recovery amounts, as they move from liability to damages. For example, in awarding compensation for lost earnings, courts do not hesitate to use flexible criteria that accommodate calculus of chances and partial recovery.[38] The following illustration is a typical example of such cases.

The Lost-Income Case

The claimant was injured in a car accident caused by the defendant's negligence and consequently suffers from a disability that reduces his ability to work. Presently, as well as before the accident, the claimant worked as a clerk and his income was very low. Before the accident, however, he had a 30 per cent probability of obtaining a more profitable employment as a seaman in the merchant marine. The claimant's injury made it impossible for him to perform this kind of work. How should the law treat these three paradigmatic cases: *Holtby-Allen*, *Hotson*, and the *Lost-Income* case? An examination of this question would reveal that there are good reasons for the law to afford each of these types of cases individual treatment. In particular, despite the apparent similarities between *Hotson* and *Holtby-Allen*, there are good reasons for treating those cases differently.

We begin with optimal deterrence. In each of the three categories of cases, the proportionate recovery approach is both generally justified and preferable to the 'all or nothing' approach. This is only *generally* so because this observation does not hold true under one exceptional scenario. Under this scenario, cases in which the probability of the claimant's allegations is higher than 50 per cent and cases in which this probability does not surpass 50 per cent are distributed symmetrically across the board. This symmetrical distribution of the cases would align the transgressors' incentives under the proportionate recovery and the 'all or nothing' approaches. The two approaches would set equal levels of expected liability, so that preferring one approach over the other would exert no influence on the transgressors' behaviour.

As we turn to corrective justice, the difference between the three types of cases becomes apparent. In the *Lost-Income* case, probabilistic recovery can easily be reconciled with corrective justice. The wrongdoer deprived the victim of an earning opportunity, and such opportunity is a tangible asset. Wrongful destruction or dilution of this asset reduces the victim's welfare and should therefore be actionable in torts. For example, if there is a non-negligible probability that the victim would have taken a particular job had he or she not been

[37] See *Gregg* v *Scott* [2002] EWCA Civ 1471 (affirming, on the *Hotson* principle, the High Court's dismissal of a medical malpractice action in which a wronged patient attempted to obtain compensation for his lost chances of recovery). This decision, however, and especially the dissenting opinion of Lord Justice Latham, who would have allowed the appeal, might lead to a reconsideration of *Hotson*.

[38] Winfield & Jolowicz, above n 14 at 773–74.

injured by the wrongdoer, and the job is currently unavailable to the victim because of the injury—the reduction of the victim's welfare, for which the wrongdoer is responsible, is both tangible and measurable. This reduction equals the multiplication of the earning improvement that could be brought about by the new job by the victim's probability of taking that job in the hypothetical setting in which he or she remains uninjured.[39]

In *Hotson* and similar cases, this reconceptualization of the victim's loss is doomed to failure. In any such case, the victim either suffered wrongful loss or did not suffer it at all. To say that the victim suffered a wrongful loss that amounts to 25 per cent of his or her entire injury would be artificial at best.[40] Holding the wrongdoer responsible for any part of the victim's loss is unlikely to promote corrective justice. This approach is more likely to extract money from a person who caused no wrongful loss and to transfer it to a person who sustained no such loss. This outcome is at odds with corrective justice.

Holtby and *Allen* fall between the two previous categories of cases. On the one hand, the defendant certainly damaged the claimant, and did so wrongfully. Therefore, finding the defendant proportionately liable would not extract compensation from a person who did not inflict any wrongful loss on the claimant. Furthermore, the prospect that the claimant will obtain compensation without being wronged does not exist in the *Holtby-Allen* type of cases. These factors bring *Holtby* and *Allen* closer to the *Lost-Income* case than to *Hotson*.

On the other hand, in cases such as *Holtby* and *Allen*, the proportionate liability regime might extract either excessive or insufficient liability payments from wrongdoers. Indeed, there is a non-negligible prospect that such wrongdoers would pay either more or less than the actual damages that they inflict on their victims. Moreover, in cases such as *Allen*, there is a virtually certain prospect that the proportionate liability regime would yield either excessive or insufficient compensation amounts for the victims of torts. These factors bring *Holtby* and *Allen* closer to *Hotson* than to the *Lost-Income* case.

In the final analysis, corrective justice would be better served by applying the proportionate liability principle to the *Holtby-Allen* type of cases. As stated at the outset, cases belonging to this category feature a recurrent wrong that systematically damages victims. From the perspective of corrective justice, this factor makes those cases suitable for proportionate liability. In *Hotson*, this factor was not present: the doctor responsible for the malpractice was not a repeat transgressor. The type of wrongdoing perpetrated by the doctor was a single, rather than systematic, event. In such cases, a long-term adjustment of compensatory

[39] Porat & Stein, above n 17 at 117–19.

[40] Cf. S. Perry, 'Risk, Harm, and Responsibility' in D.G. Owen (ed), *Philosophical Foundations of Tort Law* (1995) at 321. See M. Stauch 'Causation, Risk, and Loss of Chance in Medical Negligence' (1997) 17 *OJLS* 205 at 217–18 (claiming that imposition of liability for lost chances does not contradict the deterministic approach to causation because it makes no claims about the state of the world, as opposed to the state of our knowledge about the state of the world). For a different view, see H. Reece 'Losses of Chances in the Law' (1996) 59 *MLR* 188. The case would be different if at the time of the trial it is still unknown whether the victim will suffer a wrongful loss. See Porat & Stein, ibid at 120–25.

payments is an impossible scenario. Corrective justice, therefore, would not justify imposition of proportionate liability in this type of cases.[41]

4. *Risk v Probability of Causation in Apportioning Liability for Injuries*

This part of the article examines the *Holtby-Allen* liability principle that applies to causally indeterminate cases. Under this principle, wrongdoers are held responsible for the victim's injury in proportion to the risk of injury to which each wrongdoer exposed the victim. Thus, in a case in which the claimant's damage (d) is causally associated with different risks of injury, r_1, r_2, r_3, ... r_n, that originate from different sources, both wrongful (1, 2 and 3) and non-wrongful (n), and it is evidentially impossible to attribute any particular fraction of this damage to any of these risks, then each of the wrongdoers ought to pay the claimant the following amount of compensation:

Wrongdoer 1: $(r_1 / r_1+r_2+r_3+\ldots r_n)\ d$;
Wrongdoer 2: $(r_2 / r_1+r_2+r_3+\ldots r_n)\ d$;
Wrongdoer 3: $(r_3 / r_1+r_2+r_3+\ldots r_n)\ d$.

Within this framework, judges appraise the relevant risks comparatively. For that purpose, they can utilize any scale of cardinal numbers.

Two simple examples, both adapted from a famous Israeli case,[42] can further the understanding of this approach.

Dogs' Case I

Two dogs, each belonging to a different wrongdoer, simultaneously attacked the claimant. The ensuing damage is evidentially indivisible, for it is impossible to establish which dog did what. The claimant files a lawsuit against one of the wrongdoers, who does not contest his fault.

Dogs' Case II

Two dogs—one belonging to the defendant and the other unowned—simultaneously attacked the claimant. The ensuing damage is evidentially indivisible, for it is impossible to establish which dog did what. The defendant's fault is not contested. Note that *Dogs' Cases I* and *II* are similar to *Holtby* and *Allen*, respectively. At the same time, the factual settings of those cases do not exhibit the complexities that characterized *Holtby* and *Allen*. Discussion of those cases thus becomes methodologically advantageous.

[41] The case might be different if we shift the focus to the hospital, vicariously liable for the doctor's malpractice: the hospital, as opposed to the doctor, may have been a repeat transgressor.

[42] *Melech* v *Cornhauser*, 44(2) Piskey Din 89 (1990) (Hebrew).

The risks of injury to which the dogs exposed the claimants in each of those cases must be determined by the dogs' relative strengths and ferocity. In the absence of evidence concerning those factors, the judges would apply the indifference principle. Under this principle, probabilities of the competing factual scenarios that remain unevidenced are deemed equal and thus cancel each other out. The dogs would thus be deemed to have attacked the claimant with equal strength and ferocity. Consequently, the judges would hold the defendant liable for half of the claimant's damage in each case.

This outcome parallels *Holtby's* time-exposure criterion for liability.[43] The *Dogs' Cases* solution also parallels most of the *Allen* criteria for apportioning liability for injuries. Amongst those criteria were the length of the separate employment periods during which the claimant worked with vibrating tools, the intensity of his work during each period and the percussiveness of the different tools that he had to use throughout his employment.[44]

Risk-based apportionment of liability for injuries appears to be a plausible solution for the indeterminate causation problem. In the following paragraphs we juxtapose this solution with another probabilistic solution—one that uses the *probability of causation* as a criterion for apportionment. Thus far, we did not distinguish between the two approaches. These approaches would, indeed, produce similar outcomes in numerous cases. Yet, in many other cases, outcomes reached under the two approaches would substantively differ from each other. The risk-based liability principle, as applied to indeterminate-causation cases, suffers from a serious shortcoming. This shortcoming originates from a fundamental misalignment between risk of injury and probability of causation. We now explain the effect of this misalignment in the context of the *Hotson* type of cases (the *Thigh* Case). Subsequently, we examine its impact on *Holtby* and *Allen*.[45]

When a wrongdoer exposes another person to a risk of injury that may or may not materialize in the future, the magnitude of that risk represents the wrongdoer's probability, before the event, of inflicting injury. After the event, this *ex ante* probability becomes factually immaterial. Thus, if the prospective victim actually sustains injury following the wrongdoer's action, the court should determine the *ex post* probability of the allegation that the injury was actually inflicted by the wrongdoer. This probability is not the same as that of the injury's previously existing prospect, and we now present the formal proof of this important difference.

[43] Arguably, in cases such as *Holtby*, judges ought to discriminate between the early-stage and the late-stage exposure to the hazardous substance. See discussion below. However, if there is no evidence that warrants such a discrimination, the unrefined time-exposure criterion would become the only criterion for deciding the case.

[44] Mr Allen's judges also took into account his 'stoic' character and the consequent willingness to take risks associated with a profitable employment. They used this factor as partly offsetting the risk to which Mr Allen was wrongfully exposed by the defendant employer. See discussion below.

[45] *Holtby* and *Allen* are not entirely unambiguous with respect to this issue. In both cases, the judges focused on the severity of the defendant's contribution to the claimant's injury. The judges, however, did not explicitly commit themselves to any of the two criteria, and none of the parties made an argument that required them to do so. The issue, therefore, is still open, as far as the formal legal doctrine is concerned.

Take a person who sustains injury after being wrongfully exposed to a risk of sustaining that injury. Before the wrongdoing, this victim's probability of sustaining the injury equalled $1-p$, which is parallel to his or her probability of remaining uninjured (p). After the wrongdoing, the victim's probability of sustaining the injury became $1-q$, which is parallel to his or her probability of escaping the injury (q). Because the victim actually sustained the injury, his or her case falls into the $1-q$ category. This statistical category comprises two jointly exhaustive and mutually exclusive scenarios that reflect the victim's *initial position*. In the first scenario, the victim sustains the injury irrespective of the wrongdoing. Under this scenario, the victim was doomed to sustain the injury, so that the wrongdoing made no impact on his or her well-being. As already indicated, the probability of that scenario equals $1-p$. In the second scenario, it is the wrongdoing that causes the victim's injury. Under this scenario, the victim would have remained uninjured had he or she not been exposed to the wrongdoing. The probability of this scenario equals $(1-q)-(1-p)$, that is, $p-q$. This *ex ante* probability represents the reduction in the victim's chances of remaining uninjured, as effected by the wrongdoing.

We now inquire into the *ex post* probability of the scenario that the wrongdoing was the actual cause of the victim's injury. This probability is represented by the fraction of scenarios featuring a victim who could not sustain his or her injury without being subjected to a wrongdoing in the more general cluster of cases that feature an injured victim, a wrongdoing, and the exhaustive variety of causal factors that could inflict the same injury on the victim. The above fraction of scenarios equals $p-q$. The cluster of cases covering all possible scenarios equals $1-q$. The *ex post* probability of the scenario in which the wrongdoing actually inflicts the victim's injury therefore equals $(p-q)/(1-q)$.

As already mentioned, the victim's risk of sustaining injury as a result of the wrongdoing equals $p-q$. Consequently, in cases in which the victim actually sustains injury, the (*ex post*) probability of causation—that is, the probability of the allegation that factually attributes the injury to the defendant's wrongdoing—would generally be higher than the (*ex ante*) risk of injury. This would be so because, on numerous occasions, a wrongdoing increases the victim's probability of becoming injured without transforming this prospect into empirical reality. In any such case, since the wrongdoing still leaves the victim with chances of escaping the injury, $0 < q < 1$. Hence, $(p-q)/(1-q) > p-q$. The two probabilities would be equal only when $q=0$, that is, when the wrongdoing totally eliminates the victim's chances of escaping the injury. In $q=0$ cases, the risk of injury and the probability of causation would concur and would equal p.

In the *Thigh* Case, for example, because the defendants' malpractice totally eliminated the claimant's chances of recovery (p) that amounted to 25 per cent—so that $q=0$—$(p-q)/(1-q)=p-q=p=25\%$. Yet, in the following variation of the *Thigh* Case, in which the wronged patient still retains chances of recovery—although, unfortunately, they do not materialize—things would be different.

Malpractice or Misfortune?

The claimant required urgent surgery, which—if performed properly and on time—would have given him a 75 per cent chance of recovery. The doctors negligently delayed the surgery. The delayed surgery was performed impeccably, but it promised the claimant only a 25 per cent chance of recovery. Ultimately, the claimant did not recover. Can this outcome be causally attributed to the malpractice, or is it merely a misfortune? In this example, the *ex post* probability of causation equals 2/3, that is, 67 per cent, while the *ex ante* risk of injury amounts only to 50 per cent. The two probabilities would have been equal had the malpractice totally eliminated the claimant's chances of recovery. In such a scenario, both the risk of injury and the probability of causation would have amounted to 75 per cent. In the actual example, the malpractice transferred the claimant from a group of similarly situated patients that are promptly operated to another group of patients whose surgery was wrongfully delayed. For the sake of convenience, we now assume that there are 100 patients in each of those groups. The first group of patients would thus consist of 75 patients that recover and 25 patients that do not. The second group of patients, to which the claimant presently belongs, would consist of 75 patients that do not recover (sub-group 1) and 25 patients that recover (sub-group 2). The claimant obviously belongs to sub-group 1, that we should further divide into two categories of patients: 25 patients that were doomed not to recover, so that they remain causally unaffected by the malpractice (category A), and 50 patients that would have recovered had their doctors performed the operation on time (category B). There is, therefore, a 67 per cent chance (50/75) that the claimant belongs to category B.

In any such case, probability of causation will always be higher than risk of injury, and not accidentally so. Probability of causation must be determined by focusing on the fraction of wronged patients that did not recover, as contrasted with the entire group of wronged patients that consists not only of those who did not recover, but also of those who did. In this smaller fraction of patients—to which the afflicted claimant belongs—the proportion of patients who would have recovered in the absence of malpractice is higher than in the entire group of wronged patients.

In the long run of cases, payments extracted from wrongdoers under the risk-based recovery formula would systematically fall below the amounts needed to cover the victims' losses. Because the wrongdoers' expected liability would be lower than the expected losses that they cause, their deterrence would be sub-optimal. The risk-based formula ignores a number of simple facts, namely: the fact that the victim has already sustained injury; the fact that the injury may have been inflicted by the defendant's wrongdoing; and the fact that the probability of this scenario is higher than the level of risk to which the victim was initially exposed.

Let us illustrate this point by a numerical example, based on our *Malpractice or Misfortune?* hypothetical. Take 100 similar cases that courts have to process, in

which the average damage equals £100 and the wrongdoer is the same person or entity. In these cases, because the wrongdoer externalized a 50 per cent risk of injury, he must pay £5,000 in damages to be optimally deterred. If the wrongdoer pays a lesser amount, he would not internalize the entire risk associated with his activity and would not be sufficiently deterred. Under the controlling legal doctrine, tort compensation is paid for consequences, not just for actions. A person who was exposed to a wrongful risk, but sustained no actual harm, has no cause of action against his or her wrongdoer, and prospective wrongdoers are well aware of this fact. In our example, therefore, the wrongdoer knows that only 75 out of 100 patients who suffered from his wrongdoing would successfully sue him in court. This is so because it is certain that 25 patients sustained no actual harm and will not sue. Consequently, the wrongdoer knows in advance that the risk-based recovery formula would force him to pay £50 to each of the 75 patients who did not recover, that is, £3,750 as a total amount of money damages. The difference between this sum and the optimally deterring amount of compensation equals £1,250.

The existence of this shortfall is obviously detrimental to society. For example, if the wrongdoer's activity produces a social benefit amounting to, say, £4,000, society would be better off if the activity were not to take place. In such a scenario, society would spare a £1,000 loss. The wrongdoer, however, would prefer to engage in that activity because it would yield a £250 profit. The risk-based recovery formula therefore creates a discrepancy between the social good and the wrongdoer's private incentives. Notice, however, that if the law were to impose on the wrongdoer a £50 liability towards each of the 100 claimants—those who did not recover and those who did alike—the wrongdoer would have anticipated total liability of £5,000. The deterrence objective of the law of torts would then have been attained.[46]

Basing the compensation duty on the probability of causation would eliminate the discrepancy between the payments extracted from wrongdoers and the losses sustained by their victims. In the present example, the probability of causation amounts to 2/3. Hence, although the wrongdoer would still compensate claimants in 75 cases out of 100, the total amount of his compensation duty would be £5,000 (2/3·£100·75). Using the probability of causation as an award-multiplier would thus align the wrongdoer's compensation duty with the losses that he actually inflicted upon his victims.

A simple formal analysis demonstrates that this outcome would be achieved in all cases. Following our notation, let p and q denote, respectively, the victim's chances of remaining uninjured before and after the wrongdoing. Allow D to denote the average amount of damage that the wrongdoing inflicts in the long run of cases, and let T denote the total number of cases in which the risky activity takes place. The ideal compensation that the legal system should exact from

[46] But not corrective justice, since part of those payments would have gone to the uninjured claimants at the expense of their wrongfully injured counterparts.

the wrongdoer would thus equal $(p-q)$DT. In reality, however, only injured victims would be allowed to sue the wrongdoer. Therefore, the number of cases in which the wrongdoer would have to pay compensation would equal $(1-q)$T. The wrongdoer's compensation duty would thus be below the optimal (because $(1-q)$T is less than T). Using the probability of causation as an award-multiplier would eliminate this shortfall. As established by our previous analysis, the probability of causation equals $(p-q)/(1-q)$. The total amount of the wrongdoer's compensation duty would consequently be calculated as follows:

$$[(p-q)/(1-q)] \cdot \mathrm{DT}(1-q) = (p-q)\mathrm{DT}.$$

This compensation duty equals the losses inflicted by the wrongdoer. It would therefore optimally deter prospective wrongdoers.[47]

We now turn to *Holtby* and *Allen*. Would the disposition of such cases under the probability-of-causation formula yield outcomes that differ from those reached under the risk-of-injury approach? To avoid repetition, we focus only on *Allen*. In one respect, this case is analogous to our *Malpractice or Misfortune?* hypothetical. If some employees wrongfully exposed by the defendant to the VWF risk do not actually become afflicted and, consequently, do not sue the defendant, the total amount of compensation that the defendant would pay Mr Allen and other afflicted employees under the risk-of-injury formula would be less than the actual damage originating from the defendant's wrongdoing.

But what if all employees become afflicted? In such a case, the risk-of-injury and the probability-of-causation formulae might still produce different outcomes. This would be so in cases in which the relative gravity of the different injuries correlates with the causal impact of the wrongful risk. In cases belonging to this category, the causal impact of the wrongdoing is greater when the injury is more severe. Assume that a wrongdoer exposes one hundred people to a risk of injury that intensifies an identical risk, for which the wrongdoer is not

[47] The probabilistic misconception identified in this part of the article is prevalent in the American law of torts. See, for example, *Wendland* v *Sparks*, 574 NW 2d 327, 333 (Iowa 1998) (an oft-cited decision analogizing the value of lost chances to that of a lottery ticket); *Mays* v *United States* (1985, DC Colo) 608 F Supp 1476, rev'd on other grounds (CA10 Colo) 806 F 2d 976, cert den 482 US 913 (upon finding that malpractice reduced the patient's chances of recovery from 40 to 15 per cent, the court reasoned that the damage related to net pecuniary loss caused by the medical centre was 25 per cent of the $173,200 total net pecuniary loss, or $43,300); *Herskovits* v *Group Health Cooperative of Puget Sound*, 664 P 2d 474 (Wash 1983) (holding a 14 per cent reduction, from 39 per cent to 25 per cent, in the decedent's chance for survival as sufficient evidence to allow the case to go to the jury); *Alberts* v *Schultz*, 975 P 2d 1279, 1287 (NM 1999) (if medical malpractice reduced the patient's chance of recovery from 50 to 20 percent, that patient's compensation would be equal to 30 percent of the value of his or her life); *Jorgenson* v *Vener*, 616 NW 2d 366, 372 (SD 2000) (if instead of completely eliminating the chance of recovery, the physician's negligence merely reduced the chance of recovery from 40 per cent to 20 per cent, then the value of the lost chance would be 20 per cent of the value of a complete recovery); *Smith* v *Washington*, 734 NE 2d 548 (Ind 2000) (affirming an award of 50 per cent of the patient's damage upon finding that the defendant's malpractice increased the patient's risk of incurring an already likely injury from 50 per cent to 100 per cent). For reasons provided above, the claimant should have recovered 29 per cent of the damage in *Mays*; 19 per cent of the damage in *Herskovits*; 37.5 per cent of the damage in the *Alberts* example; and 25 per cent of the damage in the *Jorgenson* example. In *Smith*, the outcome was correct because the defendant's malpractice *totally* eliminated the claimant's chances of recovery. Otherwise, the court's adherence to the lottery analogy would have generated an error (as it did in our previous examples).

responsible. Further assume that all those people subsequently become injured and that an unidentified fraction of each injury results from the wrongdoing (the remaining fraction results from the materialization of the pre-existing risk, unassociated with the wrongdoer). Also assume that the statistically average damage suffered by a single victim is £50. Specifically, 50 people out of the 100 suffer injury of £80, and the other 50 suffer injury of £20. Finally, assume that the wrongdoing's causal contribution to the injuries that are more severe (£80) is greater than its parallel contribution to the less severe injuries (£20). Specifically, the wrongdoing is responsible for 75 per cent of the damage in the more severe type of cases and only for 25 per cent of the damage in the less severe type of cases.

In this example, the total damage inflicted by the wrongdoer equals £3,250 (75%·£80·50+25%·£20·50), which is exactly the amount of money that the wrongdoer would have to pay under the probability-of-causation formula. Under the risk-of-injury formula, the wrongdoer would only pay £2,500 (50%·£80·50+50%·£20·50). The risk-based approach would thus insuffi ciently deter the wrongdoer. Also notice that this approach would yield similar amounts of compensation to the wrongdoer's victims. Victims with more severe wrongful injuries would recover from the wrongdoer the same amount of money as the victims whose wrongful injuries are far less serious.[48]

5. *Pragmatic Intuitionism in Appraising Risks of Injury*

Holtby and *Allen* both license and encourage trial judges to apply their common sense and intuition in appraising the relevant risks of injury.[49] Making such appraisals correctly, however, would be a rather daunting task; and when the relevant evidence is scarce, discharging this task would be altogether impossible. Cases to which the *Holtby-Allen* approach will apply, feature, *ex hypothesi*, two or more risks of injury with an irreducibly uncertain causal impact. In a case in which one such risk is both wrongful and known to be causally dominant, the claimant would establish causation on a balance of probabilities. Consequently, the wrongdoer responsible for that risk would have to compensate the claimant for his or her entire injury. Alternatively, if the dominant risk did not originate from a wrongdoing—so that the residual risks, for which one or more wrongdoers are responsible, are all negligible—then it would be clear enough that none of the wrongdoers is causally connected to the claimant's injury. For the former category of tort actions, the prevalent doctrine prescribes full recovery; it prescribes zero recovery for the latter category of actions—and both *Holtby* and *Allen* leave this doctrine unmodified. Indeed, the whole point of the *Holtby-Allen* approach is to rescue the intermediate category of causally indeterminate cases

[48] The same analysis would apply to cases with the opposite correlation between the gravity of the injury and the causal impact of the wrongful risk.

[49] *Holtby* at 426–27, 429; *Allen* at 108–14.

from the unhappy oscillation between the *McGhee-Bonnington* principle and the general burden-of-proof doctrine. In other words, *Holtby* and *Allen* have abandoned the 'all or nothing' approach to tort causation only with regard to cases that are far removed from both 'all' and 'nothing'.

In such cases, accuracy in the appraisal of the relevant risks is an unlikely scenario. In cases involving industrial diseases, medical malpractice damages, or injuries sustained through exposure to hazardous substances, judges would be able to seek guidance in the growing body of scientific research. This body of research contains an impressive amount of statistical data upon which judges would be able to rely. Such guidance, however, would not be available in numerous other cases; and even when it is available, its application would often be thwarted by the particularities of the case that offer more individualized explanations for the injury. Common sense and judicial intuition can hardly serve as substitutes for missing scientific guidance. They do not accommodate a sufficient stock of reliable statistical data for appraising risks of injury and are, therefore, not safe enough to rely upon. Judges relying on their common sense and intuition would ultimately be guessing, rather than gauging, the degrees of the relevant risks.

In the absence of factual grounds for appraising the relevant risks of injury, judges using the *Holtby-Allen* approach might consider moving to an altogether different terrain. They might decide to employ blameworthiness as a touchstone. The magnitude of the risk of injury that judges would charge upon each wrongdoer would consequently derive from the degree of his or her culpability. This way of deciding cases would, however, abandon the traditional objectives of the law of torts—that of corrective justice and that of deterrence—in favour of retribution. The relationship between actions and consequences is a matter of contingent fact rather than fixed morality.[50] A moral appraisement that Wrongdoer *A* acted towards the victim in a most reprehensible way, while Wrongdoer *B*—who exposed the victim to a risk of sustaining the same injury—was only slightly blameworthy, does not allow the judges to determine *factually* that *A*'s actions were the most probable cause of the victim's injury. *A* may have been more blameworthy than *B*, but at the same time he or she may have created a lower risk of damage. Judges, nevertheless, may still treat the blameworthiness of a person's action as a criterion for imposing liability in torts regardless of the action's consequences, both actual and potential. In cases in which both the risks associated with the defendant's action and the action's consequences are indeterminable, this retributive criterion might be the only safe harbour. Indeed, this approach is not devoid of merit, but because it was not on the agenda in *Holtby* and *Allen*, we mention it only parenthetically.

The pragmatic intuitionism that both *Holtby* and *Allen* have endorsed is problematic. Yet, our critique of this approach would be incomplete without offering an alternative. After all, this approach develops a 'filler', rather than a substitute.

[50] See T. Honoré 'Responsibility and Luck: The Moral Basis of Strict Liability' (1988) 104 *LQR* 530.

Holtby and *Allen* did not embrace pragmatic intuitionism as a replacement for factual findings that can be grounded on hard evidence. Rather, they embraced it residually to fill up the evidential void. The Court of Appeal adopted this approach after rejecting the 'all or nothing' extremes, offered by the burden-of-proof doctrine, on the one hand, and by the *McGhee-Bonnington* principle, on the other. Unlike others,[51] we do not consider either of those extremes as a viable solution to the problem, so we need to offer our own alternative and defend it.

The only viable alternative to the Court's pragmatic intuitionism is the statistical 'principle of indifference', also known as the 'principle of insufficient reason'.[52] Under this principle, in the absence of solid evidence for evaluating prospects, the indeterminable prospects should be deemed equal and cancel each other out. Take a group of 100 claimants who suffer from a similar type of cancer. Assume further that 60 claimants have sustained their disease from exposure to a toxic substance, for which the defendant is responsible, and that there is no evidence that could distinguish between these 60 claimants and the remaining 40, whose affliction resulted from misfortune. The indifference principle deems this missing evidence to be distributed randomly across cases. The missing evidence is consequently assumed not to be slanted in any particular direction, even though we know that this assumption is factually untrue.[53] Each of the 100 claimants is thus deemed to have the same chance of being one of the sixty rightful claimants. Under this assumption, the probability of each claimant's case against the defendant equals 60 per cent. The most famous application of the indifference principle is that of a coin throw: in each throw, the probability of getting tails (or heads) is deemed to be 50 per cent. This postulation assumes that the coin is 'fair'. Specifically, it holds that the unknown information concerning the composition of the coin and its surrounding conditions is not slanted in any particular direction. Making this assumption is rational: in the long run of cases, this randomizing procedure will verify the '50 per cent tails' prediction. Hence, if we have to choose between two completely unevidenced scenarios, it would be rational for us to ascribe a 50 per cent probability to each.[54]

In *Thompson*,[55] a judgment that inspired both *Holtby* and *Allen*, Mustill J branded the equal-chance assumption as 'arbitrary'.[56] In choosing this adjective, however, he made an analytical mistake. Within the framework of the accepted ends of the law of torts, to whiche Mustill J's decision explicitly refers, the term 'arbitrary' diagnoses the absence of instrumental connection between the means and the ends. Specifically, it suggests that resorting to the indifference principle

[51] See, for instance, S. Hedley 'Employers' Liability—Assessment of Damages—Reduction to Reflect Fault of Other Parties' [2000] *CLJ* 435.

[52] See L.J. Cohen, *An Introduction to the Philosophy of Induction and Probability* (1989) at 43–47 (both presenting the 'indifference principle' and unfolding its limitations).

[53] Ibid.

[54] Ibid.

[55] *Thompson* v *Smiths Shiprepairers (North Shields) Ltd*, above n 27.

[56] Ibid at 909–10.

would not advance the objectives that the law of torts seeks to attain. This suggestion, however, was a mere postulation rather than proof. Mustill J's decision does not examine the possibility of promoting the tort law objectives, such as deterrence and corrective justice, through deployment of the indifference principle. Following this decision, both *Holtby* and *Allen* also did not consider that possibility. The unreflective elimination of that possibility—an oversight that went side by side with the well-considered abandonment of the traditional 'all or nothing' approach—rendered pragmatic intuitionism the best solution to the problem of indeterminate causation. The question that the courts failed to address is whether their pragmatic intuition and its application on a case-by-case basis are preferable to a blunt policy instrument that randomizes the uncertainties across the board.

From an economic point of view, for example, the indifference principle is clearly preferable to the trial judges' pragmatic intuition. First, intuitions may, at times, turn out to be wrong, a risk that the indifference principle does not entail. In the long run of cases, the indifference principle would thus allocate liability for damages more accurately than judicial intuitionism. This principle, therefore, should only be set aside on the basis of solid evidence, when such evidence is available. Second, the indifference principle saves administrative costs that include the costs of trial and other expenses related to litigation. A regime that favours pragmatic intuitionism is discretionary in character. As such, it would involve litigation over the uncertainties that judges are authorized to resolve by their intuition. Any such regime would consequently incur substantial adjudication costs. Those costs can be saved by resorting to the indifference principle: application of this principle is practically costless.[57]

The distortions that the new judicial intuitionism is likely to generate are very real. They can be exemplified by *Allen*'s counterfactual finding that part of the claimant's injury was doomed to be self-inflicted because the claimant was 'a stoic man with a good job', who would have taken upon himself some of the VWF risk in order to earn money even if the defendant employer were to warn him about the risk.[58] For obvious reasons, such findings can only be made on the basis of solid evidence. In *Allen*, no such evidence was available, and so judicial intuition was exercised instead. Apart from being simply insecure, this finding first constructs the claimant's personality; subsequently, it deterministically postulates the existence of a causal relationship between personality and action—and it does all this by alluding to generalizations that are based, even more precariously, on the claimant's gender and working class affiliation.

Indeed, if Mr Allen's judges were seriously to consider the 'stoic assumption of the risk' scenario, they ought to have compared its probability with that of the other scenarios that could have unfolded in the hypothetical world in which the defendant employer adequately warns Mr Allen about the risk of contracting

[57] See L. Kaplow 'Rules versus Standards: An Economic Analysis' [1992] *Duke LJ* 557.
[58] *Allen* at 111–13.

VWF. This hypothetical world was not inhabited solely by stoic Mr Allen and his cautious employer. In this world, as in the real one, Mr Allen must have been surrounded by family, friends, co-workers, trade-union advisors and doctors. Any of those people could have strongly advised Mr Allen to discontinue his work with vibrating tools. Members of his close family could even have insisted on that course of action, so that Mr Allen could ultimately have decided to compromise his stoic image by protecting himself from the VWF risk. This hypothetical scenario was, admittedly, unevidenced, as was the 'stoic assumption of the risk' scenario. The two counterfactual scenarios thus cancel each other out. Instead, therefore, of relying on one of those scenarios, the judges should have ignored both of them.

The time-exposure criterion, favoured by the Court of Appeal in *Holtby*,[59] also calls for comment. This linear criterion is problematic because it does not differentiate between the earlier and the later stages of the claimant's exposure to asbestos. In environmental pollution cases, for example, the latest pollution unit that takes the pollution above its tolerable level is treated as more harmful than the previous pollution units.[60] Why should things be different with the asbestos dust that gradually contaminated the claimant's lungs until it produced full-blown fibrosis? The time-exposure criterion also displays indifference towards the intensity of different exposures to the dust, a factor that varies from case to case. This factor depends on both the quantity and the perniciousness of the dust to which the claimant was exposed. With regard to this, the Court of Appeal held that its time-exposure criterion should apply 'in the absence of some unusual feature, such as for example periods of exposure to a particularly dangerous blue asbestos',[61] but this is just one of the many case-specific factors that should affect the appraisal of the relevant risk of injury.

The Court of Appeal noted that the time-exposure criterion is a practice among insurers,[62] but we doubt that this practice is universal. Take, for example, two marine fitters, *A* and *B*, who are willing to purchase health insurance policies. *A* is about to begin his career as a marine fitter, while *B* has already worked as a marine fitter for several years. The future employment periods for both *A* and *B* are estimated as equal, and in both cases, exposure to asbestos is a realistic prospect. Both *A* and *B* underwent medical examination and were found to be in good health. In these circumstances, *B*'s insurers cannot rationally ignore the possibility that *B* has already inhaled a non-negligible amount of asbestos dust throughout his past employment. In light of this possibility, the insurers would have to consider the prospect that *B*'s future exposure to asbestos would prove fatal. There is, therefore, no doubt that *B*'s insurance policy would cost more than *A*'s, and one can easily imagine other cases in which the duration

[59] Above n 1 at 431.
[60] R.A. Posner, *Economic Analysis of Law* (5th edn, 1998) at 412.
[61] *Holtby* at 431.
[62] Ibid.

of the exposure to a hazardous substance will not be the only criterion for pricing insurance policies.

These problems also arise in VWF cases, exemplified by *Allen*. Here too, the duration of the claimant's work with vibrating tools is an important factor, but—since some tools are not as percussive as others—the degree of vibration is no less important. Furthermore, as acknowledged by the Court of Appeal in another VWF case,

> A person's constitution can put up with so much exposure to vibration. If, to use the expression which appears in the medical reports, the reservoir becomes full, that is the reservoir of tolerance, then symptoms will, in the case of a significant number of people, emerge. If, on the other hand, exposure stops before the reservoir is full, then, notwithstanding a continuing vulnerability if further vibration occurs, there will be no symptoms which could give rise to an award of substantial damages.[63]

Based on this intuitive premise, the Court of Appeal held that the trial judge 'was entitled to find that, in this particular case, had there been a proper discharge by the defendants of their duties as employers, white fingers would not have developed, notwithstanding the long earlier period of exposure'.[64] This holding indeed appears impeccable, which once again highlights the problem at hand: if the trial judge in *Allen* were to use her intuition in the same way and order no apportionment of the damage, her decision would have withstood appellate scrutiny as easily as her actual decision did.

6. *The Implications of* Fairchild

The *Fairchild* decision adjudicated three separate actions. Each of these actions involved a claimant who contracted mesothelioma following his wrongful exposure to asbestos by several employers. Under the factual assumptions most favourable to these employers, this affliction originated from a single mesothelial cell in the pleura that developed malignancy. This cell became mesothelial due to a single fibre or several fibres of asbestos that the claimant inhaled. Because the claimant was not exposed to asbestos outside his employment, this cell necessarily was contaminated by one of his employers.[65] The claimant could not individually identify this employer, and so he brought his action for damages against all his employers.

Under the traditional burden-of-proof doctrine, this action was doomed to failure: any proposition that could factually attribute the claimant's affliction to a single defendant would have been more improbable than probable. The action

[63] *Smith* v *Wright & Beyer Ltd* [2001] EWCA Civ 1069.

[64] *Allen*.

[65] Necessitated by the scarcity of evidence (*Fairchild*, above n 3 at 119–20), these assumptions were most favourable to the employers for a simple reason. If all the employers were found to have contributed to the claimant's affliction, then all of them would have been liable under the *McGhee-Bonnington* principle (or, alternatively, under the new approach of *Holtby* and *Allen*).

also could not succeed under the 'material contribution to the *injury*' standard, previously set in *Bonnington*[66] and *McGhee*.[67] This standard conditions the claimant's entitlement to recovery, as against each defendant, upon the defendant's factual contribution to the claimant's injury. The *Fairchild* claimants failed to satisfy this condition since none of them could factually link his affliction to more than one defendant.

The House of Lords, nonetheless, held that the claimants are entitled to recovery and placed the defendants under a both joint and individual obligation to make good the damage. In reaching this decision, the Law Lords relaxed the *McGhee-Bonnington* standard. They held that a liability standard based on the defendant's 'material contribution to the relevant *risk of injury*' is equally good.[68] Under this standard, the risk of injury, to which the defendant wrongfully exposed the claimant, would classify as relevant if two conditions are satisfied. This risk must be similar to the risks of injury to which other defendants wrongfully exposed the claimant; and the entire cluster of those risks must contain one that actually materialized in the case at hand. Consequently, if two or more wrongdoers separately expose the victim to identical risks of injury and one of these risks subsequently materializes, the wrongdoers would assume both a joint and several liability for the resulting damage. The Law Lords analogized their new liability principle to that of *Summers* v *Tice*,[69] a famous decision of the California Supreme Court that shaped the American law of torts.[70] In *Summers*, two defendants at or about the same time separately fired at the claimant, and the claimant was seriously injured by one of the shots. The defendant who fired this crucial shot could not be identified, and the California Supreme Court held both defendants liable. The Law Lords reconfirmed the principle that the law must not 'allow both hunters to go away scot-free, even though one of them must have fired the injurious pellet'.[71]

This analogy appears somewhat untidy because in *Fairchild*, the victim's exposures to the risk of injury did not occur simultaneously, as they did in *Summers*. Unlike the *Summers* defendants, therefore, the wrongdoers in *Fairchild* did not participate in the same tortious event. However, the principal reason for holding the *Summers* defendants liable altogether removes this appearance. As emphasized by Lord Nicholls, both hunters should assume liability for the claimant's injury because 'the evidential difficulty arising from the impossibility of identifying the gun which fired the crucial pellet should redound upon the negligent hunters, not the blameless plaintiff'.[72] We return to this point in section 7 that (among other things) relates *Fairchild* to the evidential damage doctrine.

[66] *Bonnington Castings Ltd* v *Wardlaw*, above n 9.
[67] *McGhee* v *National Coal Bd*, above n 9.
[68] *Fairchild*, above n 3. For critical evaluation of this substitution see Stapleton, above n 11.
[69] *Summers* v *Tice* (1948) 199 P 2d 1.
[70] See Restatement (Second) of Torts, §433B & Ill 9; For detailed discussion of this case see Porat & Stein, above n 17 at 58–61; 169–75; 186–88.
[71] *Fairchild*, above n 3 at 121*f* (Lord Nicholls).
[72] Ibid, at 121*g–h*.

The Law Lords expressly confined their new liability principle to cases in which at least one unidentified defendant *certainly* harmed the claimant.[73] Also under this principle, tort victims would never be over-compensated. The *Fairchild* principle consequently suffers from 'only' one major deficiency: the inordinate compensation duty that it would impose on wrongdoers factually unrelated to the victim's injury. This deficiency would be partially offset by indemnification payments that liable defendants would mutually owe to each other.[74] These payments would probably be determined by each defendant's probability to have actually injured the claimant.[75] Under this system, the defendants' duty to compensate the claimant both jointly and severally would ultimately be prorated. This mitigation, however, is far from eradicating the harm that the inordinate compensation duty might produce. This harm would include both excessive deterrence and a systematic violation of corrective justice. Indeed, this harm would persist as long as individuals are forced to pay for injuries that they did not inflict.[76]

To avoid this harm, the *Fairchild* liability standard must accommodate two additional requirements. First, the *Fairchild* doctrine must only apply to recurrent wrongs perpetrated by the same defendants systematically. To be found liable under this doctrine, each defendant must thus be identified as a recurrent producer of the relevant risk of injury. Second, the mutual indemnification prospect—that would align the liability burden of each defendant with his or her statistical share in the claimant's injury—must be viable. These conditions would establish a long-run system that exacts from each wrongdoer a sum of money that corresponds to the aggregate damage that he or she actually inflicted. Payments exacted from wrongdoers in this way would compensate each victim for the damage that he or she wrongfully sustained. This system would satisfy the demands of both deterrence and corrective justice.

Fairchild's factual background appears to have satisfied these requirements. Therefore, as long as the *Fairchild* liability standard remains confined to similar backgrounds, it would adequately promote the objectives of the law of torts. After undergoing our proposed adjustment, the *Fairchild* approach would, however, still differ from that of proportionate recovery in one important respect: the risk of insolvency. Under *Fairchild*, if one of the liable defendants becomes insolvent, the remaining defendants would still have to compensate the claimant

[73] This confinement is part of the *Fairchild* decision, but the Law Lords did not foreclose further developments in their 'relaxed causation' approach. See *Fairchild*, above n 3 at 120*g–h* (Lord Bingham); 130*d–f* (Lord Hoffmann).

[74] See *Fairchild* ibid, at 120*f–g* (Lord Bingham) (affirming that liable defendants 'could of course seek contribution against each other or any other employer liable in respect of the same damage in the ordinary way'.).

[75] As suggested by Stapleton (above n 11 at 299), this probability 'may be built on factors such as relative length/intensity of exposure or market share'.

[76] Stapleton (ibid) points out that any such indemnification criterion would 'necessarily be artificial because, since the aetiology of mesothelioma is unknown, the extent of a defendant's contribution to the total risk is, as a matter of science, unknown'. This problem is not crucial. Scarcity of information is not a good reason for abandoning the fundamental objectives of the law of torts, such as deterrence and corrective justice. The legal system, therefore, must utilize any available information from which probabilities facilitating the pursuit of these objectives can be derived. See Porat & Stein, above n 17 at 42–83.

to the full extent of his or her injury. The proportionate-recovery approach places this risk on the claimant. Under this approach, co-defendants not falling into the joint-tortfeasor category are legally unrelated. There is, therefore, no justification for turning them into mutual underwriters for their respective obligations to compensate the claimant.

Fairchild introduced no changes into the proportionate recovery principle of *Holtby* and *Allen*. As already indicated, the possibility of proportionate recovery was not raised before and, consequently, not adjudicated by the House of Lords. Lord Bingham's leading opinion explicitly mentions it and leaves the issue open.[77] Apart from that, an important factual difference exists between the two settings. In both *Holtby* and *Allen*, it was practically certain that none of the defendants had inflicted the claimant's entire damage. Rather, each defendant was positively established to have caused an unidentifiable fraction of that damage. In *Fairchild*, damage suffered by each of the claimants was causally attributable to only one defendant, who could not be identified.[78] For these reasons, an attempt to read into the *Fairchild* decision an implicit repeal of the *Holtby-Allen* principle would be unwarranted.

Yet, after *Fairchild*, claimants deserving recovery under the *Holtby-Allen* principle would no longer need to discharge the burden of proof upon which this entitlement depends. Instead of establishing each defendant's statistical share in his or her injury, any such claimant would only need to prove that he or she was wronged by each defendant, that the defendants' wrongs are indistinguishable, and that one of those wrongs necessarily brought about the injury. From the claimant's perspective, if the law, as stated in *Fairchild*, is kind enough to leap the evidential gap[79] for him or her, why bother? Furthermore, making such an effort might both complicate and compromise the claimant's recovery prospect.[80] To be fully compensated under the *Holtby-Allen* principle, the claimant would have to collect from each defendant its respective share in the total compensation amount. Under *Fairchild*'s liability *in solidum*, each defendant would owe the claimant the entire amount of compensation; and it would be up to

[77] Ibid ('It was not suggested in argument that C's entitlement against either A or B should be for any sum less than the full compensation to which C is entitled ... No argument on apportionment was addressed to the House'.).

[78] Stapleton (above n 11 at 304) explains the resulting doctrine in a similar way: 'It seems clear from the terms of the Fairchild judgments that where a claimant has suffered from a cumulative condition such as pneumoconiosis, deafness or vibration white finger and medical evidence allows a rough apportionment to be made, the orthodox approach to the history question will still be applied: specifically that a defendant is only liable to the claimant for the exacerbation of the condition resulting from that defendant's tort, and not liable for any condition due to the tortious conducts of others, not liable for any exacerbation due to that defendant's tortious conduct in periods outside the limitation period and not liable for any exacerbation due to any non-tortious factors including the non-tortious conduct of that defendant. Where, however, the aetiology of a victim's condition is unknown this will raise the possibility that the claimant can leap the evidentiary gap using the *McGhee-Fairchild* "material contribution to risk" principle'.

[79] The description of the *Fairchild* doctrine as 'leaping the evidential gap' for the claimants is borrowed from Stapleton, above n 11.

[80] This discouragement from seeking and producing evidence runs against social interest: see Porat & Stein, above n 17 at 157–58.

the defendants to secure the appropriate internal sharing of this undivided obligation. The need to synchronize the two doctrines is, therefore, self-evident.

7. *The Evidential Damage Doctrine*

Liability under uncertainty is not the only framework for resolving the problem of indeterminate causation that arises in the *Holtby* and *Allen* type of cases. An additional framework that courts should consider in this connection is that of liability *for* uncertainty, also known as the evidential damage doctrine.[81] The evidential damage doctrine is yet to be recognized as a comprehensive solution to the uncertainty problem in torts. Yet, in a number of decisions delivered by American and Canadian courts, wrongful infliction of evidential damage has been accounted for as a ground for imposing liability.[82] From a purely doctrinal perspective, the concept of negligence can accommodate wrongful infliction of evidential damage and the consequent liability. The key question, therefore, is whether this development would be desirable (as the present authors recently claimed[83]).

Under the evidential damage doctrine, a person is responsible for evidential damage if he or she commits a wrongful act that impairs the claimant's ability or reduces the claimant's chances of establishing the facts underlying his or her cause of action for a direct damage. Infliction of evidential damage also infringes the victim's autonomy by depriving him or her of valuable information to which he or she was entitled.

Liability for evidential damage accommodates two alternative remedial mechanisms.[84] One of these mechanisms is situated in the domain of the law of evidence, and the other belongs to the law of torts. First, infliction of evidential damage is a ground for shifting the claimant's persuasion burden to the defendant. This form of liability is only suitable for cases in which both the direct and the evidential wrongdoings are attributed to the defendant. This evidential remedy, however, can only be effective in balanced cases, in which the claimant's complaint that the defendant inflicted his or her direct damage is as probable as the defendant's self-exonerating account of the events. When the claimant's case surpasses the balance-of-probabilities threshold, his or her entitlement to recovery does not need the assistance of the burden-shifting remedy.[85] When the claimant's case falls below that threshold, such assistance would be futile.

Second, wrongful infliction of evidential damage should also activate liability in torts. The extent of this liability would then be equal to the value of the missing information, wrongfully taken from the claimant. This value derives

[81] Porat & Stein, above n 17 at 160–84.

[82] *Haft* v *Lone Palm Hotel*, 478 P 2d 465 (Cal 1970) at 474–75; *Clemente* v *California*, 707 P 2d 818 (Cal 1985); *Dorschell* v *City of Cambridge* (1980) 117 DLR (3rd) 630 at 635.

[83] Porat & Stein, above n 17 at 160–84.

[84] Ibid.

[85] Indeed, such a claimant cannot claim himself or herself to be evidentially damaged.

statistically from the potential of the missing information to establish the allegation that the claimant's direct damage, or part thereof, results from the defendant's wrongdoing (or from a wrongdoing of another person, whom the evidentially incapacitated claimant cannot successfully sue).

In *Holtby*, each of the claimant's employers was responsible for his evidential damage. The claimant, therefore, is entitled to say to each employer:

> Had you not wrongfully exposed me to the risk of becoming afflicted, I would not have found myself short of the information concerning your part in my injury: it is because of your wrongful action that I am now lacking this information and thus cannot establish my entitlement to compensation.[86]

The defendant employer cannot adequately counter this complaint. For that reason, the defendant must compensate the claimant for the information of which it wrongfully deprived him. The value of this information equals the defendant's statistical share in the claimant's injury multiplied by the value of the injury (or the expected value of the claimant's case against the defendant). With all other things being equal,[87] the court should determine the defendant's statistical share in the claimant's injury on the time-exposure basis (by applying the same criterion that the judges in *Holtby* embraced with a different purpose in mind). The evidential damage for which the defendant must compensate the claimant would thus equal half of the claimant's injury. Hence, if the claimant were to file similar lawsuits against the remaining employers, his total recovery amount under the evidential damage doctrine would cover his entire injury. Consequently, each of Mr Holtby's employers would internalize the entire damage inflicted by its mishandling of asbestos in the long run of the cases.[88]

The same reasoning applies to both *Allen* and *Fairchild* cases, *mutatis mutandis*. Mr Allen's employer inflicted evidential damage on Mr Allen by wrongfully maintaining a hazardous workplace condition. This wrongful maintenance of the workplace was one of the possible causes of the VWF syndrome that Mr Allen subsequently developed. By wrongfully adding this causal factor to the list of factors potentially responsible for Mr Allen's affliction, the employer deprived Mr Allen of the information that could identify the cause of his affliction. To this information Mr Allen was entitled, and it was valuable to him due to its potential to support his lawsuit against the employer. Given that this lawsuit is doomed to fail under the prevalent doctrine, the employer must compensate

[86] Porat & Stein, above n 17 at 186–87.

[87] As indicated above, all other things would not be equal if the last portion of the asbestos dust inhaled by the claimant brought the contamination of his lungs up to the level of a fully-blown fibrosis. See discussion above.

[88] The outcome would be different if Mr Holtby were to work for only *two* wrongful employers who separately exposed him to asbestos. In such a case—given that Mr Holtby's entire injury results from his wrongful exposure to asbestos by the employers—the two employers would have to compensate him for his entire injury, both jointly and severally. Mr Holtby would then have been able to say to each employer: 'Had you not wrongfully exposed me to asbestos, I would have been (a) injured less severely; and (b) able to successfully sue and recover full compensation from the other employer'. This complaint squarely aligns with the *restitutio ad integrum* principle, under which the wrongdoer must reinstate the victim's original position through compensatory damages. The time-exposure factor, adopted by the judges in *Holtby*, would thus only be relevant for the indemnification suits among the employers.

Mr Allen for his evidential incapacitation. The evidential damage that Mr Allen sustained as a result of this wrongdoing equals the employer's statistical share in Mr Allen's injury. This share both can and should be calculated on the basis of the existing evidence (not including unsubstantiated conjectures, resorted to by the trial court[89]). The resulting liability amount would force the employer to internalize the entire damage that its mishandling of the VWF risk had inflicted in the long run of cases.

In the *Fairchild* case, each defendant fell under two factual scenarios that are both mutually exclusive and jointly exhaustive. In one of these scenarios, the defendant contaminates the claimant's cell that turns into mesothelial and subsequently becomes cancerous. In the other scenario, another defendant commits this wrong; yet, this defendant remains unknown because each of the remaining defendants wronged the claimant in a similar way but was lucky enough not to produce the injurious result. At the very least, therefore, each defendant evidentially incapacitated the claimant and should assume liability for that wrong. In other words, each of the *Fairchild* defendants caused evidential damage to the claimant by wrongfully adding its asbestos to the list of causal factors potentially responsible for the claimant's injury. The evidential damage that the claimant suffered in the hands of each defendant consequently equals the defendant's statistical share in the claimant's physical injury. As in the previous cases, this share must be determined by the probability of the scenario in which the defendant's asbestos contaminates the claimant's cell (the claimant's physical damage must be multiplied by this probability).[90] The claimant's evidential damage and the defendant's liability for that damage always vary in proportion to this probability. For example, if this probability equalled zero, the defendant to whom it attaches would have caused no evidential damage to the claimant. This probability would mark the defendant liable as long as it retains positive value. Similarly to the previous cases, this liability system would force each defendant to pay for the entire damage that its mishandling of asbestos generated in the aggregate.

Application of the evidential damage doctrine to each of the three cases—*Holtby*, *Allen* and *Fairchild*—would force each defendant to internalize the entire physical damage originating from its wrongdoing, neither more nor less. These and similarly situated defendants would thus be optimally deterred. Under corrective justice, evidential damage also ought to be actionable in torts whenever it is wrongfully inflicted. Individuals sustaining evidential damage suffer a reduction in their well-being. Before sustaining that damage, any such individual was better informed about his or her rights than subsequent to such damage. Accordingly, the individual's choices with respect to the pursuit of those rights would have been more informed had he or she not sustained the evidential damage. This damage, therefore, has detracted from the individual's autonomy.

[89] See discussion above.

[90] Once again: when only two defendants are liable, they should assume liability *in solidum* for the claimant's entire damage. See above n 88.

On that score, Mr Allen, Mr Holtby and the claimants in *Fairchild* had a justified complaint against their respective employers. Each of them could say to his employer 'Your negligence may or may not have damaged my anatomy, but it has certainly damaged my autonomy, and for this you must pay'. In each of those cases, the amount of compensation that the claimant should recover would, once again, derive from the value of the information wrongfully taken from him by the defendant.

The evidential damage doctrine provides a both principled and comprehensive solution for cases such as *Holtby*, *Allen* and *Fairchild*, as well as for many other cases of indeterminate causation. The *Thigh* Case, decided by the House of Lords against the claimant,[91] is one such case. For reasons already given, this case could have been decided differently under the evidential damage doctrine. As stated at the outset, the indeterminate causation problem is pervasive. As such, it requires a comprehensive solution. Adoption of the evidential damage doctrine is one such solution.

8. *Conclusion*

Holtby and *Allen* represent a remarkable departure from the traditional binary approach, under which a tort claimant either recovers compensation for his or her entire injury or is altogether denied recovery—depending on whether his or her case against the defendant is more probable than not. *Holtby* and *Allen* substituted this approach by the proportionate recovery principle, under which the defendant compensates the claimant for a fraction of his or her injury that represents the defendant's statistical share in that injury. The domain over which this innovative principle has been licensed to exercise control is that of indeterminate causation. Under both *Holtby* and *Allen*, this principle will apply in cases that exhibit the following paradigmatic pattern: it is established on a balance of probabilities that the defendant committed a wrongdoing against the claimant and that the claimant sustained injury pursuant to that wrongdoing; yet, it cannot be established which part of the injury resulted from the wrongdoing.

From the perspectives of both optimal deterrence and corrective justice, this development would constitute an improvement of the law if the courts properly formulate its scope. First, in order to satisfy these two objectives of the law of torts, the proportionate recovery principle needs to be explicitly confined to cases that deal with *recurrent* wrongs. Second, determination of the defendant's share in the claimant's injury ought to be explicitly grounded on the (*ex post*) probability of causation, rather than the (*ex ante*) risk of inflicting that injury. Third, judges must not apply unarticulated intuitions in determining the magnitude of the relevant risk or probability. Their decisions in that area would be better informed by the statistical principle of 'insufficient reason', also known as the 'indifference principle'. Fourth, courts are yet to relieve the doctrinal tension

[91] *Hotson* v *East Berkshire Area Health Authority*, above n 15.

between the proportionate recovery principle, as recognized in *Holtby* and *Allen*, and the Law Lords' rejection of that principle that took place in *Hotson*. These two lines of authority are distinguishable. The recurrent nature of the wrongs that took place in *Holtby* and *Allen* and the absence of that feature in the malpractice adjudicated in *Hotson* provide a good enough reason for treating the two types of cases differently. *Holtby* and *Allen* may nonetheless pave the road for imposition of proportionate liability in the *Hotson* type of cases, especially if courts give priority to deterrence over corrective justice. The *Fairchild* decision did not affect the *Holtby-Allen* liability principle, and it would be advisable to extend this principle to the *Fairchild* type of cases as well.

Finally, courts should also consider adoption of the evidential damage doctrine that imposes liability *for* uncertainty. This doctrine calls a spade a spade by directly targeting the uncertainty problem that is prevalent in tort litigation and thus systematically frustrates the deterrence and corrective justice objectives of the law of torts. Under this doctrine, if the uncertainty of the case emanates from the defendant's wrongful conduct, the defendant should not be allowed to render this an immunity from liability and thereby benefit from his or her own wrong. Motivated by this principle, the evidential damage doctrine forces any such defendant to compensate the claimant for the potential value of the missing information of which the defendant wrongfully deprived the claimant. This value equals the expected value of the claimant's case against the person potentially responsible for the claimant's injury. In cases such as *Holtby*, *Allen* and *Fairchild*, the same wrongdoing that inflicted an indeterminate fraction of the claimant's injury is also responsible for the claimant's evidential damage. The amount of compensation that the defendant ought to pay the claimant consequently equals the defendant's statistical share in the claimant's injury.[92] This level of liability satisfies the demands of both optimal deterrence and corrective justice.

The evidential damage doctrine, however, does not simply overlap the proportionate recovery principle of *Holtby* and *Allen*. Being a comprehensive legal doctrine, it would apply across the board and thus capture a much broader spectrum of cases. For example, there would be no need to limit the application of the evidential damage doctrine to cases involving injuries that originate from recurrent wrongs. Moreover, liability for uncertainty does not only aim at allocating responsibility for injuries both justly and efficiently. This form of liability also sets an important incentive for avoiding uncertainty in tort litigation. Finally, the evidential damage doctrine would install a truly individualized form of liability that makes this doctrine more compatible with corrective justice than any of its competitors.

It remains to be seen whether English courts will be willing to expand the *Holtby-Allen* approach by carrying the proportionate recovery principle to new domains. Despite *Fairchild*'s new 'all or nothing' approach—and, indeed, as a

[92] We qualify this general precept by the 'two liable defendants' exception: see n 88 above.

result of its problematics—the proportionate recovery principle is very much on the agenda. Courts would have to consider this principle as a general solution for cases in which it is established that the defendant committed a wrong against the claimant, but whether the claimant actually sustained any damage as a result of that wrong is highly uncertain (but still probable). American courts imposed proportionate liability in some such cases, but refused to do so in others.[93] This general issue falls beyond the scope of the present article. Most of the foregoing analysis, however, is applicable to this issue.

[93] Porat & Stein, above n 17 at 58–73.