

Boston University School of Law

## Scholarly Commons at Boston University School of Law

---

Faculty Scholarship

---

9-2015

### Information and Causation in Tort Law: Generalizing the Learned Hand Test for Causation Cases

Keith Hylton

Follow this and additional works at: [https://scholarship.law.bu.edu/faculty\\_scholarship](https://scholarship.law.bu.edu/faculty_scholarship)



Part of the [Law and Economics Commons](#), and the [Torts Commons](#)



**INFORMATION AND CAUSATION IN TORT  
LAW: GENERALIZING THE LEARNED HAND  
TEST FOR CAUSATION CASES**

Boston University School of Law  
Law & Economics Working Paper No. 15-26

September 2015 Draft

Forthcoming, *Journal of Tort Law (causation symposium)*

**Keith N. Hylton**  
Boston University School of Law

This paper can be downloaded without charge at:

<http://www.bu.edu/law/faculty/scholarship/workingpapers/2015.html>

Information and Causation in Tort Law: Generalizing the Learned  
Hand Test for Causation Cases

Keith N. Hylton\*

September 2015 draft  
forthcoming *Journal of Tort Law (causation symposium)*

**Abstract:** This paper discusses the economics of causation in tort law, describing precise implications for precautionary incentives when courts are and are not perfectly informed. With precautionary incentives identified, we can ask whether the causation inquiry enhances welfare, and if so under what conditions. Perhaps the most important innovation applies to the Hand Formula. When causation is an issue, the probability of causal intervention should be part of the Hand test, and the generalized Hand test offers a method of distinguishing significant classes of causation cases. I close with implications for the moral significance of causation and for economic analysis of tort law.

**Keywords:** causation, negligence, Learned Hand Formula, proximate cause, intervening causal factor, optimal care, economics of negligence

---

\* William Fairfield Warren Distinguished Professor, Boston University, Professor of Law, Boston University School of Law, [knhylton@bu.edu](mailto:knhylton@bu.edu). An early version of this paper was presented as part of a session on Causation in Tort Law at the AALS 2015 meeting.

Students of tort law learn early that the theoretical perspectives on the law come from one of two perspectives: consequentialist (utilitarian or economic) analysis and ethically-grounded deontological theory.<sup>1</sup> The economic approach has gained followers over the years because it aims to determine the incentive effects of tort law and to judge its desirability on the basis of the consequences of legal rules.

The economic approach to tort law early on adopted a theory that courts apply economically optimal tort standards. The Hand Formula,<sup>2</sup> which characterizes the negligence test as a comparison of the burden of precaution with the expected loss from not taking precaution ( $B$  versus  $P \times L$ ), is typically analyzed under the assumption that courts have sufficient information to apply the standard with reasonable accuracy. But this classical economic formulation seems outdated in light of the modern trend in economic analysis to relax assumptions that actors are perfectly informed and rational. Much of modern economic analysis examines the predicted behavior of actors, or predicted equilibria in competitive interactions, when actors are not fully informed, or not entirely rational. The classical economic theory of negligence seems somewhat behind the times when compared to this modern trend in economic analysis.

Economic analysis of law should devote more attention to scenarios in which courts have imperfect information, and examine the predicted effects of legal doctrines in these scenarios.<sup>3</sup> While it is obvious that the standard results of the classical economic model will not be replicated, the important question is just what will be observed. Precisely what sort of behavioral predictions will obtain when courts do not have perfect information? Knowing the answer to this question could be useful in deciding whether a legal standard should be retained as is, modified, or jettisoned. In addition, knowing the answer to this question could aid positive analysis of law, because it could help the analyst determine whether a given legal rule is having a socially desirable impact even though it is applied by a court with limited information. Indeed, some legal standards may be defensible only under the assumption that courts have limited information, as seems likely in the real world.

Causation is an excellent area for studying the implications of courts having less than perfect information. In the classic causation cases, the expected loss from not taking precaution (the probability of loss multiplied by the differential probability that the loss occurs when an actor fails to take care) depends on intervening factors that may or may not be realized in a given accident setting. Consider, for example, *New York Central R.R. v. Grimstad*,<sup>4</sup> where the court had to determine whether the defendant barge owner was negligent for failing to install life

---

<sup>1</sup> George P. Fletcher, Fairness and Utility in Tort Theory, 85 Harvard Law Review 537 (1972).

<sup>2</sup> The Hand Formula, or Learned Hand test, was stated by Judge Learned Hand in *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947).

<sup>3</sup> Admittedly, a great deal of existing scholarship can be put under this category generally. See, e.g., John E. Calfee & Richard Craswell, Some Effects of Uncertainty on Compliance with Legal Standards, 70 Va. L. Rev. 965 (1984); Keith N. Hylton, Costly Litigation and Legal Error under Negligence, 6 J. L. Econ. & Org. 433 (1990). However, the literature in this category tends to address the most general concerns, such as the precautionary incentives of the negligence test when court may err in its application. Still, there is a great deal of work remaining in applying the approaches suggested by this literature to specific legal doctrines, such as causation, and to constraints courts face in attempting to overcome informational deficiencies.

<sup>4</sup> 264 F. 334 (2d Cir. 1920).

buoys even though the evidence suggested that it was unlikely that the plaintiff, the decedent's wife, would have been able to deploy them in a timely manner to prevent the decedent from drowning. To apply the negligence test as captured in the Hand Formula accurately, the *Grimstad* court would have had to determine the possible intervening factors and the *ex ante* probabilities that those intervening factors would materialize. This is a daunting task in such a case, one that is likely to be observed being carried out in only the most factually primitive causation cases.

The purpose of this paper is to present the economics of causation in tort law, describing precise implications for precautionary incentives when courts are and are not informed.<sup>5</sup> Under certain conditions, the law on causation will lead to excessive precaution incentives, but sometimes it will lead to inadequate precaution incentives.<sup>6</sup> Once the precise precautionary incentives are identified, we can ask whether the causation inquiry is helpful, in the sense of enhancing society's welfare, and if so under what conditions. We can also ask whether the causation inquiry is desirable given the alternatives of legal immunity or of strict liability in cases where factual causation is uncertain.

Perhaps the most important innovation that comes from this analysis applies to the Hand Formula. When causation is an issue, the probability of an intervening causal factor should be part of the Hand Formula. In these cases, the accident will or will not happen, depending in part on the probability of intervention. The expected loss no longer depends on just the probability of the loss multiplied by its severity ( $P \times L$ ), as Learned Hand asserted; it depends on the product of the probability of loss, its severity, and the probability of intervention. The interesting new feature, however, is that the probability of intervention that matters to the actor *ex ante* is not always observable to the court. The court observes the *ex post* probability of intervention based on the actual accident scenario that unfolded. Negligence determinations are sometimes made by courts on the basis of the *ex post* intervention probability rather than the *ex ante* probability. This drives a wedge between the Hand Formula as it operates in theory and in many routine cases, and the Hand Formula as it operates in practice in many causation cases.

Other than Calabresi,<sup>7</sup> previous economic analyses of causation have generally evaded this issue; and Calabresi's discussion is largely suggestive rather than solution-oriented. In cases where it is not difficult to determine the *ex ante* intervention probability, the *ex ante* versus *ex post* problem emphasized here is not important: the court can apply the Hand Formula with at most the risk of error from the lack of precision that inherently arises in the application of any test. But the special difficulty observed in many of the causation cases is that courts do not have sufficient information to determine the *ex ante* intervention probability with a reasonable degree of accuracy, and evidence norms prevent courts from attempting to calculate it on the basis of conjectural evidence.

---

<sup>5</sup> Keith N. Hylton & Haizhen Lin, Negligence, Causation, and Incentives for Care, 35 International Review of Law and Economics 80 (2013).

<sup>6</sup> *Id.*

<sup>7</sup> Guido Calabresi, Concerning Cause and the Law of Torts, 43 U. Chi. L. Rev. 69 (1975).

The scenario I emphasize here is where the court has insufficient information to determine the *ex ante* intervention probability. This includes an important class of causation cases, *Grimstad* among them.

Whether precautionary incentives are excessive or inadequate in this class of cases depends generally on the probability laws or distributions governing the intervening factors. For example, consider the simplest case of one intervening factor. The probability that the intervention will occur could have the familiar symmetric, bell-shaped normal curve. Alternatively, the probability of intervention could be skewed to the right (positive) or the left (negative). Precaution is excessive in the positive and symmetric cases, and inadequate in the negative skew case. This has a few interesting implications.

The first implication is that in a universe where intervention probabilities could have any probability distribution with equal likelihood, the precautionary incentive created by negligence law, in the presence of intervening causal factors, will tend to be excessive. In other words, if symmetrical and skewed distributions are randomly distributed across possible accident scenarios, the most general effect of the negligence test with causation taken into account is excessive care. That is a bit counterintuitive. The first, superficial implication of the causation test is that it shields the potential tortfeasor from liability – it requires the plaintiff to prove negligence *and* causation, a double bar to liability. But the general finding of my analysis is that this seemingly double bar results in excessive care.

Second, the findings with respect to care levels allow us to reconsider a case such as *Grimstad* and say precisely what the court's decision implies for precaution incentives. The findings also enable a court to determine the incentive implications of its decision, based on a limited set of facts.

Third, we can try to determine whether causation analysis enhances social welfare in view of its incentive effects. The general question is whether causation analysis is preferable to a simple rule of no liability when causation is uncertain, or strict liability. The negligence analysis with causation taken into account operates as a second best negligence test. In any scenario, we can seek to determine whether the negligence test is likely to lead to excessive or inadequate precaution. Knowing the answer may lead us to choose whether legal immunity is preferable to negligence liability.

I explain the economic analysis and the case law in a straightforward manner here, free of technical jargon. The economic analysis of causation has become a substantial literature, and not all of it is easy to read. Only a glutton for punishment would attempt to work through the more complicated models in the literature. The discussion here will not cover all of the literature, but will cover enough of it to provide a solid background for someone unfamiliar with the economics of legal causation to understand the basic lessons from three decades of scholarship. I close with some implications for the moral significance of causation and for economic analysis of tort law.

An Overview of the Economics of Causation

As usual, the first place to look for an insight into the economics of tort law is Holmes.<sup>8</sup> Holmes did not present an explicitly economic analysis of tort law, but his analysis is consequentialist, and more specifically utilitarian. Holmes does not have a discussion of the causation problem in tort law, but he does have a discussion of evidence, which clearly bears on the causation problem.

The principles of substantive law which have been established by the courts are believed to have been somewhat obscured by having presented themselves oftenest in the form of rulings upon the sufficiency of evidence. When a judge rules that there is no evidence of negligence, he does something more than is embraced in an ordinary ruling that there is no evidence of a fact. He rules that acts or omissions proved or in question do not constitute a ground of legal liability, and in this way the law is gradually enriching itself from daily life, as it should. Thus, in *Crafton v. Metropolitan Railway Co.*, the plaintiff slipped on the defendant's stairs and was severely hurt. The cause of his slipping was that the brass nosing of the stairs had been worn smooth by travel over it, and a builder testified that in his opinion the staircase was unsafe by reason of this circumstance and the absence of a hand-rail. There was nothing to contradict this except that great numbers of persons had passed over the stairs and that no accident had happened there, and the plaintiff had a verdict. The court set the verdict aside, and ordered a nonsuit. The ruling was in form that there was no evidence of negligence to go to the jury; but this was obviously equivalent to saying, and did in fact mean, that the railroad company had done all that it was bound to do in maintaining such a staircase as was proved by the plaintiff. A hundred other equally concrete instances will be found in the text-books.<sup>9</sup>

Although *Crafton*, the case discussed by Holmes, is not presented by him as a factual causation case, it is easy to view it in those terms. The judge's rejection of the plaintiff's negligence theory was based on the conclusion that since many people had used the stairs without falling, the likely cause of the accident was not the worn-down nosing of the stairs. Holmes notes that this is equivalent to saying that the evidence presented by the plaintiff does not constitute negligence, and it is a short inference to say that the reason is because fixing the defect complained of by the plaintiff would not greatly alter the probability of an accident; and hence the defendant did not violate the Learned Hand test. In other words, or more generally, a ruling that a particular fact is insufficient evidence of negligence is, in essence, a ruling that an application of the negligence test in the form of the Hand Formula would not compel a finding of negligence.

The next discussion of the economics of causation in the torts literature is Posner's in his 1973 article *A Theory of Negligence*.

If the defendant was negligent but the accident would have occurred anyway, it would be incorrect to view the costs of the accident as the consequence of his negligence since they would not have been avoided by the exercise of due care. Yet the defendant was negligent: would not an award of damages serve a useful

---

<sup>8</sup> See OLIVER WENDELL HOLMES, *THE COMMON LAW* (Little, Brown and Co. 1881).

<sup>9</sup> *Id.* at 120-121.

purpose, therefore, by punishing him for his breach of duty, thereby encouraging him to comply in the future with the requirements of efficiency?<sup>10</sup>

Posner's early view of the causation problem was very traditional, and reflects what is largely considered an error in thinking in the law and economics literature today. If the accident would have happened anyway, then the actor was not negligent under an accurate economic assessment of negligence. To say that the actor was negligent but the accident would have anyway is a contradiction in the economic analysis of negligence.

The proof of this last proposition would not appear in the literature until Steven Shavell's article on causation.<sup>11</sup> Shavell provided several economic perspectives on causation in a wide-ranging discussion. One point established, as I have already noted, is that in an accurate economic assessment of negligence, an absence of causation means that the actor was not negligent. In another part of the paper, Shavell considers the causation test as an additional screen applied over the negligence test. The defendant would be liable if he failed to take care, his cost of care was less than the marginal expected accident loss, *and* an application of the *ex post* negligence test implies negligence. In this case, the causation inquiry has the effect of reducing liability and leading to inadequate care. But this particular approach to the negligence test is not consistent with what is observed in the case law.

Landes and Posner's discussion of causation establishes the same fundamental point as suggested by Holmes in 1880, and rigorously demonstrated by Shavell in 1980 – that is, that absence of causation implies absence of negligence.<sup>12</sup> Landes and Posner use an economic framework that is much more intuitive and easier to follow than Shavell's. They also discuss several cases and use them to tell stories that support the mathematical model in their paper.

An important flaw in this early literature, especially evident in the Landes and Posner article, was identified by Richard Wright.<sup>13</sup> A significant problem with the causation cases is this: an accurate economic assessment of negligence must be done on an *ex ante* basis, but in the causation cases the courts have based their decisions on *ex post* information. One could apply an *ex ante* negligence text, and an *ex post* negligence test. The two are unlikely to always yield the same prescription for precaution. Moreover, the central problem in many of the causation cases is that the court does not have sufficient information to accurately apply an *ex ante* negligence text, even if it attempted to do so. To have sufficient information, the court would have to be able to identify the relevant intervening factors, and their frequency of occurrence. In some cases, courts will have enough information to carry out this task. But many causation disputes will not yield such information to the court, and *Grimstad* is just one example. Conducting an accurate *ex ante* negligence evaluation in *Grimstad* would have required the court to gather information on the likely interventions and the probability frequency of each intervention. The

---

<sup>10</sup> Richard A. Posner, A Theory of Negligence, 1 Journal of Legal Studies 40 (1972).

<sup>11</sup> Steven Shavell, An Analysis of Causation and the Scope of Liability in the Law of Torts, 9 Journal of Legal Studies 463-516 (1980).

<sup>12</sup> William M. Landes and Richard A. Posner, Causation in Tort Law: An Economic Approach, 12 Journal of Legal Studies 109-134 (1983).

<sup>13</sup> Richard W. Wright, Actual Causation vs. Probabilistic Linkage: The Bane of Economic Analysis, 14 Journal of Legal Studies 435-456 (1985).



appellate decision in *Grimstad* made no inquiry into such evidence, and it is unlikely that a trial court could have gathered such information in a manner consistent with evidence norms.

Of the early economically-oriented writers on the causation problem, Calabresi is the only one who seemed to acknowledge this problem, though hazily. In a passage discussing causation, Calabresi notes that

It may seem strange that under a proximate cause test costs are allocated on the basis of past foreseeability, since under a market deterrence rationale such allocations are designed only to affect future choices between safety and accident costs. Inquiry into future risk - that is, degree of causal linkage - rather than into past foreseeability would seem appropriate. Yet it is probable that parties who have had relatively good information about possible risks in the past (that is, were relatively good foreseeers) would also have such information about the future. Moreover, allocation of those costs, which were foreseeable in the past, will create incentives for both the loss bearers and others to foresee those injuries that may be worth avoiding in the future. Thus it follows that, as a practical matter, past foreseeability is a useful guide to finding the cheapest cost avoider.<sup>14</sup>

In this passage Calabresi acknowledges the problem that the negligence test is based on an expectation of future harms, while the causation inquiries are *ex post* in nature. Still, he defends the causation test on the ground that the actors who are held liable probably have superior information on the expected future harms than does the court, and therefore an *ex post* liability test might be the closest that courts can come toward an optimal and actuarially correct allocation of accident costs.

In another passage referring explicitly to the but-for causation test, Calabresi notes the strange position courts put themselves in when they use the backward looking negligence determination in the case law.

One could do away with the *but for* test and employ other methods to achieve the same end. For example, one could simply guess at the size of the injury costs that will be associated in the future with behavior causally linked to such injury costs. But such an approach would be unnecessarily vague for a system of market deterrence. By using the but for requirement, we tell the chosen loss bearer that its burden will equal those costs that, but for its behavior, would not have been incurred; inevitably, therefore, we also tell the loss bearer that its future insurance premiums will be based on those injury costs that, in the same but for sense, have resulted from its past behavior. In this way we can approximate the optimal burden, that is, the burden that will create appropriate incentives to avoid injuries worth avoiding and not avoid those injuries that are too costly to eliminate.<sup>15</sup>

In other words, Calabresi suggests that courts could entirely do away with the *ex post* approach and find a way to use correct *ex ante* estimates in determining negligence. The court could

---

<sup>14</sup> Calabresi, *supra* at 87-88.

<sup>15</sup> *Id.* at 85-86.

provide its best guess, as a private actor might do under the same circumstances. After all, why would a private actor rely on purely *ex post* observations on probabilities to make a prediction about a complicated scenario coming up in the future? Take, for example, trying to determine a settlement offer without knowing the private information of the opposing litigant about his likelihood of prevailing at trial. A rational actor might use his best guess of the information possessed by the other litigant rather than ignoring it altogether or using information he knows to be inadequate. In the same sense, a court could try to optimally estimate the expected change in liability due to precaution. Although the “guess” hypothetical offered by Calabresi seems unserious at first glance, it raises a significant question.

The next stage in the economics of causation literature is represented by Mark Grady’s analysis of causation.<sup>16</sup> Grady explained that the causation test operates to remove a discontinuity built into the precautionary incentives of the negligence test which could result in suboptimal care – most likely excessive care – when courts are likely to err in determining negligence.

Grady’s theory is best explained by the cricket fence hypothetical explored by Marcel Kahan in his formalized version of Grady’s theory.<sup>17</sup> In the cricket hypothetical, based loosely on the facts of *Stone v. Bolton*,<sup>18</sup> the victim is struck by a cricket ball hit over a fence that is set at an unreasonably low height. However, the ball flies over the fence at a height that would have still led to the same accident (victim hit by ball) even if the fence had been set at the reasonable height. Since the accident would have happened even if the fence had been set at the reasonable height, the factual causation test would not be satisfied by the plaintiff’s claim.

To see the incentive implications and the discontinuity problem, suppose causation is not taken into account and that the reasonable height is 10 feet. If the owner of the cricket grounds has his fence at 10 feet he will not be held liable for negligence. Now suppose the owner lowers the fence to 9 feet 11 inches. If causation is not taken into account by the court, the owner will become liable for all cricket balls that fly over the fence, irrespective of the height at which the ball clears. If factual causation is taken into account, the owner becomes liable only for cricket balls that pass between 10 feet and 9 feet 11 inches. Thus, when the factual causation test is incorporated, the owner’s expected liability increases slowly and continuously, starting from zero, as he lowers the fence from the reasonable height. When factual causation is not taken into account the owner’s expected liability jumps discontinuously the moment he lowers his fence slightly below the reasonable height.

In Grady’s analysis, the injurer exercises reasonable care whether the court applies the factual causation test or not, provided actors have perfect information and courts set due care at the optimal level. However, when courts that are capable of making mistakes in determining negligence are introduced into the analysis, the injurer’s precaution decision is affected by whether the court takes factual causation into account. Suppose the court does not take factual causation into account. If the owner’s fence is mistakenly found to be slightly above the reasonable height, the owner’s liability is zero. If his fence is erroneously found to be slightly

---

<sup>16</sup> Mark F. Grady, A New Positive Economic Theory of Negligence, 92 Yale L. J. 799 (1983).

<sup>17</sup> Marcel Kahan, Causation and Incentives to Take Care under the Negligence Rule, 18 Journal of Legal Studies 427-447 (1989).

<sup>18</sup> [1950] 1 K.B. 201 (C.A.).

below the reasonable height, his liability is jumps discontinuously. If, in contrast, the court takes causation into account, then a finding that the owner's fence is slightly below the reasonable height leads to a small increase in liability above the zero level. It follows that the possibility of judicial error introduces an incentive toward excessive precaution that can be dampened by the factual causation test.

Stephen Marks noted an additional feature in this analysis.<sup>19</sup> Under Grady's theory, if the fence owner is contemplating a slight deviation above the reasonable fence height, or below the reasonable fence height, the asymmetry in expected liability will compel him to go above the reasonable fence height. Under Grady's theory, this incentive distortion weakens as the interval under consideration widens – say from two inches to two feet – because the risk of error likely falls to insignificance as the interval increases. Marks noted that the incentive distortion might remain even if the interval is widened to two feet as long as the possibility of error remains significant. In this case, it is the fact that courts do not subtract off counterfactual liability that generates the same tendency to overshoot the reasonable fence height.

It is important that Grady's analysis assumes courts can determine the reasonable or optimal level of care, even if there is a possibility that they may do so mistakenly. In other words, Grady assumes that courts have sufficient information to determine the optimal care level, but may err in a manner that throws the calculation off slightly, either too high or too low. Another way of saying this is that Grady's model is one in which the court observes a noisy signal of the optimal care level, but is capable nonetheless of making a reasonably accurate, though imprecise, estimate of the optimal care level.

The question raised by the literature including Grady and before is whether courts are capable of estimating the optimal care level. Suppose the court does not have sufficient information to determine the optimal care level? Again, to return to the *Grimstad* example, suppose the court cannot determine the likely causal interventions and the probabilities associated with each of them. Courts may be in position of Knightian uncertainty where the relevant interventions and their accompanying probability laws are unknown and undiscoverable to the court.<sup>20</sup> What happens to the causation framework then?

I have addressed this question in a series of coauthored articles.<sup>21</sup> My reading of cases such as *Grimstad* is that courts, in such a position of uncertainty, make no effort to determine the optimal care level. As Calabresi contended, courts in many of the causation cases apply an *ex post* determination of negligence, using information revealed by the case.

An *ex post* determination of negligence is by no means guaranteed to provide optimal care incentives. The question generated by these analyses is precisely what sort of care incentives are generated under the *ex post* approach. And, perhaps more importantly, why would a court adopt

---

<sup>19</sup> Stephen Marks, Discontinuities, Causation, and Grady's Uncertainty Theorem, 23 *Journal of Legal Studies* 287 (1994).

<sup>20</sup> By Knightian uncertainty, I refer to lack of information on the possible events and the probabilities associated with those events, a concept emphasized in F. H. Knight, Risk, Uncertainty, and Profit (1921). The connection to causation case law is discussed in Hylton & Lin, *supra* note 4, at 88.

<sup>21</sup> Hylton & Lin, *supra* note 4; Keith N. Hylton, Haizhen Lin, & Hyo-Youn Chu, Negligence and Two-Sided Causation, *European Journal of Law and Economics* (2014).

the *ex post* approach instead of trying to use a good prediction, a best guess, of the *ex ante* increment in expected harm associated with a failure to take care? I will start with this question.

### Information Constraints and Causation Analysis

As I noted earlier, a substantial share of the causation cases apply an *ex post* evaluation of negligence. Again, consider *Grimstad*. The court found that the defendant barge owner was not liable for negligence, given its failure to install life buoys, because it seemed unlikely that the captain's wife would have found a life buoy and thrown it in time to save the captain's life. But this is a strange argument when you think about it. Why should that matter at all in determining negligence? The fact that the captain's wife was unlikely to get to a life buoy on time is just one of many scenarios that might have played out. Why should a court determine negligence on the basis of only one factual scenario?

This question almost answers itself. A rational authority, with access to all of the information necessary to determine negligence, would realize, upon observing a scenario in a causation case, that it is just one of many possible scenarios that could have unfolded after the defendant's negligent act or omission. With this in mind, the rational authority would not use the *ex post* approach adopted by the court in *Grimstad*; that is, it would not use the observed scenario alone to determine whether the defendant was negligent. The authority would attempt to make an evaluation of the *ex ante* change in risk resulting from the defendant's failure to take care. Indeed, I should offer it now as a fundamental proposition that no rational decision maker, armed with full information, would ever apply the *ex post* approach to determining negligence.

Why, then, do courts apply the *ex post* approach in causation cases? The obvious answer is that courts do not have full information. They do not know all of the possible intervening causal factors in a negligence case and they do not have the probability frequencies for those intervening factors. But this is an incomplete answer, because it immediately raises the additional question why courts do not collect the information necessary to conduct a rational assessment of negligence.

Another obvious response can be offered to the question why courts do not collect sufficient information to conduct a rational assessment of negligence. It would be too costly. But this answer is also incomplete. It raises the question why the court does not collect some of the information, maybe only part of what is necessary, and try its best to use the information to conduct an *ex ante* assessment of negligence. Why wouldn't the court make its "best guess" as Calabresi suggested?

It may help to repair to an example to understand the problem better. *Grimstad* is an excellent example because there is only one intervention that seems relevant, whether an actor would be present to deploy the life buoys in time to save the captain. The obvious choices for potential rescuers would be the actual potential rescuer in the case, the captain's wife, or a fellow sailor. The probability of a rescue, that is a successful intervention, presumably would be higher in the case of a fellow sailor.

To conduct an *ex ante* assessment of negligence in *Grimstad*, the court would have to know the probabilities of a successful rescue connected to the wife and to the fellow sailor, and the likelihood that each such rescuer would be on hand when the captain falls from the barge into the water. In the actual case, the court observes that the wife was present. The trial court probably observes enough evidence to make a reasonably good estimate of the likelihood that the wife would carry out a successful rescue. The court would observe the wife and be able to tell whether she seems physically capable, and sufficiently alert, to be able to remember where the life buoys had been placed, if they had been installed, and to grab one and throw it accurately in time to save the captain. I will assume for simplicity that sufficient information is produced at the trial level for a court to make such a probability assessment of rescue by the wife.

The next question is whether the court could make an accurate probability assessment of rescue by a sailor. Here, problems start to arise for the court. No sailor was present at the time of the accident. If the court attempts to assign a probability to the successful intervention by a sailor, it will have to assign the probability to the average sailor who might have been present on the barge. There is no obvious way to get the information needed to make such an assessment in a manner untainted by bias. The plaintiff's tendency would be to assert that such a probability is high, from which it would follow that failure to install life buoys was negligent. The defendant would assert that such a probability is low. But the defendant, the barge owner, has the greater fund of experience from which to offer such a prediction. Whatever the plaintiff offers on this question, the defendant would be able to outflank by producing better historical information bearing on the likelihood that a competent sailor would be available to carry out a rescue. In the end, the court would be compelled to put a great deal of weight on the barge owner's evidence.

Still, we have only scratched the surface of the court's difficulties. Even if sufficient information is provided to enable the court to estimate probabilities of successful interventions by the wife and by the sailor, the court would have to assign frequencies to their presence. The average sailor may be an extremely competent rescuer, but if he is hardly around the captain at a time when the danger of being knocked over the side of the boat is significant, then the existence of such a rescuer would have little impact in changing the *ex ante* assessment from the *ex post* assessment. The wife would be able to testify on the matter of how often she is alone with the captain on the barge. It would not be in her interest to say that almost all of the time when an accident of the sort that occurred in the case occurs, she is alone with the captain; her incentive would be to minimize the reported frequency of such occurrences.

This example suggests that the most significant problem in conducting an *ex ante* assessment of negligence is not the cost of procuring information. It is the difficulty of obtaining evidence unbiased by the self-interest of the provider. The litigation process works reasonably well in determining facts on events that occurred. But on questions of conjecture, there is no established process for completely avoiding biased evidence. This is not to say that no one can offer accurate information on the speculative factual questions in a dispute. One or both of the parties in *Grimstad* may have been able to offer accurate information on the probability questions the court would need to have answered to make a competent *ex ante* negligence assessment. The problem is that neither party has an incentive to truthfully reveal such information.

The problem of getting parties to truthfully reveal information is a fundamental one in the economics literature. It is plausible to suppose that contracting parties will design their contracts so that counterparties do not have an incentive to lie. Some features of contracts that may seem inefficient may be better understood when we take this issue into account.<sup>22</sup> For example, a contract between an employer and a union may have a provision requiring reverse-seniority layoffs. Such a policy seems inefficient at first glance: why lay off junior works, who may be the most productive? One reason such clauses are frequently observed is that they blunt the employer's incentive to lie about the state of its profits. If the firm has to lay off some of its best employees when it reports a downturn, then it will have a weak incentive to report downturns solely for the purpose of reducing wages.

Courts punish lying too.<sup>23</sup> However, lying is difficult to catch when it concerns matters of speculation rather than things that happened. And courts do not have rules designed, like the reverse-seniority layoffs provision, to force an actor to suffer a cost *whenever* he reports a certain fact, whether he reports truthfully or not, just to discourage him from ever reporting falsely.

In view of the difficult of getting accurate evidence on conjectural matters, evidence norms have developed that essentially bar courts from choosing speculative evidence over verifiable evidence. A typical example is from Vermont's jury instructions:

While you should consider only the evidence in the case, you are permitted to draw such reasonable inferences from the testimony and exhibits as you feel are justified in the light of common experience. In other words, you may make deductions and reach conclusions, which reason and common sense lead you to draw from the facts which have been established by the testimony and evidence in the case. But do not speculate about possibilities that were not fairly proved.<sup>24</sup>

My point should be clear by now. In many causation cases, the evidence needed to permit a court to conduct an *ex ante* assessment of negligence is not before the court and can only be offered by conjecture. Courts face significant obstacles in assessing such evidence. Fundamental evidence rules in every jurisdiction discourage the use of such evidence because of its non-verifiability.

In essence, then, the verifiability problem is the core reason courts apply an *ex post* assessment of negligence. The alternative of making the best prediction possible – Calabresi's best guess – is avoided for a simple reason: the guess can only be constructed on the basis of information tainted by self-interest. The alternative of designing a mechanism that punishes litigants every time they report potentially self-serving evidence is also unpalatable, and inconsistent with the adversarial process.

---

<sup>22</sup> See Oliver D. Hart, Optimal Labour Contracts Under Asymmetric Information: An Introduction, 50 Rev. Econ. Stud. 3 (1983).

<sup>23</sup> Courts have inherent authority to punish abusive practices in litigation. *Chambers v. NASCO*, 501 U.S. 32, 44 (1991)

<sup>24</sup> For the full text of the Vermont jury instruction, see <http://www.vtbar.org/UserFiles/Files/WebPages/Attorney%20Resources/juryinstructions/civiljuryinstructions/gener-aljury.htm>.

The problem I have discussed is observed in both factual and proximate cause cases. *Grimstad* serves as an example in the factual causation cases. Consider a proximate causation example: a tree falls on a trolley car that is driven at a negligently excessive rate of speed, the scenario in *Berry v. Sugar Notch Borough*.<sup>25</sup> The court finds that the defendant is not liable because the accident was not proximately caused by the negligence.

The same question can be asked as in the factual causation scenario: of what relevance is the actual event? The tree falling on the trolley was just one of many possible events that could have happened after the driver exceeded the speed limit. The answer here is the same, though the justificatory case for the answer is probably not as strong as in the factual causation scenario. Yes, there were many possible events, but to determine whether the trolley was negligent, some weighing of all of the possible events would have to be conducted. To do so would require information that could only be provided in a conjectural manner, which would be difficult to obtain free from bias. Courts, having seen this problem many times before, have adopted rules of evidence that would discourage such a venture.

This information-constraints theory of causation offers an explanation that Calabresi seemed to be searching for in his discussion of causation, but never quite stated explicitly. In the causation cases, the courts are generally lacking the information necessary to conduct an accurate assessment of negligence. To generate such evidence would inevitably involve a quantity of conjectural and speculative evidence that established evidence norms prohibit courts from using as a basis for their decisions. Hence, courts are left with the *ex post* assessment as the remaining feasible option, a second-best Hand Formula. As Calabresi suggests, the *ex post* approach is not entirely deficient because it has the property of awarding damages in a manner that may be actuarially fair in the long run. It also has the property of avoiding the extremes of granting immunity to negligent defendants or imposing strict liability on all defendants.

### Incentive Effects

Utilitarian and law-and-economics approaches to law have focused on the incentives created by law. Given that many of the causation cases are *ex post* applications of the negligence standard, and necessarily so because of fundamental trial process constraints, the important question for utilitarian-minded analysts is what effects will such a standard have on incentives for precaution.

To determine incentive effects, one must adopt a model of a calculative Holmesian bad man.<sup>26</sup> He does not take care because of an inner moral desire. He takes care only when the expected cost of not doing so is greater than the burden of taking care. In the classic application of the Hand Formula, the expected cost of not taking care is simply the expected liability – or the expected loss imposed on the tort victim. When a court applies confronts a causation case, however, the expected liability is more complicated, and depends on the frequencies or probability distributions governing the possible interventions.

I will continue to focus on an example based on *Grimstad*. A general description of the structure of the *Grimstad* facts is as follows: taking care affects the probability of an accident, but the

---

<sup>25</sup> 191 Pa. 345, 43 Atl. 240 (1899).

<sup>26</sup> Oliver Wendell Holmes, *The Path of the Law*, 10 HARV. L. REV. 457, 459-61 (1897).

effect is conditional on an intervention. For example, if the type of care is installation of life buoys on a boat, the buoys will be effective in preventing a drowning only if deployed rapidly and accurately. The causation problem is captured in the following tree diagram.

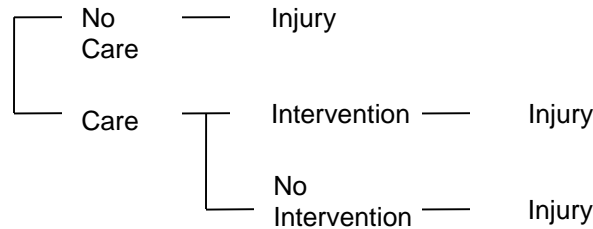


Figure 1: Causation event diagram

Before the injurer chooses how much care to take, the probability of intervention is unknown; only its distribution is known to the injurer. After the injurer invests in care, the intervention probability is revealed and an accident occurs. The court can observe the actual intervention probability when it determines negligence at the final stage, while the injurer cannot observe it *ex ante*. The injurer’s care decision is a durable type that affects the probability of an injury when the intervention probability is realized later.

Assume the barge owner knows how often the captain is likely to be alone instead of surrounded by experienced sailors, while the court does not. After the accident, the court observes whether the captain was accompanied by sailors. The probability of intervention is the probability that a successful rescue occurs, which depends on the type of rescuer present. The expected probability of intervention averages over the types of rescuer. After the accident occurs, the court sees the precise rescuer type and forms an estimate of the intervention probability for that rescuer type.

I assume there are two probabilities of intervention, reflecting two rescuer types:  $\frac{1}{4}$  and  $\frac{3}{4}$ . The low intervention probability corresponds to the instances in which the captain is on the barge with only his wife, while the high intervention probability corresponds to instances in which the captain is on the barge with other experienced sailors. The low intervention probability scenario occurs with frequency  $\frac{1}{4}$  and the high intervention probability scenario occurs with frequency  $\frac{3}{4}$ . The frequencies of the high-intervention and low-intervention probability scenarios are known to the barge owner but not to the court. The expected probability of intervention given that the defendant barge owner takes care is therefore  $(\frac{1}{4})(\frac{1}{4}) + (\frac{3}{4})(\frac{3}{4}) = \frac{5}{8}$ .

Now consider the probabilities of injury conditional on taking care. If the barge owner does not take care, or takes care and no intervention occurs, the probability of the captain drowning is  $\frac{3}{4}$ . If the barge owner takes care and intervention occurs, the probability of drowning is only  $\frac{1}{4}$ .



Finally, suppose the cost of taking care is \$40, and the injury is \$160. Under these assumptions, the *ex ante* benefit of taking care is:

$$\begin{aligned} & \left( \frac{3}{4} - \left[ \left( \frac{5}{8} \right) \left( \frac{1}{4} \right) + \left( \frac{3}{8} \right) \left( \frac{3}{4} \right) \right] \right) \$160 \\ & = \left( \frac{3}{4} - \frac{1}{4} \right) \left( \frac{5}{8} \right) \$160 \\ & = \$50 \end{aligned}$$

Thus, taking care is reasonable under the Hand Formula because the expected benefit, \$50, exceeds the cost of taking care, \$40. Under an accurate assessment of negligence, the barge owner would be held liable for negligence if he failed to install life buoys. More generally, as long as the barge owner's cost of taking care is less than \$50, taking care is reasonable.

I included the intermediate step in the Hand Formula analysis above to illustrate a general feature, to which I will return later: that the *ex ante* benefit of taking care is just the difference in the injury probabilities multiplied by the expected or *ex ante* probability of intervention. Outside of the causation context, negligence analysis would not require information on the probability of intervention.

Now suppose the accident occurs in the low-intervention probability state – that is, the captain is on the barge with only his wife. Because the court observes that the only potential rescuer was the captain's wife, it views the intervention probability as  $\frac{1}{4}$  in the case that comes before it. When the court analyzes the defendant's negligence, it compares the burden of taking care to its estimate of losses avoided *given* the observed intervention probability. The court's estimate of losses avoided is:

$$\left( \frac{3}{4} - \left[ \left( \frac{1}{4} \right) \left( \frac{1}{4} \right) + \left( \frac{3}{4} \right) \left( \frac{3}{4} \right) \right] \right) \$160 = \$20$$

and since this is less than the cost of taking care, \$40, the court would conclude that the defendant's failure to take care is not negligent, even though care is socially desirable. In other words, the court would exonerate the defendant of negligence, even though it would find the defendant guilty if the court had conducted an accurate *ex ante* assessment of negligence.

The final issue to consider in this scenario is the barge owner's own incentive. Would the barge owner have an incentive to take care, knowing that the court will conduct an *ex post* assessment of negligence? Let's consider the barge owner's rational prediction closely. There are two scenarios that the barge owner should consider. One is that the accident happens in the low-intervention probability state (only the captain's wife present), and the probability of this is  $\frac{1}{4}$ . If the accident happens in the low-intervention probability state, the court will not find the barge owner negligent, even if he does not take care, so the barge owner's expected liability is zero for this scenario. If the accident occurs in the high-intervention probability state (experienced

sailors present), the court will find that care is reasonable, and hold the barge owner liable if he fails to take care. The probability of the high-intervention state is  $\frac{3}{4}$ . His expected liability in this event is equal to the product of  $\frac{3}{4}$ , the probability of an accident given a failure to take care, and \$160, the actual loss; thus, his expected liability if he is found guilty is \$120. But he will be required to bear this liability with probability  $\frac{3}{4}$ . Thus, the expected liability is \$90, which means that the barge owner will take care whenever his cost of taking care is less than \$90. Since this is more demanding than the *ex ante* Hand Formula, the *ex post* Hand Formula generates an excessive incentive to take care.

This example reveals some unexpected twists that result under the *ex post* negligence assessment courts use in many of the causation cases. To review the example, the barge owner escapes liability under the outcome actually observed in *Grimstad*, where the wife is the only rescuer available to help. As a result, the barge owner would escape liability if he failed to install life buoys, even though he should be held liable under a proper application of the negligence test. Finally, given the *ex post* test, the barge owner's incentive to take care, under the assumed conditions, is excessive.

### Generalizing

The example just considered explores one set of conditions in a standard causation case of the sort represented by *Grimstad*. Other causation cases can be described as variations on the structure of the facts in *Grimstad*.<sup>27</sup> The question generated by this example is whether it suggests more general lessons.

In the example, the key variable of interest is the likelihood of successful intervention – that is, a rescue using life buoys installed by the barge owner. The potential benefit from taking care – that is, from installing life buoys – depends on the expected likelihood of intervention. Recall also that the expected or *ex ante* likelihood of intervention averages over the likely intervention scenarios that might unfold. The *ex post* or observed likelihood of intervention is based on the actual accident scenario observed by the court. In the example, the *ex ante* or expected likelihood of intervention is  $\frac{5}{8}$ . The *ex post* likelihood of intervention, in the event actually observed in the case where the captain's wife was the only potential rescuer, is  $\frac{1}{4}$ .

The Hand Formula is often described as the *BPL* test (where *B* is the burden of precaution, *P* the probability of the accident, and *L* the loss resulting from the accident). An actor is negligent if he fails to take care when *B* is less than *PL*. However, a more careful description of the Hand Formula would note that *P* should be replaced by  $\Delta P$ , representing the change in the probability of the accident when the potential tortfeasor switches from taking care to not taking care. The simpler version that ignores the change symbol  $\Delta$  is correct only if the probability of the accident is zero when the potential tortfeasor takes care. This is a simplification that makes the test much easier to explain; therefore I will follow the literature and continue to use it here.

In the causation scenario, the *ex ante* benefit from taking care is no longer simply *PL*, it is *PL* multiplied by the *ex ante* likelihood of intervention. Thus, the causation-modified Hand Formula is

---

<sup>27</sup> Hylton & Lin, *supra* note 4, at 82 footnote 8.

$$B < PLS$$

where  $S$  is the expected or *ex ante* likelihood of intervention. The higher the *ex ante* likelihood of intervention, other things equal, the greater is the benefit to society from taking care. If the *ex ante* intervention likelihood is known, or easily determinable, then causation cases would present no special problem to courts in conducting a negligence analysis.

The trouble with using the Hand Formula in many of the causation cases is that the *ex ante* intervention likelihood may be unknown and not even capable of determination by a trial court. In applying the *ex post* Hand Formula, the court uses its observation of the actual events. The court observes only the actual or *ex post* likelihood of intervention – say  $S_o$  – and therefore applies the causation-modified *ex post* Hand test:

$$B < PLS_o.$$

The *ex post* Hand test may be satisfied when the *ex ante* Hand test is not, and the converse holds too. Since negligence should be determined on the basis of information available to the defendant before the accident occurred, the *ex ante* Hand test is the standard that provides an accurate assessment of negligence.

As the above example based on *Grimstad* suggests, the incentive to take care in the causation scenario is determined by the relationship between the *ex ante* likelihood of intervention and the *ex post* values of the intervention likelihood for which the potential tortfeasor might be held liable. Thus, the probability law (i.e., distribution) governing the intervention likelihood is the most important determinant of incentives to take care in the causation scenario.

In thinking about the probability distribution governing the intervention likelihood, there are three cases to consider. The probability distribution could be symmetrical, like the bell-shaped normal curve. A second possibility is that it could be skewed to the right, which means that it looks like a mountain that leans toward the viewer's left – that is, a mountain with almost a sheer drop on its left side and an extended ski slope on its right side (that is, the right hand side of the viewer). A third possibility is that it could be skewed to the left, which means that it looks like a mountain that leans right.

The incentive to take care is excessive in the symmetrical and right skew cases.<sup>28</sup> The incentive to take care is inadequate in the left skew case.<sup>29</sup> Thus, knowing whether a causation holding such as *Grimstad* induces excessive precaution requires some knowledge of the probability law governing the intervention likelihood. Further, as an *a priori* matter, the incentive to take care appears to be excessive. In other words, if we imagine that all sorts of distributional shapes are equally likely to be observed, then in the absence of any information about the probability law governing the intervention, the best assumption is that the negligence test induces excessive precaution.

---

<sup>28</sup> Hylton & Lin, *supra* note 4.

<sup>29</sup> *Id.*

What is the intuitive explanation for these conclusions? Consider the right skew first. In the right skew case, the average value of the intervention probability is near the left end of the distribution – almost under the high point of the mountain, so to speak. To take an example of such a distribution, suppose you collected the heights of all of the adult males in a city, but mistakenly included a sizeable group of two-year old male children in the sample. The subsample of two-year-olds would shift the distribution from a typical bell curve to a bell curve with a right skew. Given the great height difference between two-year-old and adult males, the average height of the population in your sample might be distorted from five feet and ten inches (in an undistorted sample) to only five feet. One interesting property of the right skew distribution in this example is that if you walked out into the city and ran into a random male adult, his height probably would be greater than five feet. Thus, the probability of drawing a realization greater than the sample mean would be high.

In causation cases such as *Grimstad*, the precautionary incentive effect depends a lot on whether the *ex post* or realized intervention probability ( $S_o$ ) is greater than the *ex ante* intervention probability ( $S$ ). If the *ex post* intervention probability is very likely to be greater than the *ex ante* intervention probability, then the *ex post* benefit from taking care observed by the court ( $BPS_o$ ) is likely to be greater than the *ex ante* benefit from taking care ( $BPS$ ). The court may therefore find the tortfeasor liable for negligence even though he would not have been found liable for negligence on the basis of an accurate – that is, *ex ante* – evaluation of negligence. Because of this possibility, the tortfeasor has an excessive incentive to take care.

It follows that in the setting where the probability law governing the intervention frequency has a right skew, the excessive precautionary incentive is likely to be observed. The *ex ante* intervention probability will be low, close to zero, because of the right skew. In other words, the court is likely to observe an actual intervention probability that is greater than the *ex ante* intervention likelihood.

Now let's take these observations and translate them to the facts of *Grimstad*. Like the example with heights, suppose we start with a population of accidents where experienced sailors are there to help, generating the usual bell curve, and then add a sizeable number of accidents where the wife is the only potential rescuer present. This generates a right skew for the sample distribution governing the intervention probability. As in the heights example, the likelihood in a random accident that the observed intervention probability exceeds the low sample average is high, which gives rise to an excessive incentive to take care.

We need only reverse the story to describe the case of a left skew. Suppose, for example, there are a few exceptionally good rescuers among the sailors. They impart a left skew on the usual bell curve distribution. But in a random accident, the observed intervention probability is likely to be less than the distortedly high average, giving rise to an inadequate incentive to take care.

The last case to consider is the ordinary symmetrical bell curve. Why would care incentives tend to be excessive in this case? The care incentive is excessive here mainly for the reason identified by Stephen Marks,<sup>30</sup> the failure of the courts in most cases to subtract off counterfactual damages. Alternatively, this could be put down to the liability determination, as Grady does, but

---

<sup>30</sup> Marks, *supra* note 19.

Grady's argument is probability not applicable here because we are talking about damages rather than liability. Still, to give proper attribution to Grady, we might call this effect, the "Grady-Marks effect".

Taking all of this into account, what is a plausible view of the incentive effects created by *Grimstad*? The most plausible description, I think, is that in the vast majority of instances of an accident, the captain would have been around competent sailors. But including those instances where he is alone with his wife imparts a right skew to the probability law governing the intervention likelihood. This suggests that cases like *Grimstad* induce an excessive incentive to take care on the part of potential tortfeasors. However, note that this is a conclusion that depends on assumptions about the scenarios likely to unfold after the negligent act (or omission) and the relative frequency, within such scenarios, of the specific scenario actually observed in the case that comes before the court.

I noted earlier that this analysis applies just as easily to proximate causation cases. When an electric trolleybus driven at a negligently high speed ends up under a tree, as in *Berry v. Sugar Notch Borough*, the question arises whether the outcome was proximately caused, or foreseeable, given the negligence of the driver. This is an *ex post* analysis of causation, where the observed intervention (tree falling) affects the degree of harm likely to result. It is analogous to a case such as *Grimstad*, where the intervention affects the efficacy of care.

In economic terms, factual and proximate causation are simply two sides the same coin. We tend to think of them as very different legal issues, but the economic problem confronted in the factual and proximate causation cases is the same. Consider, for example, *Ross v. Hartman*,<sup>31</sup> a famous proximate causation case. The defendant left his key in the ignition of an unlocked car, parked in a public alley. A thief stole the car and ran over the plaintiff. The defendant's conduct was careless, but the risk of injury to third parties depended mostly on an intervention (theft coupled with careless driving) occurring. Figure 2 below captures the factual structure of proximate causation cases such as *Ross*. Although the structure for proximate causation depicted in Figure 2 differs from the structure for factual causation depicted in Figure 1, the difference is only superficial. Economic analysis of incentives under the two structures is identical. The *ex ante* probability of intervention in *Ross* may differ from the *ex post* probability of intervention. A causal intervention could occur as the result of a teenager seeking a joy ride, or a thief speeding to avoid capture. The intervention probabilities associated with these two scenarios are different. *Ex post*, the court observes a particular realization of the intervention probability and decides whether the defendant was negligent.

---

<sup>31</sup> 139 F.2d 14 (D.C. Cir. 1943).

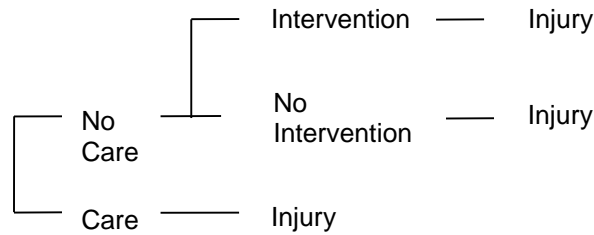


Figure 2: Proximate causation case

Some cases involve both factual and proximate causation issues.<sup>32</sup> For example, in *Wallinga v. Johnson*,<sup>33</sup> the defendant failed to lock a safe, resulting in the theft of jewelry. Suppose the defendant had failed to purchase a safe, and the negligence suit had been based on the failure to equip the hotel with a safe. Conditional on taking care by purchasing a safe, there are two interventions: locking the safe, and the appearance of thieves. The former is a question of factual causation, the latter one of proximate causation (or foreseeability). Conditional on failing to lock the safe, there is only one intervention: the appearance of thieves.

Much of the foregoing analysis can be applied to these two-sided causation cases, and I will not repeat the analysis here. The general conclusion is that two-sided causation cases tend to amplify the incentive distortions examined in this part.<sup>34</sup>

### Categories of Causation Cases

I do not wish to give the impression that the *ex post* negligence analysis describes the entire universe of causation cases in tort law. I think it is a description of just a subset, but probably the most important subset. There are many cases that have the same factual and information structure as *Grimstad*. Indeed, probably most of the causation cases can be described within the same information structure as *Grimstad*. Further, although the *ex post* negligence analysis does not perfectly describe the entire universe of causation cases, all of the causation cases can be viewed as within the general framework described here.

The causation cases can be put into three categories. The simplest consists of cases in which it is not difficult for a court to conduct an *ex ante* negligence evaluation based on the information provided by the case. These are cases of *ex ante determinable negligence*.

The classic example is *Perkins v. Texas and New Orleans Ry. Co.*<sup>35</sup> The defendant's train was traveling 12 miles greater than the speed limit, and ran over the plaintiff's car as it is stalled on the railroad tracks. The facts indicated that the train would not have been able to stop in time,

<sup>32</sup> I have described such cases as involving "two-sided causation." See Hylton, Lin, & Chu, *supra* note 21.

<sup>33</sup> 131 N.W.2d 216 (Minn. 1964).

<sup>34</sup> Hylton, Lin, & Chu, *supra* note 21.

<sup>35</sup> 147 So.2d 646 (La. 1962).

nor the plaintiff able to get out of the way, even if the train had been operating at the speed limit. The defendant was excused from liability on the basis of factual causation.

The important feature of *Perkins* and similar cases is that it is not difficult for a court to evaluate the counterfactual scenario from an *ex ante* perspective. An engineer can easily determine whether the train could have stopped in time to avoid the accident in *Perkins* if the train had been moving at the speed limit. Hence, there is no significant difficulty in such a case in conducting an accurate *ex ante* evaluation of negligence.

In *Perkins*, the intervention is the event in which the train stops in time to avoid the accident when traveling at the speed limit. The probability of such an intervention if the train had been moving at the regulated speed can be calculated with precision – indeed, it is either equal to or very close to zero in the actual case. Thus, generally, cases such as *Perkins* can be described as cases in which the reasonable level of care can be determined nearly precisely and the defendant’s compliance with that level of care can also be determined with the same high level of precision.

Returning to my generalization of the Hand Formula, *Perkins* is a case where both the intervention and the probability of intervention can be determined from an *ex ante* perspective. Because of this, the generalized Hand Formula, which requires comparing *B* to *PLS*, can be applied by a court with a likelihood of error virtually equal to zero. In this sort of case, all of the conclusions of the classical incentives analysis obtain. Causation is a necessary component of the negligence analysis, as suggested by Holmes,<sup>36</sup> demonstrated by Shavell,<sup>37</sup> and elaborated by Landes and Posner.<sup>38</sup> A finding that causation is not satisfied is equivalent to a finding that the defendant was not negligent.

A second set of cases can be described by the cricket hypothetical, based loosely on *Stone v. Bolton*. In the cricket hypothetical, the relevant intervention can be described as the event where the ball is hit on a trajectory that runs into the fence set at reasonable height, and the *ex ante* intervention probability is the probability that the cricket ball will be stopped by such a reasonable-height fence. The *ex post* intervention probability is the probability that the ball that hit the plaintiff, given its specific trajectory, would have been stopped by a fence of reasonable height. This type of case is a bit more complicated than cases in the first category such as *Perkins*. I will refer to these as cases of *ex ante determinable negligence with error*.

In the cricket hypothetical, the reasonable fence height and the *ex ante* probability of intervention are closely linked. Indeed, a reasonable fence height presumably is one that increases the *ex ante* probability of intervention to an optimal level. In *Stone v. Bolton*, the court noted that cricket balls had been hit over the fence into the surrounding neighborhood roughly six times in thirty years, suggesting an *ex ante* intervention probability of 0.8 on an annual basis. Although it is possible to conduct a Hand Formula analysis to determine whether .8 seems to be reasonable, such a determination would be compromised by computational errors and variability among courts. Further, after an accident has occurred, the court faces a further difficulty in determining

---

<sup>36</sup> Holmes, *supra* note 9.

<sup>37</sup> Shavell, *supra* note 11.

<sup>38</sup> Landes & Posner, *supra* note 12.

whether the *ex post* probability of intervention – that is, the probability that the actual cricket ball observed in the case – would have been stopped by a fence set at the reasonable height.

In the *Stone v. Bolton* type of case, the *ex ante* negligence standard can be determined, though with some difficulty and not with the precision observed in cases such as *Perkins* – and the same can be said of the *ex post* negligence standard. Because of the greater degree of uncertainty in this set of scenarios, these are cases where the negligence evaluation can be conducted, though with some risk of error.

In this class of *ex ante determinable negligence with error* cases, the risk of error means that the court observes a noisy signal of the reasonable care standard. These cases generate the incentive issues identified by Grady. Causation analysis reduces the incentive to over-comply that would otherwise exist because of the discontinuity in expected liability identified by Grady. This is a special case of the generalized Hand Formula in which the expected benefit from taking care (*PLS*) has an error term connected to it.

The third set of cases, represented by *Grimstad*, has been the emphasis of this paper. These are cases of *ex ante indeterminable negligence*. In this set, the court simply does not have enough information to conduct an *ex ante* assessment of negligence. The court cannot identify the likelihood of intervention, given an investment in care, from an *ex ante* perspective. In terms of the generalized Hand Formula, the court does not have enough information to determine the *ex ante* intervention likelihood, which is necessary to determine the *ex ante* benefit from taking care. The court observes only the *ex post* intervention likelihood. In these cases courts determine negligence on the basis of an *ex post* assessment, with resulting distortions in care incentives.

To sum up, courts necessarily conduct assessments of negligence based on *ex post* information – because that is the only type of information available. In cases of *ex ante* determinable negligence, the *ex post* information is sufficient to permit the court to conduct an accurate *ex ante* evaluation of negligence. In cases of *ex ante* determinable negligence with error, the *ex post* information is sufficient to permit the court to estimate the *ex ante* reasonable care level with tolerable error. In the *ex ante* indeterminable cases, the *ex post* information is simply insufficient to enable the court, working within established evidence norms, to conduct an *ex ante* assessment of negligence.

### Some Implications

Return once again to my stylized example based on *Grimstad*. Recall the outcome, based on my assumption in the example that the barge owner does not install life buoys: the court erroneously holds that the defendant was not liable even though he should have been held liable on the basis of an accurate assessment of negligence.

Much has been written about the moral significance of causation analysis in tort law. Richard Epstein once argued that the moral basis for liability is founded in the causation of harm: the mere fact that one person caused harm to another is both a necessary and sufficient moral basis



for liability.<sup>39</sup> It follows from this view that if a court determines that the causation test is not satisfied, the moral basis for liability evaporates. Conversely, if a court determines that the causation test is satisfied, the moral basis for liability is established.

Michael Moore views causation as a necessary condition for liability to be imposed in a morally defensible manner.<sup>40</sup> Liability serves a corrective justice or retributive purpose, according to Moore. If a court finds that an actor's conduct did not cause the harm suffered by the plaintiff, then there would be no moral basis for liability. This view differs from Epstein by discarding the sufficiency component. Causation is a sufficient basis for liability for Epstein while only a necessary basis for Moore. Thus, if a court finds that the causation test is satisfied, that is still not a sufficient moral basis for liability to Moore.

The analysis here seems to go some distance toward weakening the moral significance of causation. A court could easily find the defendant free from liability based on causation analysis when an *ex ante* assessment of negligence would find the defendant liable. To elaborate, the connection between the moral appropriateness of condemnation and the conclusion of a causation analysis varies among the three sets of cases identified here. In cases of *ex ante* determinable negligence, such as *Perkins*, causation is a necessary condition for a finding of negligence: if the accident would have happened even if the defendant had taken care, the defendant could not have been negligent under an accurate assessment of negligence. The reason is that negligence requires that the burden be less than the expected benefit of care – and when the *ex ante* intervention probability is zero, the expected benefit of care is zero also.<sup>41</sup> It follows, then, that a finding of an absence of causation may be morally significant in the *ex ante* determinable negligence cases, provided one believes that the negligence evaluation itself is morally significant. In cases of *ex ante* indeterminable negligence, such as *Grimstad*, a finding that the defendant's negligence did not cause the injury only answers the *ex post* assessment question, not the *ex ante* assessment. Excusing the defendant from blame based on the *ex post* assessment could be a morally retrograde or perverse result.

How should one view this conceptual dilemma? An accurate assessment of negligence points to guilt, while an assessment of causation leads to a conclusion of innocence. When applied to the same set of facts, one test may lead to moral blameworthiness, while the other test leads to moral innocence; one to condemnation, the other to applause or at least indifference. Should one choose the conclusion of one test over the possible implications of another? Would it not seem that the morality question is best answered by an application of the negligence standard? But that is the test that is most difficult to apply in some of the causation cases. The causation test is comparatively easy to apply, but it yields an answer that is not necessarily consonant with a negligence evaluation properly done. To apply causation analysis to exonerate a defendant who is guilty of negligence may serve some instrumental purposes, but it does not appear to advance or support the morality of tort law.

---

<sup>39</sup> Richard A. Epstein, A Theory of Strict Liability, 2 Journal of Legal Studies 151 (1973).

<sup>40</sup> Michael S. Moore, Causation and Responsibility: An Essay in Law, Morals, and Metaphysics (Oxford Univ. Press 2009).

<sup>41</sup> The expected benefit of care in the *ex ante* determinable cases is *PLS*, and this is zero when *S* is equal to zero.

A more general question suggested is whether it is possible to say much of substance about the morality of tort law without first having some sense of the incentive or compliance effects of tort standards. If the standards are applied in an imprecise manner, or if they provide improper incentives to take care, then how can one offer a moral justification for them entirely indifferent to their consequences and effects?

One might respond that my essential failure is equating the Hand Formula with morality. The causation analyses used by courts may be morally appropriate, one might say, while the Hand Formula itself is not. Thus, the court's decision in *Grimstad* is correct on moral grounds even if it resulted in a defendant who was guilty of negligence escaping any blame or liability. Morality and law are joined as one, while the utilitarian calculations of the Hand Formula belong in a different realm unrelated to ethics.

Admittedly, there are instances in which a wooden application of the Hand Formula would lead to a result that seems immoral, under almost any conceivable system of ethics. For example, suppose it is a choice between property and life. A person with an unusually expensive car decides it is better to take the risk of running over a child, whose life will be worth only as much as the average person, rather than allow his car to be damaged or destroyed in a collision. I am not aware of any system of ethics that would condone such a choice.

But I see this example as little more than an illustration of the worrisome implications of an overly expansive or aggressive approach to the Hand Formula. The law adopts norms that put life above property.<sup>42</sup> The Hand Formula generally is not used with actuarial precision in clear cases of such a tradeoff. Given the difficulty of putting a price on life, and the enormous variation in possible prices, a presumption that life is worth more than most types of personal property against which it could be traded off is economically sensible. And although not used generally, the Hand Formula does not lose all relevance in property versus life tradeoff scenarios. If it did, there would be many settings in which it would be negligence *per se* to impose the risk of death on a person for a seemingly unimportant end. People drive in their cars, imposing a risk of death on others, for trivial reasons. In many instances of ordinary life, property-versus-life tradeoffs are made. As Calabresi noted, the decision to build a tunnel under Mont Blanc required the loss of a certain number of lives, so some implicit finite valuation of life was necessarily part of the construction plan.<sup>43</sup> Such decisions, centralized and decentralized, are made frequently.

In any event, to return to the example at the core of this paper, an argument that economic analysis of causation results in morally inferior determinations seems difficult to defend on the basis of *Grimstad*. The barge owner failed to install life buoys. The result was a death. A proper *ex ante* evaluation of negligence, I have suggested, might easily have found that the barge owner was negligent. The legal analysis used by the court, however, found that the barge owner was not negligent because of the lack of evidence of causation in the events that transpired. For someone to assert that the legal analysis of causation is based on superior moral judgment while the economic analysis is morally inferior would require the asserter to believe that a system of reasoning (the law) that exonerates a person for negligently causing a death is superior to a

---

<sup>42</sup> See, e.g., *Bird v. Holbrook*, 130 Eng. Rep. 911 (C.P. 1825) (suggesting that deadly force to protect property is *per se* unreasonable).

<sup>43</sup> Guido Calabresi, *The Costs of Accidents: A Legal and Economic Analysis* 17 (Yale Univ. Press 1970).

system of reasoning that would not exonerate such a person. Such an argument would barely survive its statement.

Another objection to this paper's analysis is that by making the *ex ante* negligence analysis contingent on the probability of intervention, it renders the negligence determination too variable and too dependent on the failings of later actors. If the *ex ante* probability of intervention is low because a subset of later intervening actors are lazy or slow, then the first actor will have a broader scope to be excused of negligence. Perhaps it is better, on moral grounds, to require the first mover to assume competence on the part of the second mover.

While this approach may seem to satisfy intuitive desires to see upright behavior, it eventually leads to the same results as in this model. In other words, it suggests no modification of this paper's framework. Suppose courts determine negligence at the initial stage by assuming all later actors will be perfectly competent, so that the *ex ante* intervention probability is assumed to be one. The reasoning of most courts seems to be consistent with this assumption. The *Grimstad* court, for example, appears to concede, without careful analysis, that the defendant was negligent and reverses the jury on the question of causation. But this does not affect my conclusions. As long as the causation analysis is equivalent to an *ex post* assessment of negligence, which the case law suggests it tends to be, the operative test for liability will be the *ex post* negligence test.

Although the points I have made here about incentives were vaguely suggested by Calabresi, they have not been a part of the economic analysis of tort law until recently. The reason for the reticence in the literature to address these issues can be found in the assumption that the Hand test is implemented by perfectly informed courts, capable of calculating the optimal care level. This assumption is quite useful in understanding the precautionary incentive effect of the causation requirement in cases of *ex ante* determinable negligence (e.g., *Perkins*). To the extent such cases form a benchmark for analysis, the assumption of perfectly informed courts has been productive. But the assumption is a hindrance rather than aid to analysis when applied to other categories of causation cases (*ex ante* determinable with error and *ex ante* indeterminable). Grady had to abandon the assumption to think through the incentive effects of the causation test when courts are capable of error in determining negligence.

For economic analysis to help in rigorously understanding tort doctrine, it must sometimes depart from its standard assumptions. If courts were perfectly informed and all knowing, judges never would have created the causation framework. If the negligence test could be applied in an accurate manner in every case, courts would have done so, and would never have found a reason to even discuss the issue of causation.

The mere existence of causation doctrine is a sign that the classical economic model of negligence has been lacking something important. It has been lacking a sustained effort to incorporate the law's response to information constraints. The framework described here represents a step toward correcting this shortcoming.

Conclusion

Causation in tort law is a topic that has long generated speculative moral analysis and comparatively recently some economic analysis. The economic approach has focused on incentive effects and consequences, where incentive effects are merely consequences in the future. The innovation offered by the economic approach is that it enables precise predictions about the incentive effects of causation doctrine. Such predictions may aid courts in analyzing the probable consequences of causation holdings.