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## Foreword - Fundamentals of Causation

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## FOREWORD

### FUNDAMENTALS OF CAUSATION

MARIO J. RIZZO\*

For about the last eight years I have been deeply interested in the often-perplexing problems of causation in the law of torts. The advent of the "toxic tort crisis" has made resolution of these problems more urgent than ever before. Unfortunately, many recent attempts to address them have not paid sufficient attention to the theoretical foundations of both tort law and causation. The papers gathered together in this symposium are an attempt to fill this gap. All of the papers make fundamental theoretical contributions toward a better understanding of the critical issues. They probe deeply into the nature of causation thus seeking to shed light on the more practical matters that have surfaced in the tort crisis.

In this brief foreword I shall make no attempt to summarize the papers in any detail. The authors speak well on their own behalf. Nor shall I criticize the papers here despite my own strongly-held views on the subject. I think it inappropriate for a host gratuitously to criticize his guests. Criticism at this juncture would also deflect the reader's attention from the important contributions contained within this symposium. I shall, however, spend some time outlining what I take to be the key issues in any examination of causal questions in tort law. What follows may be viewed as a series of short notes on causation.

#### I. NATURE OF CAUSATION<sup>1</sup>

Causation is notoriously difficult to define. Accordingly, I shall not attempt such a definition here. Instead, I would like to discuss the central feature of causal interaction: transmission of a mark. Causal interaction is a property of processes, and not of events, persons or things. A causal process is capable of transmitting its own structure in the form of a mark. This mark persists even after the causal interaction has ended. Consider the simple example of an automobile hitting a pedestrian at a crossing. This is an intersection of two causal processes: the moving au-

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1. This section reflects the causal theory expounded in W. SALMON, SCIENTIFIC EXPLANATION AND THE CAUSAL STRUCTURE OF THE WORLD 168-74 (1984).

tomobile and the street-crossing pedestrian. There is a collision, after which the processes leave their marks. The pedestrian may have a broken leg, and the automobile may have a slight dent and blood splattered over it. The mark, which constitutes the sign of a causal interaction, is not *any* change that takes place in the relevant entities. It is a change relative to a baseline of noninterference in the individual processes. Each process can undergo changes of its own accord. The automobile can pass the crossing, and the pedestrian can get to the other side of the street. These are not the marks of a causal interaction. The mark is the modification of the characteristic the process would have exhibited. Thus, *omissions are not causal processes*. An omission simply permits a system to go on its way, or to exhibit the natural evolution of its characteristics.

## II. BACKGROUND OF RIGHTS

The descriptive aspect of causation discussed in the previous section can be analyzed quite independently of the idea of rights. In legal discussions, however, the ascertainment of rights is logically prior to the ascertainment of causation.<sup>2</sup> This logical priority is obscured by the "imprecision" that is characteristic of ordinary discourse. In common-sense terms, what we denote as a cause is a fusion of two ideas: the descriptive concept of causation, and the conclusion about responsibility emanating from a particular rights assignment. Sometimes this produces a deviation from what would have been assigned causal status in a purely descriptive model, while at other times it does not. If descriptive causation is absent and the defendant has no affirmative duty of care, then, in common-sense terms, there is no causation. On the other hand, if there *is* a duty of care, there will be common-sense causation, even without descriptive causation. These two types of cases raise questions about the causal status of omissions. Consider the following examples. Suppose Jones hears a small child, who is about to drown in a swimming pool, yelling for help. Although Jones could save the child at little cost to himself, he chooses not to and continues on his evening stroll. If the child drowns, is Jones the (or a) cause? Clearly his inaction is a necessary condition of the child's death, but that in turn is neither necessary nor sufficient to establish a causal connection. Whether common sense attributes causality to Jones' omission depends on the status of Jones' duty (and the child's correlative right) to rescue. If Jones has no such duty recognized in morality or in law, then he is not the (or a) cause of

2. I agree here with R. Epstein, *Nuisance Law: Corrective Justice and Its Utilitarian Constraints*, 8 J. LEGAL STUD. 49, 50-53 (1979).

the death. No one would claim, for example, that, if in a similar situation, Jones had failed to aid a small bird who was about to drown, he would be the cause of its death. This is because no one believes that he has a duty to rescue birds.

On the other hand, suppose an accountant negligently fails to provide the financial statement of a firm by the agreed-upon date. If the absence of this information leads the firm to engage in imprudent behavior that has a financially ruinous outcome, the accountant will be considered the (or a) cause even though, as in the previous case, there was no physical invasion or descriptive causation of any other kind. The contractual relationship between the parties created a right in the plaintiff and correlative duty in the defendant to the agreed-upon services. The defendant's omission will then be a common-sense cause of the plaintiff's ruin. In descriptive terms, however, the defendant is *not* the source of a causal process. He is simply being held liable for not having undertaken a causal process that would have deflected the course of events. Liability follows from the *absence* of causation—the absence of a contractually-promised causal process.

From the preceding discussion it might seem that the existence of a duty (or its correlative right) is necessary for common-sense causation, while descriptive causation is neither necessary nor sufficient. This impression would be mistaken. Common-sense causation can be present even where no rights of the plaintiff have been violated. In most cases, the common-sense view of causal interaction is completely isomorphic to the descriptive view. The violation of a plaintiff's rights, however, is crucial in the determination of legal liability. For this descriptive or common-sense causation is not enough. Two examples will make these points clear.

Suppose a new entrant into the industry that manufactures silk garments is able to produce them more cheaply and without compromising quality. As a result, an incumbent firm loses money and goes out of business. Can it recover these losses on tort principles? Clearly not. This is the case despite the presence of descriptive causation: the new entrant "caused" their garments to be produced more efficiently which in turn "caused" consumers (given their preferences) to stop buying the incumbent firm's products. One explanation of this result is that the stabilization of business profits is not a right recognized at common law. The showing of causation is thus irrelevant to the issue of liability when no right has been violated.

In most cases the existence of a right is determined by factors

outside the control of the parties to a dispute. In some situations, however, this is not true. Suppose an individual has a fatal disease and agrees to take a new, experimental drug in the hope of obtaining a cure. Instead, the drug unambiguously causes physical injury to him without improving his chances for survival. Despite a showing of descriptive (and common-sense) causation, he cannot recover damages if he voluntarily assumed the risks associated with the drug. Although an individual normally has the right to be free from physical invasion, he has, in this case and in this respect, given up that right in the hope of ensuring survival. Once again, then, causation is irrelevant when no right has been violated.

In summary, the two crucial elements of tort liability are the existence of a right and the showing of descriptive causation or the omission of an obligatory causal process. Occasionally the common-sense view of causation merges the two ideas, as when people say, for example, either that the passer-by did not cause the child's drowning, or that the accountant's omission did cause the firm's ruin. Generally, however, the ideas are separated in ordinary discourse as they should be in law.

### III. POLICY VERSUS COMMON-SENSE CAUSATION

The orthodox theory of causation distinguishes between cause-in-fact and legal or proximate cause. The former is an attempt to capture at least some of the descriptive aspects of causation. We usually say that X is a factual cause of Y if (i) Y actually occurred, and (ii) X is a necessary condition for Y. There are, however, several exceptions to the second requirement but they apply only to a minority of cases.<sup>3</sup> Legal or proximate cause "is not logic. It is practical politics."<sup>4</sup> A good deal of what is discussed under the rubric of legal causation is really a debate over policy goals and the best way to implement them.

Descriptive causation, on the other hand, is independent of specific policy goals. It is rooted in the structure of both scientific and common-sense causal understanding. A scientist does not have to possess a set of policy goals in order to determine whether the intersection of physical processes is causal. Similarly, in everyday life, people make causal judgments without subscribing to any specific set of social or economic policies. Some common-sense causal statements are not "purely" descriptive, as we have seen, but contain implicit moral judgments about

3. For a discussion of these cases, see, for example, H.L.A. HART & T. HONORÉ, *CAUSATION IN THE LAW* 122-28 (2d ed. 1985).

4. *Palsgraf v. Long Island R.R.*, 248 N.Y. 339, 352, 162 N.E. 99, 103 (1928) (Andrews, J., dissenting).

prima facie responsibility. This is because they are really complex statements involving both causal claims and rights claims.

Most economic analyses of causation are manifestations of the policy approach. They postulate a specific objective—for example, the minimization of the sum of expected accident and accident prevention costs—and then derive rules for the imposition of liability consistent with this objective. Use of the term “cause” then becomes superfluous.<sup>5</sup> The common-sense approach, however, may also serve an economic function. In this case, rendering the substance of legal arguments in a way that is consistent with (or reducible to) the structure of common-sense thought enhances the predictability of law. It creates a framework in which people can plan their actions without the threat of legal interventions, especially since such interventions can only be predicted, if at all, with the aid of expensive technical knowledge.

#### IV. NEGLIGENCE VERSUS STRICT LIABILITY

While causal theory can be developed independently of the debate over negligence and strict liability, there is a relationship between these two sets of issues. Those for whom descriptive causation is little more than the but-for test are forced to adopt negligence as a central ground of liability. There is no other way to avoid the *regressus ad infinitum* generated by their view of causation. If Smith, driving his automobile, unintentionally hits a pedestrian, Jones, as he crosses the street, are Smith's parents causes of the accident? Are *their* parents also causes? There is no end to the backward train of necessary conditions. The defender of the but-for test must stop somewhere. He stops when he reaches a necessary condition that is also an instance of wrongful conduct. In the absence of intention or statutory prohibition, wrongful conduct is some variant of negligence. Since Smith's parents and grandparents were not guilty of negligent behavior in having children, the causal chain does not extend to them. They are thus not “proximately” linked to the accident.<sup>6</sup>

It is doubtful, however, that the invocation of “negligence” is necessary to halt the potentially infinite regress of conditions. Even without a concept of negligent driving, common-sense causal attribution would never fall prey to such a regress. In a common-sense framework the behavior of Smith's parents and grandparents seems far from the causal

5. See, e.g., Landes & Posner, *Causation in Tort Law: An Economic Approach*, 12 J. LEGAL STUD. 109 (1983).

6. For an example of this type of reasoning, see O.W. HOLMES, *THE COMMON LAW* 92-95 (1881).

inquiry. True, their behavior is a necessary condition of the accident, but it is *causally irrelevant*. Whether or not Smith could have avoided the accident by more careful driving, it is still he, and not his parents or grandparents, who injured Jones. One reason for ignoring this powerful common-sense intuition lies in the difficulty of formalizing it. Why should any necessary condition be causally irrelevant? The answer must lie in analyzing the concept of "relevance."<sup>7</sup> In order to understand, for example, why an individual has a disease known as "paresis," it is useful to partition the class of all potential victims, that is, all human beings. One partition consists of dividing that reference class into those with untreated latent syphilis and those without. No one in the latter group is observed with paresis, but some small percentage of the former do get the disease. So it appears that the presence of untreated latent syphilis may help us understand why some individuals get the disease, and others do not. Indeed, syphilis may be a necessary condition for the development of paresis. Now let us return to the case of Jones' injury.

The causal question is: why did this particular case of driving result in injury to a pedestrian crossing the road, while the other cases of driving did not? Presumably the analyst would find it helpful to partition the reference class of all drivers on that road into two groups, those who hit pedestrians and those who did not. This may begin to show the relevance of Smith's driving to the injury. Although Smith's birth is a necessary condition of his driving and, hence, of the accident, it does not constitute a possible partition of the class of explanations (the "explanans"). It is meaningless to divide the class of drivers into those who have been born and those who have not. This necessary condition is irrelevant (in contrast to syphilis in the paresis example) because it does not even potentially shed light on the question: why did this driver injure a pedestrian *while other drivers did not*?<sup>8</sup> A causal argument is made relative to a partition in the reference class. The crucial error in the regression argument is that it abstracts from that partition and hence from the very context of the question.

7. I am indebted to the analysis in W. SALMON, *supra* note 1, at 128-29.

8. This formulation of the question is strictly appropriate only in a deterministic context. In that context, explaining why A injured a pedestrian is equivalent to explaining that B did not, if indeed he did not. When a cause necessitates its effect, then the absence of that cause (assuming uniqueness of causation) fully explains the absence of the effect. In cases of statistical explanation the question would have to be reformulated: why do drivers in this type of situation have a higher incidence of accidents than drivers in another type of situation?

## V. PROBABILISTIC CAUSATION

Before concluding these brief notes on causation, I would like to turn to a topic that is receiving increasing attention by those concerned with the current tort crisis: probabilistic causation. It is clear that the concept of a cause as a necessary and sufficient condition of an outcome is inadequate for understanding mass exposure or "toxic" torts. In circumstances where an individual is exposed to some hazardous chemical and then develops cancer, the chemical exposure is usually neither necessary nor sufficient. It is not necessary because there are other ways to develop even this specific form of cancer. It is not sufficient because the probability of getting the disease, given exposure, is typically very low. Analysts have thus concentrated on the incremental rise in the overall frequency of the disease in the affected population that is attributed to the exposure.<sup>9</sup> While this may be the proper focus of study in many circumstances, it ought to be the conclusion of an analysis rather than the starting point.

The essential feature of probabilistic causation is the intersection of two or more stochastic processes. A rise in the probability (frequency) of an outcome may be *evidence* of causation. It is not the causal phenomenon itself.<sup>10</sup> Exposure to cigarette smoke, for example, interacts stochastically with the human lung to produce certain changes at the cellular level. These changes, in turn, have a certain propensity (much less than unity) to generate cancer. This will appear in large populations of cigarette smokers as an increased incidence of lung cancer attributable to smoking. The increased incidence is a signal that certain causal processes are at work. In and of itself, this does not indicate that the causal relations are probabilistic. There may be some unidentified factor, *X*, sometimes present in smokers that, together with cigarette smoking, necessitates development of the disease.

The confusion between causation and evidence of causation generally arises whenever there are two or more distinct causal processes by which an outcome can be generated. Under these circumstances, a cause may actually *lower* the probability of its effect.<sup>11</sup> Suppose, for example, that exposure to a certain chemical has two consequences. First, it en-

9. See, e.g., Landes & Posner, *Tort Law as a Regulatory Regime for Catastrophic Personal Injuries*, 13 J. LEGAL STUD. 417 (1984); Robinson, *Probabilistic Causation and Compensation for Tortious Risk*, 14 J. LEGAL STUD. 779 (1985).

10. Papineau, *Probabilities and Causes*, 82 J. PHIL. 57 (1985).

11. Discussion of this issue can be found in Hesslow, *Two Notes on the Probabilistic Approach to Causality*, 43 PHIL. SCI. 290 (1976). A reply to Hesslow is contained in Rosen, *In Defense of a Probabilistic Theory of Causality*, 45 PHIL. SCI. 604 (1978). There is additional discussion in W. SALMON, *supra* note 1, at 199-200.



hances the body's resistance to carcinogens found in commonly-consumed foods (e.g., in bacon, peanut butter). Second, it triggers a stochastic process that has a 0.001 propensity of producing non-food related cancerous changes at the cellular level. The first effect, we shall assume, lowers the incidence of stomach cancer from 0.004 to 0.001 in the affected population, while the second effect increases the incidence of stomach cancer by 0.001. The aggregate result in the affected population will be a *decrease* in the incidence of disease by one-half (0.004 to 0.002). Does this mean that the chemical exposure cannot cause cancer? Clearly not. Simple examination of aggregate incidence rates, however, will not always reveal the causal mechanism at work.

There is another confusion between causation and evidence of causation that arises in the context of multiple causes. This stems from the belief that joint causation is really an illusion.<sup>12</sup> If we really understood the phenomena we are studying, the argument goes, we would know that, in any given instance, there is only *one* complex of conditions responsible for a particular effect. Thus, joint causation is really uncertainty about which of several possibilities actually did cause the outcome in question. In *Summers v. Tice*,<sup>13</sup> for example, two hunters negligently fired their guns in the direction of a third who was then injured. It was clear that only one hunter had actually injured him, but it was impossible to determine which one. This is quite obviously a case of uncertainty about causation, yet it is often classified as a "joint torts" or joint causation case.<sup>14</sup> The problem is no different in a probabilistic context. In that context, as well, joint causation cases are treated as if they were simply cases of uncertainty about causation.<sup>15</sup> Thus, when an individual who smokes is also exposed to air pollution, it makes sense, on this view, to claim that, barring synergistic effects, either smoking or pollution must have caused his cancer but not both. This, however, is incorrect. Suppose there are two independent simultaneous stochastic processes linked with a particular outcome. Each has a probability, when acting alone, of producing this outcome equal to 0.4. If a population is exposed to both processes the aggregate frequency of the outcome will be 0.64, and not 0.80.<sup>16</sup> This

12. Unger, *The Uniqueness in Causation*, 14 AM. PHIL. Q. 177 (1977).

13. 33 Cal. 2d 80, 199 P.2d 1 (1948).

14. Landes & Posner, *Joint and Multiple Tortfeasors: An Economic Analysis*, 9 J. LEGAL STUD. 517, 541-42 (1980).

15. Consider the implicit assumption underlying the following statement: "[I]t will not be known whether the carcinogenic substance discharged from a chemical plant or normal exposure to medical X-radiation . . . caused an individual's lung cancer." Shavell, *Uncertainty Over Causation and the Determination of Civil Liability*, 28 J.L. & ECON. 587, 587 (1985).

16. The mathematics are simple. The joint result of the two causes acting independently will be the sum of: (1) the probability of the "first" cause being efficacious and the "second" cause having

is because in 25% of the cases in which the outcome is manifest, *both* processes caused it.<sup>17</sup> In other words, in these cases there is causal redundancy or overdetermination. The issue is not simply one of uncertainty as to whether process A or process B is the cause. Sometimes, even from the omniscient perspective, both are.<sup>18</sup>

The fundamental point is that causation is a fact just like the weight of an airplane, the density of an atmosphere, or the distance of another solar system. The facts of probabilistic causation consist of the nature of interaction among stochastic processes. These facts, like all other scientific facts, cannot be known with absolute certainty. Probabilities thus enter the analysis of causal connections at two levels. The first is the level of the stochastic process itself, that is, the description of its propensity to achieve particular results. Thus, the "probability" in probabilistic causation refers to these propensities or physical tendencies in the relevant processes.<sup>19</sup> The second is the level of evidence. A claim about physical propensities may be more or less certain depending on the nature of the evidence available. The "probability" of such a claim is a degree of belief, conditionalized on the scientific evidence. Only this second sense of "probability" is necessarily subject to the requirements of the preponderance of the evidence standard.

## VI. THE SYMPOSIUM

I hope that the foregoing discussion has placed some of the major causal issues in a broader context. In the papers and comments that follow, a wide range of subjects is treated to a rather intensive analysis. The place of negligence and strict liability in causal theory is probed by Ernest Weinrib. The relation between causality and rights is discussed by Judith Thomson. Robert Cooter considers the contributions that economic analysis has made, and can make, to the development of modern

no effect; (2) the probability of the second cause being efficacious and the first having no effect; and (3) the probability of both causes being efficacious. If  $\alpha$  is the probability of one cause resulting in a particular outcome and  $\beta$  is the probability of the other cause, then the joint or accumulated probability will be:

$$\alpha(1 - \beta) + \beta(1 - \alpha) + \alpha\beta = \delta.$$

Let  $\alpha = 0.4$  and  $\beta = 0.4$ , then  $\delta$  will equal 0.64.

For discussions of the above, see Rizzo & Arnold, *Causal Apportionment in the Law of Torts: An Economic Theory*, 80 COLUM. L. REV. 1399, 1410 (1980); Rizzo & Arnold, *Causal Apportionment: Reply to the Critics*, 15 J. LEGAL STUD. 219, 221-22 (1986).

17. This is equal to  $\alpha\beta/\delta$  or 0.16/0.64.

18. In each of the remaining 75% of the cases, however, either one or the other caused the outcome but not both.

19. The classic statement of the propensity interpretation of probability is from Popper, *The Propensity Interpretation of Probability*, 10 BRIT. J. FOR PHIL. SCI. 25 (1959). A more recent influential study is D. MELLOR, *THE MATTER OF CHANCE* (1971).

causal doctrines. Mark Kelman offers a fundamental critique of both traditional causal doctrines and recent probabilistic analysis. Finally, Richard Epstein develops the rights context of causation in his Afterword.