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CAUSATION, COUNTERFACTUALS AND PROBABILITIES IN PHILOSOPHY AND LEGAL THINKING

FLORENCE G'SELL¹

Determining whether the law could and should have its own definition of causation which would be based solely on its own logic and objectives and would stay independent of philosophical or scientific accounts is a nagging question.² Whatever the answer may be, one must admit that law and philosophy share the same difficulty in defining causation. This difficulty is so acute that, in both disciplines, “anyone familiar with the causation debate as it has been conducted in recent years will be familiar with a vast range of theories and counterexamples, which collectively can lead one to suspect that no univocal analysis of the concept of causation is possible.”³ Therefore, it seems appropriate in both contexts, while faced with such a large number of approaches, to assess the various accounts of causation with a certain criteria of adequacy.⁴

In this respect, philosophy and law have necessarily different standards. Certainly, it may be argued that philosophy should privilege, in assessing the various approaches of causation, the criteria of coherence, agreement with common-sense intuition and compatibility with contemporary science.⁵ However the law engages in types of inquiry that are based on interrogations which may lead to favor other standards. It has been asserted that, while philosophers do not seem to agree on which underlying interrogation their approaches refer to, “lawyers should explicitly choose just one interrogation to underlie causal usage in law so that it is clear what information we are reporting when we use causal language for legal pur-

1. I am very much indebted to Professor Richard Wright for reviewing and commenting on this piece. May he be warmly thanked for it.

2. See Antony Honoré, *Causation in the Law*, in THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed., Winter ed. 2010), <http://plato.stanford.edu/archives/win2010/entries/causation-law/> (asking “whether and to what extent causation in legal contexts differs from causation outside the law, for example in science or everyday life . . .”); see also FLORENCE G'SELL-MACREZ, RECHERCHES SUR LA NOTION DE CAUSALITÉ (2005) (University of Paris I Panthéon Sorbonne).

3. *Introduction to THE OXFORD HANDBOOK OF CAUSATION 1* (Helen Beebe et al. eds., 2009).

4. Max Kistler, *Analyzing Causation in Light of Intuitions, Causal Statements, and Science*, in CAUSATION IN GRAMMATICAL STRUCTURES 79 (Bridget Copley & Fabienne Martin eds., 2015).

5. *Id.* at 82.

poses.”⁶ Within this context, such an interrogation should be chosen “to serve the wide projects of the law” which is mainly interested in “identify[ing] when a specified factor was ‘involved’ in the existence of a particular phenomenon.”⁷

In any case, it is beyond dispute that law and philosophy have much in common while addressing the notion of cause which is—in both disciplines—“a multiple-purpose tool.”⁸ Yet certain functions of causation emerge both in the legal and philosophical contexts. Above all, the notion of cause serves to explain how a certain situation came about: in this respect, the function of causation is backward-looking and explanatory.⁹ Another function is attributive: causation is used to fix the extent of responsibility of agents. The last function of the notion of cause that can be identified is to predict what will happen from a forward-looking perspective.¹⁰ While this last function is probably less prominent in the law, the others are common to law and philosophy. This circumstance explains why the various approaches of causation in the law appear to be, in many respects, the extension of philosophical developments.

The purpose of this contribution will thus be to present, very shortly and modestly, the major approaches analyzing the notion of cause in contemporary philosophy before turning to the main legal theories of causation. Such an overview purports to bring to light the obvious links between law and philosophy concerning causation thinking.

I. PHILOSOPHICAL APPROACHES OF CAUSATION

The current leading theories of causation in the contemporary philosophical landscape may be roughly divided into three major conceptions. The first one is based on the related but distinct ideas of regularity or instantiation of natural laws and is often presented as the deductive nomological (DN) conception of causation. The second one is counterfactual and the third is a probabilistic conception of causal links. Whereas the first two theories are based on the Humean-Millian account of causation, the third one results from the development of probabilistic thinking in the recent period.

6. Jane Stapleton, *Causation in the Law*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 1224.

7. *Id.*

8. Honoré, *supra* note 2.

9. *Id.*

10. *Id.*

Before presenting successively those three approaches, it should be stated at the outset that other recent but less debated theories exist and will not be discussed here, such as the attempt to characterize causation in terms of “continuous process and interaction between them” (causal process theories)¹¹ or the concept of manipulation (agency and interventionist theories).¹²

A. *The Regularity/Covering Law View of Causation*¹³

According to David Hume, causal judgments are based on the experience of regularities. He states, “We may define a cause to be an object precedent and contiguous to another, and where all the objects resembling the former are placed in like relations of precedency and contiguity to those objects that resemble the latter.”¹⁴ In other words, events that are like the cause are regularly followed by events like the effect.

From this perspective, regularity theories tend to define causation in terms of subsumption under uniformly experienced regularities. This means that singular causal judgments are not based on direct perception of powers or forces but founded on the belief that a certain succession of events instantiates one (or more) experienced regularities.

John Stuart Mill converted Hume’s regularity account, which was skeptical regarding the actual existence of causal laws, into an empiricist covering law version of what is today called the nomological account of causation. He argued that a cause is an antecedent set of conditions which is minimally sufficient for the occurrence of the effect.¹⁵ Mill distinguished the positive factors from the negative conditions, the absence of which is necessary for the effect. To Mill, the cause is, philosophically speaking, the sum total of the conditions positive and negative taken together.¹⁶ In other words, a fully described causal law would list all the conditions that together are necessary and sufficient for the occurrence of a certain consequence.

11. Phil Dowe, *Causal Process Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 360–95.

12. James E. Woodward, *Agency and Interventionist Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 396–440.

13. Stathis Psillos, *Regularity Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 230–75.

14. DAVID HUME, A TREATISE OF HUMAN NATURE 173–94 (2012) (ebook).

15. JOHN STUART MILL, A SYSTEM OF LOGIC: RATIOCINATIVE AND INDUCTIVE (CosmoClassic 2008) (1843); Michael Moore, *For What Must We Pay? Causation and Counterfactual Baselines*, 40 SAN DIEGO L. REV. 1181, 1181–1267 (2003); Psillos, *supra* note 13, at 243–45.

16. Psillos, *supra* note 13, at 243–45.

In modern philosophy, causal explanation has been assimilated to the “deductive-nomological” (DN) conception of causation¹⁷ presented by C. Hempel and P. Oppenheim in their seminal article *Studies in the Logic of Explanation*.¹⁸ According to this approach, one event *c* is the cause of another event *e*, if and only if there is a law of nature that connects events like *c* with events like *e*. Although it has been subject to much criticism since the 1960s, the DN model remains one of the major approaches to the analysis of causation.¹⁹

One of the major difficulties with regularity and covering law theories arises from the fact that regularities and empirically based causal laws (better described as causal generalizations since they are almost never fully described) are imperfect.²⁰ Causal conditions may not be invariably followed by their effects. For example, smoking is a cause of lung cancer but some smokers do not develop lung cancer. On the contrary, as Mill recognized, a specific effect may result from various different sets of factors, which is called the problem of “heterogeneity of circumstances”²¹: lung cancer may result from smoking, but also from a genetic susceptibility or exposure to asbestos. Furthermore, contemporary science has shown that causal laws are not invariable: the universe is not deterministic.

B. Counterfactual Theory

The counterfactual approach is based on David Hume’s second remark about causation.²² Hume maintained that causation was based on the experience of regularities but he also added that a causal link was established “where, if the first object had not been, the second never had existed.”²³ This second definition expressed a relationship of strict necessity between two events: the first object or event had to be strictly necessary for the occurrence of the second, in the sense that the second could never occur in the

17. James Woodward, *Scientific Explanation*, in THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY, *supra* note 2, at 1–2, <http://plato.stanford.edu/archives/win2014/entries/scientific-explanation/>.

18. Carl G. Hempel & Paul Oppenheim, *Studies in the Logic of Explanation*, J. PHIL. SCI. ASSOC. 135, 136–40 (1948); See Psillos, *supra* note 13, at 259–62.

19. Woodward, *supra* note 17, at 2.

20. Christopher Hitchcock, *Probabilistic Causation*, in THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY, *supra* note 2, at 1.1, <http://plato.stanford.edu/archives/win2012/entries/causation-probabilistic/>.

21. *Id.*

22. Peter Menzies, *Counterfactual Theories of Causation*, in THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY, *supra* note 2, <http://plato.stanford.edu/archives/spr2014/entries/causation-counterfactual/>.

23. DAVID HUME, AN ENQUIRY CONCERNING HUMAN UNDERSTANDING 56 (Peter Millican ed., 2007).

absence of the first.²⁴ Although this counterfactual definition was very different from the first definition,²⁵ Hume never explored this second perspective.

It was not until the late 1960s that sophisticated counterfactual approaches of causation were developed.²⁶ The best known and most thoroughly elaborated counterfactual theory of causation is David Lewis's theory,²⁷ exposed in his 1973 seminal article, *Causation*.²⁸ In Lewis's theory, causal relations are analyzed in terms of counterfactual dependence between two actual events. The event *e* causally depends on the event *c* if the counterfactual statement "if event *c* had not occurred, event *e* would not have occurred" is true. In this perspective, a counterfactual conditional is a conditional sentence, whose antecedent is contrary-to-fact. In Lewis's words, "We think of a cause as something that makes a difference, and the difference it makes must be a difference from what would have happened without it. Had it been absent, its effects — some of them, at least, and usually all — would have been absent as well."²⁹

In Lewis's perspective, asserting that a counterfactual statement is true implies to rely on similarity relations between possible worlds. "One world is said to be *closer to actuality* than another if the first resembles the actual world more than the second does."³⁰ In this perspective, the counterfactual "If Mr. Gurlain had not smoked he would not suffer from cancer" is true if and only if some world where Mr. Gurlain does not smoke and is in good shape is closer to the actual world than is any world where Mr. Gurlain does not smoke and suffers from cancer. The possible world analysis relies on causal laws to assess the necessity of a condition for the occurrence of the effect.³¹ Although some proponents of the counterfactual approach, as Lewis, explicitly rely on causal laws, others appear to reject any reasoning based on causal laws or generalization and favor a singular causation approach that focuses on the most similar possible world in specific circum-

24. Richard W. Wright & Ingeborg Puppe, *Causation: Linguistic, Philosophical, Legal and Economic*, 91 CHI.-KENT L. REV. 461, 465 (2016).

25. However, it is possible to read this second definition as plainly restating the first one. See MICHAEL S. MOORE, CAUSATION AND RESPONSIBILITY: AN ESSAY IN LAW, MORALS, AND METAPHYSICS 399 (2009).

26. L.A. Paul, *Counterfactual Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 276.

27. The analysis of J.L. Mackie, which is developed in the Chapter 2 of his book, can also be mentioned. See J.L. MACKIE, THE CEMENT OF THE UNIVERSE: A STUDY OF CAUSATION 2958 (1974).

28. David Lewis, *Causation*, 70 J. PHIL. 556 (1973).

29. *Id.* at 557.

30. Menzies, *supra* note 22, at 2.1.

31. Wright & Puppe, *supra* note 24, at 111–12.

stances.³² In any case, since counterfactual conditionals refer to particular events at particular times, the counterfactual approach is considered as a theory of singular instances of causation rather than of causal laws.³³ Lewis agrees with Mill that the second event may occur in the absence of the first, contrary to Hume's apparent assumption. For a condition to be a cause, it need not be always necessary for the occurrence of the effect (strict necessity), but rather only necessary for the occurrence of the effect in the specific singular instance (strong necessity).³⁴

In 1986, Lewis presented a probabilistic extension to his original counterfactual theory of causation³⁵ in order to take into account the fact that probabilistic processes are widespread in the actual world. In this view, causal dependence can be expressed as follows: if Mr. Goullain had not smoked, his probability of developing lung cancer would have been much less than its actual chance.

Nevertheless, defining causation in terms of causal dependence raises various difficulties. First, if any event but for an effect would not have occurred is a cause, the theory may generate some absurd results. For example, it is easy to assert that an injury would not have occurred if the victim or the tortfeasor were never born. This is why Herbert Hart and Tony Honoré tried to develop a distinction between causes and background conditions which common sense, in their opinion, usually draws. According to Hart and Honoré, common sense distinguishes spontaneously between causes and "mere circumstances"³⁶: the tortfeasor's birth is a background condition whereas the tortfeasor's act is a cause. Such a distinction is made by referring to the context of the inquiry: for example, tort law raises questions of personal liability. The distinction also relies on the context of the effect's occurrence.³⁷ However, Lewis himself never made such a distinction.

32. Moore, *supra* note 15, at 1195.

33. L.A. Paul, *Counterfactual Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 276–77.

34. Wright & Puppe, *supra* note 24, at 111–13. The distinction between strict, strong and weak senses of necessity and sufficiency was established by Richard W. Wright, *Causation, Responsibility, Risk, Probability, Naked Statistics, and Proof: Pruning the Bramble Bush by Clarifying the Concepts*, 73 IOWA L. REV. 1001, 1039 (1988).

35. See David Lewis, *Causal Explanation*, in PHILOSOPHICAL PAPERS II 214–40 (1st ed. 1987).

36. H.L.A. HART & TONY HONORÉ, CAUSATION IN THE LAW 72 (2d ed. 1985).

37. See *id.* at 33 ("The line between cause and mere condition is in fact drawn by common sense on principles which vary in a subtle and complex way, both with the type of causal question at issue and the circumstances in which causal questions arise.").

Second, the theory does not solve the issues created by causal overdetermination, that is preemptive causation³⁸ and duplicative causation.³⁹ In cases of preemptive causation, the effect would have been produced even if the actual cause had not occurred because another causal factor would have occurred and produced it. For example, Mr. X died in a traffic accident but he was already suffering from a fatal disease and would have died anyway, thus it would be inaccurate to assert that Mr. X would not have died but for the car accident. In duplicative causation cases, two events jointly caused the effect but both of them would have caused it alone if the other event had not occurred. For example, Mr. X was shot in the head by two bullets, each of which was sufficient to kill him.

In order to deal with such cases, Lewis developed the notion of chains of causal dependence. According to Lewis, event *c* causes event *e* if and only if there is a chain of intermediate events *c*, *c*₁, *c*₂, . . . , *e*, so that each event in the chain depends counterfactually on its predecessor.⁴⁰ By defining causation in terms of stepwise counterfactual dependence, Lewis is thus able to distinguish the preempting actual cause (the car accident) from the preempted potential cause (the fatal disease). There is a causal chain running from the car accident to the death, but no such chain running from the disease to the death. Nevertheless, the reasoning in terms of chains of causal dependence cannot deal satisfactorily with certain preemption cases, like cases of “late preemption”⁴¹ where the effect resulted from the actual cause before the preempted cause could produce anything. For example, Mr. X was injured in a collision with A’s car, but Mr. X’s car would have later collided with B’s car if the first collision with A’s car had not occurred. In other words, the alternative process (collision with B) is cut short after the main process (collision with A) has actually brought the effect. In such a case, there is no causal dependence between the collision with A’s car and the injury, because there would have been an accident due to collision with B even if there was no collision with A.

In 2000, Lewis presented a last version of his theory that develops the notion of “influence”.⁴² Influence corresponds to “counterfactuals that are sensitive to a wide range of characteristics, such that, had C not occurred just as it actually did, E would not have occurred just as it actually did. The final version of the view defended by Lewis is the thesis that, if whether,

38. Paul, *supra* note 26, at 298–99.

39. *Id.* at 306–07.

40. Lewis, *supra* note 28, at 563.

41. Menzies, *supra* note 22, at ¶ 3.4.

42. David Lewis, *Causation as Influence*, 97 J. PHIL. 182 (2000).

when, and how C occurs influences to a suitable degree whether, when, and how E occurs, C is a cause of E.”⁴³ Another way to put it is to say that an event *c* causes the event *e* if there is a “chain of influence” from *c* to *e*.

C. Probabilistic Approaches of Causation

Probabilistic theories of causation⁴⁴ are generally presented as a major alternative to the regularity approach that are intended to draw the consequences of indeterminism. Hans Reichenbach⁴⁵ was the first author to provide a comprehensive epistemological account of causal relationships based on probabilities. Nowadays, probabilistic theories of causality have reached a wider audience and their expansion was accompanied by an increased mathematization of causality.⁴⁶ In the probabilistic approach, causes are seen as raising the probability of their effects. In other words, “(1) changing a cause makes a difference to its effects, and (2) this difference-making shows up in probabilistic dependencies between cause and effect.”⁴⁷ Many proponents of probabilistic theories maintain that “probabilistic dependencies *characterize* the causal relation, i.e. provide necessary and sufficient conditions for causal connection, of the form: C causes E if and only if appropriate probabilistic dependencies obtain.”⁴⁸

Probabilistic theories of causation interpret probabilities objectively, which means that they see probabilities as expressing frequencies that are objective features of the world, as opposed to subjective probabilities which express the degree of an individual’s personal belief in the likelihood of a causal link. These theories are sometimes presented as theories of singular causation relating specific events and sometimes referred to as theories of general causation relating types of events.⁴⁹

In the probabilistic account of general causation, the cause *c* raises the probability of its effect *e*, which means that the probability that smokers

43. Paul, *supra* note 26, at 304.

44. Hitchcock, *supra* note 20; Jon Williamson, *Probabilistic Theories*, in THE OXFORD HANDBOOK OF CAUSATION, *supra* note 3, at 318–59.

45. Williamson, *supra*, note 44, at 321–25. Proponents of probabilities theories of causality include: HANS REICHENBACH, THE DIRECTION OF TIME (Maria Reichenbach ed., 1971); RICHARD E. NEAPOLITAN, PROBABILISTIC REASONING IN EXPERT SYSTEMS: THEORY AND ALGORITHMS (1990); JUDEA PEARL, CAUSALITY: MODELS, REASONING AND INFERENCE (2d ed. 2000); PATRICK SUPPES, A PROBABILISTIC THEORY OF CAUSALITY (1970); I.J. Good, *A Theory of Causality*, 9 BRIT. J. PHIL. SCI. 307 (1959); Hans Reichenbach, *The Principle of Causality and the Possibility of its Empirical Confirmation*, in MODERN PHILOSOPHY OF SCIENCE 109 (Keegan Paul ed., 1959); Wesley C. Salmon, *Probabilistic Causality*, 61 PACIFIC PHIL. Q. 50 (1980).

46. Williamson, *supra* note 44, at 330.

47. *Id.* at 320.

48. *Id.* at 320–21.

49. Hitchcock, *supra* note 20, at 1.3.

develop lung cancer is higher than the probability of suffering from lung cancer in general. It also means, in other words, that the probability, for a smoker, of suffering from lung cancer, is higher than the probability, for a non-smoker, of suffering from lung cancer.

Such approaches are compatible with imperfect regularities: *A* may raise the probability of *B* even though *A* is not invariably followed by *B*. Moreover, this approach is not threatened by the problem of heterogeneity of circumstances. In other words, smoking is a cause of lung cancer, not because all smokers develop lung cancer, but because smokers are *more likely* to develop lung cancer than non-smokers. This is also consistent with there being some smokers who avoid lung cancer, and some non-smokers who die from lung cancer.

As other theories do, the probabilistic account faces counterexamples. One counterexample is the case where an actual causal relationship established by our physical knowledge is not accompanied by the raising of probabilities.⁵⁰ Raising of probabilities is also absent in cases of causal preemption. For example, Mr. X had a traffic accident resulting in a 60% chance of death. However, Mr. X was already suffering from a fatal disease that caused a 90% chance of death. Here, the actual cause preempted a stronger cause, but it lowered the victim's chance of death from 90% to 60%. Furthermore, it may happen that a given factor raises the probability of an outcome without causing it. In view of those counterexamples, some authors advocate a pluralistic account of causality according to which causal relationships are sometimes probabilistic and sometimes not.⁵¹

II. MAIN APPROACHES OF CAUSATION IN LEGAL THINKING

The prevailing approaches to the question of causation in the law appear to be directly inspired by philosophical thinking. This is why the classification used to present those theories will be roughly similar to the one used in the first part of this article. However, the counterfactual approach will be studied first, since it seems to have developed before the emergence of the regularity and probabilistic views of causation.

A. Counterfactual Approach of Causation in the Law

The idea that a cause must be a condition that “made a difference” by being necessary for the occurrence of the consequence, in the sense that

50. Williamson, *supra* note 44, at 339–44.

51. *Id.* at 342; See, e.g., Ned Hall, *Two Concepts of Causation*, in CAUSATION AND COUNTERFACTUALS 225, 225–76 (John Collins et al. eds., 2004).

without it the consequence would not have occurred on the particular occasion, is widely shared in various legal systems. In common law countries, it takes the form of the “but for test” while in civil law countries it underlies the theory of the equivalence of conditions. In both common law and civil law jurisdictions, the but for test is usually assumed to require a hypothetical counterfactual analysis.

1. The “But for Test” in Common Law Countries

In common law countries, the causal relationship that must be established in order to make someone liable in negligence is typically described as the “but for test”.⁵² Although some commentators argue that the but for test does not need to be applied as a hypothetical possible worlds analysis,⁵³ this test is often presented as expressing a relationship of counterfactual dependence. Whether described factually or counterfactually, under the “but for” test, a defendant is a cause of the plaintiff’s harm if and only if, had the defendant not acted tortiously (or negligently), the plaintiff would not have been injured.⁵⁴ The but for test is deployed in most common law jurisdictions and is used by courts and juries to determine what is called “actual” or “factual” causation. Generally, other requirements are imposed by the law, like the fact that the link between the defendant’s negligence and the plaintiff’s harm is direct or proximate.

The but for test is subject to difficulties already discussed which are specific to counterfactual approaches. The test produces counterintuitive results, especially in cases of causal overdetermination.⁵⁵ For example, in duplicative causation situations, where two (or more) distinct causes joined to cause the damage, but each of them was sufficient to produce it alone. In those cases, neither factor can be treated as a but for cause given the existence of another factor which was sufficient to produce the harm. The same issue is raised in alternative causation cases. In the classic example of two defendants simultaneously shooting at and hitting the deceased with fatal shots, the but for test yields the implausible conclusion that neither has caused the harm.

These problems have led some commentators to suggest the abandonment of the but for test. Some of them have advanced a substantial-

52. HART & HONORÉ, *supra* note 36, at 15, 16, 69, 110; *See also* Richard W. Wright, *Causation in Tort Law*, 75 CAL. L. REV. 1735, 1775 (1985).

53. Wright & Puppe, *supra* note 24, at 114–15.

54. Robert N. Strassfeld, *If . . . : Counterfactuals in the Law*, 60 GEO. WASH. L. REV. 339, 345 (1992).

55. Wright, *supra* note 52, at 1775–76.

factor criterion under which the defendant's conduct is a cause of the harm if it is a "substantial factor" in producing that harm.⁵⁶ The substantial factor criterion was adopted in the First and Second *Restatement of Torts* to encompass both but for causes and cases in which multiple "actively operating forces" were each independently sufficient (along with shared "background" conditions) to produce the harm.⁵⁷ However, due to its question-begging nature, the *Restatement (Third) of Torts* has abandoned the notion of "substantial factor" and now refers to the NESS criterion for cases of causal overdetermination in the comments to (but not the actual text) of section 27, while providing in section 26 that "conduct is a factual cause of harm when the harm would not have occurred absent the conduct."

2. The Theory of the Equivalence of the Conditions in Civil Law Countries

The theory of the equivalence of the conditions stems from both the empiricist tradition of Hume and Mill and the further reflection of German authors.⁵⁸ Indeed, since there was little theoretical reflection on causation in French doctrinal writing during the period immediately following the adoption of the Civil Code, it was only through the influence of German literature that, during the latter part of nineteenth century, French commentators gained exposure to theories of causation.

The starting point of the theory of the equivalence of the conditions is the classic observation that a fully described causal law lists all the conditions that together are necessary and sufficient for the occurrence of a certain consequence. According to the German theorist Maximilian von Büri,⁵⁹ since it is impossible to specify the exact share of each condition in the production of the result, every factor should be considered as a cause. Von Büri justified this assertion by the fact that the ultimate result is indivisible. Franz von Liszt⁶⁰ also believed that, since all conditions are necessary to produce the result, they are, therefore, inevitably equivalent. Therefore, according to the theory of the equivalence of the conditions, every condition of an injury can be considered a cause. In this respect, the

56. LEON GREEN, JUDGE AND JURY 234–35 (1930); LEON GREEN, RATIONALE OF PROXIMATE CAUSE (1927).

57. "if two forces are actively operating, one because of the actor's negligence, the other not because of any misconduct on his part, and each of itself is sufficient to bring about harm to another, the actor's negligence may be found to be a substantial factor in bringing it about." RESTATEMENT (SECOND) OF TORTS § 432(2) (AM. LAW INST. 2015).

58. HART & HONORÉ, *supra* note 36, at 431.

59. M VON BÜRI, DIE KAUSALITÄT UND IHRE STRAFRECHTLICHEN BEZIEHUNGEN (Stuttgart 1885).

60. FRANZ VON LISZT, LEHRBUCH DES DEUTSCHEN STRAFRECHTS (13th ed. 1903).

theory of the equivalence of the conditions is often thought to lead to the classic counterfactual approach to causation. Another way to state the theory is to say that, since all the conditions are equivalent, every condition without which the effect would not have occurred is considered a cause. Causation is thus established through a test of counterfactual dependence that is roughly analogous to the but for test.

The theory of the equivalence of the conditions has been criticized in French commentary for not offering any method to select the cause among the conditions that have combined to produce the damage.⁶¹ It is often highlighted that the test is over-inclusive. For example, where victims have been injured in accidents and transported to the hospital, and subsequently harmed due to medical malpractice,⁶² the French courts tend to link the victim's ultimate harm to the initial accident, namely, the driver's negligent act.⁶³ But this criticism probably confuses the issue of causation with the distinct issue of legal responsibility.

Although the theory of the equivalence of the conditions has an unquestionable influence on case law, it cannot be asserted that this theory has been consecrated in the French positive law, which does not seem to choose one approach over another. This is probably why the reform projects of French Tort Law, the *Catala Draft*,⁶⁴ made no attempt to formulate a definition of causation (Article 1347 of the French Civil Code). The other project, the *Terré Draft*,⁶⁵ states that the cause is any fact without which the damage would not have occurred while also specifying that such a fact must be susceptible of producing the damage "according to the ordinary course of things" (Article 10).⁶⁶ Generally, civil law scholars and courts use the but for criterion for factual causation, although with various modi-

61. G'SELL-MACREZ, *supra* note 2, at ¶¶ 142, 185.

62. Cour de cassation [Cass.] [supreme court for judicial matters] crim., Jan. 14, 1970, Bull. crim. 1970, No. 23; RTD civ. 1970, 574 obs. G. Durry (Fr.).

63. Cour de cassation [Cass.] [supreme court for judicial matters] crim., Oct. 5, 2004, D. inf. rap. 2972. *Contra* Cour de cassation [Cass.] [supreme court for judicial matters] crim., Jan. 15, 1958 JCP G 1959, II, 11026, note P. Esmein (Fr.).

64. *Draft Décret du 2008, Avant-Projet de Réforme Due Droit Des Obligations Et Du Droit De La Prescription*, DOCUMENTATION FRANCAISE (P. Catala ed., 2006). *See also Proposals for Reform of the Law of Obligations and the Law of Prescription*, MINISTÈRE DE LA JUSTICE (John Cartwright & Simon Whittaker trans., 2007), http://www.justice.gouv.fr/art_pix/rapportcatatla0905-anglais.pdf [hereinafter *Oxford Translation*] (English version); HENRI CAPITANT ASSOC., AVANT-PROJET DE REFORME DU DROIT DES OBLIGATIONS (ARTICLES 1101 À 1386 DU CODE CIVIL) ET DU DROIT DE LA PRESCRIPTION (ARTICLES 2234 À 2281 DU CODE CIVIL) (2008), <http://www.henricapitant.org/node/73> [hereinafter *Capitant Translation*].

65. FRANÇOIS TERRÉ, POUR UNE RÉFORME DU DROIT DE LA RESPONSABILITÉ CIVILE (F. Terré ed., 2011).

66. *See* Oliver Moréteau, *France: French Tort Law in the Light of European Harmonization*, 6 J. CIV. L. STUD., 760, 769 (2013).

fications in specific cases. Ingeborg Puppe has detailed the inadequacies of this approach and argued for the need to instead adopt a Millian covering law analysis.⁶⁷

B. Causation Theories Based on the Covering Law Analysis

Legal theorists have been strongly influenced by Mill's covering law analysis of causal laws and singular instances of causation. According to this approach, a fully described causal law lists all the conditions that together are necessary and sufficient, when fully instantiated on a specific occasion, for the occurrence of a certain consequence. This perspective is echoed in legal approaches to causal relationships in civil law countries and common law systems.

1. The Covering Law Perspective in Civil Law Countries

In civil law countries, the covering law analysis underlies not only the "equivalence of conditions" approach to factual causation, but also, by its reliance on causal (natural) laws, the theory of adequate causation. The theory of adequate causation was developed by German authors in the end of the nineteenth century⁶⁸ as a theory of appropriate legal responsibility.

The adequacy theory belongs to the "generalizing theories" insofar as it selects "a particular condition as the cause of an event because it is of a kind which is connected with such events by a generalization or statement of regular sequence."⁶⁹ Carl Ludwig von Bar was the first scholar to develop an account of the adequacy theory.⁷⁰ For him, the determining cause of an ultimate event is the human action that altered the usual or ordinary course of events. "A man is in the legal sense the cause of an occurrence to the extent that he may be regarded as the condition by virtue of which what would be otherwise regarded as the regular course of events in human experience is altered."⁷¹ This first account of the theory defines the adequate cause as an event that departs from the ordinary or regular course of events.

67. See, e.g., Ingeborg Puppe, *Der Erfolg und seine kausale Erklärung im Strafrecht*, 92 ZEITSCHRIFT FÜR DIE GESAMTE STRAFRECHTSWISSENSCHAFT 863 (1980); Ingeborg Puppe, *The Concept of Causation in the Law*, in CRITICAL ESSAYS ON "CAUSATION AND RESPONSIBILITY" 67 (Benedikt Kahmen & Markus Stepanians eds., 2013).

68. G'SELL-MACREZ, *supra* note 2, at ¶ 80.

69. HART & HONORÉ, *supra* note 36, at 465.

70. L. VON BAR, DIE LEHRE VOM KAUSALZUSAMMENHANGE IM RECHTE, BESONDERS IM STRAFRECHTE (1871).

71. *Id.* at 14 (cited by HART & HONORÉ, *supra* note 36, at 466).

Subsequently, other commentators like Ludwig Träger⁷² expressed the view that a condition is an adequate cause of a consequence if it tends to be followed by the result in question according to human experience and in the ordinary course of things. Träger's formulation is still used in French treatises and manuals to define adequate causation. French authors consider that a condition is an adequate cause when it is likely to produce the effect according to the ordinary course of things and in light of the experience of everyday occurrences.⁷³ It is also said that necessary antecedents can be described as adequate causes if they normally produce the harm, as opposed to mere occasions that have been followed by the result because of unforeseen and exceptional circumstances.⁷⁴ That being said, the most sophisticated versions of the adequacy theory, although they are undoubtedly based on causal generalizations, appear to be closer to the probabilistic approaches of causation presented above.

2.. The Covering Law Perspective in Common Law Systems

In common law systems, the most widely accepted theories of causation derive from the Millian covering law model. That is the case with the approach developed by Hart and Honoré, which was adopted but restricted by John Mackie (INUS) and modified and extended by Richard Wright (NESS).

In 1959, Hart and Honoré published their seminal study *Causation in the Law*.⁷⁵ The aim of their study was to examine how causal language was used in the law. They considered that law was concerned with “the plain man’s notions of causation”, i.e. the “common sense notion” of causation.⁷⁶ Among the various notions they found, one was the concept of a “causally relevant factor”⁷⁷ that is “necessary just in the sense that it is one of a set of conditions jointly sufficient for the production of the consequence.”⁷⁸ In this respect, Hart and Honoré’s notion of a “causally relevant condi-

72. LUDWIG TRÄGER, *DER KAUSALBEGRIFFE IM STRAF- UND ZIVILRECHT* (1904); Duncan Fairgrieve & Florence G'Sell, *Causation in French Law: Pragmatism and Policy*, in *PERSPECTIVES ON CAUSATION* 111, 118 (Richard Goldberg ed., 2011).

73. PHILIPPE BRUN, *RESPONSABILITÉ CIVILE EXTRA-CONTRACTUELLE* ¶ 227 (3e ed. 2014); MURIEL FABRE-MAGNAN, *1 DROIT DES OBLIGATIONS, RESPONSABILITÉ CIVILE ET QUASI-CONTRATS* (3e ed. 2013); PHILIPPE MALAURIE ET AL., *DROIT DES OBLIGATIONS* ¶ 92 (L.G.D.J. ed., 7e ed. 2015); FRANÇOIS TERRÉ ET AL., *DROIT CIVIL, LES OBLIGATIONS* ¶ 860 (11e ed. 2013); PHILIPPE LE TOURNEAU, *DROIT DE LA RESPONSABILITÉ ET DES CONTRATS. REGIMES D'INDEMNISATION 2014-2015* ¶ 1716 (10e ed. 2014).

74. JEAN-LUC AUBERT ET AL., *2 LES OBLIGATIONS, LE FAIT JURIDIQUE* ¶ 158 (13th ed. 2009).

75. HART & HONORÉ, *supra* note 36.

76. *Id.* at 26.

77. *Id.* at 113.

78. *Id.* at 112.

tion” clearly relied on Mill’s idea that a fully described causal law lists all the conditions that together are necessary and sufficient for the occurrence of a certain consequence. The definition they gave is considered as “a major advance in the analysis of causation, in both law and philosophy.”⁷⁹ It expressed the view that, in a specific situation, a causally relevant condition is a necessary element of a set of conditions jointly and minimally sufficient for the harmful outcome. In their account, necessity is described in its weakest sense: it merely requires that a condition be necessary for the sufficiency of a set of actual conditions that was sufficient for the occurrence of the effect, rather than being always necessary (strict necessity) or necessary for the effect in the singular instance (strong necessity).⁸⁰

In 1965, Mackie published a well known analysis of Hart and Honoré’s contribution.⁸¹ He employed an acronym, INUS (for ‘insufficient but necessary part of an unnecessary but sufficient condition’), to describe the elements of a causal law, but, unlike Hart and Honoré, he adhered to the but for test in singular instances of causation.⁸²

In 1985, Wright⁸³ substantially revised and extended Hart and Honoré’s account of a causally relevant factor and used another acronym, NESS (for ‘Necessary Element of a Sufficient Set’), preferring its formulation to the “INUS” suggested by Mackie. According to Wright, “a particular condition was a cause of a specific consequence if and only if it was a necessary element of a set of antecedent actual conditions that was sufficient for the occurrence of the consequence.”⁸⁴ As Puppe also insists, the NESS test is not presented as requiring a “counterfactual” analysis. Both Wright and Puppe insist that speculating on what might have happened in a hypothetical world where the specified factor is absent is unnecessary.⁸⁵ It is only necessary to consider what has actually happened.

It is generally accepted in academic doctrines in common law jurisdictions and by the courts in those jurisdictions which have been exposed to and understand the NESS account, that it is appropriate to use the NESS criterion when the but for test fails, as the more comprehensive test for

79. Wright & Puppe, *supra* note 24, at 124

80. *Id.* at 123.

81. MACKIE, *supra* note 27.

82. Wright & Puppe, *supra* note 24, at 110.

83. Wright, *supra* note 52; Richard W. Wright, *Once More into the Bramble Bush: Duty, Causal Contribution, and the Extent of Legal Responsibility*, 54 VAND. L. REV. 1071 (2001); Richard W. Wright, *The Grounds and Extent of Legal Responsibility*, 40 SAN DIEGO L. REV. 1425 (2003).

84. Wright, *supra* note 52, at 1774.

85. *Id.* at 1806–07; *see also* Wright, *The Grounds and Extent*, *supra* note 83, at 1445 n. 67.

causation in its purely factual, scientific sense.⁸⁶ This test has been adopted in the comments to sections 26 and 27 of the *Restatement Third of Torts* for cases of causal overdetermination,⁸⁷ which the NESS analysis, unlike the but for analysis, is precisely able to handle. In the common example of two persons who each simultaneously fire fatal shots at the deceased victim, each of the shots is a NESS causal condition because each is part of a complete instantiation of a causal law that links shooting with dying. The same reasoning applies to preemption cases, for example in the case where Mr. X died in a car accident while suffering from a serious disease that would have led him to death anyway.

While the NESS theory is generally accepted by academics and the few courts that have considered it as the most comprehensive test for causation, its creator claims that NESS is “the meaning of causation”.⁸⁸ This claim has opened the door for criticism,⁸⁹ particularly because the NESS test is dependent on external causal laws.⁹⁰ Richard Fumerton and Ken Kress have highlighted the fact that the NESS test presupposes determinism⁹¹ and questioned both the utility of the concept⁹² and its ability to solve overdetermination cases.⁹³ Above all, they pointed out what they call a “vicious conceptual circularity”⁹⁴ since the NESS test depends on external causal laws. They reached the conclusion that the concept of NESS cannot express the very meaning of causation.⁹⁵ Nevertheless, many commentators agree that the NESS test has practical value and can serve as a device to

86. Stapleton, *supra* note 6, at 1256; Wright & Puppe, *supra* note 24, at 130–31.

87. “If multiple acts occur, each of which under § 26 alone would have been a factual cause of the physical harm at the same time in the absence of the other act(s), each act is regarded as a factual cause of the harm.” RESTATEMENT OF THE LAW (THIRD) TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 27 (AM. LAW. INST. 2005).

88. Wright, *supra* note 52, at 1802.

89. Richard Fumerton & Ken Kress, *Causation and the Law: Preemption, Lawful Sufficiency and Causal Sufficiency*, 64 LAW & CONTEMP. PROBS. 83 (2001); Jane Stapleton, *Choosing What We Mean by “Causation” in the Law*, 73 MO. L. REV. 433 (2008).

90. In Wright’s own terms, “causal law is a law of nature, it describes an empirically based, invariable, nonprobabilistic relation between some minimal set of abstractly described antecedent conditions and some abstractly described consequent condition, such that the concrete instantiation of all the antecedent conditions will always immediately result in the concrete instantiation of the consequent condition. Any concrete condition that is part of the instantiation of the completely instantiated antecedent of the causal law is a cause of (contributed to) the instantiation of the consequent.” Richard W. Wright, *Proving Facts: Belief versus Probability*, in PERSPECTIVES ON CAUSATION, *supra* note 72, at 91, http://scholarship.kentlaw.iit.edu/fac_schol/709.

91. Fumerton & Kress, *supra* note 89, at 97.

92. *Id.* at 98–99.

93. *Id.* at 100.

94. *Id.* at 84.

95. Richard Wright replied to those criticisms in Richard W. Wright, *The NESS Account of Natural Causation: A Response to Criticisms*, in PERSPECTIVES ON CAUSATION, *supra* note 72, at 285.

determine whether a specified factor was involved in the occurrence of the damage.⁹⁶

In recent years, some jurists, although influenced by the NESS theory, have preferred intuitive approaches which employ notions of “involvement” (Jane Stapleton) or “substantial contribution” (Michael Moore).⁹⁷ The notion of “involvement” is promoted by Stapleton as expressing the most convenient choice for the law when dealing with causal language. According to Stapleton, it is necessary to make “a choice of underlying interrogation (blame, explanation, physical role, any sort of involvement etc.)”⁹⁸ so that it is clear what information lawyers are reporting when they use causal language for legal purposes.⁹⁹ In this perspective, it is the notion of “involvement” that is appropriate. Such a notion “identifies that there is a contrast between the actual world and some hypothetical world from which we exclude (at least)” a specified factor,¹⁰⁰ which expresses that “while in the former world the phenomenon exists, in the latter it does not.”¹⁰¹ “Involvement” must be determined by “objective data (our knowledge of the physical laws of nature, evidence of behaviour, and so on)” and is thus untainted by normative issues.¹⁰² In this respect, the notion of involvement relies on a relationship of necessity and is therefore, to a certain extent, a version of the counterfactual approach. However, Stapleton’s concept of “involvement” is also closely related to Hart and Honoré’s notion of a “causally relevant condition.”¹⁰³ This is why Stapleton admits that the NESS test appears to be very convenient for identifying the relationships of involvement, even though she denies that NESS could express the real meaning of causation in the law.¹⁰⁴

C. Probabilistic Causation in the Law

Probabilistic approaches to causation, which are especially popular among efficiency theorists, have influenced legal scholars willing to take into account the fact that causal generalizations generally describe what usually or often happens rather than what always happens. Probabilities are

96. Stapleton, *supra* note 6, at 1256.

97. Moore, *supra* note 25 *passim*.

98. Stapleton, *supra* note 6, at 1223–24; Stapleton, *supra* note 89, at 439.

99. Stapleton, *supra* note 89, at 439.

100. Stapleton, *supra* note 6, at 1217.

101. *Id.*

102. *Id.* at 1228.

103. *Id.* at 1240–41.

104. *Id.* at 1228–29.

also used in the law of evidence, in order to express the various degrees of uncertainty affecting causal relations.

1. The Probabilistic Analysis of Legal Causation

Philosophically speaking, the probabilistic theories of causation were developed in order to take into account the fact that causal laws as we know them generally are actually indeterministic. Every smoker does not suffer from lung cancer but a smoker has an increased probability of developing lung cancer in comparison with a non-smoker. In this respect, probabilistic theories are mainly theories of causal relations between types of events: they express general causal relationships in a world where causal laws are mostly indeterministic. Yet, the probabilistic approach may also be extended to cover causal relationships between particular events. For example, it may be asserted that Mr. Gurlain being a smoker raised the probability of his suffering from lung cancer. Then it arguably may be concluded that Mr. Gurlain's lung cancer is due to his smoking. Both aspects of the probabilistic approach can be found in the law of torts.

For instance, in civil law countries, the adequacy theory (which, however, is a theory of legal responsibility for actually caused consequences) is often presented in probabilistic terms. According to Johannes von Kries,¹⁰⁵ who expanded von Bar's theory, a given fact can be considered to be the adequate cause of the damage if and only if it has significantly increased the objective probability of occurrence of the damage.¹⁰⁶ This test of objective probability thereby allows one to distinguish an adequate cause from only incidental or accidental factors contributing to the injury. Träger also highlighted that a condition may be considered as an adequate cause of a consequence if it has increased significantly the degree of probability of harm. The theory involves linking concrete facts to general causal connections in order to assess the likelihood of damage in the absence/presence of the factor considered. Within this framework, the adequacy theory is able to establish a hierarchy between different factors based on the increased probability of the outcome. The factor that increased the probability of damage by, say, 30% (all other things being equal) is more "adequate" than the factor which increased the probability of such an outcome by only 15%. Nevertheless, the idea of probability is rarely mentioned in France. For most French lawyers, a factor is an adequate cause when it usually produces the effect by the normal course of things.¹⁰⁷

105. J. VON KRIES, *VIERTELJAHRSSCHRIFT FÜR WISSENSCHAFTLICHE PHILOSOPHIE* 12 (1882).

106. HART & HONORÉ, *supra* note 36, at 469.

107. G'SELL-MACREZ, *supra* note 2, at ¶¶ 142, 185.

In common law countries, the probabilistic approach of legal causation is mainly advocated by legal economists.¹⁰⁸ Indeed, the probabilistic account appears indispensable to the efficiency theory of tort law which defines the primary objective of civil liability as minimizing accident costs. In this perspective, the party that could prevent the accident with a lower cost than the expected harm arising from the accident should be held liable.¹⁰⁹ In the absence of transaction costs, if the expected harm exceeds the cost of preventing it, those who can be expected to suffer from the accident will conclude an agreement with the one who can avoid the damage at the lowest cost in order to avoid the accident. In the presence of transaction costs, it is for the law to make the “cheapest cost avoider” pay for the accident. In other words, it is the “cheapest cost avoider” of the injury that should be considered as having caused the injury. Within this context, Guido Calabresi¹¹⁰ distinguished the but for test from a probabilistic test that he called “causal link”: an act is causally linked to an injury if it increases the probability of its occurrence. This probabilistic linkage concept, sometimes called “prospective causation” because it is forward-looking,¹¹¹ is presented by legal economists as an alternative notion of causation that should be adopted in order to identify the “cheapest cost avoider”. Therefore, it is the probabilistic approach of causation, which is embodied in Judge Learned Hand’s formula, that should be used in tort law.

To sum up, in the probabilistic perspective, a condition is a cause of some result if it increased the probability that the result would occur. This probabilistic increased-risk concept uses *ex ante* causal probabilities that are abstract and independent of the particularistic evidence specific to a particular occasion. This use of *ex ante* probabilities can be criticized on the grounds that *ex ante* causal probabilities are better suited for causal prediction of what might happen than for causal explanation of what actually happened. In order to explain what happened and to determine liability, it seems more appropriate to rely on probabilities expressing the most like-

108. Omri Ben-Shahar, *Causation and Foreseeability*, in 2 ENCYCLOPEDIA OF LAW AND ECONOMICS 644, 644–52 (Bouckaert & G. Degeest eds., 2000), *reprinted with updates in TORT LAW AND ECONOMICS: ENCYCLOPEDIA OF LAW AND ECONOMICS* 83–108 (Michael Faure ed., 2d ed. 2009); *see also* Richard W. Wright, *Actual Causation vs Probabilistic Linkage: The Bane of Economic Analysis*, 14 J. LEGAL STUD. 435 (1985).

109. William M. Landes & Richard A. Posner, *Causation in Tort Law: An Economic Approach*, 12 J. LEGAL STUD. 109, 110 (1983); *see also* WILLIAM LANDES & RICHARD POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 228–55 (1987).

110. Guido Calabresi, *Concerning Cause and the Law of Torts: An Essay for Harry Kalven, Jr.*, 43 U. CHI. L. REV. 69, 71 (1975).

111. Ben-Shahar, *supra* note 108, at 646–47. *See also* Steven Shavell, *An Analysis of Causation and the Scope of Liability in the Law of Torts*, 9 J. LEGAL STUD. 463, 468 (1980).

ly causal chain, or, in other words, a certain degree of belief. In this respect, probabilities appear to be better suited for solving evidence issues than for defining the very notion of causation.

2. Probabilities in the Law of Evidence

Although we have so far dealt with objective probabilities that express the likelihood of a specific occurrence, another kind of probability may be used in the law of evidence in order to formulate a certain degree of belief. Such subjective probabilities are not intended to render the frequency of a given phenomenon but to reflect a state of belief or a certain degree of (un)certainty. “Ex post probabilities”¹¹² may be established, after the effect occurred, in order to express a judgment on what actually happened on a particular occasion. For example, there may be a 75% probability that the statement “Mr. Gourlain’s lung cancer resulted from his smoking” is true.

In common law systems, the law of evidence uses a “standard of persuasion,”¹¹³ which is usually referred to as the “balance of probability” or, in the United States, the “preponderance of the evidence”. Most scholars and courts interpret the “preponderance of the evidence” standard as meaning “more likely than not” or “more probably true than not”.¹¹⁴ Especially with the first interpretation, it is often thought that the standard requires using a probabilistic test that requires a greater than fifty percent probability that the facts at issue are true. For example, since it must be established that it is more probable than not that Mr. Gourlain’s lung cancer is due to his smoking, there should be a greater than 50% probability that smoking caused his disease. However, it has been argued that the probability does not refer to a mere aggregate class-based frequency but rather to some minimal level of belief which is founded on the concrete evidence specific to the situation provided by the parties and the court’s general knowledge.¹¹⁵

In a civil law country like France, the use of probabilities does not appear as natural as it is in common law systems. In French Law, causation is considered as a legal fact (“*fait juridique*”) that can be proved by all means (“*par tous moyens*”). In most cases, courts use presumptive evidence provided for by Article 1349 of the Civil Code that defines presumptions as “the consequences that a statute or the court draws from a known fact to an

112. Wright, *supra* note 90, at 93.

113. *Id.* at 79.

114. *Id.* at 88, ¶ 30.

115. *Id.* at 93–94.

unknown fact.”¹¹⁶ Specifically, Article 1353 of the Civil Code provides that presumptions “are left to the insight and carefulness of the judges, who shall only admit serious, precise, and concurrent presumptions.”¹¹⁷ Since the standard of proof is provided for by a legal provision, the Cour de cassation controls the arguments used by judges to justify the admission or rejection of a causal link. In the Hepatitis B vaccine litigation, the Cour de cassation has thus recognized that the alleged causal relationship between the vaccine and the outbreak of multiple sclerosis could be established by serious, precise and concurrent presumptions,¹¹⁸ which is also accepted by the Conseil d’Etat.¹¹⁹ Thus, it was found that the short delay between the injection of the vaccine and the appearance of the symptoms of the disease as well as the lack of any predisposing factor were sufficient grounds to admit the existence of a causal relationship, despite the scientific uncertainty. Very recently, the Cour de cassation has decided to submit a preliminary question to the European Court of Justice. The question dealt with the compatibility of such a method of proof with Article 4 of the *Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, reg-*

116. “Des conséquences que la loi ou le magistrat tire d’un fait connu à un fait inconnu.” CODE CIVIL [C. CIV.] [CIVIL CODE] art. 1349 (Fr.).

117. “Sont abandonnées aux lumières et à la prudence du magistrat, qui ne doit admettre que des présomptions graves, précises et concordantes.” CODE CIVIL [C. CIV.] [CIVIL CODE] art. 1353 (Fr.).

118. Cour de cassation (Cass.) [supreme court for judicial matters] 1^e civ., May 22, 2008, Bull civ. I, No. 06-10-967, Recueil-Dalloz [D.] 2008 A.J. 1544 obs. I. Gallmeister (Fr.) and 2894, obs. P. Brun & P. Jourdain; RDSS 2008. 578, obs. J. Peigné; Revue trimestrielle de droit civil (RTD civ.) 2008. 492, obs. P. Jourdain; Revue trimestrielle de droit commercial (RTD com.) 2009. 200, obs. B. Bouloc; JCP 2008, II, 10131, note Grynbaum, JCP I 186, No. 3, obs. Stoffel-Munck; Revue des contrats [RDC] 2008. 1186, obs. J.S. Borghetti; Cour de cassation [Cass.] [supreme court for judicial matters] 1^{re} civ., Jan. 22, 2009, No. 07-16.449, D. 2009, 429; Revue de Droit Sanitaire et Social (RDSS) 2009 367, obs. J. Peigné; RTD civ. 2009. 329, obs. P. Jourdain; RCA 2009, No. 58, note Radé; RDC 2009. 1028, note Deshayes; Sept. 24, 2009, No. 08-16.097, D. 2009. 2426, obs. I. Gallmeister; RTD com. 2010. 414, obs. B. Bouloc; Cour de cassation [Cass.] [supreme court for judicial matters] 1^e civ., Nov. 25, 2010, No. 09-16.556; D. 2010. 2909, obs. I. Gallmeister; D. 2011. 316, chron. P. Brun, D. 2565, obs. A. Laude, D. 2891, obs. P. Delebecque, J.-D. Bretzner et I. Gelbard-Le Dauphin; RDSS 2011. 164, obs. J. Peigné; RTD civ. 2011. 134, obs. P. Jourdain; Cour de cassation [Cass.] [supreme court for judicial matters] 1^{re} civ., May, 29 2013, No. 12-20.903, D. 2013. 1717, obs. I. Gallmeister, note J.- S. Borghetti, D. 1723, note P. Brun, D. 2014. 47, obs. P. Brun and O. Gout; RTD civ. 2013. 625, obs. P. Jourdain; RTD com. 2013. 797, obs. B. Bouloc; Cour de cassation [Cass.] [supreme court for judicial matters] 1^{re} civ., July 10, 2013, No. 12-21.314, Dalloz actualité, July 25, 2013, obs. T. Douville; D. 2013. 2311 and 2306, avis C. Mellottée and 2312, note P. Brun and 2315, note J.-S. Borghetti, D. 2014. 47, obs. P. Brun and O. Gout D. 563, chron. C. Capitaine et I. Darret-Courgeon, D. 2021, obs. A. Laude; RDSS 2013. 938, obs. J. Peigné; RTD civ. 2013. 852, obs. P. Jourdain; RCA 2013. et 6, Bakouche; JCP 2013, No. 1012, note Parance.

119. Conseil d’Etat (CE) Mar. 9, 2007, No. 267635 (*Schwartz*); AJDA 2007. 861, concl. T. Olson; D. 2007. 2204, obs. E. Pahlawan-Sentilhes, note L. Neyret; D. 2897, obs. P. Brun et P. Jourdain; RDSS 2007. 543, obs. D. Cristol; Mar. 9, 2007, No. 278665 (*Commune de Grenoble*); AJDA 2007. 861, concl. T. Olson; RDSS 2007. 543, obs. D. Cristol; Conseil d’Etat (CE) Mar. 9, 2007, No. 285288 (*Thomas*); AJDA 2007. 861, concl. T. Olson; JCP 2007 II 10142, note Laude; July 24, 2009, No. 308876; AJDA 2009. 1466; RDSS 2009. 962, obs. D. Cristol; JCP 2009, No. 223, obs. M.C.R.; RDC 2010. 79, obs. Borghetti; RDSS 2009. 962, obs. Cristol.

*ulations and administrative provisions of the Member States concerning liability for defective products.*¹²⁰

While the French standard is not, as such, probabilistic, French courts use probabilistic reasoning in order to compensate the uncertainty of causal judgments. For instance, the concept of loss of chance is widely used,¹²¹ especially in medical malpractice cases.¹²² That being said, probabilities could also be used beyond the well-known use of the concept of loss of chance in order to compensate for a lack of evidence, for example in multiple-exposure cases (asbestos and cigarette-smoking cases) or in alternative-causation cases (DES cases). The idea is to impose liability for a proportionate share of the injury, based on each defendant's contribution to the total risk that led to the injury. In the DES litigation, the Cour de cassation has decided to reverse the burden of proof for the benefit of victims¹²³ in cases where the defendant could not be specifically identified because two different pharmaceutical companies had marketed the DES. Therefore, if the victim proves that his/her injury results from exposure to DES, then he/she can be compensated by every DES manufacturer or even by all DES manufacturers, jointly and severally (responsibility *in solidum*). Then the manufacturer who compensated the victim can exercise a recourse action against the other manufacturers. In the DES litigation, the Cour d'appel de Paris has decided that the burden of compensating the victims should be spread equally among the jointly liable producers, despite the fact that both producers had significantly different market shares.¹²⁴ However, the Tribunal de Grande Instance de Nanterre has, on the contrary, ruled that each producer's contribution should be determined in proportion to their respec-

120. Cour de cassation [Cass.] [supreme court for judicial matters] 1e civ., Nov. 12, 2015, 14-18118.

121. G'SELL-MACREZ, *supra* note 2, at ¶¶ 455–57; *See also* J. Boré, *L'indemnisation pour les chances perdues, une forme d'appréciation quantitative de la causalité d'un fait dommageable*, JCP G. 1974, I, 2620; G. Mémeteau, *Perte de chances et responsabilité médicale*, Gaz. Pal. 1997, 2, 1367 (Fr.).

122. In a seminal case, a doctor had committed an error of diagnosis on a child who remained crippled. The judges condemned the doctor to pay damages for the loss of "chances of cure". Cour de cassation [Cass.] [supreme court for judicial matters] 1re civ., Dec. 14, 1965, JCP G. 1966, II, 14753, note R. Savatier (Fr.); *See also* Cour de cassation [Cass.] [supreme court for judicial matters] 1re civ., Jan. 27, 1970, 31, Bull. civ. I No. 37, JCP G. 1970, II, 16422, note Rabut G. (Fr.); VINEY & P. JOURDAIN, *TRAITÉ DE DROIT CIVIL, SOUS LA DIRECTION DE JACQUES GHESTIN, LES CONDITIONS DE LA RESPONSABILITÉ* ¶ 370 (2e ed. 1999).

123. Cour de cassation [Cass.] [supreme court for judicial matters] 1 re civ., Sept. 24, 2009, No. 08-10.081 and No. 08-16.305, D. 2009. AJ 2342, obs. Gallmeister; D. 2010. Pan. 49, obs. Brun; JCP G. 2009. 304 obs. Mistretta; JCP G. 383, note Hocquet-Berg; RLDC 2009/65, No. 3605, obs. Bugnicourt; Cour de cassation [Cass.] [supreme Court for judicial matters] 1e civ., Jan. 28, 2010, 08-18837 (Fr.).

124. Cour d'appel [CA] [regional court of appeal] Paris, pôle 2, 2e ch., Oct. 26, 2012, No. 10/18297: D. 2012, 2859, note C. Quéstand-Finet. *See* S. Ferey et F. G'sell, *Pour une prise en compte des parts de marché dans la détermination de la contribution à la dette de réparation. A propos de l'arrêt CA Paris, Oct. 26, 2012, D. 2013, 2709.*

tive market shares.¹²⁵ There is currently an intense debate on the subject in the French commentary.¹²⁶

Finally, it cannot be said that French jurists have never developed sophisticated approaches of the concept of causation in the law of civil liability. They have rather used the theories elaborated by German authors in order to promote pragmatic solutions. It is on this basis that French courts are now developing appropriate responses to the difficult issues posed by the need to prove the causal link with sufficient certainty.

125. Tribunal de grande instance [TGI] Nanterre, 2e ch., Apr. 10, 2014, No. 12/12349 and 12/13064; Tribunal de grande instance [TGI] Nanterre, May 22, 2014, No. 12/12339; JCP G. 2014, 678, note J. Dubarry; D. 2014, 1434, obs. J.-S. Borghetti.

126. N. Molfessis, *Du critère des parts de marché comme prétendu remède à l'incertitude sur l'origine d'un dommage*, LES PETITES AFFICHES, Oct. 15, 2015, at 7.

