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The Kindynamic Theory of Tort

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The Kindynamic Theory of Tort

CHRISTOPHER P. GUZELIAN*

Commentators complain of two major deficiencies in modern tort law: (1) that liability concepts such as “negligence” or “duty” are so vacuously defined as to permit inadvertent subjectivity and error to hinder proper case adjudication, and (2) that tort is too slow in recognizing newly discovered risks and properly compensating nascent classes of injury. We accordingly report on the Kindynamic Theory, an emerging philosophy that overcomes these twin deficiencies and sharpens understanding of poorly articulated tort intuitions.

Kindynamics contends that causation is the cornerstone of tort, and that all risks are, at core, causal propositions. Contrary to its many everyday definitions, the word “risk” has a single exact meaning in Kindynamic Theory. A risk, unlike uncertainties, must be objectively known to be causally possible (“epistemically possible”). Put differently, Kindynamics prescribes that a change in a specific alleged stimulus must be objectively known to determine an asymmetric, directional change in a particular alleged harm.

Second, and in the only notable break with traditional tort intuition, some Kindynamic proponents advocate permitting compensation only for injuries arising from “significant” risks: those that are (1) widespread and (2) also likely to be injurious. Similar to common regulatory practice, the prescriptive “significant risk” constraint seeks to sensibly prioritize risk deterrence, given limited judicial resources.

Third, Kindynamic Theory invokes decision analysis—the method for formal, quantitative risk analysis universally familiar to risk analysts—to elucidate risk tradeoffs and make decisions about a risk’s costs and benefits. With its empirical grounding, decision analysis improves upon other cost-benefit models, which are typically too theoretical or assumption-laden for practical use.

Finally, courts have long desired and intuitively but unsuccessfully sought an objective method for apportioning liability for a single injury among multiple alleged tortfeasors. Kindynamic Theory formally presents such a method.

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INTRODUCTION

Those who have the happy fortune of attending law school recite forevermore that duty, negligence, actual cause, proximate cause, and injury lead to tort liability.

Very well. Define "duty."

There is one condition on this challenge: a definition must permit consistent prediction of case outcomes. Consider the traditional definition: duty is the "foreseeability that harm may result if [the duty] is not exercised."¹ This definitional test of duty is surely not predictive; as far back as *Palsgraf*, there have been doubts about the efficacy of a "foreseeability" test in predicting duties.² "Foreseeability" has proven to be a vacuous delimiter, which courts apply equally—but without consistency—in the distinguishable contexts of duty, negligence, and proximate cause.³

1. *Orlo v. Conn. Co.*, 21 A.2d 402, 404 (Conn. 1941) ("The ultimate test of the existence of a duty to use care is found in the foreseeability that harm may result if it is not exercised.") (citing *Botticelli v. Winters*, 7 A.2d 443, 445 (Conn. 1939)) (emphasis added).

2. Compare *Palsgraf v. Long Island R.R.*, 162 N.E. 99, 99 (N.Y. 1928) (Cardozo, J.) ("If no hazard was apparent to the eye of ordinary vigilance, an act innocent and harmless, at least to outward seeming, with reference to her, did not take to itself the quality of a tort because it happened to be a wrong, though apparently not one involving the risk of bodily insecurity, with reference to some one else."), with *id.* at 103 (Andrews, J., dissenting) ("Every one owes to the world at large the duty of refraining from those acts that may unreasonably threaten the safety of others [W]hen injuries do result from our unlawful act we are liable for the consequences. It does not matter that they are unusual, unexpected, unforeseen, and unforeseeable.").

3. H.L.A. HART & TONY HONORÉ, *CAUSATION IN THE LAW* 273 (2nd ed. 1985) ("Liability in negligence has and must have its limits but it is not clear that foreseeability is an appropriate notion for settling them."); Lawrence M. Solan & John M. Darley, *Causation, Contribution, and Legal Liability: An Empirical Study*, 64 *LAW & CONTEMP. PROBS.* 265, 274–75 (2001) (noting that "[i]n many [] cases, foreseeability plays a prominent role [However,] courts are not in accord as to whether the issue to which it relates is duty, proximate

In fact, “duty” has been so conceptually elusive that the California Supreme Court once said, “‘duty’ is not sacrosanct in itself, but only an expression of the sum total of those considerations of policy which lead the law to say that the particular plaintiff is entitled to protection.”⁴ When a notable court concedes in frustration that it cannot predict duties, it is unsettling. Each day, law enforces sizeable—sometimes bankrupting—judgments against “duty-violating” defendants. They are the unhappy violators of a murky word.⁵

Try defining “negligence” instead. Yes, negligence means the “breach of a duty,” or the “breach of a foreseeable obligation,” but the first taxonomy is circular and the latter, again, ineffective. They do not tell us how to *predict* negligence.

Here is a final opportunity to justify law school tuition: what is “proximate cause”? Even the most respectable courts are so confused by tort concepts that they sometimes equate duty and proximate cause, although this substitution is incorrect.⁶ Is proximate cause a limitation on liability only to those events that are “reasonably foreseeable”?⁷ (Observe that this standard is just a variation on the “foreseeability” test that has proven incapable of predictably delimiting case outcomes.) Or is proximate cause a confessedly “political” and “arbitrary” restriction?⁸

Unsettling looseness plagues basic definitions at the core of tort liability. An occasional justification for this confusion is that tort law must accommodate multiple (sometimes mutually exclusive) aims. These thinkers believe no single theory can

causation, or a generalized notion of negligence. Some judges have recognized this disagreement among courts in analyzing this problem”).

4. *Dillon v. Legg*, 441 P.2d 912, 916 (Cal. 1968) (quoting WILLIAM L. PROSSER, *LAW OF TORTS* 353 (3d ed. 1964)).

5. See Lee Epstein & Gary King, *The Rules of Inference*, 69 U. CHI. L. REV. 1, 3 (2002) (observing that “a large fraction of legal scholarship makes at least some claims about the world based on observation or experience” rather than on proper scientifically measured bases).

6. Invoking “duty” when discussing proximate cause has dramatic procedural repercussions too, for proximate cause is ostensibly a jury question, while duty remains a judge question. Dobbs describes the general confusion between proximate cause and duty well:

Many writers and some courts favor approaching scope of risk issues involved in proximate or legal cause decisions through the language of duty. The great advantage of doing so is that the confusions engendered by the use of causal language might be avoided . . . [F]ew if any judges can specialize in the diverse legal issues that confront them. They cannot all be up-to-date experts in tort theory. Consequently, when judges confront a problem already labeled as a proximate cause problem, the label alone is likely to have at least some subliminal effects that steer analysis in the wrong direction.

But . . . duty issues themselves are slippery chameleons. Moreover, to cast an issue in terms of duty is to provide another subliminal suggestion—namely that the decision is to be made by judges rather than juries.

1 DAN B. DOBBS, *THE LAW OF TORTS* § 230, at 584–85 (2001).

7. See *Poskus v. Lombardo's of Randolph, Inc.*, 670 N.E.2d 383, 386 (Mass. 1996) (“There must be limits to the scope or definition of reasonable foreseeability based on considerations of policy and pragmatic judgment.”).

8. *Palsgraf*, 162 N.E. at 103 (Andrews, J., dissenting) (“What we do mean by the word ‘proximate’ is that, because of convenience, of public policy, of a rough sense of justice, the law arbitrarily declines to trace a series of events beyond a certain point. This is not logic. It is practical politics.”).

represent tort's scope. One leading tort scholar, Vanderbilt Professor John Goldberg, rejects this view:

Must we, or ought we, concede that all we can say of any given tort decision, or any given tort doctrine, is that, if well-rendered, it will reflect the attainment of an unarticulated and unarticulable balance among various considerations—including some that are diametrically opposed? . . . [T]o make such a concession, is to give up on the idea of law.⁹

Even if Professor Goldberg is right and tort does have articulable and coherent aims, current liability standards are not achieving them. As we have seen, tort is based on vacuous (and therefore easily manipulated) terms. To achieve better consistency and predictability in case outcomes, tort requires better standards for determining liability.¹⁰

There is still a second dilemma that tort faces beyond these inherent linguistic shortcomings. Commentators now also acknowledge that tort—as it is practiced in courts and regardless of which particular theory one favors—does not sufficiently accommodate the expanding scope of contemporary risks and the accelerating pace of risk assessment and risk discovery.¹¹ Professor Goldberg, for instance, has commented that:

[O]ne may speculate that, in the near term, mechanized accidents will cease to provide the focal point of tort . . . [I]t is quite possible that tort theorists soon will be required to provide . . . comprehensive and comprehending theories of tort—theories that see the “new negligence” as part of a multifaceted yet broadly coherent law of wrongs.¹²

Tort law will have to adjust in two ways, then, to remain current and relevant to the remuneration of injuries caused in contemporary society. First, it must create more exact and rigorous judicial tests of liability that better articulate long-standing tort law

9. John C.P. Goldberg, *Twentieth-Century Tort Theory*, 91 GEO. L.J. 513, 580 (2003).

10. Cf. LUDWIG WITTGENSTEIN, *CULTURE AND VALUE* 18e (Peter Finch trans., University of Chicago 1984) (1931) (“Language sets everyone the same traps; it is an immense network of easily accessible wrong turnings. And so we watch one man after another walking down the same paths and we know in advance where he will branch off, where he will walk straight on without noticing the side turning, etc. etc. What I have to do then is erect signposts at all the junctions where there are wrong turnings so as to help people past the danger points.”). Some have argued that incentives of trial attorneys and judges favors an expansionist universe of tort with muddled, inefficient standards. See Todd J. Zwicky, *Public Choice and Tort Reform*, Geo. Mason Law & Econ Research Paper No. 00-36 (2000), available at <http://ssrn.com/abstract=244658>.

11. Stephen D. Sugarman, *A Century of Change in Personal Injury Law*, 88 CAL. L. REV. 2403, 2436 (2000) (“[T]he role of personal injury law at the end of the twenty-first century is probably as unpredictable as its current role was at the end of the nineteenth. Not only might personal injury law doctrine and the background institutions to tort law change significantly, but also technological advances may well change the pattern of accidental bodily injury that will exist 100 years from now in ways we cannot anticipate.”).

12. Goldberg, *supra* note 9, at 582–83.

intuitions. Next, a modern theory must accommodate changes in the alleged sources of injuries that are being litigated.

Here, we report on the development of the Kindynamic Theory,¹³ which is rapidly gaining support among academics and is starting to surface (anonymously, as yet) in courts as a considerable step in the direction of a unifying theory that reflects longstanding intuitions about tort, while offering considerably more flexibility over past theories to accommodate new alleged sources of injuries.¹⁴

I. A CAPSULE INTRODUCTION TO THE KINDYNAMIC THEORY

Many tort scholars emphasize the risk-deterrence aspect of tort,¹⁵ yet common dictionaries contain a dozen different definitions of the word "risk." Even leading risk philosophers assert that a "risk" cannot be precisely defined.¹⁶ Tort scholars curiously have not commented on this striking conclusion, although it has sizeable repercussions for the courtroom.

Proponents of Kindynamic Theory contend that standardless or "common sense" notions of "risk" in place of a clear definition means assigning liability is inevitably an arbitrary, subjective enterprise, *even though courts strive for objectivity*.¹⁷ A precise definition of risk would remove ambiguity surrounding duty, negligence, and proximate cause and permit more predictable and consistent case outcomes.

Kindynamic theorists believe risks *are* rigorously definable. They contend that a judicially cognizable "risk" incorporates three distinct concepts: (1) a risk identifies an *objectively known* (epistemic) causal relationship between a stimulus *A* and a harmful/injurious effect *B* (sometimes expressed as " $A \rightarrow B$ "); (2) a risk expresses a quantified frequency of occurrence (avoiding extrapolation) and that risk is sufficiently likely to result in harm, sufficiently widespread, and sufficiently costly as to merit judicial redress; and (3) a risk involves an effect *B* that is undesirable (a "harm" or "injury").¹⁸ Linguistically, therefore, a statement of "risk" contains a causal, a

13. The term "Kindynamics" derives from the Greek "kindynos" ("risk").

14. Kindynamic Theory is *both* prescriptive and explanatory. Its risk prioritization requirement is a logical, but never practiced, proposal for tort law. Its clarification of tort definitions and delimiters, however, is not prescriptive, but rather an attempt to precisely articulate intuitions that have underlain tort law throughout the past century. Similarly, decision analysis, another element of Kindynamics, is "new" to tort law, but including it in the theory does not make Kindynamics prescriptive in that regard. Instead, decision analysis is simply a more refined method of conducting cost-benefit considerations long accepted as an integral part of tort.

15. There have been so many articles discussing this major focus of tort theory that it is not worthwhile to itemize them here.

16. See generally JOHN C. CHICKEN & TAMAR POSNER, *THE PHILOSOPHY OF RISK* (1998).

17. Cf. *Brown v. Allen*, 344 U.S. 443, 496 (1953) (Frankfurter, J.) ("Discretion without a criterion for its exercise is authorization of arbitrariness.")

18. Because harms are subjective, there is obvious trouble in deciding whether a given effect is objectively undesirable (i.e., whether an effect, *B*, is a "harm" or rather, a "benefit"). Moreover, objectively identifying the proper *scope* of an effect or harm *B* is hardly a trivial enterprise, either. The number of unwanted effects created by a given stimulus varies with different acts. For example, in one case defendants' failure to clean a barge's hold caused accumulation of explosive gases. *Johnson v. Kosmos Portland Cement Co.*, 64 F.2d 193, 194

numerical, and a nominative connotation: There is a ten percent (*numerical*) risk of lung cancer (*nominative*) from cigarette smoking (*causal*).¹⁹

What becomes immediately apparent from this definition is that a risk must be established not just numerically, but also *causally*. Experts are often asked to determine “risks” even when there is insufficient knowledge of causation ($A \rightarrow B$) or probabilities, or both. To deal with such gaps in knowledge, in some cases causality is *inferred* or simply *assumed*, as is a probability. Still, the term “risk” is often invoked to describe such derivations or “discoveries.” In reality, what are being referred to are not risks, but rather causal *possibilities* or *hypotheses* (“*uncertainties*”). Kindynamic Theory demands, therefore, that the causal soundness of any judicially cognizable risk be established before all else. This process is described in Parts II and III.

In the only purely prescriptive break with traditional tort intuition, many (but not all) Kindynamic theorists advocate compensation only for injuries arising from risks that are “*significant*,” that is, that: (1) are *likely* to result in injury (the risk is “*injurious*”) and (2) affect a large number of people or a sizeable amount of property (the risk is “*widespread*”).²⁰ Similar to practices at some regulatory agencies,²¹ a

(6th Cir. 1933). Lightning struck the barge, it exploded, and two men died. *Id.* The court, faced with an issue of deciding *what* the risk of harm was before it could find liability, chose to classify the $A \rightarrow B$ risk broadly as some intervening incendiary force. However, it could have framed the question much more narrowly as “the risk of lightning strike.” Deciding how broadly to classify these liability-fixing attributes is in turn a function of the number of untoward outcomes associated with a stimulus in a particular context. *See id.* at 196 n.3 (“The particular consequences of negligence are almost invariably surprises. It is the unexpected rather than the expected that happens in the great majority of the cases of negligence. It is not necessary [for liability to attach] that injury in the precise form in which it in fact resulted should have been foreseen.”) (citations omitted); *Stodola v. Grunwald Mech. Contractors, Inc.*, 422 N.W.2d 341, 344 (Neb. 1988) (“The law does not require precision in foreseeing the exact hazard or consequence which happens. It is sufficient if what occurs is one of the kind of consequences which might reasonably be foreseen.”) (quoting *Brown v. Nebraska Pub. Power Dist.*, 306 N.W.2d 167, 171 (Neb. 1981)). Legal theorists, as they have come closer to understanding the true causal nature of risk, have also correctly perceived that framing (1) the scope of an injury and (2) the risk “density” is integral to defining a risk. These concepts of correctly framing the risk density and *delimiting* the scope of the harm or stimulus are quite important. We have discussed this elsewhere. *See infra* note 87. *But see* Edward S. Abrams et al., *At the End of Palsgraf, there is Chaos: An Assessment of Proximate Cause in Light of Chaos Theory*, 59 U. PITT. L. REV. 507 (1998) (contending that some injuries may be the result of external shocks to a condition-sensitive chaotic system).

19. Occasionally common parlance will refer only to the harm as a risk, for example, “What is the risk of dying?” Observe that this particular risk proposition does not take exactly the same form as the four we state in the main text, *see infra* text accompanying note 39; it focuses upon the harm (death), but no cause is identified. We can understand this “risk” to be an *aggregation*—it asks for the likelihood of an effect summed across *all* causes. Although aggregated risk propositions such as this are commonly referred to as “risks,” they are of little use for assigning individual causal blame and liability, as in legal circumstances. *See infra* note 45.

20. As is discussed in detail in Part III, *infra*, the injuriousness of a risk and the reach of the risk are inversely related variables under Kindynamic Theory. As the reach of a risk increases, the threshold injuriousness necessary for liability decreases, and vice versa.

21. *See infra* notes 77, 94.

“significance” requirement attempts to sensibly prioritize which risks to deter using limited judicial resources. Part IV.A discusses Kindynamic risk “significance.”

Kindynamic Theory next calls for quantitative analysis of the social benefits and costs of the act, in context, that gives rise to the litigated injury. Here, Kindynamic Theory offers improvement at achieving the traditional goal of Learned Hand-style cost-benefit considerations when it introduces *decision analysis*—a staple method of quantitative risk analysis—to the legal arena.²² Part IV.B describes decision analysis.²³

Assimilating considerations from Parts II through IV, Part V formally presents three fundamental Kindynamic definitions: negligence, duty, and proximate cause (“proximate risk”).

Finally, as Part VI reveals, Kindynamic Theory is a tort theory that is capable of precisely apportioning liability for a single injury among multiple potential contributors.

In sum, the Kindynamic Theory offers great promise as a predictable, consistent means of deterring risks caused by social actors and of remunerating injured plaintiffs.

II. CAUSALITY

Classic definitions of causality describe an external stimulus²⁴ capable of producing internal change in an object (i.e., an “effect”) as the “cause” of that change.²⁵

22. Social justice theorists object to the utilitarian nature of Kindynamic Theory. Even among those who agree that an objective standard must be used in assessing risk (and some social justice theorists, curiously, do not even accept this proposition), they contend that where a risk results in injury, recompense must follow. Kindynamic Theory acknowledges this argument as theoretically plausible. However, for a judicial system where litigation costs are more reminiscent of Soviet economies than a zero-transaction cost realm, Kindynamic Theory stresses pragmatism over utopia: it allocates court time and resources toward redress of the most prevalent or deleterious risks first. Kindynamics contends that if the judicial system must deny complete justice to some (and it must because of limits on time and resources), better it would be to deny recovery for those who suffer from infrequently caused risks, as there would be less social deterrence resulting from such damage awards.

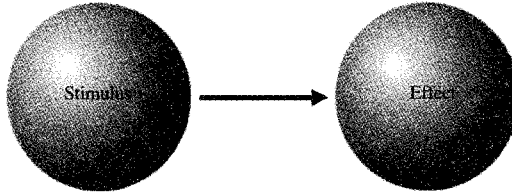
23. This article does not fully address the strong contributions that the law and economics literature has made to tort theory, some of which have cast doubt on the differentiation between negligence, intent, and strict liability. See, e.g., Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960). See also STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 32–36 (1987) (demonstrating that in many instances, the answer to whether a negligence or strict liability rule is economically preferable is indeterminate). Kindynamic Theory is certainly capable of incorporating the economists’ critiques. As the reader will see in Part IV.B when we discuss decision analysis, however, the particular form of Kindynamic Theory that we are reporting on maintains the distinction, in part because economists have not shown convincingly that courts would have the financial and time resources to handle strict liability cases the same as negligence—even if it might be net beneficial from a social standpoint.

24. A stimulus in its broadest sense could be any act, omission, action, event, circumstance, element, occurrence, and so on. Because tort law focuses on humans’ acts, when we speak of a “stimulus” after this introductory section, we will almost categorically be referring to *anthropogenic* stimuli—actions, omissions, or creations *by people*.

25. ARISTOTLE, *PHYSICS*, bk. II, ch. 3, 194b5, at 28–29 (W. Charlton trans., Clarendon Press 1970) (n.d.) (defining efficient cause as “the primary source of the change or the staying

Symbolically, causality is represented as a “causal path,” $A \rightarrow B$, with an arrow between stimulus and effect:²⁶

Figure 1
A \rightarrow B: A Causal Path



The path arrow symbolizes causality, but it does not suggest a *method* for proving that a particular stimulus *A* “causes” a particular effect *B*. Galileo sought to rectify this gap. He postulated that an “*efficient cause*” exists where a stimulus *A* is both necessary and sufficient for the outcome *B*.²⁷

Causality to later thinkers like Pierre Laplace and John Stuart Mill was instead *holistic*: a universal interconnectedness, involving a number of stimuli and effects beyond human comprehension (and thus “infinite”).²⁸ By this, every effect is the *joint*

unchanged: for example, the man who has deliberated is a cause, the father is a cause of the child, and in general that which makes something of that which is made, and that which changes something of that which is changed”); ARISTOTLE, *METAPHYSICS*, bk. I, ch. 3, 983a–b, (W.D. Ross ed., Clarendon Press 1924) (n.d.) (defining four elements of causality, including efficient cause).

26. Causal *chains* involve multiple paths, sometimes with causality running bidirectionally, where our dots represent both stimuli to subsequent effects and effects to antecedent stimuli. See Christopher P. Guzelian, *Liability & Fear*, 65 OHIO ST. L.J. 713, 728 fig. 2 (2004).

27. See GALILEO, *The Assayer*, in *DISCOVERIES AND OPINIONS OF GALILEO* 229, 231–80 (Stillman Drake trans., 1957) (1623).

28. PIERRE SIMON, MARQUIS DE LAPLACE, *A PHILOSOPHICAL ESSAY ON PROBABILITIES* 4 (Frederick Wilson Truscott & Frederick Lincoln Emory trans., Dover Publ’ns, Inc. 1951) (1819) (stating Laplace’s Demon: “We ought then to regard the present state of the universe as the effect of its anterior state and as the cause of the one which is to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it—an intelligence sufficiently vast to submit these data to analysis—it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes.”); JOHN STUART MILL, *A SYSTEM OF LOGIC* 214 (Longmans, Green & Co. 1941) (1843) (stating that, in order to understand the cause of an event, one has to understand the totality of changing conditions, both positive and negative, which in their cooperation invariably and unconditionally result in the mentioned event). Another significant protest, put forth in various statements by Descartes, Locke, Berkeley, Hume, and Kant, was that causality might be nothing more than a *relation*—an entirely fictional mental construct. See GEORGE BERKELEY, *WORKS passim* (Alexander Campbell Fraser ed., Clarendon Press 1871) (1709–52); RENÉ DESCARTES, *MEDITATIONS ON FIRST PHILOSOPHY passim* (John Cottingham trans., Cambridge Univ. Press 1986) (1641); DAVID HUME, *AN ENQUIRY CONCERNING HUMAN UNDERSTANDING* § vii (The Open Court Publ’g Co. 1949) (1748); DAVID HUME, *A TREATISE OF HUMAN NATURE* bk. I, pt. III, §§ ii–iv (L.A. Selby-Bigge ed., Clarendon Press 1888) (1739); IMMANUEL KANT, *KRITIK DER REINEN VERNUNFT* (1787); 1

product of *all* stimuli that exist or have existed in the universe at any time prior to that effect. By taking away any one stimulus, it would be impossible to know how that deletion would impact on the effect unless one knew the causal interconnectivity of *all* remaining stimuli in that universe.²⁹ Because human knowledge is limited, Galileo's efficient causality is unattainable.

This holistic critique found advocates in the logical positivist movement (spearheaded by Bertrand Russell)³⁰, and confirmation in scientific fields like quantum mechanics³¹ and chaos theory.³² Holists rejected as fictitious any causal path between *finite* sets of stimuli and effects, such as in Figure 1, "as a thread external and parallel to the remaining threads."³³

Although this attack was so persuasive that even Galilean diehards began to concede that "strict causal lines or chains simply do not exist,"³⁴ philosopher Mario Bunge explains that the isolation of artificial causal paths between *finite* numbers of stimuli "approximately" necessary and/or sufficient for a *finite* number of effects remains man's best rough-and-ready method for the acquisition of knowledge:

The isolation of a system from its surroundings, of a thing or process from its [infinite] context, of a quality from the complex of interdependent qualities to which it belongs—such "abstractions," in short, are indispensable not only for the applicability of causal ideas but for any research, whether empirical or theoretical. . . . [I]t is the concern of science to analyze such mazes of interconnected elements, singling out a few entities and features, and focusing on them with the hope of attaining a better understanding of the whole after the singled-out parts have finally been replaced in it. Holists complain that this procedure damages the totality concerned, and this is true; but analysis is the sole known method of attaining a rational understanding of the whole: first it is decomposed into

JOHN LOCKE, AN ESSAY CONCERNING HUMAN UNDERSTANDING bk. II, ch. xxvi, § 1 (Alexander Campbell Fraser ed., Dover Publ'ns, Inc. 1959) (1690). One cannot dismiss this possibility. Yet we do not address the issue further. If we are simply "brains in a vat," significantly greater existential crises than whether a particular plaintiff should recover from a defendant for injury will arise! *But cf.* MICHAEL HEUMER, SKEPTICISM AND THE VEIL OF PERCEPTION (Rowan & Littlefield 2001) (providing a readable overview of skepticism and a direct realist's rebuttal to it); John Foster, *Induction, Explanation and Natural Necessity*, 83 Proceedings Aristotelian Society 87 (1983) (inference to the best explanation is capable of withstanding skeptics' arguments).

29. John Bernal explained this concept succinctly: "[C]hance variations or side reactions are always taking place. These never completely cancel each other out, and there results an accumulation which sooner or later provides a trend in a different direction from that of the original system." J. D. BERNAL, THE FREEDOM OF NECESSITY 31 (1949).

30. Bertrand Russell, *On the Notion of Cause*, in MYSTICISM AND LOGIC 188 (1957).

31. *See, e.g.*, H. POINCARÉ, THERMODYNAMIQUE ix (J. Blondin ed., 1908) ("On the deterministic hypothesis the state of the universe is determined by an excessively large number, n , of parameters which I shall call x_1, x_2, \dots, x_n . If the value of these n parameters are known at any given instant, and their time derivatives are also known, then the values of the same parameters at a previous or at a later time can be calculated.") (translation by author).

32. *See generally* JAMES GLEICK, CHAOS: MAKING A NEW SCIENCE (1987); ILYA PRIGOGINE, THE END OF CERTAINTY: TIME, CHAOS, AND THE NEW LAWS OF NATURE (1997); STEPHEN WOLFRAM, A NEW KIND OF SCIENCE (2002).

33. MARIO BUNGE, CAUSALITY AND MODERN SCIENCE 132 (3d ed. 1979).

34. *Id.* at 133.

artificially isolated elements, then an attempt is made to synthesize the components. The best grasp of reality is not obtained by respecting fact and avoiding fiction but by vexing fact and controlling fiction.³⁵

Bunge further suggests such finite causal paths or chains “afford both a satisfactory approximate picture [of universal interconnectedness],” but only if the chains are drawn “in particular respects, in limited domains, and for short time intervals.”³⁶

Although causality is an approximation of reality, establishing causality is emphatically *not* a subjective art. Rather, as Bunge states, it is a process of “vexing fact and *controlling* fiction.”³⁷ Properly established risks embody an *objectively good* causal depiction.³⁸ As the next sections shall demonstrate, what is therefore required is a *method* by which to bifurcate risks (*objectively known* “epistemic” causal relationships) and “*uncertainties*” (hypothetical causes of harm).

III. RISK VS. UNCERTAINTY

All proposed relationships between a given stimulus and a given effect are either possible or impossible. Impossible are those that contradict logic or violate a known scientific law. It is impossible (with apologies to string theorists) for a person to be in two places at once, for a person to walk through a wall (two material objects cannot occupy the same space at the same time), or (with apologies to Michael Crichton) for a person to be devoured by a dinosaur (extinct animals cannot bite). It follows that risks must *not* be *impossible*. Consider, then, the following four propositions.³⁹

- (1) What is your risk of being trampled by a non-equine horse?
- (2) What is your risk of being trampled by a horse galloping faster than the speed of light?
- (3) What is your risk of being trampled by a four-legged alien?
- (4) What is your risk of being trampled by a horse?

Kindynamics, in establishing whether a proposition is indeed a “risk,” *first* examines whether the proposed method of causing harm is *possible and known*, and *then* answers

35. *Id.* at 129.

36. *Id.* at 133. Indeed, even when approximations of reality are known to be less accurate than the “best” present human knowledge, such approximations may still be valid in certain contexts. Consider that Einstein’s theory of relativity displaced Newtonian force as the “proper” approximation of velocities approaching light speed, yet Newtonian force equations are still taught in introductory physics classes and were employed in sending men to the moon. So too is finite causality a sufficient everyday means to categorizing relationships. We do not need quantum mechanics to build a bridge. Chaotic or quantum events that radically defy causal models do not typically impinge meaningfully on our daily lives or even on most scientific investigation. This fact permits finite causality to persist so hardily.

37. *Id.* at 129 (emphasis added).

38. Without such objectivity, “remedies” based on bogus “risks” punish “wrongdoers” who are accused (subjectively and sometimes absent any appropriate evidence) of “creating” harms. Liability, in effect, becomes limitless without objective causation.

39. Harvard physicist Dick Wilson helped motivate these scenarios. See Richard Wilson, *Ensuring Sound Science in the Courts*, 26 TECH. IN SOC’Y 501 (2004).

what the *probability* of each proposition's occurrence is, as we do now for the four propositions:

Scenario 1: Horses, by definition, are equine. A non-equine horse is what Plato called a *logical impossibility*,⁴⁰ it is impossible because it requires an object to embody a principle and its logical opposite. Because such a creature is *impossible*, we are inclined to say that the *probability* of being trampled by one is zero.

Scenario 2: Impossibly violates Einstein's laws of relativity. The justification for impossibility, however, is not the same as in the first scenario. A warp speed horse is not illogical. But it defies a *natural law*, and one concludes that Scenario 2 is *impossible*. (By extension, the *probability* of being trampled is zero.)

Scenario 3: Self-professed alien abductees aside, currently there is not convincing evidence of alien life. But inasmuch as the notion contravenes no law of nature, it is formally *possible* that a four-legged alien could exist and could trample someone. (We should resist the urge to quickly add that this harm is "quite unlikely" to occur, to avoid commingling the causal and numerical aspects of risk. This is a point we shall return to momentarily.)

Scenario 4: It is *possible* to be trampled by a horse—there are numerous historical and ongoing examples of such accidents. Estimating the *probability* of particular persons being trampled would then require understanding such circumstances as place and time.

The four scenarios suggest that merely stating the *possibility* of a relationship, $A \rightarrow B$, as a quantified probability does not suffice to establish that $A \rightarrow B$ is a risk. There are three classes of possibility: (1) *logical*, (2) *nomological*, and (3) *epistemic*. A risk must be *logical*; a "non-equine horse" cannot be included in a causal chain. A risk must also be *nomological* (i.e., comply with laws of nature); the alleged owner of a warp-speed horse cannot be held legally liable.⁴¹ These are easy requirements. But for alien trappings and ordinary horse trappings, observe that one cannot rule out the "possibility" of each causal relationship—*each* is a nomological possibility. Nomological possibilities are causal *uncertainties*, conjectures, hypotheses. They await confirmation, might in some cases have been partly corroborated through scientific investigation, but are either not yet scientifically known "facts," or, if they at one time had achieved such "factual" status, have reverted to mere uncertainties because of newer contradictory evidence. Thus, an alien trampling is nomologically possible, even if it is *unknown*.⁴²

40. See, PLATO, *MENO passim* (G.M.A. Grube trans., 1976) (invoking Socratic "elenchus" to prove logical impossibilities).

41. How scientific laws are established is, like any issue of knowledge, a topic for epistemologists. We leave this debate to them, inasmuch as it is not hugely important for our purposes of distinguishing nomological from epistemic possibility. The interested reader can see D.M. ARMSTRONG, *WHAT IS A LAW OF NATURE?* (1983); JOHN W. CARROLL, *LAWS OF NATURE* (1994); IGOR HANZEL, *THE CONCEPT OF SCIENTIFIC LAW IN THE PHILOSOPHY OF SCIENCE AND EPISTEMOLOGY: A STUDY OF THEORETICAL REASON* (1999); Carl G. Hempel, *Studies in the Logic of Explanation*, in *ASPECTS OF SCIENTIFIC EXPLANATION* (1965) (essay originally coauthored with Dr. Paul Oppenheim); and Carl G. Hempel, *Postscript (1964) to Studies in the Logic of Explanation*, in *ASPECTS OF SCIENTIFIC EXPLANATION* (1965).

42. Compare EUGENE F. MALLOVE & GREGORY L. MATLOFF, *THE STARFLIGHT HANDBOOK* (1989) (restricting discussion of space travel to present and reasonably anticipated

Epistemic possibilities, in contrast, are those nomological possibilities that are objectively *known*—causal relations that are objective “facts” on the basis of the best scientific evidence at a given moment in time.⁴³ A trampling by an ordinary horse is *known*—it has happened before, continues to happen in modern times, and is expectable as long as man and horse interact.

A risk is based *only* on epistemic possibility. In this past century, there has been insufficient discussion by philosophers or legal theorists of this need.⁴⁴ But a few late-nineteenth and early-twentieth century European thinkers, beginning with German physiologist and epistemologist Johannes von Kries, recognized it.⁴⁵ In an important 1886 publication,⁴⁶ von Kries criticized the use of quantified probabilities for which the underlying “possibility” is not objectively known.⁴⁷ To resolve possibility in any

technologies), with JOHN H. MAULDIN, PROSPECTS FOR INTERSTELLAR TRAVEL (1992) (discussing nomological possibilities of space travel, including space warps, Zero Point Energy, and Higgs fields).

43. Philosophers might find our term “epistemic possibility” ambiguous, because “epistemic” simply means “known” possibility. An epistemic possibility could be “subjectively” known or “objectively” known. By “epistemic,” we are referring *only* to “objectively known” possibilities. We prefer “epistemic” because the word “objective” has too much linguistic baggage attached already.

44. *Contra* Stordahl v. Rush Implement Co., 417 P.2d 95, 99 (Mont. 1966) (“Whenever a medical expert testifies that an asserted cause of disease is *possible*, this alone is not to be accepted as reasonable medical proof.”) (emphasis in original).

45. Prior to von Kries, the reigning causality theorist was Maximilian von Buri, whose conception of causality-as-applied-in-law was Laplacian:

[T]he German criminal jurist, von Buri, [] developed the theory of *conditio sine qua non* in the sense of a so-called doctrine of equivalence. Since all cooperating conditions within the [Laplacian] causal relation are equally necessary no one of them could be eliminated without at the same time canceling the effect, and since determining their greater or lesser quantitative operations transcends human cognitive ability, he formulated the statement that all conditions are equal in value. . . . [Von Buri concluded] that every *conditio sine qua non* may separately be viewed as a cause [in law], when all others are given.

HERMAN DOOYEWEERD, ESSAYS IN LEGAL, SOCIAL, AND POLITICAL PHILOSOPHY 40 (1996). Von Buri recognized that determining Laplacian causality is beyond human capability. To avoid this problem, he concluded that legal causality should be inferred *equally* for *each* condition. This doctrine of equivalence has a homespun “equality” appeal, but everything in the universe has such Laplacian causal properties. Under the doctrine of equivalence, the judge who sentences a murderer is also a cause of that murder, simply because the judge existed at the time it occurred. Because the doctrine of equivalence admits such silly propositions, it is not useful for establishing liability.

46. JOHANNES VON KRIES, PRINZIPIEN DER WAHRSCHEINLICHKEITSRECHNUNG (2d ed. 1927). It is said that von Kries’s work on epistemic possibilities (“objective Möglichkeiten”) had sizeable influence on John Maynard Keynes’s later work on uncertainty.

47. When . . . we say that a certain Event (Occurrence) is to be expected with a specific, quantified probability, we have made the positive claim therein that the relevant Event is bounded by a certain ‘Relationship Space,’ (Verhaltens-Spielraum) [which is limited in scope as a result of the imprecision of our knowledge]. Every probability expression therefore contains (causal) knowledge of objective meaning at its core. . . . There are

other fashion or, worse, to ignore it, would make probabilities *appear* to reflect causal inference when in fact they might not.

What has been missing, however, is a consistent, objective protocol by which to separate epistemic possibilities from nomological ones. The dividing “line” is sometimes a fuzzy boundary, within which it is occasionally open to debate whether a given stimulus-and-effect relationship is epistemically known. But the exception does not undercut the rule. Most pitches are called either balls or strikes based on a predefined strike zone, even if some close pitches spawn controversy. The existence of legitimate debate over how to classify some possibilities that rest at the interface does not disprove the logic of a dichotomous categorization.

Said differently, most proposed $A \rightarrow B$ relationships are not murky or difficult to assess. Alien tramlings are not “known.” They are only hypothetical possibilities according to the best scientific evidence. Von Kries would say that while alien tramlings are nomologically possible, it is illegitimate and deceitful to discuss a *quantified* “risk” of an alien trampling.⁴⁸ Instead, Kindynamic theorists refer to such unknown possibilities as “*uncertainties*.”⁴⁹ This is because such propositions are predicated on an insufficiently corroborated hypothesis (i.e., a hypothesis backed by *assumptions*), rather than on what is *known*.⁵⁰

several easily recognizable and essentially different parts to this knowledge. First, there must be a certain knowledge of the actual relation according to measures that define the essential Relationship Space of the probability. This same knowledge must also, at least partially, be imprecise in the aforementioned sense [of Relationship Space]; in another way, however, it is essential that the knowledge be precise. (For example, the quantified relationship between the amounts in relation to each other.)

Id. at 75 (translation by author).

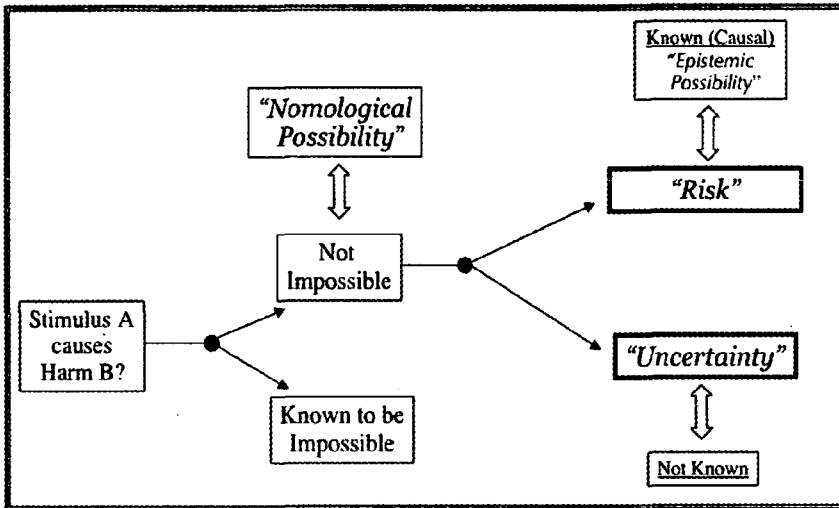
48. Thus, von Kries would disapprove of the Drake Equation, an equation formulated in 1961 that supposedly offers a means of estimating the probability of other intelligent life in the universe. See SETI Institute, *Drake Equation*, at <http://www.seti.org/site/pp.asp?c=ktJ2J9M MI&E&b=179073> (last visited Feb. 1, 2005) (describing the Drake Equation “factors” included in computing the probability of intelligent alien life).

49. The reader must take care not to confuse the Kindynamic definition of “uncertainty” with lay definitions, or, for that matter, with the way some who have overlooked the causal prerequisite to establishing a “risk” use the word: to describe those nomological possibilities—both known *and* unknown—for which a reliable probability is not easily ascertained. See, e.g., Richard Posner, *A Few Closing Thoughts* (Aug. 29, 2004), available at <http://lessig.org/blog/archives/posner.shtml> (last visited May 17, 2005) (“There is an old but still useful distinction between ‘risk’ and ‘uncertainty,’ the former referring to contingencies to which a probability can be attached, the latter to contingencies to which no probability can be attached. The former is the domain of insurance and cost-benefit analysis. The latter? No one can assign a probability to any given time, place, or manner of a terrorist attack within a very broad range (obviously some possibilities can be excluded); and yet we have to take counterterrorist [sic] measures; we have, in short, to manage uncertainty as well as risk.”).

50. To be sure, self-proclaimed UFO abductees will insist that their personal encounters make alien tramlings *known*, not just nomological possibilities. But if courts simply accept anecdotal, improperly selective, or subjective evidence that does not reflect the “best” scientific evidence (or even of opinions advanced by a professed “authority” or “expert”), separation of nomological and epistemic possibilities cannot occur.

The distinctions between “known impossibilities” (those propositions that either defy logic or known natural laws) and “nomological possibilities,” and the further bifurcation of nomological possibilities into “risks” and “uncertainties,” can be represented as a flow diagram.⁵¹

Figure 2
Establishing Whether a Proposition is a Risk



In 1956, Harvard Medical School Dean Sydney Burwell succinctly identified the fundamental epistemological problem in assessing what is objectively “known” at any given time when he stated: “My students are dismayed when I say to them, ‘Half of what you are taught as medical students will in ten years have been shown to be wrong. And the trouble is, none of your teachers knows which half.’”⁵² Burwell’s quote illustrates that causality is *tied to a definite moment in time*. At one moment, a relation $A \rightarrow B$ may reflect the best scientific theory, but not earlier or later. Scientific explanation builds causal paths and chains, and then deconstructs⁵³ and reconstructs

51. Table adapted from Philip S. Guzelian et al., *Evidence-Based Toxicology: A Comprehensive Framework for Causation*, 24 *HUM. & EXPERIMENTAL TOXICOLOGY* 161 (2005). © 2005 Edward Arnold (Publishers) Ltd. All rights reserved.

52. G.W. Pickering, *The Purpose of Medical Education*, 2 *BRIT. MED. J.* 113, 115 (1956).

53. Deconstructing finite causal chains in an infinite causal nexus might seem like “proving the negative”—demonstrating that a relation does *not* exist. Strictly speaking, proving the negative is impossible for any infinite set. Nonetheless, because of something that Michael Martin calls the Negative Evidence Principle, we can approximately and objectively “prove” the *absence*, just as we can objectively “prove” the *existence* of a finite causal chain:

A person is justified in believing that X does not exist if (1) all the available evidence used to support the view that X exists is shown to be inadequate; and (2) X is the sort of entity that, if X exists, then there is a presumption

links as compelling contradictory or corroboratory evidence is found. This explanatory process is not always progressive. The Dark Ages, in which anecdotal experience, ungrounded hypotheses, unscientific alchemy, and mythos reigned, caused loss of public knowledge.⁵⁴ Scientific “explanations” are no less immune to fashion or to fancy than fiction itself if they do not derive from an objective protocol.⁵⁵

Thus, according to Kindynamic Theory, an *objective*, consistent metric for “knowing what we know” *at a given time* is essential.⁵⁶ Without such, some of the most taken-for-granted “facts” or so-called “risks”—even when advocated by well-regarded authorities⁵⁷—turn out to be nothing more than uncertainties. Consider, for instance,

that [there] would be evidence adequate to support the view that *X* exists; and (3) this presumption has not been defeated although serious efforts have been made to do so; and (4) the area where evidence would appear, if there were any, has been comprehensively examined; and (5) there are no acceptable beneficial reasons to believe that *X* exists.

MICHAEL MARTIN, ATHEISM: A PHILOSOPHICAL JUSTIFICATION 283 (1990).

54. See, e.g., Michael J. Minnicino, *The New Dark Age: The Frankfurt School and “Political Correctness,”* 1 FIDELIO 4 (1992), available at http://www.schillerinstitute.org/fid_91-96/921_frankfurt.html (contending that the “Frankfurt School” of academia, public opinion polls, infotainment, and political correctness are causing a deconstruction of modern culture and scientific knowledge akin to the Dark Ages’ regression).

55. See, e.g., AM. COUNCIL ON SCI. AND HEALTH, *FACTS VERSUS FEARS: A REVIEW OF THE GREATEST UNFOUNDED HEALTH SCARES OF RECENT TIMES* (4th ed. 2004) (reviewing the deleterious effects of 25 prominent fear epidemics based on uncertainties or minute risks, including the 1959 Cranberry Scare, Red Dye Number 2, saccharin, hair dyes, Three Mile Island, and cellular phones); CARL SAGAN, *BROCA’S BRAIN: REFLECTIONS ON THE ROMANCE OF SCIENCE* 43–146 (1979) (recounting various historical anecdotes of “Paradoxers”—pseudoscientists—who propagated widespread myths).

56. It is critical that we understand that an epistemic possibility is linked to a specific moment in time. What is uncertain today may tomorrow become epistemic because of critical experiment or carefully controlled observation that corroborates the causal relation.

57. Philip S. Guzelian & Christopher P. Guzelian, *Authority-Based Explanation*, 303 SCIENCE 1468, 1469 (2004) (“Uncritical acceptance of authority-based opinions as conclusive evidence is pervasive, even though top authorities unsuccessfully predict what scientific knowledge will be preserved as ‘fact.’”). Dr. David Sackett explains that reliance on expert medical opinions, which themselves are not based upon an objective methodology, poses a jeopardy of improperly bestowing epistemic status upon uncertainties:

For the problems we’re likely to encounter very infrequently ([for example]...a man who developed bad pneumonia while trying to reject his heart-lung transplant), we “blindly” seek, accept, and apply the recommendations we receive from authorities in the relevant branch of medicine. This “replicating” mode also characterizes the practice of medical students and clinical trainees when they haven’t yet been granted independence and have to carry out the orders of their consultants. The trouble with the “replicating” mode is that it is “blind” to whether the advice received from the experts is authoritative (evidence-based, resulting from their [objective appraisal of evidence consistent with “best evidence” methods]) or merely authoritarian (opinion-based, resulting from pride and prejudice)...If we tracked the care we give when operating in the “replicating” mode into the literature and [objectively] appraised it, we would find that some of it was

the dogma in early nineteenth-century France that phlebotomies (bleeding of patients) cured cholera.⁵⁸ Until the 1980s, generations of doctors—persuaded by authorities whose entire careers were devoted to proving that peptic ulcers were an acid problem—administered milk and bland diets and performed selective vagotomies and antrectomies only to be shown by a young resident, Barry Marshall, that the disease is

effective, some useless, and some harmful. But in the “replicating” mode we’ll never be sure which.

DAVID L. SACKETT ET AL., *EVIDENCE-BASED MEDICINE: HOW TO PRACTICE AND TEACH EBM 5* (2d ed. 2000). Daniel Friedland and his co-authors compare “traditional” (authority-based) and “evidence-based” assumptions as applied in medicine:

Evidence-based medicine is a movement that has developed to help us make . . . decisions with our patients *systematically*. This movement is represented by a recent profusion of literature and course work in evidence-based medicine, and . . . has been characterized as a paradigm shift.

The *traditional medical paradigm* comprises four assumptions:

1. Individual clinical experience provides the foundation for diagnosis, treatment, and prognosis. The measure of authority is proportional to the weight of individual experience.
2. Pathophysiology provides the foundation for clinical practice.
3. Traditional medical training and common sense are sufficient to enable a physician to evaluate new tests and treatments.
4. Clinical experience and expertise in a given subject area are a sufficient foundation to enable the physician to develop clinical practice guidelines.

The new *evidence-based medicine paradigm* comprises a different set of assumptions:

1. When possible, clinicians use information derived from systematic, reproducible, and unbiased studies to increase their confidence in the true prognosis, efficacy of therapy, and usefulness of diagnostic tests.
2. An understanding of pathophysiology is necessary but insufficient for the practice of clinical medicine.
3. An understanding of certain rules of evidence is necessary to evaluate and apply the medical literature effectively.

DANIEL J. FRIEDLAND ET AL., *EVIDENCE-BASED MEDICINE: A FRAMEWORK FOR CLINICAL PRACTICE 2* (Daniel J. Friedland ed., 1998) (emphasis in original). See also G. Rowe & George Wright, *Expert Systems in Insurance: A Review and Analysis*, in 2 INT’L J. INTELLIGENT SYS. IN ACCT., FIN., AND MGMT. 129 (1993) (Daniel E. O’Leary ed.) (concluding there is little evidence that experts are more veridical than laymen in risk assessment); George Wright et al., *An Empirical Test of the Relative Validity of Expert and Lay Judgments of Risk*, in 22 RISK ANALYSIS 1107, 1118 (2002) (Elizabeth L. Anderson ed.) (finding that underwriters—risk assessment experts—are little better at estimating certain risk measures than laypersons because of lack of objective feedback); *contra* Paul Slovic et al., *Characterizing Perceived Risk*, in PERILOUS PROGRESS: MANAGING THE HAZARDS OF TECHNOLOGY 91-125 (R.W. Kates et al. eds., 1985) (reaching opposite conclusions, but criticized by Wright et al., *supra*, for lack of statistical power and for use of a heterogeneous panel of experts).

58. Paris clinician Pierre Louis dispelled this belief through systematic examination of patients. See P. Ch. A. Louis, *Researches on the Effects of Bloodletting in Some Inflammatory Diseases* (C. G. Putnam trans., 1835), reprinted in *Researches on the Effects of Bloodletting in Some Inflammatory Diseases Together with Researches on Phthisis* (Morton D. Bogdonoff et al. eds., 1986).

a bacterial infection.⁵⁹ More recently, a generation of well-meaning cardiologists put its postmenopausal patients at risk of cancer and heart disease through estrogen treatments that were widely and incorrectly believed, ironically, to reduce heart disease.⁶⁰ And in

59. Rachel K. Sobel, *Barry Marshall: A Gutsy Gulp Changes Medical Science*, U.S. NEWS & WORLD REP., Aug. 20–27 2001, at 59, available at <http://www.usnews.com/usnews/doubleissue/heroes/marshall.htm>.

60. David Herrington and Timothy Howard tout the newfound realization that this untested hypothesis-turned-dogma could have been easily prevented:

During the past decade, postmenopausal hormone therapy became one of the most frequently prescribed therapies in the United States, with a highly diversified portfolio of presumed benefits for postmenopausal women. The belief that hormone therapy might reduce a woman's risk of coronary heart disease contributed considerably to its widespread use. Beginning in 1998, results from a series of randomized clinical trials . . . have clearly demonstrated that hormone therapy does not slow the clinical or anatomical progression of established coronary disease, nor does it prevent clinical cardiovascular events in previously healthy women. Indeed, data from the Women's Health Initiative (WHI), in conjunction with data from several other trials with clinical end points, suggest that hormone therapy may even increase cardiovascular risk. . . .

. . . The simple and intuitively appealing concept that replacing estrogen lost during menopause would be beneficial was easy for both patients and physicians to believe. This fact, coupled with impressive indirect evidence of a cardioprotective effect and growing awareness of the need for effective means to treat and prevent heart disease in women, made for a nearly unshakable belief in the benefits of hormone therapy. As a result, many people suspended ordinary standards of evidence concerning medical interventions and concluded that hormone therapy was the right thing to prevent heart disease in millions of postmenopausal women—despite the absence of any large-scale clinical trials quantifying its overall risk-benefit ratio.

Not surprisingly, when the initial randomized clinical trials failed to show a cardiovascular benefit, the results were heavily criticized and, in some cases, disregarded in lieu of the less credible evidence that fit the prevailing paradigm

The lesson is that belief, no matter how sincerely held, is no substitute for proof Similarly, observational or mechanistic studies, animal models, and basic research have tremendous value for the generation of hypotheses but should not be used to justify broad-based pharmacologic interventions.

David M. Herrington & Timothy D. Howard, *From Presumed Benefit to Potential Harm—Hormone Therapy and Heart Disease*, 349 NEW ENG. J. MED. 519, 519 (2003). See also Lars Holmberg & Harald Anderson, *HABITS (Hormonal Replacement Therapy for Breast Cancer—Is It Safe?), A Randomised Comparison: Trial Stopped*, 363 LANCET 453 (2004) (randomized trials ended because of unacceptable recurrence of breast cancer in women using estrogen therapy), available at <http://image.thelancet.com/extras/03let12260web.pdf>. And as another author observes, there were published indications as early as 1986 that would have offered an evidence-based practitioner insight into the dubious value of estrogen therapy:

As long ago as 1986 Diana Petitti and colleagues showed that HRT was apparently equally protective against accidental and violent deaths in an observational study as it was against cardiovascular disease deaths. They pointed out that given the

a most recent and shocking finding, the longstanding, universal application of corticosteroids to patients with traumatic head injury, although indicated by seemingly sound pathophysiological explanations to reduce brain swelling, has been shown in a recent well-designed randomized trial to result in a sizeable *increase* in deaths.⁶¹ This unsettling discovery prompted editorialists to conclude that “administration of corticosteroids to brain-injured patients has seemingly caused more than 10[,]000 deaths during the 1980s and earlier”⁶² and that “[t]he key message . . . is that applying treatments with unproven effectiveness is like flying blindly.”⁶³

Courts too are starting to see the need to divide risks and uncertainties. One federal judge found that the U.S. Environmental Protection Agency, which first promoted the now-accepted dogma that second-hand cigarette smoke causes lung cancer, had no objective basis at the time for that proclamation.⁶⁴ Former Yale and Pennsylvania Law dean and federal judge Louis Pollak preliminarily concluded only two years ago that there was no objective basis for presenting “evidence” that a murder suspect’s fingerprints were identical to those later taken by authorities, despite a century of fingerprinting’s evidentiary use and a professional requirement that multiple experts examine each pair of prints.⁶⁵

Thanks to remarkable advances in informatics and database searchability, one can now objectively judge much causal “knowledge” without relying on popular, unfounded, or incompletely founded opinion. This method is referred to as “best evidence” or “evidence-based logic” (“EBL”). Medicine, dentistry, engineering, computer science, veterinary science, insurance companies and HMOs,⁶⁶ human toxicology,⁶⁷ library science,⁶⁸ and even professional baseball⁶⁹ have adopted EBL to

lack of any biologically plausible link between HRT and these external causes of death both associations should be suspected of suffering from residual confounding.

Debbie A. Lawlor et al., *Commentary: The Hormone Replacement—Coronary Heart Disease Conundrum: Is This the Death of Observational Epidemiology?*, 33 INT’L J. EPIDEMIOLOGY 464, 466 (2004) (footnote omitted).

61. Stefan Sauerland & Marc Maegele, *A CRASH Landing in Severe Head Injury*, 364 LANCET 1291 (2004).

62. *Id.* at 1291.

63. *Id.* at 1292.

64. *Flue-Cured Tobacco Coop. Stabilization Corp. v. EPA*, 4 F. Supp. 2d 435, 465–66 (M.D.N.C. 1998) (rejecting EPA “research finding” that second-hand cigarette smoke causes lung cancer for lack of objective evidence), *vacated by* 313 F.3d 852 (4th Cir. 2002) (holding that issuance of report was not reviewable agency action).

65. Adrian Cho, *Fingerprinting Doesn’t Hold Up as a Science in Court*, 295 SCIENCE 418 (2002). *See also Exxon Corp. v. Makofski*, 116 S.W.3d 176 (Tex. App. 2003) (conducting preliminary EBL review to assess whether benzene contamination of aquifer caused plaintiffs’ ailments).

66. *See* Christopher P. Guzelian, *Liability & Fear*, 65 OHIO ST. L.J. 713, 741–42 & nn.84–89 (2004) (listing cites for evidence-based medicine, dentistry, engineering, computer science, veterinary science, and insurance companies).

67. Guzelian et al., *supra* note 51.

68. Jonathan D. Eldredge, *Evidence-Based Librarianship: An Overview*, 88 BULL. MED. LIBR. ASS’N 289 (2000).

gauge what is “known” (i.e., an epistemic possibility) at a particular time. Elsewhere this author, along with others, has set out a comprehensive overview of how EBL functions in two contexts: human toxicology and medicine.⁷⁰ Here, it suffices to note that EBL exists and is the best method for objectively distinguishing risks and uncertainties.⁷¹

Admittedly, many regulatory agencies, public advocacy groups, crisis managers, and safety experts advise that certain actions (such as evacuations, waste cleanups, restricted product usage, etc.) be taken even if only a nomological possibility of harm (i.e., an “uncertainty”) exists. Journalists or government officials often warn about uncertainties.⁷² Such regulation, warnings, and reporting are defended by reference to the *precautionary principle*: better safe than sorry.⁷³ The precautionary principle has

69. See MICHAEL LEWIS, *MONEYBALL: THE ART OF WINNING AN UNFAIR GAME* (2003) (describing rudimentary EBL-style steps recently taken by the Oakland Athletics to maximize chances of making the playoffs with the league’s lowest-salaried roster).

70. For an instructive overview of EBL, see Guzelian et al., *supra* note 51.

71. Whether a single method for addressing *general* and *specific* causation can exist is open to the most basic epistemological debates. See Christopher Hitchcock, *Probabilistic Causation: Singular and General Causation*, in *STANFORD ENCYCLOPEDIA OF PHILOSOPHY* (Edward N. Zalta ed., Fall ed. 2002) (citing specific/general causation dichotomy literature and noting “we make at least two different kinds of causal claim, singular and general. With this distinction in mind, we may note that . . . counter-examples . . . are all formulated in terms of singular causation. So one possible reaction to . . . counter-examples . . . would be to maintain that a probabilistic theory of causation is appropriate for general causation only, and that singular causation requires a distinct philosophical theory. One consequence of this move is that there are (at least) two distinct species of causal relation, each requiring its own philosophical account—not an altogether happy predicament.”), available at <http://plato.stanford.edu/entries/causation-probabilistic/>. EBL recognizes that this fundamental tension between specific and general causation exists and attempts to resolve both forms of causation adequately, as courts increasingly demand be done. See, e.g., *Eskin v. Carden*, 842 A.2d 1222, 1229-30 (Del. 2004) (holding in case involving biomechanical expert testimony that “[e]xtrapolating from general . . . principles to demonstrative evidence that supports or disproves injury to an individual may not be reliable in every case. We, therefore, hold that a trial judge may admit . . . expert opinion that a particular injury did (or did not) result from the forces of an accident only where the trial judge determines that the testimony reliably creates a connection between the reaction of the human body generally to the forces generated by the accident and the specific individual allegedly injured or another determinative fact in issue.”) (footnote omitted).

72. This observation should not be taken to mean that communicating uncertainties or rare risks should be wholly disallowed. But the risk communicator must think about how his audience is going to *perceive* the information he presents. If it is an uncertainty, the audience must perceive it as that, not as a risk grounded in epistemic possibility. See Guzelian, *supra* note 66 (advocating that negligent risk communicators be assigned liability for clinically serious emotional harms or fears caused by errant risk communication); see also Christopher P. Guzelian, *Scientific Free Speech* (Working Paper 2005) (on file with author).

73. V. Dethlefsen et al., *The Precautionary Principle: Towards Anticipatory Environmental Management*, in *CLEAN PRODUCTION STRATEGIES* 41 (Tim Jackson ed., 1993); COMMISSION OF THE EUROPEAN COMMUNITIES, *COMMUNICATION FROM THE COMMISSION ON THE PRECAUTIONARY PRINCIPLE* 3 (2000) (maintaining that some applications of the precautionary principle are valid, but stressing “[r]ecourse to the precautionary principle presupposes that potentially dangerous effects deriving from a phenomenon, product or process have been identified, and that scientific evaluation does not allow the risk to be determined with sufficient certainty”), available at http://europa.eu.int/eur-lex/en/com/cnc/2000/com2000_0001en01.pdf.

critics; some say that it encourages wasteful, ad hoc expenditures on uncertainties at the expense of efficient resource allocation toward reducing risks.⁷⁴ The debate is an

74. Elizabeth Whelan, president of the American Council on Science and Health, critiques the precautionary principle:

There are . . . at least two reasons why the precautionary principle itself, when applied in its extreme, is a hazard, both to our health and our high standard of living.

First, if we act on all the remote possibilities in identifying causes of human disease, we will have less time, less money and fewer general resources left to deal with the real public health problems which confront us. This does not mean that before we take prudent action to protect public health we have to dot every scientific "i" and cross every environmental "t". It does mean that we should not let the distraction of purely hypothetical threats cause us to lose sight of the known or highly probable ones.

Second, the precautionary principle assumes that no detriment to health or the environment will result from the proposed new banning or chemical regulation . . .

. . . .

When we apply the precautionary principle and focus on hypothetical risks and ponder what actions we might take "just in case", we leave the world of science and enter the realm of ideology. We allow ourselves to come under the spell of those who are motivated, for whatever reason, by a desire to return to what they perceive as a pre-industrial Garden of Eden.

These "what if" ideologues need to be reminded that wealth and industrial progress are associated with better, not worse health. Blanket applications of the precautionary principle ultimately would mean rejecting the modern technologies that have given us our enviable state of good health and longevity, and the freedom to enjoy it.

Elizabeth M. Whelan, *Too Much Safety Be Hazardous? A Critical Look at the "Precautionary Principle"*, AMERICAN COUNCIL ON SCIENCE AND HEALTH (May 23, 2000), at http://www.acsh.org/healthissues/newsID.236/healthissue_detail.asp. See also THOMAS R. DE GREGORI, *BOUNTIFUL HARVEST: TECHNOLOGY, FOOD SAFETY, AND THE ENVIRONMENT* 122 (2002) ("The precautionary principle is often defined as 'absence of evidence is not the same as absence of risk.' What this really says is that the proponents of the principle have lost the argument on the evidence (otherwise they would argue the evidence), so they argue that we should follow their policy prescriptions anyway. Stated differently, if our fears and phobias are right, we are right, but even if we are wrong, well we are still right: it's 'my policy, right or wrong.'"); BJORN LOMBORG, *THE SKEPTICAL ENVIRONMENTALIST: MEASURING THE REAL STATE OF THE WORLD* 258–324 (Hugh Matthews trans., Cambridge Univ. Press 2001) (1998) (arguing for evidence-based prioritization of resources toward "real" problems rather than nomological possibilities for global warming); CASS R. SUNSTEIN, *RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT* (2002) (arguing that government agencies should predicate regulatory decisions and prioritize expenditures on the basis of sound risk assessments); John D. Graham & Susan Hsia, *Europe's Precautionary Principle: Promise and Pitfalls*, 5 J. RISK RES. 371, 371 (2002) (finding the European Commission's broad regulatory adoption of the precautionary principle unsatisfactory and concluding that "[c]ritical terms need to be defined, the evidentiary hurdles for precaution need to be clarified, and checks and balances against ill-considered application of the principle need to be strengthened. A systematic process of ranking hazards and targeting cost-effective protection opportunities should be implemented by the EC as a counterweight to enactment of precautionary measures on a crisis-by-crisis basis."); Gary E. Marchant, *From*

interesting one, but which side has the better of it does not matter for common law tort liability.⁷⁵ Because plaintiffs have a burden of proof to establish causality, only risks (*known* causal possibilities) are relevant; the fact that a regulatory agency issued sanctions or took “preventative” action against uncertainties because it was compelled to *by law* does not demonstrate an established causal contribution (or lack thereof).⁷⁶

To summarize the first major contribution of Kindynamic Theory: a properly identified risk is (1) an *epistemic* causal possibility, (2) expressed as a quantified probability/likelihood, (3) that results in a harm/injury. All other would-be “risk” propositions are either uncertainties or impossibilities, and Kindynamic Theory asserts that they cannot serve as a basis for liability.

IV. PROXIMATE RISK AND NEGLIGENCE

Someone creates a risk. Someone is injured. Does the victim recover? Not automatically. A negligence-based tort requires more than the mere creation of risk and injury. But exactly *which* elements should factor into a finding of negligence (and thus, liability) has resulted in intense debate without good resolution.

General Policy to Legal Rule: Aspirations and Limitations of the Precautionary Principle, 111 ENVTL. HEALTH PERSP. 1799, 1801 (2003) (“The ambiguity of the [precautionary principle] invites arbitrary application, both with respect to which risks it is applied to and what it requires when it does apply.”) (citation omitted).

75. In his struggle to address the arbitrariness of the precautionary principle’s application, Gary Marchant has indirectly suggested a more refined set of classes of possibility than those we described in Figure 2. Marchant, *supra* note 74. By extension of Marchant’s reasoning, uncertainties consist of two subclasses: (1) those that have arisen in some individuals’ imagination but remain empirically controverted (“*hypotheses*”), and (2) those that have not yet even been dreamt up (“*ignorance*”). See *id.* at 1800 (“It is difficult to see how the [precautionary principle] can help address risks for which we are ignorant rather than uncertain.”). It is far from clear that Marchant’s standard does anything to refine the precautionary principle other than to state what is necessarily true: there is no possibility of taking action against things we cannot even imagine. *But see* Paolo F. Ricci et al., *Precautionary Principles: A Jurisdiction-Free Framework for Decision-Making Under Risk*, 23 HUM. & EXPERIMENTAL TOXICOLOGY 579 (2004) (presenting decision analysis framework that offers reproducibility and formal structure for making precautionary decisions about uncertainties).

76. See Philip S. Guzelian & Christopher P. Guzelian, *Authority-Based Explanation*, 303 SCIENCE 1468, 1469 (2004) (“It may be prudent for preventative purposes to act as if some chemicals present health risks, but such decisions should never be confused with evidence-based conclusions that such agents do cause harm.”). And as Judge Richard Posner has said, “[l]aw lags science; it does not lead it.” *Rosen v. Ciba-Geigy Corp.*, 78 F.3d 316, 319 (7th Cir. 1996). See also *Black v. Rhone-Poulenc, Inc.*, 19 F. Supp. 2d 592, 606 (S.D. W. Va. 1998) (“[T]he Court cannot abdicate its role as ‘gatekeeper’ and subject the jury unfairly to confusing and misleading ‘pseudoscientific’ research.”); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 727-28 (Tex. 1997) (“Courts should not embrace inferences that good science would not draw. . . . [T]he law should not be hasty to impose liability when scientifically reliable evidence is unavailable.”); Christopher P. Guzelian, *Did Daubert Rid Courtrooms of Advocacy Science?*, in SCI. EV. REV. (7th ed., Am. Bar Assoc., forthcoming 2005); Arnold J. Rosoff, *Evidence-Based Medicine and the Law: The Courts Confront Clinical Practice Guidelines*, 26 J. HEALTH POL., POL’Y & L. 327 (2001) (advocating expanded use of evidence-based approach to separate uncertainties from epistemic possibilities).

Unlike regulatory agencies,⁷⁷ American courts have never systematically prioritized tort claims. As has been observed in regulatory contexts,⁷⁸ without risk prioritization, coherent risk deterrence does not occur. Accordingly, many Kindynamic theorists contend that negligence must involve systematic risk prioritization.⁷⁹

77. See, e.g., SCI. ADVISORY BOARD, U.S. ENVTL. PROT. AGENCY, SAB-EC-90-021, REDUCING RISKS: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION 6 (1990) (encouraging EPA to “target its environmental protection efforts on the basis of opportunities for the greatest risk reduction”).

78. Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 50-51 (2001) (“[M]any commentators believe that lack of appropriate risk analysis and comparative risk prioritization represents the greatest obstacle to achieving sound environmental regulation. They argue, with considerable justification, that without a sustained effort to measure and compare risks, environmental regulation is little more than shooting in the dark”) (footnote omitted).

79. Courts rarely bother to quantify risks (some even expressly refuse to). See, e.g., *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 788 (3d Cir. 1994) (“Paoli II”) (“Nor do we think that an expert must quantify the increased risk.”); *Merry v. Westinghouse Elec. Corp.*, 684 F. Supp. 847, 850 (M.D. Pa. 1988) (criticizing a quantification of risk requirement because “[w]e think this formulation unduly impedes the ability of courts to recognize that medical science may necessarily and properly intervene where there is a significant but unquantified risk of serious disease”) (quoting *Ayers v. Jackson Township*, 525 A.2d 287, 309 (N.J. 1987)). They rely instead on quantitative adjectives such as “substantial,” “inconsequential,” “trivial,” or “significant” to delimit which risks are judicially redressable. Such modifiers, absent supporting quantification, are notoriously imprecise. They encourage both subjectivity and error; they defeat any effort to sensibly risk prioritize. As this author has written elsewhere:

Quantitative adjectives lack precision and accuracy. Descriptors such as “significant,” . . . “serious,” “large,” “small,” “trivial,” “meaningful,” “substantial,” “inconsequential,” and so forth are simply ineffective standards for classifying risk magnitudes unless backed by actual quantification. Say we wish to discuss a particular level of risk. What level of risk is “significant”? . . .

The correct answer . . . is “*it depends.*” Quantitative adjectives only gain meaning *in a context*. Is a quantitative adjectival “bright line” getting at a *proportionate* risk increase (“[A] relative risk of 1.0 means that the agent has no effect on the incidence of disease. . . . [A] relative risk of 2.0 implies a 50% likelihood that an exposed individual's disease was caused by the agent.”), an *aggregate* level of risk (“[a]sbestosis sufferers . . . have a significant (one in ten) risk of dying of mesothelioma”), or *both* (“because of plaintiff's exposure to benzidine, his risk of developing bladder cancer had increased from one in ten thousand to one in ten”)[?] In determining whether medical screening is advisable, for instance, physicians focus only on aggregate risk; diagnostic decisions do not turn on the *source* of risk, just that a threshold has been transgressed. However, . . . fair apportionment of [] liability . . . requires *both* aggregate and relative risk considerations.

Guzelian, *supra* note 66, at 815–16 (emphases added). See also CHICKEN & POSNER, *supra* note 16, at 11 (“[A]ny precise discussion of the acceptability of a risk must describe the risk in quantitative terms; if the risk is described only in soft, qualitative terms, any conclusions about its acceptability will be equally soft or, to put it another way, will be merely uncertain speculation.”); SUNSTEIN, *supra* note 74, at 111 (suggesting that accounting for both quantitative and qualitative aspects of risk is necessary for adequate risk assessment); Christopher P.

One problem with an explicit move to a risk-prioritized tort system—in which certain injury-resulting risks would not be judicially cognizable because they occur too infrequently to merit judicial attention—is that courts are tasked (possibly as a constitutional requirement) with dispensing individual justice injury-by-injury. Yet the practical reality is that there is nothing superhuman about the judicial branch. It is constrained by finite budgets, time, expertise, and staff (more so even than regulatory agencies comprised of expert risk analysts).⁸⁰ Even while paying lip service to the adage that “every man must have his day in court,” tort law faces the reality that if every alleged negligence-and-resulting-injury claim really had its day in court, the system would buckle.

To maintain an *illusion* of individual justice, the current tort system has fashioned an unprincipled haphazard set of rules to limit the number of cognizable injuries.⁸¹ Take a specific example: a person within the “zone of danger” who witnesses his daughter struck and killed by an automobile has an actionable claim (emotional distress). But a plaintiff who witnesses his fiancée struck and killed in identical circumstances cannot recover in some jurisdictions. This is not because the fiancé’s emotional distress is scientifically believed any less injurious and terrible than the father’s. Rather, it is because courts have set up a veiled, illogical patchwork of prioritization rules that quietly eliminate certain classes of injuries, which in a world of unlimited judicial resources might well be actionable. This patchwork prevents administrative overload of the courts, while maintaining the false public belief that individual justice is being done.⁸²

Class action suits and the rise of so-called “enterprise liability” theory are recent theoretical attempts to improve individual justice. Still, the take-home lesson is that inability to ensure individual justice, *regardless* of how much one cherishes that goal, is an inherent aspect of *any* constrained judicial system where claims outpace resources.

As we show in the following Parts IV(A) and (B), some Kindynamists contend that within this administratively limited system of justice, better risk prioritization should, must, and can be attained in tort law.

Guzelian et al., *A Quantitative Methodology for Determining the Need for Exposure-Prompted Medical Monitoring*, 79 IND. L.J. 57, 62 (2004) (“Judicial use of quantitative adjectives as a proxy for assessing the actual increase in risk is a questionable practice. One pair of authors observes that ‘the court[s] self-consciously rel[y] on a series of quantitative modifiers . . . in an effort to reserve liability for truly deserving cases. Anyone familiar with modern American trial practice will understand that, however well-meaning, this reliance on superlatives will not prevent most well-prepared cases from reaching triers of fact.’”) (quoting James A. Henderson, Jr. & Aaron D. Twerski, *Asbestos Litigation Gone Mad: Exposure-Based Recovery for Increased Risk, Mental Distress, and Medical Monitoring*, 53 S.C. L. REV. 815, 845 (2002)).

80. See COUNCIL OF ECONOMIC ADVISERS, WHO PAYS FOR TORT LIABILITY CLAIMS? AN ECONOMIC ANALYSIS OF THE U.S. TORT LIABILITY SYSTEM (2002), available at http://www.whitehouse.gov/cea/tortliabilitysystem_apr02.pdf.

81. For a related idea, see Meir Dan-Cohen, *Decision Rules and Conduct Rules: On Acoustic Separation in Criminal Law*, 97 HARV. L. REV. 625 (1984) (contending that selective transmission to the public of rules governing decisionmakers’ adjudications is a questionable practice).

82. See Guzelian, *supra* note 66, at 766–850 (describing the nonsensicality of fear and emotional distress tort liability rules and proposing rules to sensibly prioritize emotional harm claims).

A. "Significant" Risks

Case-by-case regulation is an inefficient and possibly disadvantageous means for risk deterrence.⁸³ Nonetheless, common law tort is ingrained in American culture. Abandoning it in favor of an administrative regime designed for risk prioritization probably will not happen. But common law can still be tilted toward individual case adjudication that is based on orderly risk prioritization. For *any* regulatory system, Kindynamic Theory favors infusing whatever amount of risk prioritization is possible. It therefore expects courts to systematically decide whether a risk is "significant."⁸⁴ Assessing whether a risk is "significant" proceeds according to a basic risk priority rule (which we state first and then examine in detail immediately below):

A Kindynamically "Significant" Risk

The more an at-risk (and injured) plaintiff can establish that the risk he suffers is

1. one that results in judicially cognizable injury more frequently relative to other risks ("*injurious*" risk); and
2. one for which comparatively more people or property are at similar risk relative to other risks ("*widespread*" risk),

the greater should be the plaintiff's priority among would-be claimants for recovery.⁸⁵

83. As one academic states:

[J]udicial review may make problems of fragmentation and lack of consistency worse by overlaying extensive legal procedures and case-by-case litigation on an already unwieldy and fragmented legal and institutional apparatus. This overlay of procedural formality and litigation makes many aspects of the U.S. environmental regulatory system more costly and burdensome than the similar command-and-control systems of other advanced industrialized countries that achieve equivalent levels of environmental protection.

Stewart, *supra* note 78, at 38 (footnote omitted).

84. As we will see in Part V, a risk must be "significant," according to Kindynamic Theory, if the claim of "negligence" hinging upon that risk is to be cognizable. Furthermore, even if a risk is "significant," it must also be net costly to lead to liability. See *infra* Part IV(B).

85. *Sutcliffe v. G.A.F. Corp.*, 15 Phila. 339, 345-46 (1986). The court in *Sutcliffe* held that:

[W]hen attempting to establish increased risk of harm . . . by statistical evidence, it is imperative that statistics be given for both the plaintiff and for the average individual (the base rate). One without the other is of no statistical or probative value since it would require sheer speculation as to the missing statistic in attempting to determine the actual increase in risk and whether such a risk is of sufficient significance

Id.

For fear or emotional distress liability assignments, an additional assumption that a Kindynamic-minded jurist must make is to assert that the person placed at physical risk *perceives* that risk. For additional details about this requisite supposition and the unique

1. The Injurious Risk Threshold

The first step Kindynamic Theory takes to risk prioritize is to limit court access to those plaintiffs whose defendant-caused⁸⁶ risks are more likely to be *injurious* (i.e., result in the predicted injury) than other risks. Evidence-Based logic can usually nail down what percentage of people at similar risk as the plaintiff⁸⁷ do, in fact, sustain injury. Thus, Kindynamic Theory envisions establishing an *injurious risk cut-off* for each risk. Risks whose likelihoods of resulting in harm fall below this threshold are generally not cognizable; risks whose likelihoods surpass the threshold generally are.⁸⁸

There is a considerable problem with this rationale, however, which Kindynamic Theory acknowledges: it is anything but clear *at what level* the injurious risk cut-off should be set. Indeed, some natural rights philosophers reject *any* non-zero injurious risk threshold, as philosopher Robert Nozick once explained:

[W]hat is the magnitude of the specified [injurious risk] value? The harm of the least significant act (yielding only that harm for certain) that violates a person's natural rights? This construal of the problem cannot be utilized by a tradition which holds that stealing a penny or a pin or anything from someone violates his rights. That tradition does *not* select a threshold measure of harm as a lower limit, in the case of harms certain to occur. It is difficult to imagine a principled way in which the natural-rights tradition can draw the line to fix which probabilities impose unacceptably great risks upon others. This means that it is difficult to see how, in these cases, the natural-rights tradition draws the boundaries [a threshold] focuses upon.⁸⁹

Thus, inherent philosophical tension between judicial pragmatism (explained at the outset of this section) and this natural rights critique makes it difficult to set a *particular* "injuriousness" level or range and even less obvious *on what basis to do so*. To complicate matters further, the *disutility* of a particular injury may influence the

techniques necessary for addressing psychic injury claims, see Guzelian, *supra* note 66, at 750–66.

86. The *cumulative risk* of a specific injury to a particular person usually results from an *aggregation* of acts and circumstances, not just from one tortfeasor's act. For instance, the cumulative risk of contracting leukemia from benzene exposure almost invariably presupposes that there are *multiple agents* contributing as sources of that benzene exposure—the dry-cleaning shop around the corner, the large textile factory across town, and exposure to background benzene residues—both natural and man-made. See Guzelian et al., *supra* note 79, at 91–92 (indicating that a risk is the sum of the plaintiff's contribution plus the pre-exposure incidence) (citing David Rosenberg, *The Causal Connection in Mass Exposure Cases: A "Public Law" Vision of the Tort System*, 97 HARV. L. REV. 849, 855–56 (1984)). In setting the injurious risk threshold, Kindynamic Theory focuses exclusively on the creation of or augmentation in risk resulting from a *defendant's* acts. It does not concern itself with cumulative risk.

87. See Guzelian, *supra* note 51 (describing how specific delimiters can be used to tailor general causal conclusions to an individual case).

88. There are at least three reasons for deviation from this general principle: (1) the amount of disutility a particular risk's effect causes, on average, in injured victims (see immediately below in this section); (2) how widespread the risk created by the individual defendant is, see *infra* Part IV(A)(2); and (3) economic considerations, see *infra* Part IV(B).

89. ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 75 (1974) (emphasis in original).

particular injury cut-off. For instance, if the injurious risk cut-off is 5% for contracting cancer, is the acceptable cut-off higher (e.g. 15%) for a less grievous harm (e.g. destroying another's property)?

As the Supreme Court itself has come close to acknowledging, society can only *arbitrarily* delineate which risks to address and which to ignore.⁹⁰ Judges have to decide what *quantified* aggregate level of risk for a specific harm they are philosophically uncomfortable with permitting and set the corresponding *quantified* injurious risk cutoff.⁹¹ What Kindynamic Theory recommends is *transparency*: when judges select a particular quantified injurious cutoff (or range), they should be explicit in stating that level. As a result, the tenor and quality of policy debate as to whether that cutoff is appropriate will vastly improve.

2. Widespread Risks

There is another reason the "injurious risk cutoff" is difficult to identify in practice: it is a benchmark that is not necessarily the same as the cutoff set in any courtroom. For instance, might we allow an actor to engage in certain behaviors whose likelihood of causing risk exceeds the risk threshold (e.g., the threshold is 10%, the defendant's act causes an 11% chance of harm)? Conversely, would we ever want to hold a specific defendant liable even if the risk of physical harm he has created does not meet the risk floor (e.g., the cutoff is 10%, the defendant's act causes an 8% risk of harm)?

Under Kindynamic Theory, establishing the "significance" of a risk incorporates considerations beyond those that factor into setting the "injurious risk cut-off." One cause for deviation from the injurious risk threshold is the number of people or amount of property a tortfeasor has placed at risk.⁹² Say, for instance, that tortfeasor *A* by his careless actions has placed 100 people at risk of cancer, and that the fashion in which he did is known by EBL to cause 11% of the same to contract cancer, where the injurious risk cut-off is set at 10%. Assume tortfeasor *B* has negligently placed 100 million people at risk of cancer, and that EBL predicts 9% will contract cancer. On

90. See *Indus. Union Dep't v. Am. Petrol. Inst.*, 448 U.S. 607, 655 n.62 (1980) ("[W]hile [a regulatory agency] must support its finding that a certain level of risk exists by substantial evidence, we recognize that its determination that a particular level of risk is 'significant' will be based largely on policy considerations. At this point we have no need to reach the issue of what level of scrutiny a reviewing court should apply to the latter type of determination."). See also NOZICK, *supra* note 86, at 75 ("One might plausibly argue that beginning with probabilities that may vary continuously and asking that some line be drawn misconstrues the problem and almost guarantees that any position of the line (other than 0 or 1) will appear arbitrary.").

91. See, e.g., *Temple-Inland Forest Prods. Corp. v. Carter*, 993 S.W.2d 88, 90 (Tex. 1999) (rejecting fear of asbestos-related illness claims of asymptomatic plaintiffs, even upon accepting the testimony of an expert "that the chances of [plaintiffs'] developing a disease as a result had increased from one in a million, which [the expert] estimated to be the risk that a person would ever develop a disease from asbestos exposure not occupationally related, to about one in 500,000 for the next ten or fifteen years, and as much as one in 100 over twenty or thirty years.").

92. There are at least two other reasons to deviate from the theoretical threshold. See *supra* note 88.

average, *A* should cause 11 people to suffer the harm, but *B* will cause 9 million people to suffer the same. Should *A* be liable while *B* is not?⁹³

Following the current logic of many regulatory agencies,⁹⁴ the Kindynamic answer is typically “no.” Applying an aggregate cutoff *equally* to all physical injurers would enable a behemoth injurer to escape liability simply because he doesn’t meet the one-size-fits-all *percentage* threshold. An *individual* threshold (or range) must be constructed along a sliding scale based on *how many* individuals a physical injurer puts at risk, with the threshold serving only as the initial benchmark. This Kindynamic concept is motivated by antitrust law, where some actions regarded as lawfully “competitive” by companies with little market power (analogous to tortfeasors who put few people or little property at risk) are unlawfully “monopolistic” when undertaken by larger competitors (analogous to tortfeasors who put many people or much property at risk).⁹⁵

Cutoffs set for an individual defendant can deviate in practice, sometimes substantially, from the theoretical injurious risk threshold. Kindynamic Theory suggests judges, however, *first* derive that cutoff, and *then* determine whether an individual defendant’s circumstances merit upward or downward departure. Only by this method can one separate the distinct considerations that go into establishing the aggregate and individual “significances” of a risk.

B. Excusing “Significant” Risks: Decision Analysis

Even if a defendant’s act creates an individually “significant” risk, he sometimes will be excused from liability because of cost-benefit considerations. Robert Nozick explained:

[I]t might be decided that mining or running trains is sufficiently valuable to be allowed, even though each presents risks to the passerby no less than compulsory Russian roulette with one bullet and *n* chambers (with *n* set appropriately), which is prohibited because it is insufficiently valuable. There are problems in . . .

93. Assume that the cost-benefit ratios, scaled accordingly for the magnitude of each injurer’s act, are identical.

94. Curtis C. Travis et al., *Cancer Risk Management: A Review of 132 Federal Regulatory Decisions*, 21 ENVTL. SCI. & TECH. 415, 419 (1987) (finding an inverse relationship between the EPA and other regulatory agencies’ injurious risk thresholds and the sizes of the at-risk populations).

95. Areeda and Hovenkamp, for example, define market power as “the ability to raise price by restricting output.” See generally PHILLIP E. AREEDA & HERBERT HOVENKAMP, *IIA ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION* § 5A (2d ed. 2002). By analogy, a tortfeasor with “risk power” has the resources and means to put many people in a society at risk by his act(s). Kindynamic Theory thus far has accommodated all philosophical camps in assessing what the correct size of “society” is in considering the scope of a risk. Some contend that local risk regulation is more effective. See, e.g., Richard A. Minard, Jr., *CRA and the States: History, Politics, and Results*, in *COMPARING ENVIRONMENTAL RISKS* 23 (J. Clarence Davies ed., 1996). Others believe only a national (or international) integrated approach can adequately address risk. ENVIRONMENTAL LAW AND POLICY 508–17 (Peter S. Menell & Richard B. Stewart eds., 1994). An answer to this debate may have to be borne out over time.

making . . . these decisions. . . . The problems could lessen if the overall states (totality below the threshold, and so on) can be reached by the operation of some invisible-hand mechanism. But the precise mechanism to accomplish this has yet to be described⁹⁶

Learned Hand long ago popularized a rudimentary cost-benefit test.⁹⁷ A persistent criticism of Hand's test (which Nozick recognized when he said that no "precise" mechanism for such analysis exists) is its denomination of physical harms and economic/property harms on a single monetized scale.⁹⁸ Kindynamic Theory mandates use of "decision analysis," which avoids the problems of Hand's test,⁹⁹ but still appropriately exonerates certain physical injurers from liability, *even for some injurers who have created "significant" risks to certain individuals.*

Decision analysis is best understood through case examples,¹⁰⁰ but its conceptual thrust is that it is a robust,¹⁰¹ evidence-based, and widely accepted methodology used to

96. NOZICK, *supra* note 89, at 74.

97. *See* United States v. Carroll Towing, 159 F.2d 169 (2d Cir. 1947) (holding that the risk of a defendant's conduct is calculated as a combination of (i) the magnitude of damage that might occur; (ii) the probability that a certain magnitude of damage will occur).

98. *See, e.g.,* Gregory C. Keating, *Reasonableness and Rationality in Negligence Theory*, 48 STAN. L. REV. 311, 346 (1996) ("[I]t is neither natural nor necessary to conceptualize accident and precaution costs in economic terms."); Kenneth W. Simons, *Negligence*, 16 SOC. PHIL. & POL'Y 52, 80 (1999) (objecting that monetization of physical risks turns "moral analysis into a bloodless form of calculation," but noting that such "qualitative" balancing as described would avoid this problem).

99. Decision analysis allows quantification of estimated risk "losses" *in terms of risk*. It is simultaneously capable of itemizing estimated monetary values for *economic* losses. But it doesn't require that the analyst reduce risks and property harms to a singular monetary scale, as Hand's formula necessarily must. In this fashion, decision analysis can contribute to unprecedented judicial consistency and accuracy in gauging negligence without sacrificing reflection on the "moral" nature of many injuries. *Cf. Iieto v. Glock, Inc.*, 349 F.3d 1191, 1205-06 (9th Cir. 2003) (holding without conducting quantified decision analysis that handgun manufacturers' distribution of guns to police departments, which ostensibly allows for easier criminal access to used guns, "is outweighed by the health and safety interests of potential victims of gun violence at the hands of prohibited purchasers"); Joseph L. Arvai et al., *Testing a Structured Decision Approach: Value-Focused Thinking for Deliberative Risk Communication*, 21 RISK ANALYSIS 1065 (2001) (finding that focus group use of "value-focused thinking"—a crude and sometimes non-quantitative form of decision analysis—can help to improve public perceptions of risk).

100. *See generally* DETLOF VON WINTERFELDT & WARD EDWARDS, *DECISION ANALYSIS AND BEHAVIORAL RESEARCH* (1986) (explaining how to perform decision analysis); *THE PRINCIPLES AND APPLICATIONS OF DECISION ANALYSIS* (1983) (Ronald A. Howard & James Matheson eds.); Jerome P. Kassirer et al., *Decision Analysis: A Progress Report*, 106 ANNALS INTERNAL MED. 275 (1987) (explaining that decision analysis in the clinical profession has become more widely used and improved); Stephen G. Pauker & Jerome Kassirer, *Decision Analysis*, 316 NEW ENG. J. MED. 250 (1987) (applying the principles of decision analysis to patient care); Harold C. Sox, Jr., *Decision Analysis: A Basic Clinical Skill?*, 316 NEW ENG. J. MED. 271 (1987) (commenting on problems with using decision analysis in the medical context); Ronald A. Howard et al., *The Decision to Seed Hurricanes*, 176 SCIENCE 1191 (1972) (using decision analysis to help determine whether seeding hurricanes would be worthwhile).

determine whether leaving an act unaltered is *relatively* less socially costly than modifying the act so as to mitigate some or all of the act's associated "significant" risks. Stated formally, a defendant has no liability if the *expected net social cost*¹⁰² after any feasible modification to his act is higher than the expected net social cost of leaving the act unchanged. (Conversely, if some viable modification would have made the act less costly, the actor is liable.) Purely for simplicity, we will consider only an act's costs, not its benefits.¹⁰³ This simplifying assumption means that individual liability exists whenever the modified act's expected *total* social cost is less than the unaltered act's expected *total* social cost.¹⁰⁴

101. Stephen G. Pauker, *Deciding About Screening*, 118 ANNALS INTERNAL MED. 901 (1993) ("A formal decision analysis can help structure the problem, organize data, elucidate tradeoffs, and estimate benefits and costs."). Decision analysis has been shown in medicine to be a particularly helpful alternative to conducting costly and time-consuming controlled clinical trials when a physician wishes to assess whether a proposed medical intervention is more likely to be of benefit than of harm to patients. See Peter Doubilet & Barbara J. McNeil, *Clinical Decisionmaking*, 23 MED. CARE 648, 648 (1985) ("Decision analysis is most applicable to clinical questions that cannot be answered by appealing directly to the results of clinical trial or to a large database. This can occur because no trial has been carried out or because the patient in question differs substantially from the populations in existing sources of data."). As such, decision analysis's predictive power is directly translatable to determining negligence. It could be used to predict whether modification or elimination of an act that has caused harm is socially preferable to the alternative of allowing the act to proceed unchanged.

102. "Net social cost" is measured by subtracting "total social costs" (the social disutility suffered from a defendant's act, *see infra* note 104) from "total social benefits" (the social utility gained from a defendant's act). A person causing a significant risk is negligent whenever a modification could have been made to the underlying act that would have resulted in a *relative* decrease in net social cost. Thus, it is theoretically possible that the "net social cost" is *positive* (i.e. a net social *benefit*), yet a person is still negligent.

103. This assumption obviously need not be true in reality. A modification or elimination of an act could have disparate impacts on social benefits and social costs associated with it. Decision analysis is fully capable of addressing both. Dobbs explains well why one makes this assumption: "The usefulness or [benefit] of conduct actually includes the costs saved by not adopting some other course of conduct, but it is sometimes clearer if [benefit] and cost of greater safety are stated separately." 1 DOBBS, *supra* note 6, § 144 at 338 n.5 (2001).

104. A "total social cost" is derived for *both* the unaltered act *and* each proposed modification of that act. The "total social cost" associated with the unmodified act (" TC_{act} ") is a vector of all " n " significant risks (" R_i ") along with a vector of all " m " property damages, (" P_j "):

$$TC_{act} = \overline{R}_i + \overline{P}_j, \quad i \in \{1, \dots, n\}, \quad j \in \{1, \dots, m\}$$

Assuming only for notational simplicity that the defendant would suffer no transactional (out-of-pocket) financial costs by being forced to modify his act, the "total social cost" (" TC_{mod} ") of each proposed and EBL-justified *modification* of the act is expressed similar to the unmodified total social cost equation above, but the number and magnitudes of some or all of the associated "significant" risks must be assessed for *each* modification and are not necessarily the same across modifications. Thus, proposed modification number 1 might have s "significant" risks associated with it, and t property costs, and so on for every other possible modification. (The vector sizes of the modifications may or may not be equal to the vector sizes of the unmodified act. There is no way of universalizing how a modification will affect the *number* of significant risks, or the *number* of different property damages.) The final EBL-known modification, the z^{th} possible modification, has u "significant" risks associated with it, and v property costs:

An act's total social cost can actually *increase* when one tries to reduce a particular risk. This is because of "risk covariance": eliminating the "significance" of one risk can make another "significant."¹⁰⁵ For example, designing a street-corner lamp pole to collapse easily in a vehicular collision decreases the risk of injury to drivers, but the modification may simultaneously convert a previously insignificant risk of injury to nearby pedestrians into one that is significant.¹⁰⁶ Modifications, however, do not always cause other risks to become significant. Bailing water out of a flooded lifeboat into the ocean substantially reduces the risk of drowning, but does not increase the risk of coastal flooding.¹⁰⁷

Decision analysis, in sum, promises to elucidate tradeoffs and offers effective risk minimization and avoidance without suffering the sustained criticisms that cost-benefit computations that set all losses in economic terms do.

V. KINDYNAMIC DEFINITIONS: PROXIMATE RISK, NEGLIGENCE, DUTY

Kindynamic Theory, based on the principles set out in the previous sections, can offer rigorous definitions of proximate cause, negligence (breach), and duty that have been lacking so greatly.¹⁰⁸ The reader will observe that these Kindynamic definitions are quite formal, as they must be when incorporating the precise concepts of risk and a risk's "significance" discussed in Sections III and IV.

$$TC_{\text{mod } l} = \vec{R}_k + \vec{P}_l, \quad k \in \{1, \dots, s\}, l \in \{1, \dots, t\}$$

$$\vdots$$

$$TC_{\text{mod } z} = \vec{R}_a + \vec{P}_b, \quad a \in \{1, \dots, u\}, b \in \{1, \dots, v\}$$

Observe from this process that it is still possible to reduce the expected utilities of a risk to a common scale, as Hand did. The power of decision analysis is that that computation is not *required*; one has the ability to tabulate risks in risk-terms, rather than to monetize them.

105. See *generally* RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (John D. Graham, Jonathan B. Wiener, & Cass R. Sunstein eds.) (1997) (contending that risk covariance is ubiquitous).

106. *Bernier v. Boston Edison Co.*, 403 N.E.2d 391 (Mass. 1980) (concluding that pedestrian risk of injury became too significant and hence defendant was negligent for designing breakaway pole to protect drivers).

107. See *Indiana Consolidated Ins. Co. v. Mathew*, 402 N.E.2d 1000 (Ind. Ct. App. 1980) (finding no negligence where defendant immediately fled plaintiff's garage after mower caught fire instead of pushing mower outside first, because the expected risk of harm to the garage was less than the expected risk of injury tending to a potentially explosive mower marginally longer).

108. Kindynamic definitions are partly motivated by Ludwig Träger's "most clairvoyant person" rule. See LUDWIG TRÄGER, *DER KAUSALBEGRIFF IM STRAF- UND ZIVILRECHT* (1904). This author has discussed this rule elsewhere in detail. See Christopher P. Guzelian, *Liability & Fear*, 65 OHIO ST. L.J. 713, 777-804 (2004). Under the Kindynamic adaptation of Träger's rule, liability should attach if the risk (a) is recognizable under EBL at the time the event occurred; and (b) taking into account any additional knowledge the alleged tortfeasor has. Condition (b) is not usually applicable but may have relevance for, say, individuals with classified or secret information.

Proximate Cause (“Proximate risk”). A proximate cause (“proximate risk”) is (i) a risk associated with an act that should have been mitigated at the time the act occurred because (ii) the risk is “significant” and (iii) the net social cost, if the act had been modified so as to counteract this particular risk, would have been less than the unaltered act’s net social cost.

The definition is a mouthful, but if we break it down into its three enumerated parts, it is sensible.

(i) **Risk.** Proximate cause is a kind of *risk*, verified as an epistemic possibility by EBL (see Part III, *supra*). Proximate cause is also a form of *negligence* (which, we will see in the next definition below, is a *set* of risks).¹⁰⁹ Negligence exists even if there is only exactly one risk that meets its definitional conditions. Not coincidentally, that is also the definition of a proximate cause, which can therefore be thought of as the “weakest” form of negligence.¹¹⁰

Furthermore, beware: proximate cause (or negligence in general) is *not* an *act* (a human-prompted stimulus). It is a *risk* associated with an act.¹¹¹ Courts and scholars, beginning with then-Judge Cardozo,¹¹² have often made this mistake.¹¹³ The distinction may seem semantic, inasmuch as an act must occur for a risk to exist. Yet it is necessary because examining the “act” usually regresses to considering only the defendant’s *conduct*. This deprives scrutiny of the *context* in which that act occurred

109. Dobbs suggests that proximate cause—“a rule limiting liability for risk to the scope of the risk”—is properly viewed “as a corollary to or even a part of the basic rule of negligence.” DOBBS, *supra* note 6, § 181 at 446. In fact, the rigorous Kindynamic definition permits us to go one better: proximate cause is *always* a kind of negligence.

110. Notice, however, the implicit prerequisite to proximate cause that is *not* imposed on negligence generally: for proximate cause to exist, not only must it be the case that it is *generally* “possible” for the particular risk of harm to cause injury, it *must have done so* in the particular instance. Thus, the legal issue of “*specific scientific causality*” (“specific cause in fact”) must be resolved *before* proximate cause can be.

111. True, a person cannot have created or perpetuated a risk *without* committing an act or omission. But this is not the same as saying the act *is* the proximate cause (or negligence). Even if zebras were the only creatures with stripes, this does not mean a zebra is a stripe.

112. See *Palsgraf v. Long Island R.R.*, 162 N.E. 99, 100 (N.Y. 1928)

[O]ne who drives at reckless speed through a crowded city street is guilty of a negligent act and therefore of a wrongful, one irrespective of the consequences. Negligent the act is, and wrongful in the sense that it is unsocial If the same act were to be committed on a speedway or a race course, it would lose its wrongful quality. The risk reasonably to be perceived defines the duty to be obeyed, and risk imports relation

113. *Hernandez v. Trawler Miss Vertie Mae, Inc.*, 187 F.3d 432, 437 (4th Cir. 1999) (“[I]t is well understood that negligence is ‘conduct which falls below the standard established by law for the protection of others against unreasonable risk of harm.’” (quoting RESTATEMENT (SECOND) OF TORTS § 282 (1965) (emphasis added)). *Beshada v. Johns-Manville Prods. Corp.*, 447 A.2d 539, 544 (N.J. 1982) (“negligence is conduct-oriented, asking whether defendant’s actions were reasonable . . .”).

and jeopardizes rigorous assessment of whether the risk associated with the act is both epistemic and “significant.”¹¹⁴ Although then-Judge Cardozo himself made this mistake in *Palsgraf*, he was on the right track when he distinguished speedy drivers on a racetrack and those on a crowded public street.¹¹⁵

(ii & iii) “**Significant**” Risk & Decision Analysis (*Cost-Benefit Analysis*). For a risk associated with an act to also be a proximate cause, it must be both “significant” and inexcusable by decision analysis. The aim of these requirements, consistent with the “significant risk” principle set out in the introduction to Section IV (see *supra* text accompanying note 74), is to prioritize risk deterrence and address the most socially costly, inexcusable risks first.

We make two other observations about proximate causes. First, a plaintiff must identify the proximate cause. Proximate causes are therefore always *litigated* risks. Second, litigators and judges should use the expression “proximate risk,” rather than the misnomer “proximate cause,” to avoid continued confusion with scientific causation—both in its general and specific forms.¹¹⁶ We will do so ourselves henceforth.

Negligence. “Negligence” is a *subset* of all risks that are associated with an act. Specifically, it is any subset {A} of risks that should have been mitigated at the time the act occurred because (i) the risk(s) in {A} was/were significant and (ii) the net social cost, if the act had been so modified as to counteract any significant risk(s) in {A}, would have been less than the unaltered act’s net social cost.

Negligence is a particular kind of *set* of risks (“negligent risks”) associated with an act.¹¹⁷ For negligence to exist, *at least one* risk must be “significant,” and an *aggregate* decision analysis (see *supra* Part IV.B) must show that leaving the act unaltered has a greater total social cost than eliminating or abating some or all “significant” risks.¹¹⁸

114. See Guzelian, *supra* note 51 (discussing how to form necessary “delimiters” so that risk propositions are properly stated).

115. Judges sometimes create categorical duty “rules,” such that an act is presumptively wrongful, no matter what its context. In the limit, these rules blur negligence with strict liability. For instance, dynamite blasting is categorized as an “ultrahazardous” activity—harms resulting from it are presumptively recoverable. See *Garden of The Gods Vill., Inc. v. Hellman*, 294 P.2d 597, 600 (Colo. 1956) (“Where damage to property is done by vibration or concussion from blasting operations . . . there is liability irrespective of negligence . . . [P]roof of negligence is unnecessary to establish liability.”). See also *Palsgraf*, 162 N.E. at 100 (Cardozo, J.) (“Some acts, such as shooting are so imminently dangerous to any one who may come within reach of the missile however unexpectedly, as to impose a duty of prevision not far from that of an insurer.”). This author has misgivings about the widespread invocation of categorical duty rules, particularly in the context of fear, but that topic is beyond the scope of this article.

116. See *supra* note 109.

117. Some acts or omissions may have *no* known negligent risks associated with them at a given time. Understand, however, it is never permissible to pronounce such acts as “definitively” non-negligent. Because risk knowledge is a product of time and humanity’s collective knowledge, uncertainties that are not known risks today may become so tomorrow.

118. *Aggregate* decision analysis proceeds much the same as decision analysis would for proximate risk. The only change is that aggregate decision analysis considers whether act

The traditional judicial concept of negligence says that an individual is still “negligent,” even if the negligent risks associated with his conduct are *not* the ones being litigated.¹¹⁹ Thus, a defendant could be negligent, but be exonerated from liability because he has not created a proximate risk (which is a *litigated* risk).

Identifying *all* negligent risks associated with a conduct is not necessary in practice. Instead, one should simply ask whether the *litigated* risk is a proximate risk. If the answer is no, there is no need to discuss negligence – the claim can be dismissed for want of proximate risk. If instead proximate risk exists, so too does the minimal form of negligence.¹²⁰

Duty. (i) Duty exists for a defendant in a negligence-based cause of action if a reasonable jury could find negligence and proximate risk, (ii) unless there exists an ulterior policy motivation, unrelated to negligence and proximate risk, that compels the conclusion that liability should not attach to a defendant, (iii) Duty likewise exists, even if no reasonable jury could find negligence or proximate risk, (iv) if there exists an ulterior policy motivation, unrelated to negligence and proximate risk, that compels the conclusion that liability should attach to a defendant.

There is a hugely important difference between “duty” and the former two definitions: duty is judge-determined, but “negligence” and “proximate risk” are often jury questions.¹²¹ Defining duty rigorously, therefore, is vital for judicial procedure.

Duty in a negligence-based action arises in one of two fashions. Per part (i) of our definition, to decide whether the issue is suited for a jury (and hence, whether a duty

modification to avoid *any* set of significant risks (not necessarily the *litigated* risk(s)) would be net socially beneficial.

119. Dobbs gives a fine example of this conception of negligence:

[S]uppose the defendant parks his car on the street, parallel to the curb, in a no-parking zone. This conduct is negligent because it runs the [significant] risk that traffic will be impeded, but leaving a car parked in a no-parking zone does not negligently create a risk of injury to an able bodied pedestrian. Courts are likely to say that the driver is not a proximate cause of the pedestrian’s harm from walking into the car, even though other risks made it negligent to park the car in such a way.

DOBBS, *supra* note 6, § 181 at 446.

120. This is because a proximate risk is a “significant” risk not exemptable by decision analysis. Such a risk, if it exists, *also* meets negligence conditions (ii) and (iii) stated above, meaning there is a *set* of negligent risks: a set with at least one element (the proximate risk). This technique yields only the “weakest” form of negligence: only one negligent risk has been proven to exist. Observe that asking about the *litigated* risk(s) first will also avoid the similarly Sisyphean task of identifying *every* risk associated with a particular act. One simply asks whether the *litigated* causal proposition is epistemically possible.

121. See generally DOBBS, *supra* note 6, § 225 at 577 (“The most significant identity of limited or no-duty rules and immunity rules is that they are determined by judges or legislatures, not by juries. That is an enormous contrast with the negligence issue, which is a jury determination whenever reasonable people can differ.”).

exists), a judge makes his own preliminary conclusion whether a reasonable jury could find proximate risk and negligence.

But as part (ii) of our definition states, there is a notable exception to this general rule. Courts are sometimes motivated by policy considerations to say that “no duty exists,” *despite* the fact that a reasonable jury could find negligence and proximate risk.¹²² What are these considerations? They can be nearly anything courts believe should affect liability that are not part of *typical* liability assessment (i.e. negligence, proximate risk, scientific cause, and injury determination). For example, the financial solvency of the defendant or a class of defendants,¹²³ the existence of a special relationship between litigating parties,¹²⁴ the youthful age of a defendant,¹²⁵ the scope of a governing statute (where applicable),¹²⁶ the illegality or immorality of the tortious

122. Courts weighing duty have been remarkably lax in failing to separate negligence and proximate risk considerations—typically reserved for juries—from extra-negligence factors. Rather, many courts heap negligence-related and extra-negligence factors together in a confused mass that makes duty appear increasingly like a jury question, rather than the question of law it is. *See* DOBBS, *supra* note 6, § 229 at 583 (“[Duty] factors are so numerous and so broadly stated that they can lead to almost any conclusion.... [H]owever, they are mainly the very same factors that determine the negligence question. Yet when the question is phrased as a question of duty, the judge, not the jury, will be the decision maker, even on such quintessential jury issues as foreseeability.”). Consider, for example, the factors that are to be weighed under California’s test of duty:

- (1) the extent to which the transaction was intended to affect the plaintiff, (2) the foreseeability of harm to him, (3) the degree of certainty that the plaintiff suffered injury, (4) the closeness of the connection between the defendant's conduct and the injury suffered, (5) the moral blame attached to the defendant's conduct, (6) the policy of preventing future harm[,] and (7) effective judicial administration, including guarding against limitless liability.

Amaya v. Home Ice, Fuel & Supply Co., 379 P.2d 513, 522 (Cal. 1963), *overruled by* *Dillon v. Legg*, 441 P.2d 912 (Cal. 1968) (rejecting *Amaya*’s holding, but not its duty factors). Factor 1 assesses whether the tort case is based in negligence. Factor 2 is akin to negligence’s foreseeability prong. Factor 3 touches on actual causality and certainty of injury, two other traditional requirements for recovery. Factor 4 is a vague description of proximate cause. Factor 5 is a vague factor that could represent effectively anything, but if reduced to an “economic” set of considerations, represents the cost-benefit prong in the definition of negligence. Factor 6 is related to the “significance” prong of the negligence definition. Thus, only Factor 7—judicial administrative ease and curbing the risk of a litigation flood—appears to be a purely “extra-negligence” consideration.

123. *See* Christopher Guzelian, *Liability & Fear*, 65 OHIO ST. L.J. 713, 849 (2004).

124. *Lough by Lough v. Rolla Women’s Clinic*, 866 S.W.2d 851, 854 (Mo. 1993) (“[I]n determining existence of a duty, . . . a relationship between the parties where one is acting for the benefit of another . . . plays a role.”).

125. Except where children are engaged in adult activities (such as driving), courts typically hold that children under the age of six or seven are conclusively presumed to lack sufficient risk comprehension to be held liable. *See* *Price v. Kitsap Transit*, 886 P.2d 556 (Wash. 1994).

126. This concept—that no rule is intended to remedy each type of conceivable loss or harm—has been advocated particularly in the German civil law system, which refers to it as “Normzweck” (“Legal Purpose”). *See e.g.*, J.G. WOLF, *DER NORMZWECK IM DELIKTSRECHT. EINE*

conduct,¹²⁷ social custom,¹²⁸ or any combination of the above¹²⁹ have been such extra-negligence factors.¹³⁰

The second form of duty (Elements (iii) and (iv)) is assessed *independent of negligence or proximate risk considerations*. Intentional tort and strict liability duties often take this form, as do some categorical duty rules in negligence cases that are motivated by extra-negligence factors, such as special relationships.

VI. JOINT TORTFEASOR LIABILITY

A final contribution of Kindynamic Theory is that it is the first tort theory to objectively allocate liability for a single injury among *multiple* alleged tortfeasors. We report on how it does so in the following two subsections.

A. Enabling Tort

Liability usually involves two parties: an injured plaintiff (“π”) and a tortfeasor (call him the “Secondary” (“2^o”). This traditional liability arrangement appears as:

DISKUSSIONSBEITRAG (1962); E. VON CÄMMERER, DAS PROBLEM DES KAUSALZUSAMMENHANGE IM RECHTE, BESONDERS IM STRAFRECHTE (1956). *But see* Kernan v. Am. Dredging Co., 355 U.S. 426 (1958) (holding defendant liable where his tug carried a kerosene lamp closer to the water than the required 8-foot minimum and exploded upon entering petroleum-laden waters, even though statutory prescription was only intended to prevent collisions).

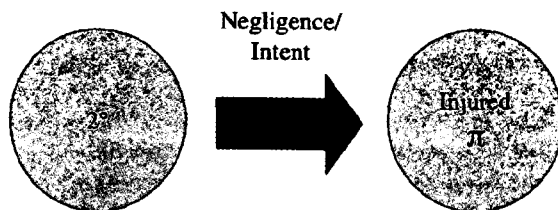
127. *Zysk v. Zysk*, 404 S.E.2d 721, 722 (Va. 1990) (“A party who consents to and participates in an immoral or illegal act cannot recover damages from other participants for the consequence of that act.” (quoting *Miller v. Bennett*, 56 S.E.2d 217, 218 (Va. 1949))). *But see* *Doe v. Roe*, 841 F. Supp. 444, 447 n.8 (D.D.C. 1994) (condemning *Zysk*’s categorical bar because it ostensibly frustrates efforts to deter the spread of sexually transmitted diseases).

128. *See* Richard Epstein, *The Path to T.J. Hooper: The Theory and History of Custom in the Law of Tort*, 21 J. LEG. STUDIES 1 (1992) (theorizing which classes of defendants should be made liable under social custom).

129. *See e.g.*, *Burgess v. Superior Court*, 831 P.2d 1197, 1200-01 (Cal. 1992) (finding the duty supporting a direct victim negligent infliction of emotional distress case can have three alternative origins: (1) it can be a duty assumed by defendant, or (2) it can be a duty imposed on defendant by law, or (3) it can be a duty arising out of a preexisting relationship between defendant and plaintiff).

130. Because it is commonly accepted that judicial administrative ease should not come at the expense of individual justice, it is not usually explicitly cited as an extra-negligence factor. *See* John C.P. Goldberg, *20th Century Tort*, 90 GEO. L.J. 513, 534 (2002) (“The abstract idea of “policy” [or “administrability”]—for which no criteria have been developed—can just as readily support decisions to limit or not limit particular forms of negligence liability. Even if rendered adequately determinate, it often seems unable to explain limits on negligence liability.”).

Figure 3
Traditional Tort



Stanford Professor Robert Rabin, however, has described an important shift, which he calls “enabling tort,” in how the common law assigns negligence-based liability:¹³¹

[Enabling tort] comes to full flowering in our risk-saturated closing decades of the twentieth century—an epoch in which our perceptions of hazards in the neighborhood, workplace, and environment have reached unprecedented heights. In this milieu, blameworthiness is not so readily confined as was the case in times past. Beyond the immediate perpetrator of harm, the victim perceives the individual, or more often, the enterprise, that set the stage for the suffering that unfolded. The Enabler.¹³²

Blaming Enablers adds a third, fourth, or more parties to the liability dance, depending on how far we want to extend “reachback” liability. Rabin observes the Enabler does not *himself* commit the final act leading to injury,¹³³ but is still liable for bolstering another’s tortious risk.¹³⁴ Assuming there is one “Enabler” (we will

131. Robert L. Rabin, *Enabling Torts*, 49 DEPAUL L. REV. 435 (1999). This shift was actually *predicted* first by Hart and Honoré. See H.L.A. HART & TONY HONORÉ, CAUSATION IN THE LAW 284 (2d ed. 1985) (“[T]he law is in a transition from a stage at which liability was based almost exclusively on negligently causing harm to one in which it is based not merely on causing harm but also on exposing others to a risk of harm by providing other persons or things with the opportunity of doing harm. Probably the future will see a considerable extension of the latter form of liability.”). See also LEONARD TALMY, TOWARD A COGNITIVE SEMANTICS 504–09 (2000) (describing same).

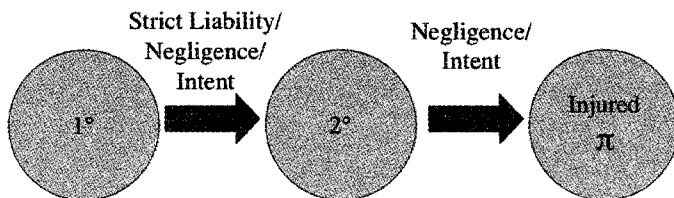
132. Rabin, *supra* note 131, at 437–38.

133. Thus, enabling torts are not the same as “legally concurrent” causes of injury. See *Watts v. Smith*, 134 N.W.2d 194 (Mich. 1965) (plaintiff suffering an indivisible injury in two unrelated car crashes on the same day can recover jointly and severally from the unrelated tortfeasors).

134. Rabin, *supra* note 131, at 450 (“[T]he essential element in enabler responsibility is that a dangerous ‘instrumentality’ has been put in the hands of a third-party with a foreseeable expectation that a ‘remote’ victim will suffer harm.”). Rabin’s requirement that victims be “remote” (i.e. “innocent”) has been relaxed in many circumstances. For example, in recent tobacco suits, individual smokers have been able to recover, despite their own complicity in smoking, because of negligent or intentional concealment by the tobacco industry of internally generated “addiction” data. See, e.g., *Whiteley v. Phillip Morris, Inc.*, 11 Cal. Rptr. 3d 807 (Cal. Ct. App. 2004). Criminal law too has assigned liability for those who negligently assist suicide victims. See, e.g., *People v. Kevorkian*, 527 N.W. 2d 714 (Mich. 1994).

symbolize him as the “Primary” (“1^o”) demands modification of Figure 3’s traditional liability scheme as follows:

Figure 4
Facilitated Tort



Observe that the general *form* enabling tort takes—“*facilitated tort*”—is not new. For example, law penalizes *intentional* facilitation of a crime (think of conspiracy),¹³⁵ and manufacturers are strictly liable for defective product designs, even if another person is the direct cause of injury.¹³⁶

Conversely, enabling tort—that class of facilitated torts in which an Enabler suffers liability when it is specifically his *negligence* (as the term is customarily used)—has only recently begun to emerge:¹³⁷

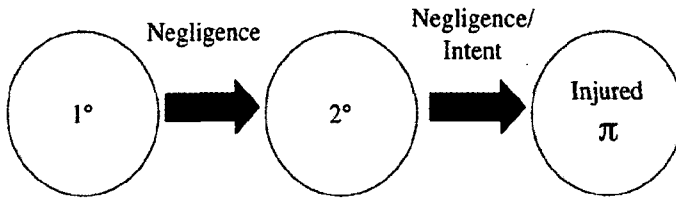
135. See MODEL PENAL CODE § 5.03(a) (1962)

A person is guilty of conspiracy with another person or persons to commit a crime if with the purpose of promoting or facilitating its commission he: (a) agrees with such other person or persons that they or one or more of them will engage in conduct that constitutes such crime or an attempt or solicitation to commit such crime; or (b) agrees to aid such other person or persons in the planning or commission of such crime or of an attempt or solicitation to commit such crime.

136. For example, handgun manufacturers have been sued under strict liability theories for failure to put trigger-locks on their guns. Compare Turley & Harrison, *Strict Liability of Handgun Suppliers*, 6 HAMLIN L. REV. 285 (1983) (proposing strict liability for handgun manufacturers under the product liability principles of RESTATEMENT (SECOND) OF TORTS § 402A (1964)), with *Martin v. Harrington and Richardson, Inc.*, 743 F.2d 1200, 1206 & n.2 (7th Cir. 1984) (Cudahy, J., concurring) (discussing possible strict liability of handgun manufacturers under the ultrahazardous activity principles of Restatement (Second) of Torts §§ 519-520 (1976)). See also *Soule v. Gen. Motors Corp.*, 882 P.2d 298 (Cal. 1994) (holding auto manufacturer liable for injuries resulting from “defective” wheel and floorboard mounting when driver was struck by another driver who careened out of control).

137. Traditional tort law did not hold Enablers liable. Oliver Wendell Holmes rejected negligence-based Enabler liability in a famous law review article, Oliver Wendell Holmes, *Privilege, Malice and Intent*, 8 HARV. L. REV. 1, 10 (1894). (“The principle seems to be pretty well established, in this country at least, that every one has a right to rely upon his fellow-men acting lawfully, and, therefore, is not answerable for himself acting upon the assumption that they will do so, however improbable it may be.”). Recognizing that his rule would provide too much shield from liability for certain Primaries, Holmes conceded that liability could be assessed against a Primary if “he intended to bring about consequences to which that unlawful

Figure 5
Enabling Tort



The traditional prohibition on negligence-based “enabler” liability is ending. A century after Oliver Wendell Holmes specifically rejected enabler liability for handgun manufacturers,¹³⁸ Rabin’s chief example of enabling tort is recent (sometimes successful¹³⁹) litigation against the handgun industry. The enabling theory is that these

act was necessary.” *Id.* at 11. *Intent* was Holmes’s dividing line for facilitator liability. This means he categorically rejected enabling tort.

Criminal law, in contrast, has already shifted to an “enabling model”; often it condemns negligent enabling acts where the Secondary tortfeasor commits a crime. Kevorkian, 527 N.W.2d at 738 n.70 (“[T]here may be circumstances where one who recklessly or negligently provides the means by which another commits suicide could be found guilty of a lesser offense, such as involuntary manslaughter.” (citing *People v. Duffy* 595 N.E.2d 814 (N.Y. 1992)) (emphasis added)). See also *Persampieri v. Commonwealth*, 175 N.E.2d 387 (Mass. 1961) (convicting husband of manslaughter after taunting drunken and possibly suicidal wife and showing her location of and means to use handgun); *State v. Bier*, 591 P.2d 1115 (Mont. 1979) (upholding husband’s negligent homicide conviction for placement of gun near drunken wife who committed suicide); *Zinck v. Whelan*, 294 A.2d 727, 730 (N.J. Super. Ct. App. Div. 1972) (“A substantial and growing number of jurisdictions, though still a minority, have held, in the ordinary fact case of theft [of car keys] and accident within a reasonable time thereafter that there are at least jury questions as to duty, negligence, and proximate cause [of a negligent car owner] . . .”). *But see Mays v. City of East St. Louis*, 123 F.3d 999, 1003 (7th Cir. 1997) (“A person whose negligence just sets the stage for a criminal act generally is not liable for ensuing injury. For example, a person who negligently leaves a car unattended, with the keys in the ignition, is generally not liable to a person injured by a thief driving the car.”); *Wise v. Superior Court*, 272 Cal. Rptr. 222 (Cal. Ct. App. 1990) (finding, in the absence of a special duty, that wife of a sniper who shot plaintiff from his roof is not liable for her failure to warn plaintiff about her husband).

138. Holmes posed an “enabling tort” hypothetical in 1894 that must strike an eerily prophetic note with a modern crowd when he wrote: “[W]hy is not a man who sells fire-arms answerable for assaults committed with pistols bought of him, since he must be taken to know the probability that, sooner or later, someone will buy a pistol of him for some unlawful end?” Holmes, *supra* note 137, at 10 (concluding that the gun manufacturer shouldn’t be liable).

139. *Ileto v. Glock, Inc.*, 349 F.3d 1191 (9th Cir. 2003) (finding duty under negligent distribution theory); *NAACP v. AcuSport, Inc.*, 271 F. Supp.2d 435, 490-91 (E.D.N.Y. 2003) (rejecting liability on other grounds, but acceding that “a duty of care could be imposed on gun manufacturers where there [i]s a ‘tangible showing that defendants were a direct link in the causal chain that resulted in plaintiffs’ injuries and . . . defendants were realistically in a position to prevent the wrongs.’” (quoting *Hamilton v. Beretta U.S.A. Corp.*, 750 N.E.2d 1055, 1062 (N.Y. Ct. App. 2001))); *Hamilton v. Accu-Tek*, 62 F. Supp.2d 802 (E.D.N.Y. 1999) (awarding damages under negligent distribution theory). *But cf. McCarthy v. Olin Corp.*, 119 F.3d 148 (2d

corporations share responsibility for handgun deaths and injuries as a result of conscious or negligent oversupply of markets with lax gun laws.¹⁴⁰

Other enabling torts have recently emerged: second-hand smoke litigation,¹⁴¹ defective products that the Secondary has negligently manipulated or altered,¹⁴² property owners with inadequate security measures in crime-ridden neighborhoods,¹⁴³ negligent municipalities or companies whose poor maintenance of defective roadways or property contributed to injuries caused by negligent drivers,¹⁴⁴ vicarious employer liability or *respondet superior* claims,¹⁴⁵ failure of an employer to provide work areas

Cir. 1997) (finding bullet manufacturer did not have duty to control distribution of ammunition to protect against gunman's act in opening fire).

140. Rabin, *supra* note 131, at 435–36.

141. *See Broin v. Philip Dobbs Cos.*, 641 So. 2d 888 (Fla. Dist. Ct. App. 1994) (certifying a class in an action by flight attendants for their alleged second-hand smoke injuries).

142. Although most product liability cases proceed in strict liability a few Enablers have been held liable for *negligence* in product manufacture. *See Liriano v. Hobart Corp.*, 700 N.E.2d 303, 308 (N.Y. 1998) (requiring duty to warn of foreseeable risks of harm even when there is no design defect liability).

143. *Sharon P. v. Arman, Ltd.*, 65 Cal. Rptr. 2d 640 (Cal. Ct. App. 1997) (liable owner of parking complex in which plaintiff had been sexually assaulted, despite no prior incidents); *Zuniga v. Hous. Auth.*, 48 Cal. Rptr. 2d 353 (Cal. Ct. App. 1995) (public housing authority liable for failing to make arrests or erect safety barriers in building, where tenants died as a result of arson); *Kline v. 1500 Mass. Ave. Apartment Corp.*, 439 F.2d 477 (D.C. Cir. 1970) (landlord duty to protect against third-party violence); *Carlisle v. Ulysses Line Ltd., S.A.*, 475 So. 2d 248 (Fla. Ct. App. 1985) (cruise line failed to warn or protect against masked gunman in port); *Tenney v. Atl. Assocs.*, 594 N.W.2d 11 (Iowa 1999) (landlord liability for negligently supervising lock changes and key issuance where tenant was raped in apartment); *Cruz v. Middlekauff Lincoln-Mercury, Inc.*, 909 P.2d 1252 (Utah 1996) (keys left in car where theft was likely means defendant may be proximate cause of harms done by thief while trying to escape police). *But see Ann M. v. Pac. Plaza Shopping Center*, 863 P.2d 207 (Cal. 1993) (no duty of shopping mall retail store owner to provide security absent previous incidents); *Leslie G. v. Perry & Assoc.*, 50 Cal. Rptr. 2d 785 (Cal. Ct. App. 1996) (rejecting landlord liability where only evidence of negligence was expert's testimony that rapist was attracted to and entered the garage because of broken security gate).

144. *Bigbee v. Pac. Tel. & Tel. Co.*, 665 P.2d 947 (Cal. 1983) (jury question whether telephone company is liable when man in phone booth with a faulty door could not escape car veering onto sidewalk); *McKenna v. Volkswagenwerk Aktiengesellschaft*, 558 P.2d 1018 (Haw. 1977) (city liable for constructing defective road shoulder where negligent driver caused accident); *Cruz v. City of New York*, 218 A.D.2d 546 (N.Y. App. Div. 1995) (construction crew leaving hole in road where negligent driver drove into it, became immobilized, and a second car struck the first, injuring the second driver); *Harvey v. Hansen*, 445 A.2d 1228 (Pa. Super. 1982) (sign obstruction by bushes facilitating vehicles' collision).

145. *Warner Trucking, Inc. v. Carolina Cas. Ins. Co.*, 686 N.E.2d 102 (Ind. 1997) (employer may still be liable for intoxicated driver's actions, even if driving in violation of company rule); *Foster v. The Loft, Inc.*, 526 N.E.2d 1309 (Mass. Ct. App. 1988) (failure to properly screen formerly convicted bartender who punched plaintiff); *McLean v. Kirby Co.*, 490 N.W.2d 229 (N.D. 1992) (employer hiring door-to-door salesman without conducting simple and revealing background check liable for salesman's rape of potential buyer); *Christensen v. Swensen*, 874 P.2d 125 (Utah 1994) (setting standards for vicarious employer liability for employee's negligence toward third party during course of employment).

safe from third-party dangers,¹⁴⁶ media or publisher “inducement” of negligent or reckless behavior,¹⁴⁷ liability for Enablers where Mother Nature is the intervening cause of harm,¹⁴⁸ lawsuits against both tobacco and the fast food industry in which the plaintiffs cast themselves as “remote victims” as a result of the products’ purported addictiveness,¹⁴⁹ and perhaps even crime-enabling speech.¹⁵⁰

146. *Lillie v. Thompson*, 332 U.S. 459, 461–62 (1947) (holding railroad company liable for assault upon woman employee).

Petitioner alleged in effect that respondent was aware of conditions which created a likelihood that a young woman performing the duties required of petitioner would suffer just such an injury as was in fact inflicted upon her. That the foreseeable danger was from intentional or criminal misconduct is irrelevant; respondent nonetheless had a duty to make reasonable provision against it. Breach of that duty would be negligence, and we cannot say as a matter of law that petitioner’s injury did not result at least in part from such negligence.

Id. See also Derdiarian v. Felix Contracting Corp., 414 N.E.2d 666 (N.Y. 1980) (employer who failed to erect adequate traffic barricade liable to plaintiff construction worker struck and injured by negligent driver).

147. *Weirum v. RKO Gen., Inc.*, 539 P.2d 36 (Cal. 1975) (disc jockey announcing that first listeners to drive to his location would win prize liable for vehicular death caused by listeners’ reckless driving). *But cf. Rice v. Paladin Enter.’s, Inc.*, 128 F.3d 233 (4th Cir. 1997) (where writer *conceded intent* in publishing tutorial on murder was to assist crime perpetrators, liability attaches); *Olivia N. v. Nat’l Broad. Co.*, 178 Cal. Rptr. 888 (1981) (negligence alone not enough to create liability for television broadcaster’s inducing viewer to commit “copycat” crime).

148. *Gallick v. Baltimore & O. R. Co.*, 372 U.S. 108 (1963) (finding jury question of employer’s negligence where employee working near a standing pool of water was bitten by an insect and suffered life-threatening infection); *Bradford v. Universal Constr. Co.*, 644 So. 2d 864 (Ala. 1994) (unsecured plywood sheets that wind blew into plaintiff); *Lanz v. Pearson*, 475 N.W.2d 601, 603 (Iowa 1991) (Act of God jury instruction denied because icy and obscured highway conditions could have been “reasonably anticipated.”). *But see Memphis & C.R. Co. v. Reeves*, 77 U.S. (10 Wall.) 176 (1869) (no liability for delayed tobacco shipments destruction due to “unexpected” and “sudden and extraordinary” flood); *Rocky Mountain Thrift Stores, Inc. v. Salt Lake City Corp.*, 887 P.2d 848 (Utah 1994) (“no duty” to protect against “unforeseeable” flooding). At least one court has noted where a defendant was negligent *and* the inclement conditions were extraordinary and “unforeseeable,” the liability “concur[s]” and the defendant remains liable for the whole of the harm done. *Lang v. Wonnenberg*, 455 N.W.2d 832 (N.D. 1990). This ruling is equivalent to a joint-and-several liability rule that imposes all financial burden on the Primary where the Secondary is not reachable.

149. For example, class action attorneys have recently targeted the fast food industry in enabling-style lawsuits. *See Pelman v. McDonald’s Corp.*, 237 F. Supp. 2d 512 (S.D.N.Y. 2003) (dismissing lawsuit for lack of specificity against McDonald’s restaurants for allegedly contributing to minors’ obesity). The theory for recovery is that these fast food chains have concealed their aim and internal research efforts to improve the taste of their calorie-laden food products to make them more “addicting,” and that these foods, consumed in excess, contribute to the myriad health conditions associated with obesity. *See ERIC SCHLOSSER, FAST FOOD NATION: THE DARK SIDE OF THE ALL-AMERICAN MEAL* (2d ed. 2002) (describing emergence of “flavor industry” to increase sales of American fast food products). Similar lawsuits against tobacco companies are now familiar. Rabin disputes that these are true enabling torts, inasmuch as the injured third parties are also responsible. Nonetheless, by asserting the “addictiveness” of

While these examples confirm enabling torts newfound popularity, many counter-examples persist.¹⁵¹ Such inconsistency must be explained. Rabin, like Richard Posner before him,¹⁵² asserts that the “inconsistency” in applying enabling tort is nothing more than proper determination of which party is best suited to bear liability.¹⁵³ This view equates liability with *capability or suitability to provide social insurance*.¹⁵⁴ However appealing Rabin’s theory may be prescriptively,¹⁵⁵ it is not the motivation behind the new popularity of enabling tort. Courts assume much more righteous airs, invoking terms such as “fairness” or “morality” to justify the reachback liability they place on Primaries. These are judicial fighting words, not bland cost-benefit musings.¹⁵⁶

these products, the plaintiffs are clearly trying to shift liability from themselves to the Enablers to conform their lawsuits to the now-recognized form of enabling tort. *See generally* Little v. York County Earned Income Tax Bureau, 481 A.2d 1194, 1201 (Pa. Super. Ct. 1984) (woman incarcerated for failure to pay income taxes can recover emotional harms damages from negligent tax advisor).

150. Eugene Volokh, *Crime-Facilitating Speech*, 57 STAN. L. REV. 1095 (2005).

151. Brewer v. Teano, 47 Cal. Rptr. 2d 348 (Cal. Ct. App. 1995) (no recovery against deceased’s estate for emotional harms stemming from arrest and prosecution where plaintiff’s car had been struck by deceased’s, but plaintiff fled the scene in apparent fear of the deceased and was arrested on suspicion of felony hit and run); Poskus v. Lombardo’s of Randolph, Inc., 670 N.E.2d 383 (Mass. 1996) (no Enabler liability for negligent valet service when police officer suffered injury arresting car thief who had already abandoned vehicle); Sheehan v. City of New York, 354 N.E.2d 832 (N.Y. 1976) (no Enabler liability where bus in violation of traffic regulations did not pull over to curb when stopping and was struck from behind by negligently driven garbage truck, injuring bus passenger); Johnson v. Angretti, 73 A.2d 666 (Pa. 1950) (no liability for bus company where bus negligently stopped in the road and another driver negligently tried to overtake the bus but struck and killed oncoming car’s driver); Newton v. S.C. Public Rys. Comm’n, 462 S.E.2d 266 (S.C. 1995) (defendant employed to maintain malfunctioning railroad crossing signal not liable when plaintiff stopped as a result of signal and was struck from behind by negligent driver who failed to halt); Phan Son Van v. Peña, 990 S.W.2d 751 (Tex. 1999) (storeowner who negligently and illegally sold alcohol to minors not liable for subsequent murder commission). Other counter-examples are offered throughout notes 143–48, *supra*.

152. Richard A. Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29 (1972) (arguing that responsibility, especially in civil law, should be placed on the person who is in the best place to most cheaply avoid the loss).

153. For example, Rabin concludes for crime-ridden property cases: “[n]ot only is the renter in a better position than the tenant to adopt precautionary measures, but the renter is better situated than the police to diminish the risk of criminal assault on the premises—the police, after all, cannot be expected to patrol the interiors of large residential apartment buildings and to exercise vigilance in private spaces.” Rabin, *Enabling Torts*, *supra* note 131, at 444. Is this really why Enabler liability is increasing?

154. Rabin concedes that an implicit but important motivation behind some enabling torts may simply be an attempt to reach solvent pocketbooks. *Id.* at 444 (suggesting a major motivation of enabling tort “is the inability to effectively reach the putative [Secondary] wrongdoer himself, either through criminal or tort sanctions. This is the...link to creating responsibility for enabling behavior.”).

155. Kindynamic Theory rejects Rabin’s theory as inconsistent with the major goals of tort law. *See supra* text at Part I.

156. *In re Kinsman Transit Co.*, 338 F.2d 708, 719 (2d Cir. 1964) (“[T]he discredited notion that only the last wrongful act can be a [liable] cause [is] a notion as faulty in logic as it is wanting in fairness.”); Michael S. Moore, *The Metaphysics of Causal Intervention*, 88 CAL. L.

Kindynamic theorists assert that the reason for confusion and incorrect theories about when enabling tort is the suitable form of liability stems from a lack of rigorous *quantification* of the Primary's and Secondary's respective risk contributions. Without knowing *how much* risk of a future injury an agent contributes, it is an utterly futile proposition to apportion to him any particular amount of blame or to have confidence that that liability is a "deterrent" commensurate with that actor's risk contribution. Yet courts are universally lacking a rigorous risk quantification metric, namely EBL and decision analysis.¹⁵⁷ Moreover, varied and inconsistent terminology obscures the causal principles behind "enablement."¹⁵⁸ Absent risk quantification and a solid understanding of the causal principles that underlie tort law, we should hardly be surprised that recent commitment to enabling torts appears to some as proof that tort is "out of control" or "arbitrarily" decided. Yet, as we report next, Kindynamic theorists offer a new consistent method for establishing when to (and when not to) extend liability to Enablers.

REV. 827, 828 (2000) ("It is morality, not legal policy, that tells us that actions that cause harm are more blameworthy than those that merely attempt or risk such harm."). Cf. U.S. v. Gottshall, 512 U.S. 532, 543 (1994) ("FELA does not make the employer the insurer of the safety of his employees while they are on duty. The basis of his liability is his negligence, not the fact that injuries occur." (quoting *Ellis v. Union Pacific R.R. Co.*, 329 U.S. 649, 653 (1947))).

157. It is evident that courts *desire* some workable risk calculus in enabling tort. Consider, for instance, one federal court's implicit adoption of a primitive risk assessment for handgun liability:

"Duty" at its essence is a question of policy. While there is a general reluctance to impose liability where harm results in part from the conduct of third-party tortious or criminal conduct,... a duty of care could be imposed on gun manufacturers where there was a tangible showing that defendants were a direct link in the causal chain that resulted in the plaintiffs' injuries and defendants were realistically in a position to prevent the wrongs. A showing of a direct link between the negligence and damage to the public at large ensures that there is no threat of a specter of limitless liability. *Important in the determination is that a plaintiff not rely merely on the foreseeability of harm to attempt to hold all members of an industry liable, but rather present evidence tending to show to what degree the risk of injury was enhanced by the presence of negligently or intentionally harmfully marketed and distributed guns.*

NAACP v. AcuSport, Inc., 271 F. Supp.2d 435, 490-91 (E.D.N.Y. 2003) (emphasis added) (citations omitted).

158. Commentators, including courts, have sometimes described Rabin's "enablement" as "indirect causation." *Marbled Murrelet v. Babbitt*, 83 F.3d 1060, 1065 (9th Cir. 1996) (referring to habitat alteration as "indirect cause of harm" for interpretation of Endangered Species Act); Erich J. Greene & John M. Darley, *Effects of Necessary, Sufficient, and Indirect Causation on Judgments of Criminal Liability*, 22 LAW & HUM. BEHAV. 429, 439-41 (1998). Others have indicated that language patterns may be to blame for proper understanding of enabling causality. For example, one pair of authors has shown psychological differences prompt some to write statements such as "the plant bloomed" and others to write "the gardener caused the plant to bloom." The authors contend that the linguistic similarity of these statements encourages judges to bypass causality issues without critically considering causal differences in these statements. Lawrence M. Solan & John M. Darley, *Causation, Contribution, and Legal Liability: An Empirical Study*, 64 LAW & CONTEMP. PROBS. 265, 279-80 (2001).

B. Kindynamic Modes of Joint Tortfeasor Liability: Traditional, Enabling, and Leapfrogging Liability

The usual test for assessing division of liability among multiple parties asks whether a Secondary is a *superseding cause*.¹⁵⁹ In the traditional model (*see supra* Figure Three), a superseding cause exists and only the Secondary is liable. In enabling tort, no superseding cause exists and both Enabler and Secondary are liable (*see supra* Figure Five).

The existence of a superseding cause usually turns on “reasonable foreseeability.”¹⁶⁰ We already have seen the problems with “foreseeability,” to be consistent in allocating liability, we need a better delimiting definition of superseding cause.

Two fact patterns can clarify what “superseding cause” is getting at. Construction employee A is working on a busy public highway near traffic. Employer B, without statutory obligation to do so,¹⁶¹ erects a barricade to protect A and others. An automobile veers out of control and crashes through the barricade. Stronger barricades

159. Dobbs attempts to explain superceding cause’s motivation:

A ruling that an intervening actor is a superseding cause embodies the dual conclusion that the intervening actor should be responsible and that the original actor, in spite of his causal negligence, should not. . . . [I]n contemporary law, when courts then ask what counts as a superseding cause. . . . [t]he rule is that if the intervening cause itself is part of the risk negligently created by the defendant, or if it is reasonably foreseeable at the time of the defendant’s negligent conduct, then it is not a superseding cause at all. In that case, the defendant is not relieved of liability merely because some other person or force triggered the injury.

DOBBS, *supra* note 6, § 186, *citing* RESTATEMENT (SECOND) OF TORTS, §§ 442(A)-(B). However, like others before him, Dobbs is linguistically hampered by a lack of firm definitions for negligence and proximate risk. *See* ROBERT E. KEETON, *LEGAL CAUSE IN THE LAW OF TORTS* (1963); Glanville Williams, *The Risk Principle*, 77 L. Q. REV. 179 (1961); Warren A. Seavey, *Mr. Justice Cardozo and the Law of Torts*, 52 HARV. L. REV. 371 (1939).

160. *Duphily v. Delaware Electric Coop. Inc.*, 662 A.2d 821, 829 (Del. 1995)

If the intervening negligence of a third party was reasonably foreseeable, the original tortfeasor is liable for his negligence because the causal connection between the original tortious act and the resulting injury remains unbroken. If, however, the intervening negligence was not reasonably foreseeable, the intervening act supersedes and becomes the *sole* proximate cause of the plaintiff’s injuries, thus relieving the original tortfeasor of liability.

Id. (emphasis in original) (citations omitted).

161. The issue of inferring negligence or proximate risk from statutory non-compliance complicates risk analysis, and thus, liability analysis. Statutes can be generated by politics or other factors, rather than pure risk analysis. If a statute is divorced from optimal Kindynamic policy, non-compliance *does not* mean a person is negligent, yet the legal presumption usually given to non-compliance is that the person *is* negligent. Cass Sunstein has championed the evident way to solve this deadlock: create administrative and legislative policies that are rooted in Kindynamic analysis, not politics. CASS R. SUNSTEIN, *RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT* (2002). If Sunstein’s vision is achieved, illegality would become a better proxy of negligence or proximate risk.

could have slowed, perhaps stopped, the careening car. A is injured by the car. B is probably liable to A.¹⁶²

Now imagine a permutation: an airplane crashes on the highway, slides down the road and breaks through the barricade. It causes exactly the same injuries to A as the car collision would have. There are barricades that can shield against sliding airplanes, but they are quite expensive. B is probably not liable to A.¹⁶³

Most people should have an intuitive understanding of the difference in these liability results: an airplane strike seems “extraordinary,” while a car collision seems “normal.” Our intuition, while correct, conceals that there are *two* pertinent differences. First, the likelihood of being struck by an airplane while working on an urban street is orders of magnitude lower than the likelihood of being struck by a car.¹⁶⁴ Thus, airplane strikes are less likely to amount to a “significant” risk than are vehicular collisions. The second difference is a cost-benefit consideration: the airplane barricade is much more expensive than is a vehicular barricade. Even if the risks of an airplane strike and a vehicular strike were *equally* likely, the marginal risk reduction benefit from investment in a vehicular barricade would be greater than from investment in airplane barricades. Kindynamic Theory urges investment of risk-reducing dollars in the most efficient manner possible.

These examples make evident that “reasonable foreseeability,” the fulcrum on which superseding cause currently rests, should be replaced by our definition of proximate risk (see boxed text at note 109 *supra*). Kindynamic Theory accordingly rewords the superseding cause test:

If a tortfeasor creates a proximate risk and if relevant duty exists, there is no superseding cause for that tortfeasor.

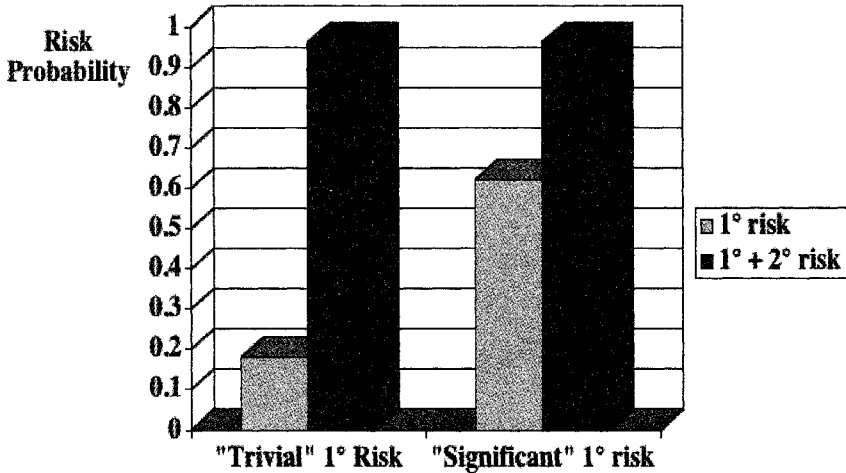
A Secondary’s acts may (1) cause *new, additional* risks; or (2) amplify *existing* risks. If a Secondary creates a *new* risk, a Primary obviously shares no liability. But if a Secondary *amplifies* a risk to which the Primary also contributed, multiparty liability allocation is not as simple. One must then ask: what would the risk have been *in the absence* of the Secondary’s behavior? Would the Primary’s risk have been “significant” *on its own*? To see this concept better, consider the following diagram (assume the “significant” risk threshold is 0.3):

162. See *Derdarian v. Felix Contracting Corp.*, 414 N.E.2d 666 (N.Y. 1980) (finding liability for this fact pattern). In this example, we are assuming that the cause of action is negligence, not workman’s compensation.

163. See *Doss v. Town of Big Stone Gap*, 134 S.E. 563 (Va. 1926) (finding no liability for alleged negligence of city in forcing vehicular detour around impassable road where decedent was struck and killed by an airplane while on detour).

164. Kimberly M. Thompson et al., *The Risk of Groundling Fatalities from Unintentional Airplane Crashes*, 21 RISK ANALYSIS 1025 (2001) (estimating the total lifetime risk of a groundling being killed by an airplane to be approximately nine in ten million persons, with the risk “rapidly declining” outside the first two miles around an airport).

Figure 6
Risk "Significance": A Requirement for Individual Liability



To set liability for jointly caused risks, it is essential to quantitatively determine whether that *fraction* of the total risk attributable to a Primary is a proximate risk *on its own*. Even if the Primary's risk contribution is "significant," his actions may be economically justified and therefore still not create a proximate risk.¹⁶⁵ But if not, the judge will conclude that a reasonable jury could find the Primary to have created a proximate risk.¹⁶⁶

To assess a *Secondary's* liability for *amplifying* an *existing* risk, the same method applies: first one subtracts the Primary's risk contribution from the total risk. If the remaining risk fraction attributable to the Secondary is "significant"—and observe that nothing invariably requires the "significant" risk cut-off be the same for a Secondary and a Primary—the Secondary has contributed an *independent* proximate risk if his act is unexcused by decision analysis or duty.¹⁶⁷

165. See *supra* Part IV.B.

166. Even this doesn't mean Primary liability follows automatically. Procedurally, a judge determines *duty*, not proximate risk. A policy consideration, unrelated to negligence or proximate risk, could still militate against finding a duty. But if there is no such policy concern, the case goes to a jury, which will (re)deliberate the issues of negligence and proximate risk to set liability. Note that even after being released to a jury, cases can be dismissed on other grounds such as failure to demonstrate actual causality or injury, or for procedural or jurisdictional reasons.

167. Note that for a Secondary to be liable *every* element of proximate risk must be met, *independent of other risk contributions*. For instance, there is a temptation to erroneously place liability on the Secondary if his amplification of extant risk causes the *total* risk—not his *individual contribution to that total*—to be significant. See *Lipke v. Celotex Corp.*, which held:

[O]ne guilty of negligence cannot avoid responsibility merely because another person is guilty of negligence contributing to the same injury. Under *Romine v. City of Watseka* (1950), 341 Ill. App. 370, 377, 91 N.E.2d 76, where such guilt

Up to now, we have discussed two ways liability is allocated among multiple tortfeasors: traditional and enabling tort. Kindynamic Theory recognizes a *third* form of liability allocation, “leapfrogging tort.” Leapfrogging tort, like enabling tort or traditional tort, involves a Secondary who (1) creates a new (additional) proximate risk,¹⁶⁸ or (2) amplifies an *existing* risk of the Primary’s. For example: Driver *A* creates a risk of injurious collision with each of two pedestrians, *B* and *C*. To escape injury, *B* dives out of the car’s path. *A* swerves and grazes *C*. Simultaneously, *B*’s dive knocks *C* down, breaking *C*’s arm. This broken arm would not have occurred if *A* alone had grazed *C*. *C* can recover against *A* but not *B* for his broken arm.¹⁶⁹

The conceptual premise of leapfrogging tort is subtle to catch particularly because it is unintuitive that the last contributing agent in a causal chain known to lead to harm assumes no liability. Yet this is exactly what sometimes happens.¹⁷⁰ The implication of leapfrogging tort is that *all* liability bypasses the Secondary actor and accrues entirely to Enablers upstream (in the two-person model, to the Primary). If those Enablers also did not *individually* create proximate risks, there simply is no liability, even if there has been cognizable injury.

exists, “it is no defense that some other person, or thing contributed to bring about the result for which damages are claimed. Either or both parties are liable for all damages sustained”. Thus, the fact that plaintiff used a variety of asbestos products does not relieve defendant of liability for his injuries. Evidence of such exposure is not relevant.

505 N.E.2d 1213, 1221 (Ill. App. Ct. 1987) (emphasis added). *See also* Kochan v. Owens-Corning Fiberglass Corp., 610 N.E.2d 683 (Ill. App. Ct. 1993) (same).

Further, a Secondary may amplify extant risk—perhaps even “significantly”—but has still not created a proximate risk if decision analysis exonerates his act. In such an instance, liability for the Secondary’s “significant” but economically justifiable risk increase could be assigned jointly and severally to those tortfeasors who *did* create a proximate risk of that injury. *But cf.* Kennedy v. Southern Calif. Edison, 268 F.3d 763 (9th Cir. 2001) (finding, in a multifactorial causation case, that microscopic particles of radioactive material that the plaintiff’s husband carried home on his work clothes was not a substantial factor in causing her leukemia, where the court defined “substantial” as something more than “negligible” or “infinitesimal” or “theoretical”).

168. This includes the class of “rescue” cases in which a person who aids the victim of a negligent tortfeasor is himself injured in the rescue attempt. In the rescue cases, the rescuer has created a *novel* risk of harm—injury to himself—rather than having *amplified* the extent or likelihood of injuries to the original victim. *See* Thomas v. Garner, 672 N.E.2d 52 (Ill. App. Ct. 1996); Solomon v. Shuell, 457 N.W.2d 669 (Mich. 1990); Wagner v. Int’l. R.R. Co., 133 N.E. 437 (N.Y. 1921).

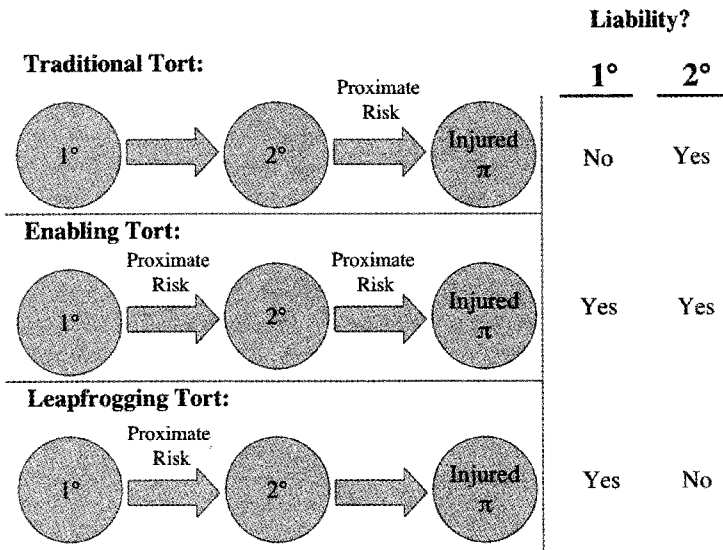
169. *See* RESTATEMENT (SECOND) OF TORTS § 445cmt. C, illus. 3 (1965) (describing leapfrogging tort by example: “A negligently drives his car so as to endanger B in the street. To escape being hit B leaps out of the way. In doing so he knocks down C, who was not in the path of the car. A’s liability to C will depend upon whether he should have realized when driving that such a person in the vicinity of B might be injured by his negligent driving.”).

170. Consider, for instance, emotional harms or fear claims. In such cases, risk communicators—who often are the ultimate “cause” of fear—almost universally escape liability, while physical injurers who have allegedly placed a plaintiff at physical risk must pay the entirety of the fear or emotional harm claim, sometimes even if that fear is irrational. *See generally* Christopher P. Guzelian, *Liability & Fear*, 65 OHIO ST. L.J. 713 (2004).

Kindynamic Theory corrects perennial oversights about *why* enabling tort is coming into vogue. Enabling tort *always* should have been recognized. The long-running failure to do so consistently is attributable to misconceptions about risk. How could courts expect to correctly identify *multiple* proximate risks resulting in a single harm, as in enabling tort, when judges have enough trouble identifying *single* proximate risks? Undoubtedly similar misapprehensions explain why leapfrogging tort has not even been named before. But under Kindynamic Theory, torts involving two causal actors can result in three distinct modes of liability assignment:¹⁷¹

171. We have been working with the simplest form of enabling tort: cases with two alleged tortfeasors. But the principles are generalizable. If there are N accused tortfeasors, liability should accrue to however many of those actors have created independent proximate risks. To do this in practice, one should calculate the total risk and then determine each of the N actors' potential proximate risk creations by beginning farthest *upstream* in the causal chain. Each layer of risk augmentation or additional risk creation, regardless of whether it amounts to a proximate risk, should be subtracted from the total risk magnitude or number of risks, until the last tortfeasor, by definition, the only non-Enabler, is reached. Presumably, if there are numerous risk communicators who each created a proximate risk they are jointly and severally liable, along with any proximately negligent physical injurers for a resulting injury. To the extent that a state does not recognize joint-and-several liability, other liability apportioning mechanisms may have to be introduced, such as market share liability or *m*. See *Hamilton v. Accu-Tek*, 62 F. Supp. 2d 802 (E.D.N.Y. 1999) (imposing collective liability for sellers of .25 caliber handguns who negligently marketed handguns, such that they were too likely to be used illegally and criminally by teenagers); *Hymowitz v. Eli Lilly Co.*, 539 N.E.2d 1069 (N.Y. 1989) (market share approach adopted in DES cases); *Collins v. Eli Lilly Co.*, 342 N.W.2d 37 (Wis. 1984) (liability in proportion to risk imposed, with market share relevant to determining that risk proportion). *But see Smith v. Eli Lilly & Co.*, 560 N.E.2d 324 (Ill. 1990) (rejecting market share approach to collective liability for DES production). Novel liability apportionment schemes may also be more efficient in some circumstances. See Ronen Avraham, *Modular liability rules*, 24 INT'L REV. L. & ECON. 269 (2004).

Figure 7
Kindynamic Theory's Modes of Liability



CONCLUSION

Legal scholars complain that traditional tort theory is inadequate to address the expanding scope of risks in the post-industrial world.¹⁷² The alleged risks that are increasingly finding their way into litigation are more complex and less intuitive to establish. Risks are also dynamic constructs subject to change as risk assessment generates greater knowledge about their causal and numerical natures.¹⁷³ Tort must accurately reflect the dynamic nature of risk analysis.

Most jurists and scholars concur that the primary aim of tort law is (efficient) risk deterrence. Thus, this Article set out asking and preliminarily answering two brief questions. First, what is a risk? Second, how does one *objectively* determine which risks to deter through tort?

The typical Industrial era attorney would have answered these questions by immediately launching into a lengthy, and at times muddled, discussion of duty and breach (negligence), and proximate cause. He would have given a short nod to general or specific causation¹⁷⁴—issues that were rarely contentious.

172. See *supra* note 9.

173. In assessing by EBL whether a nomological possibility is a risk, *stare decisis* makes less sense than anywhere else in the field of law. Current scientific knowledge, not legal precedent, determines what is, and is not, a risk.

174. The leading legal treatise on causation, H.L.A. HART & TONY HONORÉ, *CAUSATION IN THE LAW* (2d ed. 1985), is out-of-print. Causation, the fulcrum of Kindynamic tort law, is undoubtedly being under-addressed.

But as risk knowledge has improved and as risks have changed, the population of risks alleged in modern courtrooms is not the same as in 1930. A new theory of tort—Kindynamic Theory—accommodates these changes. Kindynamic Theory hones the understanding of long sensed, but poorly articulated tort intuitions in three ways, and offers one significant prescriptive modification to tort.

First, contrary to its many everyday definitions, the word “risk” has a single exact meaning in Kindynamic Theory. To a Kindynamic theorist, a risk must be *objectively known* to be possible (“epistemically possible”). Put differently, Kindynamics prescribes that a specific alleged stimulus must be objectively known to cause a particular harm before liability can even begin to be considered.¹⁷⁵ This can only be achieved by use of Evidence-Based Logic (EBL), the transparent and systematic protocol for identifying scientific knowledge.

Second, and in the only notable break with traditional tort intuition, many Kindynamic proponents advocate modifying tort by permitting compensation only for “significant” risks. This particular brand of risk (which must also usually result in injury to be redressable by tort) is (1) *widespread* and (2) likely to be *injurious*. Similar to common regulatory practice, this prescriptive constraint seeks to sensibly prioritize risk deterrence, given limited judicial resources.¹⁷⁶

Third, Kindynamic Theory invokes *decision analysis*—the method for formal, quantitative risk analysis universally familiar to risk analysts—to elucidate risk tradeoffs and make decisions about the costs and benefits of a risk. With its empirical grounding, decision analysis improves upon cost-benefit models that are typically too theoretical or assumption-laden for practical use.¹⁷⁷

Finally, courts have long desired and intuitively but unsuccessfully sought an objective method for apportioning liability for a single injury among *multiple* alleged tortfeasors. Kindynamic Theory is the tort theory that formally presents such a method.¹⁷⁸

Kindynamics is indeed in one aspect (risk prioritization) a *purely* prescriptive theory that does not pretend to capture past legal trends.¹⁷⁹ Other than risk prioritization, however, Kindynamics is not a prescriptive theory, but rather a rigorous restatement and clarification of longstanding tort intuitions. Kindynamics only seems prescriptive and novel because it uses new vocabulary and is a uniquely demanding, quantitative, and precise way of thinking about traditional tort concepts.

175. See *supra* Part II–III.

176. See *supra* Part IV.A.

177. See *supra* Part IV.B.

178. See *supra* Part VI.

179. The argument of those Kindynamicists who advocate risk prioritization (and not all Kindynamic thinkers do) is that even assuming the goal of tort were solely corrective justice—the right to have one’s day in court—risk prioritization is logically necessary as long as a jurisdiction’s case load overtakes thorough judicial review of each case. If courts can only sufficiently address a certain number/category of cases, then each jurisdiction effectively has a “race” system of case prioritization. Whoever files suit first or bangs one’s fist the loudest gets more adequate redress, while others may receive shoddy judicial attention or simply settle the case under suboptimal terms to avoid such treatment. Kindynamics contends that if individual justice must be constrained (and if the Soviet command-control nature of tort law does constrain), then why not do so sensibly according to a primary tenet of tort: *proximate* risk?

It is true that Kindynamics rejects many decisions as improper. While some will accuse it of being a purely prescriptive theory dressed in explanatory clothing, it must be understood that Kindynamics is often times *not* criticizing the *aims* of decisionmakers in cases it declares “wrongly” decided. Rather, because of its rigorous nature, Kindynamic Theory is uniquely capable of discovering that judges, lacking access to the powerfully objective and precise tools of EBL (evidence-based logic), decision analysis, and Kindynamic multiparty liability allocation, have often reached conclusions they simply did not *intend* to make. Indeed, Kindynamic advocates contend that if courts had been able to apply Kindynamic methods, many outcomes would have been different, even when *holding judges’ and juries’ tort philosophies constant*.

Kindynamic Theory holds great promise as a modern theory of tort.¹⁸⁰ In a complex world, Kindynamic Theory is better suited than its predecessors to achieving the age old jurist’s wish to efficiently marshal judicial resources towards deterring society’s most pressing risks and fairly recompense those harmed by those risks.

180. Kindynamic Theory is currently investigating how to systematically frame the causal question underlying any risk. Scientific investigation is capable of establishing nearly any risk as epistemic if a causal proposition is stated too broadly. Conversely, if a risk proposition is put too narrowly, scientific knowledge will nearly always be incapable of speaking to such an overly restrictive proposition. What is therefore required is an objective process for framing the appropriate scope of the cause *A* and effect *B* at issue in a particular claim, then assessing by evidence-based methods whether a risk indeed exists as a general causal proposition. It will then be up to the trier of fact to assess through the introduction of case-specific evidence whether the plaintiff’s individual circumstances meet that general pattern of that risk. See generally Guzelian, *supra* note 51.