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Intelligent Design and Tort Law: Partners in a Unified Theory of Causation

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Articles

*543 INTELLIGENT DESIGN AND TORT LAW: PARTNERS IN A UNIFIED THEORY OF CAUSATION

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I. Introduction

The prospect of teaching intelligent design in a public school science course will typically produce controversy in any community. [FN1] Parents, *544 professional educators, and policy makers are some of the stakeholders with strong and passionate interests in the matter. Courts of law and legal scholars likely will become increasingly involved in resolving legal issues pertaining to the teaching of intelligent design.

Intelligent design is a theory of causation in the natural sciences. Essentially, its method employs a variant of probability theory. [FN2] This method permits an inference that intelligent design produced an effect, provided that the given effect has been observed to be "both complex and specified." [FN3] Intelligent design begins with observations of the complexity of patterns and information in living organisms and their subsystems, and draws inferences from those observations based on the probabilities of their characteristics having been produced randomly, on the one hand, or by design, on the other hand.

Two of the proponents of intelligent design have described the observation of such complexity and information in the living cell:

> On its surface we find millions of openings, like portholes in a ship. But these are not mere portholes. They regulate the flow of materials in and out of the cell. Cells exhibit nano-engineering on a scale and sophistication that scientists have hardly begun to scratch. . . .
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> Inside the cell we find a host of raw materials maneuvered back and forth by robot-like machines all working in unison. In fact, many different objects move in perfect unison through seemingly endless conduits. . . .
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> If we peer further inside the cell, we find coils of DNA that store the information necessary to construct proteins. Proteins themselves are remarkably complex molecular systems. A typical protein is composed of a few hundred amino acids arranged in a precisely ordered sequence that then folds into a *545 highly organized three-dimensional structure. That structure enables the protein to perform its function inside the cell. [FN4]

Tort cause-in-fact theory, a significant and essential element of the determination of liability for negligent and intentional acts, is a theory of causation in the law. Its basic method permits an inference that an act produced an injury, provided that there is sufficient evidence to allow a trier of fact to conclude that, more likely than not, the injury would not have happened without the act. [FN5] The phrase "more likely than not" or "more probable than not" is a requirement of evidentiary proof, known as the "preponderance" (greater weight of the

evidence) standard. Essentially, the method of analysis of cause-in-fact in tort law also employs a form of probability theory. [FN6]

Both of these theories, although operating independently in two separate disciplines, make logical inferences about causation of past events from data or evidence, based on certain rules or criteria. This Article argues that the existence of a number of similarities between the two methods helps to establish the validity of the intelligent design method as conforming to well-established and time-tested reasoning.

The Article will describe and compare the methods of analysis employed in these two disciplines: causation analysis in intelligent design theory and causation analysis in tort theory, one from the discipline of science and one from the discipline of law. As to intelligent design theory, the Article will describe the irreducible complexity concept and the specified complexity criterion. As to tort theory, it will describe and give examples of cause-in-fact theory, a method that partakes of logic as well as common knowledge and common sense, and that has been used for centuries in courts of law to determine liability in tort cases. It will also briefly address the concept of superseding intervening causes in the theory of proximate causation. Further, it will integrate into the discussion the evidentiary doctrine of res ipsa loquitur and the causation analysis included in that doctrine.

The Article will then compare the method of analysis in tort theory to the method of analysis of intelligent design theory. It will note numerous similarities between the two methods of analysis. It will argue that the similarities demonstrate that intelligent design theory is an acceptable, rigorous, and eminently reasonable method for determining causation.

***546** The Article does not address the constitutionality of teaching intelligent design in public schools. Thus, it does not attempt to resolve the related matter of whether intelligent design theory is religious for the sake of addressing Establishment Clause challenges to intelligent design. Those tasks have been undertaken ably by others. [FN7] However, the Article addresses the fact that the method of intelligent design theory is neutral as to supernatural causes and does not presuppose supernatural or divine causes. The Article argues that the integrity of the method of analysis employed in intelligent design theory is not compromised if the method leads to the ultimate conclusion that a supernatural agent produced a living organism or a system within a living organism.

II. The Debate over Supernatural Causation

The validity of the method of intelligent design theory is an important issue in the consideration of whether to teach the theory in science courses. One approach to the validity of the method is to discount it entirely, based on the idea that an inference of an intelligent cause necessarily means an inference of a supernatural cause, and that allowance for supernatural causes takes the method outside the realm of science. A second approach is to permit open-ended inquiry into causes, not excluding supernatural causes from the inquiry, and thus leave room for an inference of intelligent design as a cause, even if the intelligent designer is presumed or supposed to be supernatural.

The first approach was summarized succinctly in the opinion in Kitzmiller v. Dover Area School District, [FN8] where the court stated, “[intelligent design] violates the centuries-old ground rules of science by invoking and permitting supernatural causation . . . .” [FN9] The second ***547** approach posits that excluding the supernatural as a cause actually hinders scientific inquiry. For example, William Dembski states, “[n]aturalism [the view that science should consider only natural causes] is the intellectual pathology of our age. It artificially constricts the life of the mind . . . .” [FN10]

The validity of a theory should be distinguished from its plausibility. A theory is valid if it is "well-grounded or justifiable: being at once relevant and meaningful." [FN11] An argument is plausible if it is "appearing worthy of belief." [FN12] In other words, validity has to do with the soundness of the grounding of a theory; plausibility has to do with whether a line of reasoning is apparently believable. If a theory is well-grounded in a sound methodology, it arguably has sufficient validity to merit a place in a science curriculum, regardless of whether it merely appears to be worthy of belief. [FN13]

Kitzmiller involved a constitutional challenge to one school division's policy to require a reference to intelligent design in a science curriculum. The policy required teachers to read to students in a ninth-grade biology class a statement mentioning intelligent design as an alternative to Darwin's theory of evolution. [FN14] In its discussion, the Kitzmiller court undertook the ***548** task of deciding whether intelligent design theory is science and concluded that it was not science, at least partially if not largely on the ground that intelligent design takes into account supernatural causes. [FN15] The court, earlier in its opinion, had cited with approval case law to the effect that the acknowledgment of supernatural causation takes a theory outside the realm of science. The court there stated, "[intelligent design's] religious nature is evident because it involves a supernatural designer. The courts in Edwards and McLean expressly found that this characteristic removed creationism from the realm of science and made it a religious proposition." [FN16] Thus, the court in Kitzmiller adopted the view that a theory that involves, or even declines to exclude, a supernatural designer, is religious and not scientific.

The court in Kitzmiller, in adhering to the view that any acknowledgment of supernatural causation takes a theory outside the realm of science, evidently assumed that a theory of causation in science must consider either material causes or non-material (such as supernatural) causes, and that a theory cannot consider both. This has not always been the view in causation theory. Aristotle's theory of causation posited that there were four causes of any phenomenon: material, efficient, formal, and final. [FN17] ***549** Applying Aristotle's four causes to an example, the statue of Michelangelo's David, the material cause is the material of which the item is made, that is, marble. The efficient cause is the activity that produced the item, that is, the chiseling of the marble. The formal cause is the structure of the item, that is, a representation of David. The final cause is the purpose of the item, that is, a work of art intended to beautify its surroundings. [FN18] Aristotle's theory thus included two material causes-the material and efficient causes-and two non-material ones-the formal and the final causes. The reason for mentioning the Aristotelian causes is not to recommend that they be brought back literally into scientific thinking, but to suggest that science has not always limited its inquiry to material and natural causes.

The common law legal tradition has something to offer to the debate over the consideration of supernatural causes: a method of analysis as to causation that is neutral as to whether a cause is natural and material or supernatural and immaterial. The common law of torts contains an analysis as to "cause-in-fact" which permits the trier of fact (whether judge or jury) simply to infer from evidence presented that an event or act more likely than not produced a result. The analysis focuses on the evidence of the sequence of events and draws inferences based on that evidence.

The purpose of the "cause-in-fact" analysis is to determine whether a human actor is responsible for a particular injury, and therefore its focus generally is on causation of harm by human actors-intelligent, but not supernatural, causes. Nevertheless, by focusing on the sequence of events leading to an injury rather than on the characteristics of the causal agent, the method shows neutrality toward the characteristics of the causal agent. If the method were to lead to the conclusion that a supernatural agent caused an injury, the integrity of the method would not be compromised.

III. A Description of Intelligent Design Theory

Intelligent design is a theory of causation in the natural sciences. One of its well-known proponents, William Dembski, has described it as follows:

> Within biology, intelligent design is a theory of biological origins and development. Its fundamental claim is that ***550** intelligent causes are necessary to explain the complex, information-rich structures of biology and that these causes are empirically detectable. To say intelligent causes are empirically detectable is to say there exist well-defined methods that on the basis of observational features of the world are capable of reliably distinguishing intelligent causes from undirected natural causes. [FN19]

Dembski has thus characterized intelligent design as a theory that uses a methodology to reach conclusions based on empirical data. Dembski has pointed out that design theory is not new, [FN20] but that it has experienced a "resurgence" because of the recent development of "precise methods for discriminating intelligently from unintelligently caused objects." [FN21] He indicates that such methods uncover "information," [FN22] and that this information "becomes a reliable indicator of intelligent causation. . . ." [FN23] He further states that intelligent design is "not the study of intelligent causes per se but of informational pathways induced by intelligent causes." [FN24] Dembski emphasizes that "intelligent design presupposes neither a creator nor miracles. Intelligent design is theologically minimalist. It detects intelligence without speculating about the nature of the intelligence." [FN25]

The two primary concepts of the intelligent design method are "irreducible complexity" and "specified complexity." The two are related, as the second refines and tightens the analysis of the first. "Irreducible complexity" was set forth and argued by biochemist Michael Behe in 1996 in Darwin's Black Box. [FN26] As summarized in a recent work by William Dembski and Jonathan Wells, Behe's argument was not only that Darwinian theory fails to explain the origin of complex molecules inside of cells, but also that the complex molecules inside of cells must have come about by design. [FN27] Both of these arguments were supported by Behe's concept of irreducible complexity. Behe asserts that: "A functional system ***551** is irreducibly complex if it contains a multipart subsystem (i.e., a set of two or more interrelated parts) that cannot be simplified without destroying the system's basic function." [FN28]

One of the irreducibly complex biological systems that Behe studied and described was the bacterial flagellum. Its complexity, as described by Dembski and McDowell, is such that it cannot function if one of its parts is missing:

> [T]he flagellum is like an outboard motor that powers a boat through the water. It spins a whip-like tail to propel certain bacteria through their watery environments. . . . The flagellum spins at many thousands of revolutions per minute (its motor can reach 100,000 rpm) and can change its direction in a quarter turn.
>
> . . . .
>
> . . . [T]he flagellum has multiple interdependent parts that are each necessary for its function. The intricate machinery of the flagellum includes a rotor, a stator, O-rings, bushings, mounting disks, a drive shaft, a propeller, a hook joint for the propeller, and an acid-powered motor. Not only are all these multiple parts absolutely essential for the operation of the flagellum, but its intricate machinery also requires the coordinated interaction of roughly 30 proteins, which in turn require about 20 proteins to direct their assembly. The absence of any one of them would cause the flagellum to cease functioning. [FN29]

Behe's inference that irreducible complexity cannot be explained by natural selection was as follows:

> An irreducibly complex system cannot be produced . . . by slight successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition nonfunctional. . . . Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually it would have to ***552** arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on. [FN30]

As Dembski explains, the complex proteins in systems such as the bacterial flagellum are "beyond what natural selection can muster in a single generation." [FN31] Then, if such a system could not have been produced randomly by natural selection, a second logical inference from the evidence of irreducible complexity is that the system was produced non-randomly, by design. This inference does not begin with any presupposition about the origin of the flagellum; it begins with evidence of the characteristics of the flagellum and draws an inference from that evidence. Intelligent design is properly characterized as a method that does not begin with presuppositions, but begins with data. [FN32]

"Specified complexity" is a systematic criterion for justifying an inference of intelligent design. Dembski summarizes this criterion as follows: "[w]hen intelligent agents act, they leave behind a characteristic trademark or signature known as specified complexity. By recognizing this feature, we can distinguish intelligently designed objects from those that are the result of unintelligent natural forces." [FN33] The criterion not only takes into account the complexity of a system, but it also provides an "explanatory filter" that sufficiently eliminates the possibilities that even a complex system arose by "necessity" (the latter is also called "law") or by chance. [FN34] For example, a complex rock formation could have arisen by chance. A complex ice crystal arises by law or necessity, that is, the laws governing the properties of water, and although those laws may have been designed, the crystal itself is not designed in the sense that an engineer designs a structure. [FN35]

The explanatory filter requires that three things be established in order to infer design: contingency, complexity and specification. [FN36] Dembski has described the purpose of these three things as follows:

> ***553** Contingency ensures that the object in question is not the result of an automatic and therefore unintelligent process [necessity or law] that had no choice in its production. Complexity ensures that the object is not so simple that it can readily be explained by chance. Finally, specification ensures that the object exhibits the type of pattern characteristic of intelligence. [FN37]

The explanatory filter thus applies probability theory in a systematic way to the observable data, in order to sufficiently eliminate other possible explanations for the apparent design of a system, and to provide a basis for a legitimate inference that the system was intelligently designed. The method sufficiently eliminates law and chance as the cause, then infers design as the cause. [FN38]

As the foregoing discussion shows, the writings of Michael Behe and William Dembski together explicate the theory of intelligent design. According to Behe, "irreducible complexity" constitutes evidence of intelligent design. That is, if the observer takes note of a system of interrelated parts, where removal of one part would destroy the system's basic function, that system can be described as irreducibly complex. An irreducibly complex system could not come about by slight successive modifications of a hypothetical precursor system, because that precursor system, missing at least one essential part, would be dysfunctional. It is a logical inference, then, that an irreducibly complex system must have come about by design.

Dembski's explanatory filter complements the irreducible complexity concept. The explanatory filter is a path of analysis requiring the observer systematically to eliminate chance and necessity as likely causes of a complex system's existence or development. The filter then permits the observer to analyze the pattern of com-

plexity in the system, and if that pattern of complexity exhibits certain characteristics of intelligence (specified complexity), to infer design.

One writer has thus summarized intelligent design theory as follows:

> [I]ntelligent design theorists have argued that many cases of complex specified information in nature, of which irreducible complexity is but one example, point to intelligent design. The basic idea, an application of probability and statistical theory, is ***554** that intelligent agency can be detected when an improbable (i.e., complex) outcome conforms to a pattern (i.e., specification). [FN39]

The propositions of a logical syllogism in intelligent design theory would proceed as follows:

> (1) High information content (or specified complexity) and irreducible complexity constitute strong indicators or hallmarks of past intelligent design.
>
> (2) Biological systems have a high information content (or specified complexity) and utilize subsystems that manifest irreducible complexity.
>
> (3) Naturalistic mechanisms or undirected causes do not suffice to explain the origin of information (specified complexity) or irreducible complexity.
>
> (4) Therefore, [intelligent] design theory constitutes the best explanation for the origin of information and irreducible complexity in biological systems. [FN40]

Thus, specified complexity and irreducible complexity work together to support an inference of design in biological systems. The exhibition of characteristics of intelligence known as specified complexity, and the existence of a type of complexity that could not be assembled by gradual permutation (irreducible complexity), are the fundamental criteria, or rules, of intelligent design theory.

IV. A Description of Tort Causation Theory

In a cause of action for a tort, the plaintiff must show a connection between the defendant's wrongful conduct and the injury that the plaintiff suffered. The method of demonstrating such a connection is to prove that the defendant's conduct was a “cause-in-fact” of the injury. The classic test of cause-in-fact, known as the “but for” or “sine qua non” rule, is that “the defendant's conduct is a cause of the event if the event would not have occurred but for that conduct; conversely, the defendant's conduct is not a cause of the event, if the event would have occurred without it.” [FN41] In ***555** certain situations, as when the conduct of two actors combines to bring about a harm and the conduct of either of them alone would have caused it, the “but for” rule would unjustly excuse both actors. In such situations, courts will apply a broader rule, the “substantial factor” rule, which states that “the defendant's conduct is a cause of the event if it was a material element and a substantial factor in bringing it about.” [FN42]

The plaintiff has the burden of proof on the issue of cause-in-fact, which means that the plaintiff must persuade the trier of fact by a preponderance, or the greater weight of the evidence, that the defendant's conduct caused the plaintiff's injury. Thus, “plaintiff must introduce evidence which affords a reasonable basis for the conclusion that it is more likely than not that the conduct of the defendant was a cause in fact of the result.” [FN43] Notably, the plaintiff does not have to eliminate all other possibilities for the cause of the injury; the plaintiff need only present sufficient evidence that the defendant's conduct was more likely than not a cause. The plaintiff is not required to eliminate all “possibility that the defendant's conduct was not a cause.” [FN44] According to the Restatement:

> It is enough that [plaintiff] introduces evidence from which reasonable men may conclude that it is more probable that the event was caused by the defendant than that it was not. The fact of causation is incapable of mathematical proof, since no man can say with absolute certainty what would have occurred if the defendant had acted otherwise. [FN45]

The trier of fact infers causation by examining the evidence in light of the way things ordinarily happen in the observable world. One court observed that: "Courts, in such matters, consider the natural and ordinary course of events, and do not indulge in fanciful suppositions." [FN46] Further, it is common knowledge as to how things ordinarily happen that generally ***556** guides the inquiry into cause-in-fact. Keeton and Prosser explain that, "If as a matter of ordinary experience a particular act or omission might be expected, under the circumstances, to produce a particular result, and that result in fact has followed, the conclusion may be permissible that the causal relation exists." [FN47] Underlying the cause-in-fact inquiry, then, is an understanding that laypersons serving as jurors are capable of making inferences about causation based on how events usually happen. Richard W. Wright further observes that:

> An inference is based on some concept of how things generally happen-that is, on causal generalizations. Causal generalizations incorporate the belief that the cause is in some sense necessary for the occurrence of the consequence. The but-for test is simply the means by which we determine whether this element of necessity exists in the particular case. [FN48]

Thus, laypersons, armed with an understanding of how events generally happen, use a rule or test to decide what most likely happened in a particular instance.

Where common knowledge is inadequate to reveal to the trier of fact the way things ordinarily happen, expert testimony may supply that knowledge. Tort principles of law dictate that: "Circumstantial evidence, expert testimony, or common knowledge may provide a basis from which the causal sequence may be inferred." [FN49] Thus, even when the knowledge necessary to infer causation is beyond the ken of the trier of fact, that knowledge may be supplied by appropriate expertise, and the trier of fact may proceed with its task of drawing inferences from the available evidence.

Tort law clearly acknowledges that in the proof of causation, post hoc does not mean propter hoc, that is, the mere fact that one event follows another event does not establish a cause-effect relationship between the two events. [FN50] Nevertheless, where the probabilities weigh in favor of causation, the plaintiff's proof suffices. A Louisiana court summarized this principle stating that:

> Where the negligence of the defendant greatly multiplies the chance of accident to the plaintiff, and is of a character naturally leading to its occurrence, the mere possibility that it might have ***557** happened without the negligence is not sufficient to break the chain of cause and effect between the negligence and the injury. [FN51]

This distinction between probability and possibility is the dividing line between sufficient evidence and insufficient evidence of cause-in-fact. Professor Malone observed that:

> Whenever the judge has concluded that the showing on the issue of cause is not sufficient to warrant a submission to the jury, he is likely to emphasize that there is a sharp distinction between a 'mere possibility' and a showing of 'probability' or 'reasonable probability.' The evidence must do more than leave the matter 'in equilibrio.' [FN52]

Thus, the resolution of the issue of cause-in-fact in tort cases is integrally related to probability. As the trier of fact weighs the evidence, the trier must determine whether the evidence makes it more probable than not that,

without defendant's negligence, the plaintiff's injuries would not have occurred.

Once cause-in fact is established, courts may limit liability by applying the concept of “proximate cause” or “legal cause.” “Proximate cause” has to do with “setting the limits beyond which the courts will not look in the attempt to trace the connection between a given cause and a given effect.” [FN53] Two theories of proximate causation have developed. One is that liability is limited to the scope of foreseeable risks. The other is that liability is limited to direct consequences of an action, as well as to indirect consequences that are foreseeable. [FN54] The basic principle of proximate ***558** causation is that actors are not liable for every conceivable and perhaps remote result of their actions-a principle of fairness and common sense.

One rule of proximate causation is that of the superseding intervening cause. An intervening cause is a new and somewhat independent force that comes into operation after the negligence of the defendant and contributes along with defendant's negligence to produce the result. [FN55] The intervening cause does not relieve the defendant of liability if it is “foreseeable,” that is, if it is “a significant part of the risk involved in the defendant's conduct, or is so reasonably connected with it that the responsibility should not be terminated.” [FN56]

An intervening cause is identified as a superseding intervening cause, which relieves the defendant of responsibility, where it is unforeseeable or outside the risk created by the defendant. Courts consider a number of factors in determining whether an intervening force is a superseding cause; among them are the fact that the intervention brings about harm different in kind from that expected by the defendant's negligence, the fact that the intervention is extraordinary, and the fact that the intervention is operating independently of the situation created by the defendant's negligence. [FN57]

A special example of intervening cause analysis occurs with regard to an extraordinary force of nature that comes into operation after the defendant's conduct. Tort law distinguishes between forces that merely increase or intensify the expected results of defendant's conduct and forces that are somewhat more independent of defendant's conduct. As to the former, the Restatement indicates that “[t]he extraordinary operation of a force of nature, which merely increases or accelerates harm to another which would otherwise have resulted from the actor's negligent conduct, does not prevent the actor from being liable for such harm.” [FN58] As to the latter, the Restatement indicates that:

> [a]n intervening operation of a force of nature without which the other's harm would not have resulted from the actor's negligent ***559** conduct prevents the actor from being liable for the harm, if (a) the operation of the force of nature is extraordinary, and (b) the harm resulting from it is of a kind different from that the likelihood of which made the actor's conduct negligent. [FN59]

The tort doctrine of res ipsa loquitur (“the thing speaks for itself”) contains a rule of circumstantial evidence permitting an inference of negligence from the mere occurrence of an event, provided that certain requirements are met. The requirements are: (1) the event that occurred has the characteristics of an event that ordinarily does not happen without negligence; (2) the instrumentality that caused the event was under the control (or management) of the defendant; and (3) other potential causes, such as the negligence of the plaintiff, are reasonably eliminated. [FN60] The considerations of causation implicit in the first and third of these requirements bring this doctrine within a discussion of the inferences of causation made in tort law.

V. Comparisons Between Intelligent Design Theory and Tort Theory

The analytical process in intelligent design theory is similar to that in tort causation theory in that inferences

are made about causes using certain rules of logic. [FN61] In both methods of analysis, the form of analysis is neutral as to possible causes and does not specifically exclude supernatural causes. [FN62] In intelligent design theory, one may infer the existence of an intelligent designer of an organism where there is sufficient evidence of irreducible complexity in the organism, or where the organism stores and passes on significant or detailed information. [FN63] In tort causation theory, one may infer that an event, such as the negligence of an actor, caused a harm ***560** where there is sufficient evidence that "but for" that event, the harm would not have occurred. [FN64]

Intelligent design theory looks at what has happened (the existence of an organism with certain characteristics) and asks whether it could have been produced absent an intelligent designer. [FN65] Tort causation theory, using the "but for" test, looks at what has happened and compares it to what would have happened if the defendant had not been negligent. [FN66] In this sense, the reasoning process in intelligent design theory is closely akin to the "but for" test in tort causation theory. Both theories examine a past event and determine whether it could have occurred without a certain antecedent act. Both theories use a test or rule to eliminate causes and to determine the likelihood that a particular act produced a given result.

A. Probability Theory Controls the Drawing of Inferences in Both Methods of Analysis

In intelligent design theory, the more irreducible complexity there is in the structure of an organism, the more probable it becomes that it was intelligently designed, and the less probable it becomes that it came about by chance. [FN67] Further, the more complex and detailed are the information pathways in an organism, the more probable it becomes that it was intelligently designed, and the less probable it becomes that it happened by chance. [FN68]

The explanatory filter of the specified complexity criterion forces the investigator to sufficiently eliminate one by one the possible explanations for the existence of a living organism or system, other than design. If the other explanations are not sufficiently eliminated, the analysis stops. [FN69] The filter thus is a meaningful way to sort out and eliminate putative causes that ***561** may appear to have a causal connection with an event but do not actually have such a connection.

First, at the contingency step of the analysis, the investigator must sufficiently eliminate the likelihood that the organism or system came about by an automatic and therefore unintelligent process (necessity). [FN70] Second, at the complexity step of the analysis, the investigator must sufficiently eliminate the likelihood that the organism came about by chance. [FN71] Third, at the specification step of the analysis, the investigator must be able to say that the object exhibits the type of pattern characteristic of intelligence. [FN72] Once these steps are satisfied, the best explanation for the organism's characteristics is design. [FN73]

The above three-step analysis of the specified complexity criterion requires that the data satisfy a strict standard in order to reach a conclusion of intelligent design. Once the specified complexity criterion is satisfied, the evidence (or data) weighs heavily in favor of the design inference, and it is highly probable that the organism was intelligently designed. [FN74] The explanatory filter, therefore, systematically examines and eliminates putative causes in intelligent design theory.

In causation theory, in the proof of "cause-in-fact," the stronger the connection between an act and a harm, the more probable it becomes that the act was a cause of the harm. [FN75] The more compelling the evidence that "but for" the act the harm would not have occurred, or in certain types of cases that the act was a

"substantial factor" in producing the harm, the more probable it becomes that the act was a cause of the harm. [FN76] If the trier of fact (judge or jury) can say that it is more probable than not (or more likely than not) that the act caused the harm, then the trier of fact is justifiably ***562** persuaded that the act was a cause-in-fact of the harm. [FN77] This requirement that the proof show that the causal connection is more probable than not is integrally related to the standard of proof in a civil case: the trier of fact must be persuaded by a preponderance of the evidence, that is, the greater weight of the evidence. [FN78]

In determining whether it is more likely than not that a negligent act caused a harm, courts weigh the evidence in the light of generally known facts as to how things happen, such as generally known principles of force and speed. For example, where a train and car collided at a railroad crossing, and the train's engineer had been negligent in driving at thirty-seven miles per hour instead of twenty-five miles per hour, the survivors of the passenger who was killed in the collision failed to prove cause-in-fact under the "but for" test. [FN79]

The evidence was that, as the train approached the intersection, its brakeman and fireman saw the car emerge from behind a warehouse, which blocked the view, and that they immediately alerted the engineer, who applied the brakes. The train struck the automobile and carried it approximately 1250 feet beyond the crossing. The train was very close to the crossing at the moment when the car was sighted (between thirty and sixty feet). [FN80] Although no evidence was given of typical stopping distances at various speeds, the evidence that the train carried the car well beyond the crossing tended to show that the train could not have stopped before reaching the crossing even at twenty-five miles per hour. [FN81] The plaintiff could not show that it was more probable than not that, "but for" the train's excessive speed, the train would not have struck the car and the passenger would not have died. [FN82] The "but for" test, with the preponderance standard underlying it, thus operated in Perkins as a filter to eliminate a negligent act as a cause of an event.

***563** Thus, the explanatory filter of intelligent design analysis and the "but for" test of tort causation analysis each provide a meaningful way in their respective disciplines to sort out and eliminate putative causes that may appear to have a causal connection with an event, but do not actually have such a connection.

The "substantial factor" test has been used to narrow the field of putative causes in cases in which the absence of reasonably expected medical care significantly lessened a plaintiff's decedent's chance of survival. Thus, when after negligent delay in treatment in a hospital emergency room decedent perished from a heart attack, and medical testimony was to the effect that decedent would have had a seventy-five percent chance of survival if the delay had not occurred, the court found that the negligence of emergency room personnel was a substantial factor in the decedent's death. [FN83] A negligent delay in diagnosis of lung cancer that reduced a decedent's chance of survival was a substantial factor in producing losses related to the reduced chance of survival. [FN84]

Such cases are closely related to another factual situation, in which a decedent perished by drowning in the absence of an expected protective precaution. [FN85] In these cases, the failure to treat, failure to diagnose, or failure to provide protection becomes a cause-in-fact when the failure sufficiently decreases chance of survival, because other conditions that might have produced death are sufficiently eliminated as likely causes.

Although such cases elude mathematical certainty, courts are able to apply causation theory to more difficult causation inquiries such as these, where the tools of analysis legitimately narrow the field. Similarly, in intelligent design theory, scientists are able to apply the tools of irreducible complexity and specified complexity to narrow sufficiently the field of putative causes, by systematically eliminating the inferences other than design.

When tort causation theory is applied to scientific evidence of the effects of drugs and toxic substances, the "more probable than not" requirement may be expressed as a statistical standard. In Daubert v. Merrell Dow Pharmaceuticals, Inc., the court determined that epidemiological evidence of the incidence of birth defects in children exposed in utero to Bendectin would not suffice to prove cause-in-fact. [FN86] The evidence failed to ***564** demonstrate that there was a greater than 2:1 incidence of birth defects in the children exposed to the drug than in the general population. [FN87] A ratio of greater than 2:1 would have made it more probable than not that Bendectin caused the birth defects in those who ingested it. [FN88]

Tort theory is well suited to inquiries involving statistical evidence. The preponderance standard adapts flexibly to numerical expressions of "more probable than not." Similarly, intelligent design theory, which is a type of probability theory, is well-suited to the use of statistical data and numerical expressions to analyze causation questions in regard to biological systems. [FN89]

B. Human Experience as to What Ordinarily Supports an Inference of Causation is Part of the Knowledge Base of Both Methods of Reasoning

A guiding principle in the drawing of inferences in legal reasoning generally is that the logical connection between a known fact and a conclusion is supported by human experience. As a text on logic in the law observes, "The key to a logical inference is the reasonable probability that the conclusion flows from the evidentiary datum because of past experiences in human affairs." [FN90]

In the determination of cause-in-fact in tort cases, the trier of fact reasons from a knowledge base which includes common knowledge as to the way things ordinarily happen. For example, where a railroad company negligently failed to provide a lighted stairway for passengers to exit from the train in darkness and a passenger fell attempting to descend the unlighted stairway, the court was not persuaded by an argument to the effect that the passenger, a "corpulent woman," might have fallen even if it had been daylight. [FN91] The court, in concluding that the negligent failure to provide a lighted stairway was the cause of the fall, stated:

> Where the negligence of the defendant greatly multiplies the chances of accident to the plaintiff, and is of a character naturally leading to its occurrence, the mere possibility that it might have ***565** happened without the negligence is not sufficient to break the chain of cause and effect between the negligence and the injury. [FN92]

The court concluded with a statement evincing the practicality of the causation inquiry in tort law: "The whole tendency of the evidence connects the accident with the negligence." [FN93]

When the knowledge base of the trier of fact in a tort case does not include specialized information that is necessary for a determination of causation, as in a case of medical malpractice, tort law utilizes expert testimony to provide the requisite specialized information, so that the trier of fact can make the proper inference about causation. [FN94] In other words, the expert testimony raises the lay persons' knowledge to the level needed for the factual determination of causation.

Similarly, intelligent design theory draws on common human experience as to what constitutes a rational basis for making an inference of design. William Dembski asserts that "[i]ntelligent design formalizes and makes precise something we do all the time. All of us are all the time engaged in a form of rational activity which . . . can be described as 'inferring design.'" [FN95] In intelligent design theory, when the knowledge base of the student of natural science does not include enough information to reach a conclusion about causation, sci-

entists with expertise in biological systems can give evidence as to the detailed complexity in an organism. [FN96] Experts trained in probability theory can provide evidence as to the likelihood of an organism's having a certain identifiable level of complexity purely by random natural processes, and the likelihood, in the alternative, that the level of complexity is attributable to intelligent design. [FN97] At that point, the student of natural science should have the level of knowledge needed to make inferences about causation.

***566** C. Both Methods of Reasoning Are Able To Tolerate Some Measure of Uncertainty as Long as the Inquirer Does Not Compromise the Rules of Logic That Govern the Inquiry

Tort causation theory does not aim for complete certainty in assigning responsibility for a harm. As Professor Glannon observes, “Although we can never achieve certainty about cause in fact, the jury can usually make a reasoned judgment as to whether the negligence contributed to the outcome.” [FN98] The preponderance standard, permitting the trier of fact to be persuaded by the greater weight of the evidence, contains by definition an allowance for some uncertainty. [FN99] There is in tort causation theory, therefore, a tolerance of some unresolvable uncertainty as long as rules of logic are applied. In scientific theory as well, there is tolerance of necessary uncertainty as long as rules of reasoning are consistently applied. Intelligent design theory permits an inference of design where the inquirer detects irreducible complexity and/or informational pathways. [FN100] It does not require absolute certainty as to its conclusion. Nor does natural science, generally. Where science is investigating the origin and development of living organisms, it presumably cannot aim for complete certainty, as there is no direct evidence available as to the causes of this origin and development.

D. Both Theories Allow For and Explain the Intervention of Extraordinary Causes in a Sequence of Events That May Contain Less Extraordinary Causes

In a tort case, an extraordinary force of nature, also referred to as an “act of God,” may arise unexpectedly and intervene in a situation already created by a human actor's negligence. [FN101] Tort law has developed rules to determine the effect of the extraordinary force of nature on the liability of the human actor. [FN102] Restatement Section 451 provides that:

> ***567** [a]n intervening operation of a force of nature without which the other's harm would not have resulted from the actor's negligent conduct prevents the actor from being liable for the harm, if (a) the operation of the force of nature is extraordinary, and (b) the harm resulting from it is of a kind different from that the likelihood of which made the actor's conduct negligent. [FN103]

The logic of the “different harm” requirement in Restatement 451 is that the occurrence of a harm different in kind from that threatened by the original actor's negligence must mean that the extraordinary force of nature took over the chain of events and altered the events in a very significant way, and that this alteration should relieve the original actor of liability. [FN104] Even though the harm would not have occurred “but for” the original actor's negligence and that negligence is therefore a “cause-in-fact” of the harm, the original actor's negligence is not the proximate cause of the harm and therefore the original actor is not responsible. [FN105]

The rule of Section 451, relieving the human actor where an extraordinary force of nature has produced a different kind of harm and thus has taken over the chain of events, is helpful in understanding intelligent design theory, where “intelligent causes are necessary to explain the complex, information-rich structures of biology.” [FN106] Just as evidence in a tort case may show that an extraordinary force of nature took over a sequence of events that was begun by human activity, so also evidence of irreducible complexity and informational pathways

in an organism may show that the activity of an intelligent designer was part of a sequence of events in which there were also natural causes, and may even show that the intelligent designer became the operative cause of an organism's existence and characteristics. [FN107]

E. The Tort Doctrine of Res Ipsa Loquitur, a Rule of Circumstantial Evidence Pertaining to the Proof of Negligence, Contains Reasoning Similar to That of Intelligent Design Theory

Res ipsa loquitur ("the thing speaks for itself") is a rule of circumstantial evidence, allowing a jury to infer negligence from the circumstances of an ***568** injury-causing event. [FN108] In an early well-known case, a barrel of flour fell from a window above the defendant's shop (the defendant being a dealer in flour), injuring the plaintiff. [FN109] There was no evidence specifically to connect the defendant or the defendant's employees with the barrel of flour. [FN110] The court, in ruling for the plaintiff, used the principle that the accident itself (the falling of the flour barrel) was evidence of negligence. [FN111] The court reasoned that a barrel does not roll out of a warehouse without some negligence, and further, that the barrel was in the custody of the defendant and the defendant's servants had control of the barrel. [FN112]

Following the reasoning of Byrne v. Boadle, courts have developed a test for determining whether a negligence case may be submitted to a jury with a res ipsa loquitur instruction, allowing the jury to infer negligence from the event itself, absent any other evidence of negligence. The test has been stated as follows:

> [W]here the thing [causing injury] is shewn to be under the management of the defendant or his servants, and the accident is such as in the ordinary course of things does not happen if those who have the management use proper care, it affords reasonable evidence, in the absence of explanation by the defendants, that the accident arose from want of care. [FN113]

The phrase "the accident is such as in the ordinary course of things does not happen if" bespeaks a species of causation analysis.

Similarly, in intelligent design theory, the inquirer observes and studies a living organism. When the inquirer detects a high level of irreducible complexity and/or a system for storing and transferring information, the inquirer reasons that these characteristics do not ordinarily occur absent an intelligent designer. [FN114] This reasoning closely resembles analysis under the res ipsa loquitur doctrine, in which a court reasons that an occurrence is the ***569** type of event that does not ordinarily occur without negligence. [FN115] The design inquirer will also consider whether random natural sequences can be sufficiently eliminated as causes, using probability theory. [FN116] The latter part of the inquirer's reasoning in intelligent design analysis closely resembles the analysis under the res ipsa loquitur doctrine, which requires that other responsible causes be sufficiently eliminated by the evidence. [FN117]

F. Both Theories Are Neutral as to Whether a Cause Is Natural or Supernatural

Intelligent design theory simply has criteria from which a legitimate inference of "intelligent design" can be made. It does not start with any assumption about intelligent design; rather, it starts each inquiry with observations and data. [FN118] Buckles argues that intelligent design is "consistent with nonexclusionary methodological naturalism." [FN119] He explains further:

> [N]onexclusionary methodological naturalism is committed only to the assumption that a natural ex-

> planation may explain a given natural phenomenon. As scientific inquiry proceeds, along the way the evidence may suggest that a nonnatural explanation better accounts for a natural phenomenon than a purely naturalistic explanation. It is at this point that intelligent design theorists are free to make their case. Intelligent design can be understood as the articulation of the inference of a nonnatural explanation for scientific evidence gathered through the scientific process guided by nonexclusionary methodological naturalism. In other words, intelligent design can be understood as one "inferential phase" in the long process of scientific inquiry. Because the scientific inquiry is committed to nonexclusionary methodological naturalism, intelligent design is ***570** not necessarily the final phase of the process. New evidence may later surface to negate the inference that a natural cause alone cannot plausibly explain the researched phenomenon. [FN120]

Tort law has criteria from which inferences about causation can be made. It does not start with any assumption about the identity of a cause of a harm. Rather, it starts its inquiry with the available evidence. [FN121] The purpose of the inquiry is to determine whether the defendant named in the complaint is the cause of the harm alleged; therefore, its focus is generally on the conduct of human actors. [FN122] But, because it allows for extraordinary forces of nature as possible causes, it makes room for non-human causes along the way in its inquiry. [FN123] If the evidence were to point to a non-natural cause, there would be nothing in the method of reasoning to prevent that inference.

VI. Applications of the Similarities Between Tort Theory and Intelligent Design Theory: Intelligent Design Employs a Time-Tested Method

Tort rules of cause-in-fact have been refined over many centuries by judges and juries. The rules, which provide a method for inferring factual causation, are well-grounded in common sense and logic. They have stood the test of time. As such, these rules may provide a universal form of reasoning as to causation that would be helpful in any discipline, including the natural sciences. Tort rules on proximate causation, such as the rules for intervening forces of nature, demonstrate that extraordinary forces of nature may supersede human negligence as legal causes. [FN124] Other tort rules, such as the res ipsa loquitur doctrine, demonstrate that it is acceptable to draw inferences based on strong circumstantial evidence. [FN125]

Intelligent design analysis, although it is a relatively new science, follows much the same form of reasoning as does traditional tort law, that ***571** is, drawing inferences about causation from empirical evidence using rules that clearly define what constitutes acceptable empirical evidence (irreducible complexity and informational pathways). [FN126] Thus, intelligent design may have already passed muster by conforming to a well-established method of reasoning.

Furthermore, juries for centuries have decided the issue of causation in the law by weighing the evidence in light of the preponderance standard. Students and proponents of intelligent design make inferences about causation in science by the use of an explanatory filter-a strict method of eliminating alternate possible causes of complexity. The explanatory filter can be viewed as intelligent design's method for weighing the evidence. Its rigor compares well to the preponderance standard used in tort law. This favorable comparison also bolsters the worthiness and credibility of the methodology of intelligent design.

VII. An Analogy to Tort Causation Theory Exposes One of the Weaknesses of the Primary Competitor of Intelligent Design, Naturalistic Evolution

Dembski, in a critique of scientific naturalism, and specifically its insistence that "science" does not and should not consider any causes except natural and material ones, labels its reasoning as "circular" or "begging the question." [FN127] Dembski describes the path of reasoning of naturalistic thinkers as follows:

> (1) "Science" by definition excludes everything except the material and the natural;
> (2) This exclusion rules out intelligent design as a scientific theory;
> (3) This exclusion then ensures that the answer to the question "how did life originate and develop?" will be answered solely naturalistically;
> (4) Thus, naturalistic evolution is the only logical answer to the question of how life originated and developed, even if the evidence in support of it is weak. [FN128]

***572** The exclusion of a set of possible causes, if applied to the analysis of a causation question in tort law, could radically affect the outcome of tort lawsuits in an absurd way.

Consider a hypothetical, but typical, tort causation question. Driver, driving an automobile, saw a child in the street ahead of him. Driver did not apply the brakes. Driver's automobile struck the child, injuring the child. Based on the distance between the automobile and the child, and on expert testimony about the stopping distance at the speed at which Driver was driving, Driver could have avoided striking the child by applying the brakes immediately upon seeing the child. Assuming Driver breached a standard of care and was therefore negligent in his failure to apply the brakes after seeing the child in the street, was Driver's negligence the cause of the child's injury?

Ordinarily, the question would be answered by a jury's determination as to whether the injury would not have happened "but for" the negligent failure to apply the brakes. On the facts given, a jury would likely decide that the driver's negligence caused the injury. Consider, however, what would happen if the definition of "cause" were structured quite differently, to exclude as causes everything except physical forces, thus excluding human actions or human failures to act. The reasoning might go as follows:

> (1) "Causation" by definition excludes all causes except physical forces (even when a human act, such as failure to apply brakes, has contributed to a physical force such as that of a car hitting a child, the cause, by definition, will be simply the physical force); [FN129]
> (2) This exclusion rules out human actions as causes;
> (3) This exclusion ensures that the question of the cause of an injury will be answered without reference to human responsibility and solely based on a chain of physical forces;
> ***573** (4) Thus, the driver's act of failing to apply brakes is logically not a "cause" of the child's being struck by the car and the driver is not responsible.

Judge Aldisert describes "Begging the Question" (also known as "Petitio Principii") in his discussion of logical fallacies as follows:

> This fallacy is really a first-class rascal because it sneaks up on us so often. It is a species of question-begging that assumes as true what is to be proved. It is to assume the truth of what one seeks to prove in the effort to prove it. The rascal bears many names, petitio principii, arguing in a circle, circular reasoning, putting the bunny in the hat, failing to prove the original proposition asserted and using the original premise as proof of itself. [FN130]

If indeed the theory of naturalistic evolution has tolerated a logical fallacy at its root, then the traditional canons of logic should be brought to bear on that theory in order to expose the fallacy. If the exclusion of intelligent design from the definition of "science" is a species of begging the question, then there is an error that must

be corrected.

VIII. Conclusion and Recommendation

The foregoing discussion demonstrates that intelligent design's analysis conforms to time-tested, logical methods for analyzing causation. The barrier typically interposed to the teaching of intelligent design is that it allows for consideration of supernatural causes. However, because the mere allowance for intelligent supernatural causes does not compromise the strength and integrity of its method, there is no sound reason to exclude intelligent design from the teaching of science.

In the inquiry into origins of life, intelligent design theory should be granted an equal footing with naturalistic evolution and allowed to proceed on its own merits. A jury in a tort case is permitted to consider all possible causes before drawing an inference of causation and rendering its verdict. Students of natural science should be permitted to consider all possible causes of the existence of living organisms before making inferences as to the cause of their existence.

If the scientific community excludes a valid and helpful form of analysis from its work, that form of analysis and its benefits are lost to the scientific community and to the culture generally. It would breathe life into our ***574** culture to recognize intelligent design as a valid and helpful method of analysis and to permit it to flourish.

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[FN1]. See Kitzmiller v. Dover Area Sch. Dist., 400 F. Supp. 2d 707, 708-11 (M.D. Pa. 2005). The Kitzmiller decision is discussed infra Part II. Footnote 14, infra, contains a quotation of the statement regarding intelligent design which gave rise to the controversy in Kitzmiller. For examples of press coverage of the Kitzmiller case, see Lisa Anderson, Intelligent Design Fails Federal Test; Judge's Ruling Called Landmark, The Record (Bergen County, N.J.), Dec 21, 2005, at A18, available at 2005 WLNR 20708891; Michael Powell, Judge Rules Against “Intelligent Design”: Dover, Pa., District Can't Teach Evolution Alternative, Wash. Post, Dec. 21, 2005, at A1, available at 2005 WLNR 20804592.

See also Selman v. Cobb County Sch. Dist., 390 F. Supp. 2d 1286 (N.D. Ga. 2005) (vacated and remanded, 449 F.3d 1320 (11th Cir. 2006)) (controversy arose concerning school district's requirement to place on biology textbooks a sticker proclaiming evolution to be a theory, not fact). For examples of press coverage in various communities of the teaching of intelligent design and other alternatives to evolution, see Bill to Promote Intelligent Design Talk Fails, Tulsa World, Feb. 16, 2009, available at 2009 WLNR 3039065 (defeat of bill that would have required that “no student in any public school . . . shall be penalized . . . because the student may subscribe to a particular position on scientific theories”); James C. McKinley, Jr., Split Outcome in Texas Battle on Teaching of Evolution, N.Y. Times, Jan. 24, 2009, at A11, available at 2009 WLNR 1406654 (Texas Board of Education's decision to end a 20-year policy requiring science teachers to “explore with their students the ‘strengths and weaknesses' of all theories,” but adopting a specific requirement that science teachers inform students concerning certain aspects of the fossil record that do not support “the idea of species changing over time”); Will Sentell, Creationism Ban Stripped from Rules, Baton Rouge Advocate, Jan. 14, 2009, at A1, available at 2009 WLNR 747047 (Louisiana Board of Education contemplating and expected to approve regulations that would remove language prohibiting use of materials that teach creationism or intelligent design); Peter Slevin, Kansas Education Board First To Back “Intelligent Design”: Schools To Teach Doubts About Evolutionary Theory,

Wash. Post, Nov. 9, 2005, at A1 (indicating that state standards mention a “lack of adequate natural explanations for the genetic code”).

For examples of articles supporting and critiquing intelligent design theory, see Bob Allen, Intelligent Design Renews Debate Between Science and Religion, The Baptist Standard, Feb. 6, 2009, available at http://www.baptiststandard.com/index.php?option=com_content&task=view& id=9132&Itemid=53; Dan Falk, A Pseudoscientific Challenge to Evolutionary Theory-“Intelligent Design”-Is Raising Questions About the Origins of Life and Sparking Debate in Academia, Boston Globe, Oct. 21, 2001 (Magazine), at 16; Gregory S. Paul, Creationism in Denial, Wash. Times, Nov. 4, 2001, at B5, available at 2001 WLNR 386834; Philip S. Skell, The Dangers of Overselling Evolution, Forbes, Feb. 23, 2009; Robert M. Taylor, Science Can't Rule Out God's Role in Creation of Life, Columbus Dispatch (Ohio), Nov. 9, 2001, at 2D, available at 2001 WLNR 11915001.

[FN2]. See William A. Dembski, Intelligent Design: The Bridge Between Science and Theology 130 (1999) (“Complexity . . . here is a form of probability. . . . [T]o determine whether something is sufficiently complex to warrant a design inference is to determine whether it has sufficiently small probability [of occurring without design].”).

[FN3]. Id. at 47; see also infra Part III for a discussion of the requirements of complexity and specification.

[FN4]. William A. Dembski & Sean McDowell, Understanding Intelligent Design 122 (2008).

[FN5]. See infra Part IV for a discussion of tort causation theory.

[FN6]. See infra Part IV for a discussion of the preponderance standard and probability in regard to proof of causation in tort theory.

[FN7]. See, e.g., Johnny Rex Buckles, The Constitutionality of the Monkey Wrench: Exploring the Case for Intelligent Design, 59 Okla. L. Rev. 527 (2006); Kent Greenawalt, Establishing Religious Ideas: Evolution, Creationism, and Intelligent Design, 17 Notre Dame J.L. Ethics & Pub. Pol'y 321 (2003); Anthony Kirwin, Toto, I've a Feeling We're Still in Kansas? The Constitutionality of Intelligent Design and the 2005 Kansas Science Education Standards, 7 Minn. J.L. Sci. & Tech. 657 (2006); Casey Luskin, Alternative Viewpoints About Biological Origins as Taught in Public Schools, 47 J. Church & St. 583 (2005); Stephen L. Marshall, When May a State Require Teaching Alternatives to the Theory of Evolution? Intelligent Design as a Test Case, 90 Ky. L.J. 743 (2002); Jay D. Wexler, Darwin, Design, and Disestablishment: Teaching the Evolution Controversy in Public Schools, 56 Vand. L. Rev. 751 (2003); T. Mark Moseley, Comment, Intelligent Design: A Unique Perspective to the Origins Debate, 15 Regent U. L. Rev. 327 (2003).

[FN8]. Kitzmiller v. Dover Area Sch. Dist., 400 F. Supp. 2d 707 (M.D. Pa. 2005).

[FN9]. Id. at 735.

[FN10]. Dembski, supra note 2, at 120.

[FN11]. Merriam Webster's Collegiate Dictionary 1304 (10th ed. 1997) (using as example “a valid theory”).

[FN12]. Id. at 892.

[FN13]. The court in Kitzmiller confused validity and plausibility when it expressed doubt as to the “validity” of intelligent design theory, on the incorrect assumption that Michael Behe, one of the most notable proponents of

intelligent design, had stated that the validity of intelligent design theory rests on a belief in God. The court first indicated that Behe had claimed that "the plausibility of the argument for [intelligent design] depends upon the extent to which one believes in the existence of God." See Kitzmiller, 400 F. Supp. 2d at 720. The court then made a leap from Behe's statement about plausibility to its own statement to the effect that no other theory of origins bases its validity on a belief in God, without making any distinction between validity and plausibility.

[FN14]. The statement to be read was as follows:

> The Pennsylvania Academic Standards require students to learn about Darwin's Theory of Evolution and eventually to take a standardized test of which evolution is a part. Because Darwin's Theory is a theory, it continues to be tested as new evidence is discovered. The Theory is not a fact. Gaps in the Theory exist for which there is no evidence. A theory is defined as a well-tested explanation that unifies a broad range of observations. Intelligent Design is an explanation of the origin of life that differs from Darwin's view. The reference book, Of Pandas and People, is available for students who might be interested in gaining an understanding of what Intelligent Design actually involves. With respect to any theory, students are encouraged to keep an open mind. The school leaves the discussion of the Origins of Life to individual students and their families. As a Standards-driven district, class instruction focuses upon preparing students to achieve proficiency on Standards-based assessments.

Kitzmiller, 400 F. Supp. 2d at 708-09.

[FN15]. Id. at 735-46. The court indicated:

> [W]e will offer our conclusion on whether [intelligent design] is science not just because it is essential to our holding that an Establishment Clause violation has occurred in this case, but also in the hope that it may prevent the obvious waste of judicial and other resources which would be occasioned by a subsequent trial involving the precise question which is before us.

Id. at 735. It was not absolutely essential to undertake the task of reaching a conclusion as to whether intelligent design constitutes science; the court could have decided the case simply on the question of whether, under the first prong of Lemon v. Kurtzman, 403 U.S. 602 (1971), there was a secular purpose to the school division's policy to require reference to intelligent design.

[FN16]. Id. at 720 (citing Edwards v. Aguillard, 482 U.S. 578, 591-92 (1987); McLean v. Ark. Bd. of Educ., 529 F. Supp. 1255, 1265-66 (E.D. Ark. 1982)). The Supreme Court in Edwards characterized the view that a "supernatural creator was responsible for the creation of humankind" as a religious belief. Edwards, 482 U.S. at 592. The court in McLean had found that creation science "is simply not science" because it depends upon "supernatural intervention." McLean, 529 F. Supp. at 1267.

[FN17]. Dembski, supra note 2, at 123. The Aristotelian causes were rejected by Francis Bacon in favor of an inductive method that eliminated supernatural explanations and considered only natural explanations of events. See Anne Marie Lofaso, Does Changing the Definition of Science Solve the Establishment Clause Problem: Doing an End-Run Around the Constitution, 4 Pierce L. Rev. 219, 223-24 (2006). Charles Darwin is seen as a modern scientist in that his theories consider only natural explanations for phenomena. Id. at 230. However, an argument has also been made to the effect that Darwin's theory of natural selection actually takes into account all four Aristotelian causes. See Massimo Pigliucci, Design Yes, Intelligent No: A Critique of Intelligent Design Theory and Neo-creationism, Skeptical Inquirer, Sept. 2001, at 34, available at http://www.infidels.org/library/modern/features/2000/pigliucci1.html.

[FN18]. Dembski, supra note 2, at 123.

[FN19]. Id. at 106.

[FN20]. Id. at 105.

[FN21]. 21. Id. at 106.

[FN22]. 22. Id.

[FN23]. 23. Id.

[FN24]. 24. Id. at 107.

[FN25]. 25. Id.

[FN26]. 26. Michael Behe, Darwin's Black Box: The Biochemical Challenge to Evolution 39 (1996).

[FN27]. 27. William Dembski & Jonathan Wells, The Design of Life: Discovering Signs of Intelligence in Biological Systems 146 (2008).

[FN28]. Id.

[FN29]. 29. Dembski & McDowell, supra note 4, at 142.

[FN30]. Dembski, supra note 2, at 148 (quoting Behe, supra note 26, at 39).

[FN31]. Id.

[FN32]. See Moseley, supra note 7, at 337 (quoting David K. DeWolf et al., Teaching the Origins Controversy: Science, or Religion, or Speech?, 2000 Utah L. Rev. 39, 93).

[FN33]. Dembski & McDowell, supra note 4, at 102.

[FN34]. Id. at 106 (citing William A. Dembski, The Design Inference: Eliminating Chance Through Small Probabilities 19, 36 (1998); William A. Dembski, The Design Revolution 88 (2004)).

[FN35]. Id. at 105-06.

[FN36]. Dembski, supra note 2, at 128.

[FN37]. Id.

[FN38]. See Moseley, supra note 7, at 336-37.

[FN39]. Buckles, supra note 7, at 535-36.

[FN40]. Moseley, supra note 7, at 352 (citing Ronald L. Numbers, The Creationists: The Evolution of Scientific Creationism 95 (1993)).

[FN41]. W. Page Keeton et al., Prosser and Keeton on Torts 266 (5th ed. 1984). For classic discussions of cause-in-fact, see Wex S. Malone, Ruminations on Cause-in-Fact, 9 Stan. L. Rev. 60 (1956); Richard W. Wright, Causation in Tort Law, 73 Cal. L. Rev. 1735 (1985); Paul J. Zwier, “Cause in Fact” in Tort Law-A Philosophical and Historical Examination, 31 DePaul L. Rev. 769 (1982). For a treatment of causation generally, see H.L.A.

Hart and A. Honore, Causation in the Law (2d ed. 1985).

[FN42]. Id.; see, e.g., Anderson v. Minneapolis, 179 N.W. 45 (Minn. 1920). Two fires, one caused by the negligence of the defendant and one of unknown origin, merged and burned plaintiff's property. Either fire alone would have burned the property. Defendant's fire was found to be a cause of the damage under the "substantial factor" test. Given that the fire of unknown origin was strong enough to burn the property, the defendant could have unfairly escaped liability under the "but for" test by saying that the damage would have occurred even without his negligence. Id.

[FN43]. Keeton et al., supra note 41, at 269.

[FN44]. Id.

[FN45]. Restatement (Second) of Torts § 433B cmt. b (1965).

[FN46]. Reynolds v. Texas & Pac. Ry. Co., 37 La. Ann. 694, 697 (La. 1885).

[FN47]. Keeton et al., supra note 41, at 270.

[FN48]. Wright, supra note 41, at 1786.

[FN49]. Keeton et al., supra note 41, at 270 (emphasis added).

[FN50]. See, e.g., Kramer Service, Inc. v. Wilkins, 186 So. 625 (Miss. 1939).

[FN51]. Reynolds, 37 La. Ann. at 697.

[FN52]. Malone, supra note 41, at 68.

[FN53]. Atlantic Coast Line R.R. Co. v. Daniels, 70 S.E. 203 (Ga. Ct. App. 1911). A typical jury instruction on causation combines the "but for" concept of cause-in-fact with language that conveys the concept of the proximate cause limitation on liability for remote or unforeseeable consequences. See, e.g., Va. Model Jury Instructions (LexisNexis 2008), Instruction 5.000, "Definition of Proximate Cause" ("A proximate cause of an accident, injury, or damage is a cause which, in natural and continuous sequence, produces the accident, injury, or damage. It is a cause without which the accident, injury, or damage would not have occurred."). For classic discussions of proximate cause, see Bohlen, The Probable or the Natural Consequences as a Test of Liability in Negligence, 40 U. Pa. L. Rev. 79 (1901); see also Goodhart, The Unforeseeable Consequences of a Negligent Act, 39 Yale L.J. 532 (1930); Smith, Legal Cause in Actions of Tort, 25 Harv. L. Rev. 103 (1911).

[FN54]. Keeton et al., supra note 41, at 273.

[FN55]. Id. at 301.

[FN56]. Id. at 302; see, e.g., Aetna Ins. Co. v. 3 Oaks Wrecking and Lumber Co., 382 N.E. 2d 283 (Ill. App. Ct. 1978) (after failure to secure a condemned house, vagrants entered and started fire); Pease v. Sinclair Refining Co. 104 F.2d 183 (2d Cir. 1939) (after mislabeling of water, the water was mixed with sodium and caused explosion).

[FN57]. Restatement (Second) of Torts § 442 (1965); see, e.g., Watson v. Kentucky & Indiana Bridge & R.R.

Co., 126 S.W. 146 (Ky. 1910) (after negligent spilling of gasoline from tank car, bystander threw lighted match into gasoline vapor, allegedly with intent to start fire).

[FN58]. Restatement, supra note 57, § 450; see, e.g., Kimble v. Mackintosh Hemphill Co., 59 A.2d 68 (Pa. 1948).

[FN59]. Restatement, supra note 57, § 451. Courts historically have used the term "act of God" for an extraordinary force of nature which may prevent the original negligent actor from being liable. See, e.g., McWilliams v Masterson, 112 S.W.3d 314 (Tex. App. 2003).

[FN60]. Keeton et al., supra note 41, at 244-50.

[FN61]. Dembski & Wells, supra note 27, at 160 (arguing that intelligent design can be logically inferred from irreducible complexity).

[FN62]. See Dembski & McDowell, supra note 4, at 46 (stating that intelligent design does not require any particular designer); Keeton et al., supra note 41, at 264 (stating that tort law, in order to impose legal responsibility, narrows the inquiry from a philosophically unlimited number of causes that "go back to the dawn of human events"; thus, tort law implicitly makes no assumptions relative to causation).

[FN63]. See Dembski, supra note 2, at 107; see also supra Part III.

[FN64]. Keeton et al., supra note 41, at 266.

[FN65]. Dembski, supra note 2, at 106-07 (arguing that intelligent design is necessary to explain complexity, and that intelligent causes are empirically detectable).

[FN66]. Joseph W. Glannon, The Law of Torts: Examples and Explanations 141 (2d ed., Aspen 2000).

[FN67]. Dembski & Wells, supra note 27, at 160 (arguing that Darwinian pathways cannot explain complexity in causation, but intelligent design can). See the discussion of the explanatory filter, supra Part III and notes 36-38.

[FN68]. Dembski, supra note 2, at 160-61 (arguing that even if Darwinian "chance" can explain transmission of information between organisms, it cannot explain the origin of information).

[FN69]. Dembski & McDowell, supra note 4, at 106 (noting that both chance and necessity must be eliminated as causes before the inference of design may be made).

[FN70]. Id. at 107 (referring to a description of the explanatory filter as applied to the opening of a bank safe, and the statistical probabilities of its being opened by chance as opposed to being opened by an intelligent actor); see also supra Part III and notes 33-38 (discussing the specified complexity and the explanatory filter).

[FN71]. Id.

[FN72]. Id.

[FN73]. Id.

[FN74]. In contrast, Charles Darwin rested his theory on possibilities, rather than probabilities. Darwin stated, “If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.” On The Origin of Species 189 (Gryphon Edition 1987) (1859) (in the context of Darwin's discussion of the organ of the eye).

[FN75]. Keeton et al., supra note 41, at 269 (stating that possibility is not enough; rather, proof of causation requires introduction of sufficient evidence to create probability).

[FN76]. Id. at 267 (stating that if an action is both a “material element” and a “substantial factor,” causation may be proved).

[FN77]. See, e.g., O'Connor v. Boulder Colo. Sanitarium Ass'n, 111 P.2d 633, 634 (Colo. 1941) (evidence must show “probability”; “possibility” is not sufficient); Lippold v. Kidd, 269 P. 210, 215 (Or. 1928) (in cases of doubt as to which of several probable causes produced a harm, the case should be submitted to the jury for their determination of the question).

[FN78]. See, e.g., Daubert v. Merrell Dow Pharms., Inc., 43 F.3d 1311 (9th Cir. 1995); Lasha v. Olin, 625 So. 2d 1002, 1005 (La. 1993) (proof by direct or circumstantial evidence is sufficient to constitute preponderance when, taking evidence as a whole, such proof shows that fact of causation sought to be proved is more probable than not); Friedman v. General Motors Corp., 331 N.E.2d 702 (Ohio 1975).

[FN79]. Perkins v. Tex. and New Orleans Ry. Co., 147 So. 2d 646, 649 (La. 1962).

[FN80]. Id. at 647.

[FN81]. Id. at 649.

[FN82]. Id.

[FN83]. Hamil v. Bashline, 392 A.2d 1280, 1283, 1285 (Pa. 1978).

[FN84]. Herskovitz v. Group Health Coop. of Puget Sound, 664 P.2d 474, 476 (Wash. 1983).

[FN85]. Zinnel v. U.S. Shipping Bd., 10 F.2d 47, 48-49 (2d Cir. 1925) (seaman was washed overboard in absence of ship guard rope).

[FN86]. Daubert v. Merrell Dow Pharms., Inc., 43 F.3d 1311, 1321-22 (9th Cir. 1995).

[FN87]. Id. at 1319. The court also addressed the reliability prong of the U.S. Supreme Court's test set down in Daubert and found the epidemiological evidence inadmissible under that prong as well. Id. at 1317-19 (discussing Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579 (1993)).

[FN88]. Id.

[FN89]. See, e.g., the discussion of “Specified Complexity” in Dembski & Wells, supra note 27, at 165-203.

[FN90]. Ruggero J. Aldisert, Logic for Lawyers: A Guide to Clear Legal Thinking 27 (1997).

[FN91]. Reynolds v. Tex. & Pac. Ry. Co., 37 La. Ann. 694, 697 (La. 1885).

[FN92]. Id.

[FN93]. Id.

[FN94]. See, e.g., Boyce v. Brown, 77 P.2d 455, 457 (Ariz. 1938); Turney v. Anspaugh, 581 P.2d 1301, 1308 (Okla. 1978).

[FN95]. Dembski, supra note 2, at 48.

[FN96]. See Dembski & McDowell, supra note 4, at 102 (arguing that intelligent design is logically inferred from complexity). The scientist who is knowledgeable about biological systems thus functions in a role similar to that of an expert witness in that the scientist can raise the level of knowledge of the student of natural science, so that the student can make proper inferences about causation.

[FN97]. See Dembski & Wells, supra note 27, at 168.

[FN98]. Joseph W. Glannon, The Law of Torts: Examples and Explanations 144 (2d ed. 2000).

[FN99]. Keeton et al., supra note 41, at 269-70 (noting that mathematical certainty is seldom possible, and thus evidence sufficient to establish probability is enough).

[FN100]. Dembski & Wells, supra note 27, at 160.

[FN101]. Restatement (Second) of Torts § 451 (1965).

[FN102]. See supra Part IV (discussing the rules of intervening cause); see also Bowman v. Columbia Tel. Co., 179 A.2d 197, 202 (Pa. 1962); Kimble v. Mackintosh Hemphill Co., 59 A.2d 68, 71-72 (Pa. 1948) (collecting cases citing various rules of tort law); McWilliams v. Masterson, 112 S.W.3d 314, 320 (Tex. App. 2003).

[FN103]. See Restatement (Second) of Torts § 451 (1965).

[FN104]. Id.

[FN105]. Id.

[FN106]. Dembski, supra note 2, at 106.

[FN107]. Dembski, supra note 2, at 46 (stating that in the pre-modern view, natural causes constituted only part of the explanation for events in the world, “intelligent causes had free play in the world as well,” and “natural and intelligent causes operate in tandem”).

[FN108]. Jesionowski v. Boston & M.R.R., 329 U.S. 452, 457 (1947).

[FN109]. Byrne v. Boadle, 2 H. & C. 722, 159 Eng. Rep. 299 (1863).

[FN110]. Id. at 301.

[FN111]. Id.

[FN112]. Id.

[FN113]. Scott v. London & St. Katherine Docks Co., 159 Eng. Rep. 665, 667 (1865); see also Simpson v. Gray Line Co., 358 P.2d 516, 517 (Or. 1961); Sullivan v. Crabtree, 258 S.W.2d 782, 783-84 (Tenn. Ct. App. 1953).

[FN114]. Dembski & Wells, supra note 27, at 160 (arguing that naturalistic Darwinian pathways are inadequate to explain complexity; intelligent design, however, provides the explanation).

[FN115]. Keeton et al., supra note 41, at 244-45 (events such as bricks or window panes falling from defendant's premises, collapse of structures, live stock loose on the highway, explosion of boilers, sudden starting of machinery give rise to inference that someone was negligent).

[FN116]. Dembski & Wells, supra note 27, at 168 (“the greater the complexity, the smaller the probability” in regard to the opening of a combination lock).

[FN117]. Toney v. U.S. ex rel U.S. Dept. of Army, 273 Fed. App'x 384, 386 (5th Cir. 2008) (holding that res ipsa loquitur allows defendant's negligence to be established by circumstantial evidence when other possibilities are sufficiently eliminated by the evidence).

[FN118]. Dembski, supra note 2, at 248-49.

[FN119]. Buckles, supra note 7, at 577.

[FN120]. Id. at 577-78.

[FN121]. Keeton et al., supra note 41, at 242 (noting that negligence is never presumed; sufficient evidence must be produced to render the negligence more likely than not the cause of the injury).

[FN122]. Id. at 173-74 (tort law compares conduct of human actors to the standard of the reasonable person).

[FN123]. Id. at 315 (unforeseeable “acts of God” have long been considered to break the link between negligence and causation).

[FN124]. See supra note 102 (listing various cases which contain basic torts rules stating that “acts of God” (or “force majeure”) can in some cases be a more proximate cause than human agents).

[FN125]. See Jesionowski v. Boston & M.R.R., 329 U.S. 452, 457 (1947).

[FN126]. Dembski & Wells, supra note 27, at 160 (irreducible complexity); Dembski, supra note 2, at 107 (informational pathways and irreducible complexity).

[FN127]. Dembski, supra note 2, at 119.

[FN128]. Id. at 117-19.

[FN129]. Although such a definition sounds far-fetched to those trained in traditional tort law, it is curiously similar to the reasoning of the protagonist in Camus's The Stranger. Albert Camus, The Stranger 55-57 (Everyman's Library ed., Alfred A. Knopf 1993) (1942). On trial for murder, and being asked his motive for shooting and killing a man, he could think of no reason other than that “it was because of the sun.” Id. at 98. In narrating the details of the killing, the protagonist described in detail how the intensity of the sun and the glaring light on a hot beach had propelled him forward into a totally unnecessary confrontation with the man whom he

shot. Id. at 55-57. In the world of this protagonist, the sun would be just as meaningful (or meaningless) as any other explanation for the killing. In such a mode of thinking, an entire set of causes (such as human wrongdoing) could be arbitrarily excluded from consideration, and responsibility could be assigned to something as absurd as the sun.

[FN130]. Aldisert, supra note 90, at 208.
3 Liberty U. L. Rev. 543

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