



Thinking about the indeterminate

Catastrophe, by Richard A. Posner. New York: Oxford University Press, 2004, 322 pp.

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Judge Richard Posner, a prominent legal scholar and a leading intellectual of our time, has explored a dazzlingly diverse array of subjects. He seems to write thoughtfully faster than I can read thoughtfully, in prose that transmits the gleanings of a great breadth of reading. I have wondered what insights he could provide regarding my area of expertise: risk and uncertainty. In *Catastrophe*, Posner has partially satisfied my curiosity by turning his attention to how society should prepare for events with extreme consequences and indeterminate probabilities, including large asteroid strikes, abrupt climate change, bioterror-induced pandemics, and runaway reactions from particle physics experiments.

Posner begins by engagingly describing some of these nightmarish prospects. These are events that we know could result through the unlikely conjunction of identifiable processes, but we do not know enough about the strengths and interactions of these processes to estimate the events' likelihood of occurring. Some of these stories smack of the moral tales told by science fiction writers: What is the acceptable risk of sacrificing civilization in return for an indeterminate chance of saving it from tyranny? What is fundamental understanding of the universe worth, in terms of fundamental threats to our corner of it?

Not satisfied with simply musing about these possibilities, Posner wants action, arguing that "the risks of global catastrophe are greater and more numerous than commonly supposed, and they are growing, probably rapidly." His gloomy projection reflects the specter of ever more people able to exploit ever more powerful science and

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technology, without an equivalent growth in societal controls. In his account, we are ignoring some threats, such as asteroids, while dithering over inadequate responses to others, such as international regulatory controls on carbon emissions.

Posner traces this failure to people's inability to get their minds around these threats. It is not that the possibilities are hard to envision. Many have been portrayed in "disaster" films, creating vivid pictures in the public mind. Rather, it is the probabilities of these events that bedevil us. Posner notes that especially when there is no historical record on which to base estimates of frequency, "it is difficult for people to take [events] seriously, . . . [producing a] general tendency to ignore the catastrophic risks, both individually and in the aggregate."

In the absence of a historical record, we need to develop models to estimate risks. However, as Posner shows, those models often involve making judgments about unprecedented interactions among processes that are poorly understood even in isolation. As a result, even a wholly rational and informed observer would hardly know what gambles we are taking with our world.

As an example of these difficulties, consider the decision made by many travelers to drive rather than fly in the days after the September 11 terrorist attacks. From the perspective of historical per-mile fatality statistics, driving is much riskier. Adding injuries makes driving look worse still. Arguably, the events of September 11 had little effect on theories of driving safety. However, at that time, reasonable people could believe that aviation had entered a whole new era, in which historical statistics had lost their relevance. Indeed, the flight restrictions imposed at the time reflected official uncertainty about that very question. Even using historical traffic statistics requires some caution. The risks to late-night drunk drivers are much higher than those for professionals driving to Washington, D.C., because the airport is closed.

Posner laments societal institutions' failure to compensate for individual citizens' limitations. He lambastes politicians who traffic in lies, half truths, and unwarrantedly confident claims, thereby confusing matters and undermining public trust. Thus, for example, he should have little patience with those who highlight the Transportation Safety Administration's failings (or successes) in order to score points in the political battle over the privatization of government services.

Conversely, Posner has compassion for those who do their best, however imperfectly. Unlike some legal scholars who reference psychological studies of human judgment as evidence that individuals are often incapable of rational decisionmaking, he allows that suboptimal choices do not "show that people are dopes or are irrational, only that human mental capacity is limited and the mind uses various triggers to direct its attention."

In considering ways to manage catastrophic risks, Posner evaluates proposals such as science courts and precautionary principles. His view is a benign one, focused on how such innovations would

sharpen or distort people's thinking. A more cynical view would consider the possibility that scientists, like anyone else, would prefer to set the rules governing their own behavior and then be trusted to apply those rules impartially. The cynic views scientists as naturally predisposed to favor "courts" where they adjudicate their own disputes using the analytical methods with which they are most familiar. Conversely, scientists are naturally skeptical about any process that reduces the home-field advantage of the analytically adept—a goal of those who advocate various precautionary principles.

Economic framework

Posner assigns incentives a central role in his guardedly proposed partial solution: casting catastrophic choices in economic terms. This proposal should come as no surprise, given Posner's long-running advocacy of using economics in legal proceedings. However, the role that he assigns to economics is to inform, not dictate, solutions. When risk analysts cannot estimate the magnitude of threats, economists cannot establish the optimal allocation of resources. Economics might, however, still improve our thinking by framing policy questions: Should we discount future lives, as we discount future income? Should we assume that future generations will have greater resources for dealing with the problems that we leave them? Do we understand markets well enough to create artificial ones, in which "pollution rights" are efficiently allocated and traded?

As a mode of disciplined thought, Posner's application of economics to catastrophes should not be bound to monetary consequences. For example, it should take into account the catastrophic loss of biodiversity without requiring the tortured exercise of monetizing that loss. Posner's catastrophe economics also avoids doctrinaire insistence on people always being rational, even in situations where they barely know what they want or what they can achieve. Indeed, the enterprise of *Catastrophe* addresses a suboptimal decisionmaking tendency that is well documented in psychological research: viewing decisions in isolation, hence not seeing the strategies latent in tactical choices. One result of this tendency is not seeing how small risks mount up through repeated exposure. For example, although perhaps 1 trip in 5 million ends in a fatal accident, about 1 American in 100 dies in traffic. Posner's mission is to encourage a strategic approach to the cumulative risk of many improbable catastrophes.

A book as rich as this can be viewed from many angles. For example, one could look at Posner's commentary on pseudoscientific popular culture. Here, Posner and I are on the same wavelength: The special effects of the later *Matrix* films didn't compensate for the weak plots, and Michael Crichton's latest fictionalized jeremiad was dreadful. However, I am not sure that either of us has any stunning insights on the subject.

The weakest link in Posner's main argument is intrinsic: Given that we do not know how big these risks are, how can we know that we are doing too little about some and too much about others? Having set the stage, the book moves past this critical point rather quickly. It

devotes rather more attention to the contingent question of how much we can usefully spend on managing a threat, once we decide that it is real. An interesting discussion considers the difficulties of estimating the return on investment in R&D, which seems as arcane as estimating the return on investment in advertising.

The element of the book that left me most uneasy was its treatment of my own field of psychological research regarding judgment and decisionmaking. Often, Posner's conclusions did not correspond to my reading of the literature. Although the book has copious references, the link between these and its conclusions is not always clear. Posner often seems to afford equal evidentiary status to sources of very different quality.

It seems churlish to ask a legal scholar not only to respect psychology but also to capture the contours of its internecine struggles. However, making informed choices about catastrophes or anything else requires understanding the limits of our knowledge, including that rooted in the science of our own behavior. A seemingly feasible suggestion is that scholars such as Posner who visit another literature should clearly identify the pedigree of the results they cite. For example, visitors to psychological research should be able to distinguish among the following (in order of decreasing evidentiary strength): quantitative meta-analyses of all research on a topic (statistically estimating effect sizes), qualitative reviews by scientists (thoughtfully summarizing patterns), specific empirical results in archival sources (the more, the better), scholarly essays by nonscientists, and partisan polemics.

Assessing *Catastrophe's* psychological evidence in these terms left me more comfortable with evaluating its conclusions. However, to be fair, Posner might have tried to do more than is humanly possible: fully understanding another field without an apprenticeship in it. Nevertheless, one should be grateful for the insights generated by such a thoughtful visitor.

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