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Review of *Why Things Bite Back: Technology and the Revenge of Unintended Consequences* by Edward Tenner

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WHY THINGS BITE BACK: TECHNOLOGY AND THE REVENGE OF UNINTENDED CONSEQUENCES, by Edward Tenner. New York: Alfred A. Knopf, 1996. 346 Pp. \$26.00.

Historian of science Edward Tenner begins his book with a typical example of what he sees as the irony of modern life in a technological society. With the advent of electronic mail and inter-office networking, one would expect that the amount of paper used in offices would markedly decline, but in fact, notes Tenner, paper recycling bins are more full than ever before. People do indeed communicate through e-mail, but since they mistrust the permanence of electronic transmissions, they also back them up with an ever increasing amount of paper communication. In his typically amusing way, Tenner notes that when the office supply stores Office Max and Staples opened up in his hometown of Princeton, their most sought after products were not computers or software, but five-thousand-sheet cases of paper for photocopiers, laser printers, and fax machines. (p. ix).

This story is but one of hundreds which Tenner employs to illustrate the central point of his book, which is that in areas as diverse as medicine, the environment, the office, and the world of sports, technological advances more often than not bring unintended and unforeseen negative consequences. (p. xi). Technology often transforms, rather than eradicates risk. (p. 5-6). Technological advances have frequently been successful in solving catastrophic risks but have caused more subtle, chronic problems that are both more difficult to predict and more challenging to solve. In the area of medicine, for example, advances such as vaccines and surgical techniques have allowed doctors to prevent and treat countless catastrophic illnesses, (p.26-46) but have also resulted in a dramatic increase in chronic ailments, such as mental illness and other elusive, polymorphous, and open-ended maladies. (p. 47). Despite this ubiquitous phenomenon, however, Tenner is not a pessimist. Though he recognizes that technological change is never costless, he does not advocate against change. Instead, he argues for a modest, tentative, and skeptical acceptance of it. (p. xi). He argues that the chronic and subtle problems brought about by technology demand that we as a society become more vigilant in protecting ourselves. (pp. xi, 46, 94, 101).

Tenner illustrates his thesis with numerous examples from the area of environmental protection. As in the field of medicine, technology has often converted catastrophes into chronic conditions. (p. 72). This is particularly true in energy-related environmental regulations and activities. For example, Tenner documents the unintended effect of federal and state clean air regulations which set local pollution standards and caused polluters to build tall smoke stacks (some nearly as large as the Empire State Building) that simply exported pollution to nearby regions. (p. 86). A number of Tenner's examples come from the sea. He discusses the various revenge effects caused by the cleanup of the Exxon Valdez disaster, noting, for example, that high-velocity hot water treatments scalded the beach and killed many organisms that had survived the original spill. (p. 90). Tenner also describes the unintended consequences of releasing animals saved from the spill back into the wild, pointing out that the two-hundred sea otters which veterinarians rescued and sent back to sea spread a herpes virus to otters living far beyond the reach of the spill. (p. 91). Beyond the specific energy context, Tenner argues that the general reduction of ocean pollution which has occurred over the last century has allowed pests such as the two-foot long shipworm and the pesky zebra mussel to thrive, causing billions of dollars of property damage as well as threatening other marine species. (pp. 98-100). Tenner's point is not that cleanup crews should have not cleaned up the Valdez spill or that efforts to clean the oceans should be halted. Rather, his point is simply to demonstrate that one can never predict the result when man seeks to use technology to manage the environment. (pp. 91, 271).

Tenner's book is written for a popular audience, and it is both engaging and entertaining. In an era of nearly unbounded optimism about the possibilities of technology, Tenner has certainly succeeded in communicating a sense of skepticism about technological progress without leaving the reader in a state of despair. Instead, one comes out of the experience of reading *Why Things Bite Back* a little less serious about the possibilities of rationality and a little more impressed with the complexity of nature.

However, it is unfortunate that Tenner does not distinguish between unintended consequences that arise out of human shortsightedness and those that arise out of the impenetrability of natural systems. After all, there is quite an important difference between the smokestack example and the shipworm example. In

the case of the smokestacks, it is certainly possible to argue that regulators should have and could have foreseen the consequences of building larger stacks. On the other hand, probably no one would argue that anyone should have foreseen the rise of shipworms as a result of clean water policy, and if anyone is willing to make this argument, they assuredly would not also argue that clean water policy should have been changed as a result. When Tenner argues that the advent of puncture-resistant tubeless automobile tires unexpectedly caused the spread of the Asian tiger mosquito, a carrier of dengue fever which lives in the tires, (p. 271), he is describing an unintended consequence that nobody could have predicted. But when he describes the negative effects of DDT on human health and the environment, (pp. 107-109), he is describing an unintended consequence that at least some would argue should have been foreseen.

Tenner is not writing about regulatory policy or environmental law, but his work does have broad relevance for assessing important issues central to these fields. Unfortunately, Tenner's failure to clearly distinguish between consequences that humans can and cannot predict greatly clouds the effect of Tenner's findings on the legal controversy that is most closely related to his discussion.

Although scholars and legislators have criticized current regulatory policy in the United States for a variety of reasons,¹ one of the recurring critiques of the administrative state is that it fails to account for countervailing risks.² Critics who take this position argue

1. For scholars critical of the administrative state, see STEPHEN BREYER, *BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK MANAGEMENT* 10-29 (1993) (criticizing administrative agencies for their tunnel vision, random agenda selection, and inconsistency); Daniel Fiorino, *Environmental Risk and Democratic Process: A Critical Review*, 14 COLUM. J. ENVTL. L. 501, 501-02 (1989) (noting the undemocratic nature of administrative regulation); Cass R. Sunstein, *Legislative Forward: Congress, Constitutional Moments, and the Cost-Benefit State*, 48 STAN L. REV. 247, 260-61 (1996) (criticizing agencies for being too rigid and arguing that government should favor flexible, market-based incentives rather than rigid commands). Legislators have also been critical. The 104th Congress considered several proposals that would have amended the Administrative Procedure Act, 5 U.S.C. 551-559 (1996), to require cost-benefit analysis and increased judicial review of agency actions. See, e.g., S. 291, 104th Cong., 1st Sess. (1995); S. 343, 104th Cong., 1st Sess. (1995). For an excellent summary of the 104th Congress debate over regulatory reform, see Sunstein, *supra*, at 274-82.

2. See e.g., Risk Versus Risk: Tradeoffs in Protecting Health and the Environment 10 (John D. Graham & Jonathan Baert Wiener, eds. 1995) ([W]e suspect that risk tradeoffs are quietly hindering the effectiveness of the national campaign to reduce risk. The campaign to reduce target risks may in effect be at war with itself: it may be clearing away target risks but cultivating a new crop of countervailing risks.); BREYER, *supra* note 1, at 23 ([T]he regulation of small risks can produce inconsistent results, for it can cause more harm to health than it prevents.); Cass R. Sunstein, *Health-Health Tradeoffs*, 63 U. CHI. L. REV. 1533,

that regulatory agencies, guided by imprecise Congressional statutes and uncontrolled by deferential courts, consistently implement regulations that cause more harm than good.³ As a solution to this problem, scholars have argued that agencies should formally consider countervailing risks when making and enforcing rules, and that they should only take actions that will decrease overall risk.⁴ This argument assumes that agencies, and human beings more generally, are able to accurately identify relevant countervailing risks and weigh them against potential benefits in order to determine whether they should take some particular regulatory action.

Although it is somewhat unclear whether Tenner's book strengthens these arguments or renders them unpersuasive, it ultimately should make us think twice about the possibilities of any improved risk tradeoff assessment program. On the one hand, Tenner's observations, particularly those of the smokestack and DDT variety, suggest that regulatory policies do often overlook potentially identifiable countervailing risks. But Tenner's argument is deeper than this. At bottom, Tenner suggests a deep skepticism about the possibility of understanding or predicting the complex consequences that arise out of man's interaction with nature. Tenner is no pessimist, and his call to vigilance does indicate that he thinks some of nature's unintended consequences can be predicted and avoided. This suggests that at some level, agencies should be able to identify large and easily observable countervailing risks and adjust their risk assessment policies accordingly. Nevertheless, the basic thrust of *Why Things Bite Back* is that the ability of human beings to predict the results of their actions is profoundly limited. This suggests that even the best efforts of agencies to foresee the results of regulatory policy will fail to anticipate the endless variety of unintended consequences which materialize whenever human beings seek to protect themselves from risk.

Jay D. Wexler

1535 (1996) (My purpose in this Essay is to discuss a pervasive problem in risk regulation . . . The problem occurs *when the diminution of one health risk simultaneously increases another health risk*).

3. See, e.g., Sunstein, *supra* note 2, at 1537 (arguing that, in order to begin solving the risk tradeoff problem, agencies should consider countervailing risks, Congress should amend the APA to require agencies to consider them, and the judiciary should review agency decisions more closely).

4. See, e.g., Risk Versus Risk, *supra* note 2, at 252-56 (urging agencies to make formal risk tradeoff analyses when determining regulatory policy).