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THE RIGHTS OF STATISTICAL PEOPLE

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The use of cost-benefit analysis to evaluate the wisdom of life-saving regulatory programs presents a puzzle. Deciding to allow one person to harm, even to kill, another person on the basis of how much it costs the person doing the harm to refrain from doing it denies the person harmed a right against harm. It makes a person's freedom from harm, indeed her life, contingent upon the financial profile of the life-threatening activity.

The puzzle is that we do not allow this kind of cost-benefit balancing in all life-threatening contexts. We do not, for example, believe that so long as it is worth $10 million to one person to see another person dead, and so long as current estimates of the value of human life are lower than $10 million, it is acceptable for the first person to shoot and kill the second. Indeed, in this setting we refrain entirely from placing a monetary value on life. Yet when it comes to regulatory programs that prevent deaths—deaths also due to the actions of other people—it has become commonplace to argue that the people doing the harm should be allowed to act so long as it would cost more for them to stop doing the harm than the harm is worth in monetary terms. Why are these two situations coming to be viewed so differently?

In this Comment, I argue that the use of cost-benefit analysis to evaluate life-saving regulatory programs has, in a society that eschews reliance on cost-benefit analysis in other life-saving situations, been justified by the creation of a new kind of entity—the statistical person. A primary feature of the statistical person, as I will explain, is that she is unidentified; she is no one's sister, or daughter, or mother. Indeed, in one conception, the statistical person is not a person at all, but rather only a collection of risks. By distinguishing statistical lives from the lives of those we know, economic analysts have attempted to sidestep the uncomfortable fact that most of us profess ourselves quite incapable of identifying the monetary equivalent of the lives of our sisters, daughters, mothers, and friends.

The framing of life in statistical terms has generated, for statistical people, two disadvantages not suffered by those whose lives are not so framed. First, the people whose lives are framed in statistical terms are explicitly priced in advance of their deaths. Second, this pricing has come to vary depending on the age, health, disability status, and wealth of the people who might be harmed. Thus the most basic kind of right—the right to be protected from physical harm caused by other people, on

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he right to be protected from physical harm caused by other people, on equal terms with other people—is denied to those whose lives are framed in statistical terms.

Despite the increasing importance of the concept of statistical life in informing regulatory policy, regulatory scholars to date have not provided a standard definition of the statistical life. There are two possible conceptions of statistical life. According to the first conception, a statistical life is a life expected to be lost as a function of probabilities of death applied to a population of persons. On this understanding, the salient features of the statistical life are *unidentifiability* and *uncertainty*: the person who is expected to die is not identifiable before (or perhaps even after) death, and the probabilistic estimates are uncertain. The second conception of statistical life is that it is not a life at all, but only an aggregation of relatively small risks of harm to the individuals in a population. These risks can be summed, together with the size of the population, to estimate how many lives are likely to be lost as a result of the risk. But, under this conception, "statistical life" refers to the collective risk, not to life itself.

Neither of these two conceptions of the statistical life justifies the differential treatment that regulatory policy has begun to afford statistical and nonstatistical life. Identifiability does not explain our differing responses to situations that threaten the lives of others; our varying reactions likely have more to do with identifying *with* the victim of the threat. Moreover, any person in a situation of risk can be framed in statistical or nonstatistical terms. Making regulatory policy turn on this framing threatens to ratify the apathy or prejudice society may exhibit toward certain kinds of people or certain kinds of risks. As for uncertainty, the analytical devices that have sprung up around statistical lives—monetization according to willingness-to-pay and according to age, health, and disability—simply have nothing to do with the uncertainty of estimates of physical risk. Using monetary valuations, and discriminatory ones at that, to adjust for scientific uncertainty cloaks scientific uncertainty in the garb of moral choice. It is, among other things, a strange commentary on our times that it has proven easier to persuade regulatory agencies to abandon their longstanding commitment to the equal worth of human lives than it has proven to persuade them that their scientific analysis is unsound.

The idea that a statistical life is really not a life at all, but only an aggregation of relatively small risks of harm, also does not justify differential treatment of statistical and nonstatistical lives. Close examination of the manipulations analysts perform on the monetary valuation of statistical life—including discounting and adjusting for life-years saved—reveals that these analysts in fact treat statistical lives as lives, and not merely as collections of small risks. Since the statistical life, according to this second conception, turns out to be a life after all, and not simply an aggregation of risks, the ground for distinguishing it from nonstatistical lives evaporates.

I. Discriminatory Pricing

Much modern regulation aims to prevent people from being killed by the actions of other people. In discussing the benefits of this kind of regulation, regulators often refer to the lives of the people who would have died without the regulation as "statistical."[1] Below, this Comment will develop and explore several different possible meanings of statistical life. For now, I would like to establish how important the modifier "statistical" has become in influencing the discourse concerning life-saving measures. In particular, I will try to show how common it has become to strip statistical lives of rights against harm enjoyed by those whose lives are not described in statistical terms.

People whose lives are described in statistical terms suffer from two large disadvantages. First, the lives of statistical people are *explicitly priced in advance of their deaths*. We are told, for example, that the life of a statistical person is worth $5.8 million to the Environmental Protection Agency,[2] $2.5 million to the Department of Transportation,[3] and $5 million to the Consumer Product Safety Commission.[4] The analysts who have helped develop these monetary values readily explain that the values do not apply to "identified" lives, nor to the deaths of "named individuals," but only to "statistical" lives.[5] They deny having any special knowledge of the value of identified lives, and they appear to tolerate, if not embrace, the widely held assumption that we will do more to avoid the death of an identified person than to avoid the death of a statistical person.[6] As a result, identified lives remain unpriced while statistical lives wear price tags.

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1. For a recent example, see Control of Air Pollution from New Motor Vehicles: Proposed Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, 64 Fed. Reg. 26,004, 26,079 (1999) (to be codified at 40 C.F.R. pts. 80, 85–86).

2. *See* Radon in Drinking Water Health Risk Reduction and Cost Analysis, 64 Fed. Reg. 9560, 9576 (1999).

3. *See* Memorandum from Walter B. McCormick, Jr., General Counsel, U.S. Dep't of Transp., & Jeffrey N. Shane, Assistant Secretary for Policy and Int'l Affairs, U.S. Dep't of Transp., to Assistant Secretaries and Modal Adm'rs, U.S. Dep't of Transp., Treatment of Value of Life and Injuries in Preparing Economic Evaluations 2 (Jan. 8, 1993) (on file with the *Harvard Environmental Law Review*) [hereinafter McCormick & Shane].

4. *See* U.S. Consumer Prod. Safety Comm'n, Estimating the Cost to Society of Consumer Product Injuries: The Revised Injury Cost Model 6–8 (Jan. 1998).

5. *See* W. Kip Viscusi, Fatal Tradeoffs: Public and Private Responsibilities for Risk 21 (1992) [hereinafter Viscusi, Fatal Tradeoffs]; Thomas C. Schelling, *The Life You Save May Be Your Own*, *in* Thomas C. Schelling, Choice and Consequences 113 (1984).

6. *See generally* Viscusi, Fatal Tradeoffs, *supra* note 5, at 21, 29.

It might be argued that, in fact, our legal system prices identified lives as well: the tort system has for many years effectively priced identified human lives by awarding compensation for wrongful deaths.[7] Because the tort system responds to harms that have already occurred, and because its remedy is money damages, the system faces a choice between not providing financial compensation for wrongful deaths, because lives are priceless, or providing compensation for them and risking damage to the belief that human lives are beyond price. Refusing to compensate at all for a death caused by wrongful action would seem a perverse way of giving force to a belief in the pricelessness of human life. Thus tort law, at least, can plausibly place a monetary value on human life for purposes of retrospective compensation, and at the same time hold to the belief that human lives should remain, in a fundamental sense, unpriced.

Resolving the contradiction between pricelessness and pricing when a monetary value is placed on human lives *in advance of death* presents a more difficult conundrum. In that case, the government in essence decides that it is not worth more than a certain finite sum of money to prevent someone from dying, even when death will come about through the actions of another person, and even when the person being killed has done nothing wrong. This proposition is equivalent to saying that a person can kill another person if it would cost too much to avoid killing her. This is a striking proposition, and so far one that has been applied only to lives described in statistical terms. Indeed, as mentioned above, the major writers in the literature on the pricing of human lives take pains to emphasize that they are discussing *only* statistical lives.[8] Government analysts have been equally fastidious about the distinction between the value of an identifiable life and the value of a statistical life.[9]

The second disadvantage to being a statistical person is that statistical lives are valued differently from each other on the basis of characteristics not used to distinguish among nonstatistical lives. Some analysts lately have become dissatisfied with the practice of placing an equal monetary value on all statistical lives. Lives are never *saved*, they ob-

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7. *See* GUIDO CALABRESI, IDEALS, BELIEFS, ATTITUDES, AND THE LAW 89 (1985).
8. *See, e.g.*, VISCUSI, FATAL TRADEOFFS, *supra* note 5, at 19.
9. An internal memo of the Department of Transportation advises:

> Under limited circumstances, computational procedures in investment analyses may require insertion of an explicit value for fatalities averted. In such limited cases, the [willingness-to-pay] value can be used, but the accompanying text should avoid implying that the Department has set a dollar price on lives or injuries. *Rather than saying something like, "The Office of the Secretary has set the value of life at $2.5 million dollars . . ." the preferable language would be more like, "Economic research indicates that $2.5 million per statistical life saved is a reasonable estimate of people's willingness to pay for safety."*

McCormick & Shane, *supra* note 3, at 4 (emphasis added).

serve, but only *prolonged*, and thus, it only makes sense to ask *by how much* regulation prolongs the lives it protects.[10] Thus, we now see a parade of normally equality-minded writers extolling the virtues of evaluating regulatory action on the basis of the number of "quality-adjusted life-years" saved by it.[11] (Often the concept goes by the even more occlusive abbreviation "QALY.") This technical approach obscures its implications: that regulation saving the statistical lives of the elderly, the sick, and the disabled will be a lower priority than regulation saving the statistical lives of the young, the healthy, and the able-bodied. One's age, health, and disability status suddenly have become good grounds for distinguishing the value of one's life from another, for the explicit reason that the lives of those situated on the undesirable side of the statuses of age, health, and ability (the elderly, the sick, and the disabled) are worth less than the lives on the desirable side.[12] And, although few analysts will admit it, the upshot of the prevailing method for valuing statistical lives—which asks how much individuals are willing to pay to reduce risk in their own lives—also favors the statistical lives of the rich over the statistical lives of the poor.[13]

The disaggregation of statistical lives based on characteristics like age, health, disability status, and wealth deserves notice not only because of the inequality it facilitates, but also because it subtly alters the very concept of statistical life. Although the concept of statistical life has several possible meanings, all of these meanings contain one common feature: a statistical life is an unidentified life. We do not know the names of statistical people. Indeed, prior to the recent interest in disaggregating statistical people, one would have said that we know nothing about statistical people except that they are humans. But now, we are beginning to learn various facts about the statistical people whom regulation affects,

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10. *See, e.g.*, Cass R. Sunstein, *Bad Deaths*, 14 J. RISK & UNCERTAINTY 259, 260 (1997).

11. *See, e.g.*, Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. CHI. L. REV. 1, 83–85 (1995).

12. The Food and Drug Administration recently described the benefits of a rule in terms of the "quality-adjusted life-*days*" affected by the rule. Preliminary Regulatory Impact Analysis and Initial Regulatory Flexibility Analysis of the Proposed Rule to Require Refrigeration of Shell Eggs at Retail and Safe Handling Labels, 64 Fed. Reg. 36,516, 36,522 (1999). The Environmental Protection Agency ("EPA") has been slower to embrace QALYs as the measure of the benefits of its rules. Compare Regulatory Impact Analysis for the Petroleum Refineries NESHAP, EPA Office of Air Quality Planning and Standards, EPA-452/R-004, at 174 (Aug. 1995) (suggesting that "[l]ife years saved may be a more relevant measure" of regulatory benefits than lives saved) with EPA, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT: 1970 TO 1990, EPA Office of Air and Radiation, at ES-9 (1997) (noting problems associated with calculating life-saving benefits based on life-years saved).

13. *See* W. Kip Viscusi, *Equivalent Frames of Reference for Judging Risk Regulation Policies*, 3 N.Y.U. ENVTL. L.J. 431, 447 (1994) ("[T]he United States Department of Transportation should want to place a higher value of life on the well-being of the lives of airline passengers than those killed in motor-vehicle crashes because the airline passengers have a higher income.").

such as whether they are young or old, healthy or unhealthy. We should expect that, if this disaggregation continues, we will soon know whether the statistical lives relevant to a regulatory decision are men or women, white or black, infants or preschoolers.

The evaluation of life expectancy alone has the potential to introduce many such specific features of a person's identity into the regulatory equation. A large lurking question, neglected in the recent rush to embrace QALYs, is what baseline level of life expectancy to use in calculating the life-years lost due to a given hazard.[14] In keeping with the whole premise of the QALY movement—that only the portion of life *actually lost* due to regulation should concern regulators—there is good reason to expect that the baseline level will be the life expectancy of *the group to which the affected people belong*, insofar as group identity is an important determinant of life expectancy.[15] Thus, one can imagine race, ethnicity, socioeconomic status, gender, and other life expectancy-related characteristics all being fed, quite invisibly, into the equation that determines the worth of a person's life. In this way, the very identifiedness that, when it comes to nonstatistical people, helps justify their equal protection from harm, becomes, for statistical people, the very thing that leads to inequality among them.

Whether consciously or unconsciously, analysts have softened the discriminatory appearance of these analytic developments in two ways. First, rather than using as a baseline the life expectancy of the specific group to which the affected statistical people belong, analysts typically use the average life expectancy of the whole population. For example, in one influential analysis,[16] Robert Hahn of the American Enterprise Institute calculated life-years saved by comparing the average age of death from broad categories of hazards—such as "accident," "fire," "worker injury," and "cancer"—to estimates of the average life expectancy of the entire population of people of a given age.[17] The use of overall life expectancy as the baseline for comparison avoids the awkward fact that life expectancy is strongly associated with statuses like race, gender, disability, and socioeconomic status. While it may be that analysts like Hahn use overall life expectancy rather than the specific life expectancy of the group to which

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14. *See* Lisa Heinzerling, *Environmental Law and the Present Future*, 87 GEO. L.J. 2025, 2062, 2075–76 (1999).

15. Professor Revesz has proposed that regulatory analysts consider the "age profiles" of the population targeted by regulation. *See* Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 967 n.120 (1999).

16. The Office of Management and Budget relies heavily on Hahn's analysis in developing its own estimates of the costs and benefits of environmental regulation. *See* OFFICE OF INFO. AND REGULATORY AFFAIRS, OFFICE OF MANAGEMENT & BUDGET, REPORT TO CONGRESS ON THE COSTS AND BENEFITS OF FEDERAL REGULATIONS 16 (1998).

17. *See* Robert W. Hahn, *Regulatory Reform: What Do the Government's Numbers Tell Us?*, *in* RISKS, COSTS, AND LIVES SAVED 208, 247 n.40 (Robert W. Hahn ed., 1996).

the target population belongs as a means of avoiding inappropriate distinctions between classes of people, one must then wonder why the same concern for equality does not persuade them to abandon the entire QALY project.[18]

A second way analysts have attempted to soften the discriminatory thrust of currently popular methods of valuing human life is to avoid making these valuations, and thus, life-saving policies, turn on ability, rather than willingness, to pay. In other words, they have tried to dilute the effect of wealth on the valuation of life. Professor Kornhauser, for example, suggests that life be valued according to the preferences of a group that has an "acceptable" level of wealth, such as the median wealth of the overall population.[19] Similarly, Professor Revesz proposes valuing lives based on the preferences of a population having "representative characteristics of the population of the United States," and argues that valuations be adjusted upward where the subjects of willingness-to-pay studies "have relatively low incomes" compared to the group targeted by regulation.[20] Under both proposals, of course, wealth would still determine the willingness to pay for risk reduction and thus the value of statistical life, but the value of life would be nudged upwards by excluding the highly income-constrained preferences of the worst off among us.

Thus, analysts have obscured—but not eliminated—the unequal protection of life afforded by identifying the features of human lives that make them worth saving or not. Most important for present purposes, however, is the fact that analysts have often used the bare adjective "statistical" to justify their pricing of, and discriminations among, human lives.[21] What is it about statistical lives that supposedly makes them so expendable? Answering this question requires an exploration of the different possible meanings of statistical life.

II. Unidentifiability and Uncertainty

The literature on risk and its regulation contains two different conceptions of the statistical life. According to the first conception, the statistical life is a life expected to be lost as a function of probabilities of death applied to a population of persons. The person expected to die is not identifiable in advance of death, and the probabilistic estimates are

18. *See* Heinzerling, *Environmental Law and the Present Future*, *supra* note 14, at 2075–76.

19. *See* Lewis A. Kornhauser, *The Value of Life*, 38 Clev. St. L. Rev. 209, 221–22 (1990).

20. Revesz, *supra* note 15, at 967–68.

21. *See, e.g.*, Jeremy D. Fraiberg & Michael J. Trebilcock, *Risk Regulation: Technocratic and Democratic Tools for Regulatory Reform*, 43 McGill L.J. 835, 860 (1998); James F. Blumstein, *Rational Medical Resources: A Constitutional, Legal, and Policy Analysis*, 59 Tex. L. Rev. 1345, 1353–54 (1981).

uncertain.[22] However, neither unidentifiability nor uncertainty justifies differential protection against harm for statistical and nonstatistical people.

A. Unidentifiability

One of the features thought to set the statistical life apart from the nonstatistical life is unidentifiability. We will spend a fortune, it is regularly remarked, to rescue miners trapped in a mine, or a little girl trapped in a well, or a downed balloonist, but we will not spend an equivalent amount to protect these people from getting in harm's way in the first place.[23] Observers have asserted that the identifiedness of the miners, the little girl, and the balloonist makes us especially willing to help them.[24] As an empirical matter, this assertion is unproved and probably mistaken. As a normative matter, it seems clear that the rights of people not to be harmed should not depend on the identifiedness of the people who will be harmed.

There is good reason to believe that our willingness to spend money, time, and other resources to save someone from harm does not turn on the identifiedness of the person who will be harmed unless we intervene. When Tylenol capsules were contaminated with cyanide and placed on the market in the fall of 1982, no one knew which capsules contained the cyanide. Accordingly, no one knew who would be poisoned if no preventive measures were taken. This unidentifiedness did not soften the response that followed the first poisonings. Indeed, it arguably magnified it, as unidentifiedness is a close cousin of the awful randomness—associated with terrorists and criminal maniacs—that many people uniquely fear.[25]

Contrast our response to the Tylenol poisonings with an equally familiar response to an identified life. Many of us who live in large urban areas come face to face, weekly if not daily, with homeless people who look cold, hungry, desperate, and sick. Often these people explicitly ask for our help and we do not give it. Or we give a little—a dime, a quarter, a dollar or two—enough to assuage our consciences but not enough really to help. Yet it is hard to imagine a more clearly identified person in need.

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22. Scholars who appear to embrace this conception of a statistical life include, among many others, Charles Fried and W. Kip Viscusi. *See* VISCUSI, *supra* note 5, at 21. *See generally* Charles Fried, *The Value of Life*, 82 HARV. L. REV. 1415 (1969).

23. *See, e.g.*, GUIDO CALABRESI & PHILIP BOBBITT, TRAGIC CHOICES 20–21 (1978); Fried, *supra* note 22, at 1415.

24. *See* Fried, *supra* note 22, at 1428–33 (labeling this the "personalist" argument).

25. *See Murder by Capsule*, N.Y. TIMES, Oct. 5, 1982, at A30.

The different responses to the Tylenol poisonings and to the homeless raise the possibility that the "identifiedness" that increases our willingness to save others from harm has little to do with our being able to identify the victim of harm. Rather, it probably has more to do with our being able to identify with her. Making individual—or, worse, public—responsibility to aid another person turn on the extent to which the person who needs help is like the people who might help her is a covert, but effective, way of making characteristics like race, class, gender, age, and personal habits determinative of our obligations to others. This approach is, needless to say, the antithesis of a regime of rights. In this way, the issue of identifiability also bears a strong resemblance to the unequal treatment of statistical people. People whose lives are framed in statistical terms thus suffer twice: first, when their lives are labeled statistical simply because the people doing the labeling do not identify with them, and second, when their lives are devalued precisely because they are statistical.

The possibility that the word "statistical" will be used as cover for an unconscious or invidious failure to identify with the person in danger is heightened by the fact that virtually any person in a situation of danger can be described in either statistical (unidentified) or nonstatistical (identified) terms. The classification of a threatened person as statistical or nonstatistical largely turns on one's definition of the harm the person faces and its cause. In the case of the homeless person, for example, one might say that the harms this person faces are acute hunger and exposure to the elements, and that the causes of these harms are inadequate food, clothing, and shelter. These are immediate harms, readily addressed by interventions any one of us might make. But if one says that the harm the homeless person suffers is poverty, and the causes are a lack of education, mental illness, and societal discrimination, then simple interventions seem inadequate indeed. Thus, if the obligation to help turns on whether the life of the person in need of help is framed in statistical or nonstatistical terms, we can give that obligation any shape and scope we want through our definition of harm and causation. And, oddly enough, the more chronic, intractable, and widespread the harm as we describe it—the more "statistical" the harm and its cause—the less will be the responsibility to intervene.

Returning, finally, to the paradigmatic cases of the identified victim—the trapped miner, the little girl in a well, the downed balloonist—it becomes obvious upon reflection that identifiedness—as in, what is the person's name? what does she look like?—probably has little to do with our willingness to help. Rescue workers traveled halfway across the world to try to locate survivors of the massive earthquake that hit Turkey in August 1999, yet most of those people found were not identifiable in advance of their rescues. They were known only by their cries for help. In that case, the important factor was that there was no doubt that the people buried in the rubble of the quake were in grave danger. The knowledge that might distinguish these victims from other people in need, therefore, is not knowledge of their personal identities, but knowledge of their need for help. Perhaps it is uncertainty, then, that distinguishes the statistical from the nonstatistical life.

B. Uncertainty

Suppose one million people are each exposed to a hazard estimated to pose a one-in-one-million risk of death. One life would be the expected loss to this population facing this probability of death. To say that this life is "statistical" might mean one of two things. Both relate to the uncertainty of the probabilistic estimate.

In one sense, the word "statistical" is a kind of pejorative; it often connotes an association that is contingent or random rather than intrinsic or causal. For example, suppose that ninety percent of all airplane crashes in the last two decades occurred on Tuesdays, yet only five percent of all airplane flights occurred on Tuesdays. Suppose further that regression analyses of the facts surrounding airplane crashes rule out, to a ninety-five percent certainty, the possibility that the association between flying on Tuesdays and airplane crashes is random. Yet assume that researchers lack any theory about why Tuesdays are especially dangerous for air travel. One might then regard estimates of the number of lives expected to be lost during Tuesday airplane flights as estimates of the loss of "statistical" life because the association between Tuesdays and crashes has been established only statistically.

This meaning of statistical life does not justify the monetization of, nor discrimination between, statistical lives. At most, the idea that statistical lives are different because the threat to them has been probabilistically identified, but not causally explained, suggests that we should proceed cautiously in our response to the hazard. If we believe that the probabilistic association we have identified is coincidental rather than causal, then we would be well advised to study the matter further before undertaking a major regulatory intervention. But if the statistical probabilities have been established over a large enough number of cases, in different settings, then the lack of a causal theory explaining the statistical association between the two events should not stop us from taking action. For example, it was not until 1996 that scientists identified the mechanistic link between cigarette smoking and lung cancer.[26] Prior to that time, the connection between smoking and cancer had been established only statistically, through decades of epidemiological and biological research.

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26. *See* Mikhail F. Denissenko et al., *Preferential Formation of Benzo[a]pyrene Adducts at Lung Cancer Mutational Hotspots in P53*, 274 Sci. 430, 430 (1996).

Yet the absence of a causal theory did not prevent widespread acceptance of the idea that smoking causes lung cancer.[27]

More fundamentally, cautiousness in the face of uncertainty is not the same as a distinction based on value. If scientific uncertainty is the issue, then the solution is not to declare that statistical lives are less important, less valuable, more expendable, than nonstatistical lives, or that the age or health or wealth of the people who might be harmed should inform our willingness to help them. Monetization of human life and distinctions among humans based on age, health, disability, and wealth, have nothing to do with the meaning of statistical life that I am here considering. If the uncertainty of probabilistic estimates distinguishes statistical from nonstatistical life, then this uncertainty should be inserted in the regulatory equation as an adjustment to the probabilities themselves, and not as an adjustment to the value being measured. Doing otherwise allows scientific disagreement over the existence and magnitude of risk to masquerade as a value choice about who in our society is worth saving and at what cost.

Scientific uncertainty also may underlie another conception of statistical life. Even where there exists a causal theory as to why one event—say, exposure to asbestos—produces an adverse result, there may be disagreement over the conditions under which the adverse result will materialize. A statistical life might therefore be the life expected to be lost if each of a series of assumptions about the world holds true. But because the assumptions are uncertain, the loss of life is uncertain, too.

Modern risk assessment, which forms the basis of much health-related regulation, attempts to determine the probability of future harm to individuals exposed to particular hazards.[28] This analysis requires many assumptions about the potency of the hazard, the magnitude of exposures, and the susceptibility of the individuals to the harm in question. Often the assumptions must be made in the absence of conclusive proof. For example, many risk assessments attempt to determine the probability of cancer in a human population exposed to a particular substance by considering the effect of that substance on an animal population, such as rats or mice.[29] Extrapolating the results in animal studies to the human

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27. *See* Denise Grady, *So, Smoking Causes Cancer: This Is News?*, N.Y. TIMES, Oct. 27, 1996, at D3. *See also* American Trucking Ass'n v. EPA, 175 F.3d 1027, 1055–56 (D.C. Cir. 1999) (rejecting the argument that the EPA could not regulate fine particulate pollution until it established the "biological mechanism through which particulate pollution causes adverse health effects").

28. The literature on quantitative risk assessment is enormous. For general discussion, see NATIONAL RESEARCH COUNCIL, SCIENCE AND JUDGMENT IN RISK ASSESSMENT (1994).

29. *See, e.g.*, Public Citizen Health Research Group v. Tyson, 796 F.2d 1479 (D.C. Cir. 1986) (upholding the Occupational Safety and Health Administration's rule limiting workplace exposure to ethylene oxide, based on animal studies); Synthetic Organic Chem. Mfrs. Ass'n v. Department of Health & Human Servs., 720 F. Supp. 1244, 1256 (W.D. La. 1989) (upholding Health and Human Service's classification of certain chemicals as known

population requires an assumption about the similarity between the relevant responses of animals and humans.[30] Risk assessments must also, to take another example, attempt to predict what level of exposure the relevant human population will experience with regard to the substance in question. Will the individuals in the population eat the substance, drink it, breathe it, or all of these and more? How often? For how many days or weeks or years? These are difficult questions to answer in advance. Risk assessors must therefore make assumptions about what the future exposures will be to estimate the risk the population faces.[31]

Often these assumptions lean in the direction of assumptions that will support findings of more rather than less risk. The Occupational Safety and Health Administration routinely assumes, for example, that worker populations exposed to a risky substance will be so exposed for their entire working lives; in other words, the workers will neither switch occupations nor quit working altogether nor limit their exposures in another way.[32] In fact, many workers do spend their working lives at one facility or at one type of facility, thus experiencing similar exposures throughout their years of work.[33] Yet this kind of assumption has led to several memorable depictions of the kinds of people risk assessment assumes to exist. Justice Breyer, for example, brought us the "dirt-eating children playing in . . . a swamp" by way of arguing that the government's decisions to clean up hazardous waste sites are often extravagant.[34] More recently, John Applegate has conjured the image of the "naked dirt-eating farmer," assumed in Environmental Protection Agency analyses of the risks from a nuclear weapons production facility in Ohio—a farmer who consumes the food, and some of the soil, from his own farm, and in the meantime covers his naked body with the farm's soil.[35]

Although no one has said so explicitly, I believe that the practice of using these kinds of assumptions in risk assessment may be what lies behind the demotion of "real" human lives to "statistical" lives. It may be

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or suspected carcinogens based on results in animal studies).

30. For discussion of this assumption, see Proposed Guidelines for Carcinogen Risk Assessment, 61 Fed. Reg. 17,960, 17,966–68 (1996) (proposed Apr. 23, 1996).

31. *See, e.g.*, Leather Indus. of Am. v. EPA, 40 F.3d 392, 403–05 (D.C. Cir. 1994) (remanding an EPA rule for failure "to demonstrate a rational relationship between its highly conservative exposure assumptions and the actual usage regulated by those assumptions").

32. *See* STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION 46 (1993).

33. *Cf.* Adam M. Finkel, *A Second Opinion on an Environmental Misdiagnosis: The Risky Prescriptions of* Breaking the Vicious Circle, 3 N.Y.U. ENVTL. L.J. 295, 351 (1995) (explaining why a similar assumption about residential exposures is not overly conservative).

34. *See* BREYER, *supra* note 32, at 12.

35. *See* John S. Applegate, *A Beginning and Not and End in Itself: The Role of Risk Assessment in Environmental Decision-Making*, 63 U. CIN. L. REV. 1643, 1654 (1995).

the reason why writers who normally would cringe at distinguishing among people based on characteristics like age and class find no difficulty embracing such distinctions when it comes to statistical people. The idea, I think, is this: statistical people do not exist. There are no dirt-eating children living in swamps and no naked dirt-eating Ohioan farmers. To be sure, there are children living near hazardous waste sites and near nuclear weapons facilities, but there are no children and no adults who do the things risk assessment imagines them to do. Thus, the statistical people of risk assessment exist only on paper; there is no person, no name, no face, no *body*, that could be matched to them even if one had perfect information. Consequently, to say that a statistical life is expected to be lost as a result of a particular hazard is to say that, in reality, *no one will die*.

If statistical people truly do not exist, if statistical deaths truly do not occur, a qualitative distinction between statistical and nonstatistical lives would indeed be justified. But the qualitative distinction would be the same as that between zero and any positive number. It would not be a distinction that would, for example, support attaching a monetary value to statistical but not nonstatistical lives. If nonstatistical lives truly do not exist, they are not worth $5 million, or $2.5 million, or in fact, anything at all; they have *no* value. The idea that statistical people do not exist also would not support distinctions among statistical people; it is incoherent, for example, to make age- or health-based distinctions between nonexistent people. Thus, once again, the meaning of statistical life that derives from scientific uncertainty does not justify the analytical practices that have accompanied the framing of life in statistical terms.

One might object that even if some statistical deaths do occur—even if quantitative risk assessment sometimes correctly predicts some loss of life—quantitative risk assessment vastly overstates the number of deaths likely to occur. But if the conservatism of quantitative risk assessment means only that fewer people may die than we expect—not *zero*, but *fewer*—then this uncertainty does not justify the *qualitative* difference in the treatment of statistical and nonstatistical lives that I have discussed. Only if the actual loss of life is zero—only if no one will die—can the situations of the statistical and nonstatistical lives be regarded as qualitatively distinct. And, as I have said, they would not be qualitatively distinct in the way analysts have imagined.

It would be difficult, however, to support the claim of zero risk. Many other assumptions commonly used in risk assessments are just as artificial as the ones I have described, but they are artificial in a way that likely understates rather than overstates actual risk. For example, one standard assumption in risk assessment is that the population targeted by regulation has the same susceptibility to the relevant harm as the population studied in the risk assessment.[36] Yet most of the epidemiological studies underlying the risk assessments used in developing regulation have involved only white male workers; women, children, the elderly, racial and ethnic minorities, and poor people may be more vulnerable to the risks in question than the relatively healthy white male workers assumed in most analyses.[37] The dueling assumptions of risk assessment—some conservative, some not—provide little support for the notion that statistical lives (and deaths) simply do not exist.

The necessity of maintaining the zero-risk scenario, which justifies a qualitative distinction between statistical and nonstatistical lives, may help to explain the incredible durability of scientific disagreement in environmental and health regulation. A quarter-century after the pesticide DDT was banned, there appears to be no universal agreement that the pesticide was, all things considered, harmful enough to be banned;[38] the same is true of the two-decade-old ban on PCBs.[39] Indeed, there is likely no industrial chemical or substance as to the harmfulness of which everyone of any influence would agree. Equally striking, even when claims of the direct harmfulness of a substance are quite undeniable, these claims are almost inevitably opposed by the claim that regulating the substance would at least indirectly harm the same health-related interests as much as, or more than, the substance itself. For example, in the handful of cases in which federal courts have struck down health regulations on the ground that the regulations took inadequate account of costs, the courts have coupled their economic conclusions with the suggestion that the regulations would not, in any event, have saved lives on balance, but more likely would have taken more lives than they saved.[40] This kind of reasoning is exactly the kind of "subterfuge" Calabresi and Bobbitt would predict to occur in this kind of situation;[41] it would, I think, be an unusual judge who could say explicitly and unqualifiedly that people will die because he struck down a regulation—and that this is fine, because the regulation cost too much money. The long latency period of many of

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36. *See* Proposed Guidelines for Carcinogen Risk Assessment, 61 Fed. Reg. at 17,966.

37. *See, e.g., id.*; *see also* Robert R. Kuehn, *The Environmental Justice Implications of Quantitative Risk Assessment*, 1996 U. ILL. L. REV. 103, 123.

38. *See* George M. Gray & John D. Graham, *Regulating Pesticides*, *in* RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT 173, 173–74, 179, 189 (John D. Graham & Jonathan Baert Wiener eds., 1995).

39. *See* BREYER, *supra* note 32, at 17, 92 n.72.

40. *See, e.g.*, Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991) (invalidating EPA's ban on asbestos on grounds that the rule may require spending an unreasonably large amount of money to save a human life and also may have created more risks than it avoided because nonasbestos brakes may not be as effective as asbestos brakes); American Trucking Ass'ns v. EPA, 175 F.3d 1027 (D.C. Cir. 1999) (invalidating EPA's national air quality standard for ozone on grounds that EPA failed to articulate an intelligible limiting principle for its standard and that ozone may be beneficial to human health because pollution may block cancer-causing ultraviolet radiation).

41. *See generally* CALABRESI & BOBBITT, *supra* note 23.

the human diseases prevented by environmental and health regulation helps to preserve the subterfuge, as latency frustrates efforts to make a clear and crisp causal connection between exposure and harm. If the subterfuge were abandoned, if the zero-risk scenario were ever eliminated, it would become clear that human lives are being priced in advance of their deaths, based on explicit classifications the legal system normally would eschew.

Thus, preserving the zero-risk hypothesis by emphasizing and perhaps fomenting scientific disagreement maintains the qualitative distinction between statistical and nonstatistical lives. I repeat, however, that the qualitative distinction thus maintained—between real lives and nonexistent ones—does not justify the analytical devices that have been developed for statistical lives, namely monetization based on age, health, disability, and wealth.

In sum, neither identifiability nor scientific uncertainty justifies the differential treatment of statistical and nonstatistical lives. Perhaps another way of conceptualizing the statistical life would justify this treatment.

III. Risk

The second conception of the statistical life is that it is really not a life at all, but merely an aggregation of relatively small risks of harm to the individuals in a population. These risks can be summed, in combination with the size of the population, to determine how many lives are likely to be lost as a result of the risks. But, under this conception, "statistical life" refers to the collective risk, not to the life itself. According to this second understanding of the statistical life, a statistical life is indeed qualitatively different from a nonstatistical life because it is not a life at all but only a collection of risks.

This second approach is adopted, formally at least, by the analysts who advocate valuing life-saving measures according to individuals' willingness to pay.[42] These analysts note that while it is difficult to persuade people to think rationally and economically about the certain prospect of their own deaths, they can think rationally and economically about small increments of risk.[43] To put the idea in concrete terms: if each person in a population of 1000 faces a 1/1000 risk of death from a particular hazard, and each person is willing to pay $5 to eliminate this risk to herself, then the value of a "statistical life" in this population is $5,000. But, as analysts repeatedly remind us, it is the collection of 1000

42. *See* W. Kip Viscusi, Rational Risk Policy 45–46 (1998).
43. The seminal discussion is Schelling's. *See* Schelling, *supra* note 5, at 126–28.

risks of 1/1000, and not life itself, being valued here.[44] In practice, however, analysts treat the valuation achieved by consulting willingness-to-pay as a valuation of life itself. Since the statistical life, according to this second conception, thus turns out to be a life after all, and not just a collection of risks, the ground for distinguishing it from nonstatistical lives disappears.

One way in which analysts treat the valuation of risk as equivalent to a valuation of life is that they do not calculate the value of both statistical life and life itself.[45] They calculate only the value of statistical life. They do not go on to observe that their calculations drastically understate the value of their programs because they measure only the value of risk and not the value of life. The value of a discrete risk, however, remains the same regardless of whether anyone actually ends up dying as a result of that risk. Risk and death are two separate injuries.[46] If analysts behaved consistently with their claim that the monetary value of a statistical life reflects only risk and not life itself, they would either substantially upgrade their estimates of the benefits of life-saving programs by, for example, adding some measure of the loss of life itself (a rather outdated possibility would be the measure of lifetime earnings lost as a result of premature death),[47] or by acknowledging in every case that their estimates of the value of life-saving programs are dramatically understated because they reflect only risk and not life. Analysts do neither of these two things. It is hard, therefore, to escape the impression that, despite their protestations to the contrary, they do indeed believe they have found the measure of the value of life and not just risk.

Second, analysts commonly discount the monetary value of statistical life to reflect the temporal lag, if any, between the costs and benefits of regulation.[48] But rather than discounting from the moment when risk is imposed, they discount from the probable moment of death. In fact, the Office of Management and Budget recommends this practice.[49] If, how-

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44. *See, e.g.*, VISCUSI, RATIONAL RISK POLICY, *supra* note 42, at 45; Richard Thaler & Sherwin Rosen, *The Value of Saving a Life: Evidence from the Labor Market*, *in* HOUSEHOLD PRODUCTION AND CONSUMPTION 265–66 (Nestor E. Terleckyj ed., 1976).

45. Indeed, if analysts did calculate the value of life itself according to the same compensation theory of value that underlies the valuation of risk, the benefits of regulatory programs that save human lives would be infinite, as "no finite amount of money could compensate a person for the loss of his life, simply because money is no good to him when he is dead." John Broome, *Trying to Value a Life*, 9 J. PUB. ECON. 91, 92 (1978).

46. *See generally* Heinzerling, *Environmental Law and the Present Future*, *supra* note 14, at 2029–46, 2061–63.

47. For discussion, see CLAYTON P. GILLETTE & THOMAS D. HOPKINS, ADMINISTRATIVE CONFERENCE OF THE UNITED STATES, FEDERAL AGENCY VALUATIONS OF HUMAN LIFE, REPORT FOR RECOMMENDATION 88-7 (1988).

48. For discussion, see Lisa Heinzerling, *Discounting Our Future*, 34 LAND & WATER L. REV. 39 (1999).

49. *See* OFFICE OF INFO. & REGULATORY AFFAIRS, INTERAGENCY GROUP CHAIRED BY A MEMBER OF THE COUNCIL OF ECONOMIC ADVISORS, ECONOMIC ANALYSIS OF FEDERAL REGULATIONS UNDER EXECUTIVE ORDER 12,866, at pt. III.B.5(a) (Jan. 11, 1996)

ever, monetary valuations of statistical life indeed represent only risk, and not life, then it is inappropriate to discount the value of statistical life from the probable date of death rather than from the date a risk is created.[50]

Third, the practice of disaggregating statistical lives into statistical life-years seems more consistent with the idea that a statistical life is a whole human life, than with the idea it is an aggregation of individual risks of death. Human lives are composed, in part, of years lived; risk is not. Although it might be argued that the value of a *risk* to individuals depends in part on how many years of life will be lost if one dies, the value of statistical life-years is not currently calculated in this manner. Instead, analysts estimate the value of a life-year by simply annualizing the value of a statistical life.[51] They rarely attempt to individualize the valuations of life-years to take into account the special characteristics of the risk in question. A jarring example of this insensitivity to context comes from the economic analysis of the Food and Drug Administration's rule on mammography quality standards. After noting that $5 million was "the implied value of society's willingness to pay to avoid the likelihood of an additional death," the agency stated:

> However, FDA recognizes that the studies upon which this estimate is based were conducted, for the most part, on male, blue-collar workers of approximately 30 years of age. At 30 years of age, the average male life expectancy is 44.2 years. Thus, the estimate implies that individuals are willing to pay $5 million for 44.2 years of life. Amortizing $5 million over 44.2 years using a 7 percent discount rate yields an unadjusted average annual value per life-year of $368,000. Adjusting the life expectancy of a 30-year-old male to account for future non-bed and bed disability . . . yields an expectation of 41.3 QALYs. Thus, FDA assumes that the average annual value of one QALY, using a 7 percent discount rate, equals $373,000.[52]

Thus, the agency estimated the value of life-saving mammography in women with breast cancer based on the amount thirty-year-old male workers are estimated to demand in higher wages given the possibility of workplace accidents. By disaggregating the value of a statistical life into statistical life-years without any consideration of the special qualities of

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[hereinafter ECONOMIC ANALYSIS].

50. *See* Heinzerling, *Discounting Our Future*, *supra* note 48, at 71; Lisa Heinzerling, *Discounting Life*, 108 YALE L.J. 1911, 1913 (1999).

51. *See* ECONOMIC ANALYSIS, *supra* note 49, at pt. III.B.5(c).

52. Executive Summary, Economic Analysis of U.S. Food and Drug Administration's Final Rule Under the Mammography Quality Standards Act of 1992, at 5–26 (on file with the *Harvard Environmental Law Review*) (citations omitted).

the risk in question, the agency strongly suggested that it is striving toward a uniform, acontextual valuation of lives and life-years that is inconsistent with the premise that only risk—contingent, case-specific, fluidly perceived risk—is being valued.

In acknowledging the monetary value of reducing risk, economic analysts have contributed to our growing awareness that life-threatening risk itself—and not just the end result of such risk, death—is an injury. But they have erred in pretending that risk is all there is. The fundamental problem with the conception of statistical life as risk, not life, is the same as the problem with defining statistical life in terms of uncertainty: it implicitly assumes that statistical people do not die.[53] Because this is a question of science, not value, any attempt to resolve it through the monetization of, and differential valuation of, statistical lives, is to create a mismatch between the problem, if there is one, and its solution. In addition, because risk itself is an injury, it is wrong to allocate exposure to it based on characteristics like age, health, and wealth.

As I have explained, economic analysts do not act consistently with their assertions that they are valuing only risk and not life. In failing to develop an estimate for the value of life separate and apart from the value of risk, in discounting from the end of life rather than from the beginning of risk, and in treating life-years as components of life rather than risk, these analysts belie the truth of their assertions that their concern is with risk rather than life itself. Perhaps this is a way of trying to reconcile a very awkward tension in their methodology. By the analysts' own account, individuals are capable of rationally and economically valuing only risk, not life itself. An economic account of life-saving programs that excluded the value of life would be quite inadequate, however. By proclaiming that risk is their concern, but by in fact treating the valuations they derive as valuations of life itself, economic analysts have managed to have it both ways. They have retained the theoretical plausibility of the willingness-to-pay methodology, but have put it in the service of a system that appears, for all the world, to have arrived at the value of life itself. This strategy must fail. To the extent that the willingness-to-pay methodology can indeed value only risk and not life, it omits a large—probably the largest—benefit of life-saving regulation. Yet to the extent that it purports to value life, it is inconsistent with its own theoretical premises.

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53. Throughout this Comment I have spoken only of the risk of death, and death that is associated with the hazards regulated by federal agencies. But of course many of the risks that can lead to death also cause other serious problems, including illnesses that are painful and debilitating. *See* Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 YALE L.J. 1981, 2060–63 (1998). In focusing on death here, I do not mean to slight the other harms caused by modern hazards.

IV. Conclusion

Regulatory analysts have predicated their pricing of, and discriminations among, human lives on the idea that the lives protected by regulation are statistical. By this, they either mean that no lives will be lost or that only risk, not life itself, is at stake. In either case, the notion is that statistical people do not die. But this is true only if our scientific estimates of risk are so unreliable that they commonly predict deaths will occur where, in fact, none will. I believe this is an inaccurate, even hysterical, account of scientific uncertainty. In any event, if the problem were scientific uncertainty, the solution would not be to monetize the lives subject to an uncertain risk, nor to discriminate among them based on characteristics such as age, health, and wealth. The solution would be to develop better scientific estimates of risk.

In defending the monetization of, and discrimination among, human lives based on the statistical nature of those lives, economic analysts have dehumanized the suffering and death that scientific risk assessments tell us will occur due to particular hazards. It is hard to understand, much less empathize with, statistical pain and loss. It is easier to assume that statistical suffering and death are things that do not happen to us—real people—but only to others—statistical people—and then to assume that the other people—statistical people—do not exist. Describing pain and loss in statistical terms allows us to think coolly about them; it strips life-threatening risks of the moral and emotional texture they derive from their association with real humans with real bodies and real loved ones. Describing human lives in statistical terms thus creates the conditions under which human suffering and loss can be conceived of in economic terms, and under which this suffering and loss can be allowed to continue simply because the monetary value we have attached to them is lower than the costs of avoiding them. In inventing the statistical life, economic analysis has contrived the very entity it seeks to value.