An important tendency in the modern era, particularly in cultures shaped by individualism, is to turn to science to make sense of alleged environmental ills, to ask scientists to give guidance on them if not in a sense to arbitrate disputes about them. Journalists routinely seek out scientific experts to comment on possible dangers. Lawmakers do the same, not just when holding hearings but when specifying how regulatory agencies should implement broadly phrased statutes. Under the U.S. Clean Air Act, for instance, the Environmental Protection Agency is told to set maximum air-pollution levels based strictly on science. Similarly, the U.S. Fish and Wildlife Service, in deciding whether to extend legal protections to a species under the Endangered Species Act, is told to make its decision based entirely on science and other factual data. Science provides the vocabulary and the arena in which environmental policy often plays out.

This high status for science is consistent with a more encompassing cultural tendency on matters of public interest to embrace objectivity, to focus on facts and logical reasoning and keep emotions and personal preferences out of the picture. Scientists are viewed as the most objective and are raised up accordingly, even as they get attacked when the facts they generate are unwelcome.

Objectivity is deemed a virtue in the modern age, at least in public affairs. It is not, of course, regarded the same in artistic and other expressive realms. Indeed, when it comes to personal spheres therapy is one of the age’s leading tropes. The psychological professions, social work, personal counselors, even many churches: all are about helping people identify their subjective choices and become comfortable with them. Modern advertising, it hardly needs saying, is all about subjective yearnings and stimulating more of them. Objectivity still plays a role in personal matters; there’s little room for subjective expression when fixing a leaky water pipe. Nonetheless, the contrast between public and private spheres is rather stark. Objectivity dominates (or is supposed to) in the public arena. Subjective choices are given greater rein on the private side.

The still-lingering debate about human-induced climate change offers a case in point. Three elements of this debate are particularly illuminating in cultural terms. First, scientists are put front and center in it, both the thousands of scientists assisting or agreeing with the Intergovernmental Panel on Climate Change and, disproportionately, the vastly fewer scientists who question the dominant consensus. Atmospheric scientists are expected to tell us whether our modes of living are problematic. Second, the issue as framed publicly is whether or not human-induced climate change has been proved as a matter of fact. As raised, the issue calls for factual evidence, collected and weighed. Finally, when it comes to proof the preferred standard is that of scientific proof. Has it been factually proven, in the
scientific sense, that humans are materially changing the climate?—that’s the question.

On all three of these points, today’s climate-change debate reflects distinctive cultural traits, ones that are, in this setting and others, rather confusing and unhelpful. Indeed, most of the reasons why the modern age has trouble coming to terms with ecological change can be teased out of this slanted, three-part framing of the climate issue. To see this, though, we need to back up. We need to explore what science is and what it is not. We also need to consider the origins of morality, or more generally the origins of normative values—the values or standards used to distinguish the wise from the foolish; the ethically right from wrong. Where do we get the raw materials to make such determinations, and what gives them legitimacy? Both of these inquiries—on science and morality—lead to rather firm ending points in that the foundations of both are reasonably clear. We need to gain better awareness of these foundations if we are to make sense of our ecological plight.

Objectivity and Its Costs

When people talk about science, scientists included, they typically have one or both of two meanings in mind. Nonscientists typically refer to the body of factual knowledge that has arisen from or been confirmed through the scientific processes. Science is what we know pretty much for sure. In the case of natural science it is what we know about the natural world, its constituent elements, how it functions, and how it changes over time. Scientists use the term this way but they also use it to refer to the methods and standards by which new knowledge is generated and tested. Science is a process, guided by professional standards. It entails formulating and testing hypotheses and gathering and interpreting data under circumstances that are sometimes controlled, sometimes not.

What is important about science as thus defined is that it is all about facts and their interpretation (setting to one side science as engineering and technology). Science as method or process is a purely descriptive enterprise in the sense that it seeks understanding about what is, what was, and what will be. The sought-for descriptions can cover dynamic processes, not just static conditions. They can look back in time and forward, and include predictions based on stated assumptions. What they cannot do is pass judgment on the goodness or badness of any particular state of affairs, not without drawing upon at least a vague normative standard pulled from elsewhere.

We might consider, for instance, how scientists would describe two equal-sized fields, one covered by a tallgrass prairie of the type that once dominated east-central parts of the United States, the other a familiar expanse of soybeans planted in rows. Scientific descriptions of these fields would differ substantially in terms of their resident species (macroscopic and microscopic), the functioning and interactions of the species, nutrient flows, hydrology, and more. The descriptions would vary in both static and dynamic terms. Yet, the scientists doing this work could not, if pressed, tell us whether one field was better than another, or whether the condition of one field
was more morally right, beautiful or even useful. These questions, as noted, can't be answered without drawing on standards of evaluation that come from outside science. The scientific data are, of course, essential to any evaluation; normative standards alone are hardly enough. Answers require that the two parts be brought together. Scientists might be the best people to do this work; they'll have a better grasp of the often-complicated scientific facts. But it is work that reaches beyond science as such, and the conclusions of any assessment, whoever does it, are sound only insofar as the right evaluative standard is used along with good facts.

To see this is to see why it is problematic for atmospheric scientists to be expected to explain whether human-induced climate change is worrisome. The science part they can take on, challenging though it is. But the judgment about whether ongoing change is problematic requires use of a standard of evaluation. What is the best one to use and who gets to pick it? We could, of course, view any human-caused climate change as stupid or immoral, embracing a zero-tolerance policy. But to take this strict approach is, once again, to turn against the idea that people belong on the planet and can legitimately use it. It is to assume that all change is abusive and the less of it the better. Perhaps such a strict standard does make sense when it comes to climate; our knowledge of climate change is distinctly partial, and we don't understand in particular how climate change, once it gets going, can feed on itself. But the absolute, no-change-to-nature standard is typically unhelpful in dealings with nature. It is not immediately apparent why it would make good sense in this setting.

Our tendency to treat climate change this way, treating the issue as one of science and expecting scientists to give advice, says much about where we are culturally. The prospect of human-caused climate change triggers profound moral concerns. Our tendency, though, is to view moral questions as properly lodged in the personal sphere of life, not as matters for public judgment—at least in the case of issues such as climate change that seem to pose new quandaries. Former Vice President Dick Cheney expressed this perspective when he defended a new energy policy that only considered ways to increase energy supplies. The policy didn't consider energy conservation, he asserted, because conservation was a personal virtue, not a matter of public policy. No doubt Cheney's oil-industry ties had something to do with his stance. But his reasoning likely resonated with many people. Morality was like religion, a matter for people to sort out and implement in private life so long as they didn't harm anyone else. Subject to a no-harm rule and with due regard for the equal rights of others individuals can make their own subjective choices.

With this cultural slant, society as such has real trouble framing the climate-change issue sensibly. When morality is mostly about one-on-one interactions and individual rights, how can we talk about what is good for us collectively? How can we talk about moral obligations that we should bear not as individuals but as a people acting together? . . .

The Limits on Proof
The piece of the climate-change story not yet covered has to do with the issue of proof. The modern tendency, as observed, is for scientists to be asked for answers and the question posed thus is factual: Are we in fact changing the climate in a significant way? Merely to pose the question to scientists is implicitly to ask for an answer using scientific methodology. Has it been scientifically proved that we are changing the climate?

Countless environmental issues are reduced to this same question. It is a common practice, one that needs unpacking to expose its cultural meanings and social consequences. What does scientific proof mean, is use of the standard sensible, and what does it say about modernity that we so regularly and instinctively employ it?

The issue of proof is linked to the definition of truth, a matter taken up in the first chapter. For scientists, the gold-standard, the aim of all inquiry, is to establish truth using the correspondence definition. A statement about the physical world is true if it corresponds accurately with the physical conditions of the world, if it accurately describes reality. To the nonscientist, the standard seems plain enough and easily satisfied many times. But scientists bring more critical judgment to bear. Philosophers of science are even more demanding, so much so as to assert that no facts are every fully proved, particularly facts about nature. Instead they are simply established to very high degrees of probability, always leaving open the possibility that new data will call for modification.

Explanations of scientific proof typically distinguish between two modes of reasoning, deduction and induction. Deductive reasoning begins with initial axioms, presumed to be true, and proceeds by logical steps to conclusions that are, in a sense, implicit in the axioms. Mathematical reasoning is of this type. When the logic is sound the conclusions reached are said to be proved, though of course their accuracy depends on the validity of the starting axioms. In the study of nature, including the study of ills such as climate change, deductive proof plays a distinctly secondary role.

More central to factual claims about nature is inductive reasoning, which begins by gathering sensory data about the world and inferring conclusions from them. For instance, if numerous balls are dropped and they consistently fall toward earth at the same rate, a conclusion can be drawn about what will happen when the next ball is dropped. Data about the falling balls are brought together and an inference drawn that the next ball will move in the same way. This reasoning seems sound enough and very likely is. But it depends upon a key assumption, first prominently explained in the eighteenth century by David Hume and accepted ever since. The reasoning depends upon what is termed the Uniformity of Nature, the assumption that nature exists and behaves in uniform ways. Without that assumption, an inference about the next ball’s motion is not logically sound. So far as scientists can tell, nature does act uniformly in many respects but patterns in nature are by no means always uniform. Particularly when it comes to actions involving living creatures they can vary in ways we might easily miss. On the other side, nature might be acting uniformly without our knowing it because it follows a pattern more complex than we have observed. Nature’s dynamism comes into play, so a pattern that prevails for a time may also shift due to natural causes.
The illustration of the falling ball is a simple one in that experiments are easily undertaken under controlled circumstances. Balls can be dropped thousands of times, just as coins can be tossed thousands of times, with the results recorded and tabulated. In many settings, however, experiments are costly and time-consuming if they can be undertaken at all, and they may take place under conditions that are erratic. Often data must be collected simply by observing events as they unfold outdoors with no ability to control the operative forces.

Here we might consider a study of forest logging and its effects on the nesting success of various bird species. When a solid block of forest is disrupted by the logging of wooded patches here and there, what happens to the ability of forest-dwelling birds to raise their young? Realistically scientists can't take control of multiple forests and conduct experiments in them, again and again. Even if they could, the forests would differ in species composition, climate, hydrologic flows, and more. Inevitably researchers must gather real-world facts as they can and infer conclusions from the facts. To the extent the data show material consequences from the logging, the researchers then must formulate theories to explain them. As more studies are conducted, necessarily under varied conditions, more data come together and explanatory inferences (often revised) can gain strength. But scientific conclusions in such a setting are never as solid as in the case of balls being dropped. This is so because the assumption about the Uniformity of Nature seems less secure. It is so also because study conditions are uncontrolled, the likely relevant facts are vast, and the possible explanatory factors and forces so numerous, more numerous than the simple process of gravity at work on the falling balls. As a result, conclusions necessarily are more tentative. In the language of the philosophy of science, a conclusion in such a research setting is often termed an Inference to the Best Explanation. Scientific judgment is needed to decide how solid an explanation seems to be. In any event, a conclusion cannot be proved in any air-tight sense. New data might call the inference into question and future scientists, reviewing the same data, might propose different theories of causation.

Given these limits faced by scientists, it is often said that science cannot prove claims to 100 percent certainty. Instead it can offer claims with varied levels of confidence behind them, based on probabilities that can approach 100 percent but never reach it . . .

These observations about scientific proof are especially pertinent to the case of long-term climate change. Plainly, atmospheric scientists cannot conduct whole-planet experiments in which they study the effects of human activities over very long periods of time. We have only one planet, people are living on it and changing it, and nature’s ongoing processes are dynamic. We can’t put the planet on hold while we conduct thousand-year experiments. Further, the relevant data awaiting collection are essentially infinite and scientists must get by with well-chosen pieces. Their goal can only be to draw conclusions by inference both on what the facts are—whether change is taking place and if so how much—and on why the change is taking place. Necessarily any conclusion would be a matter of probability. Necessarily also the accuracy of conclusions will be evidenced in the same way as other scientific truths:
by widespread acceptance among climate experts and by the good consequences that come by assuming their validity (in the form, for instance, of newly collected data that conform to predictions). . . .

Public uncertainty about scientific proof has hampered the public’s understanding of climate change. The poor understanding opens the doors to demagogues who assert that if climate change were true all data would support it and the proof would be certain. More troubling than that is the fact that the burden of proof being publicly used is a scientific one at all. Scientific standards play essential roles in the scientific process. But is it wise to use them outside of that arena? Is it wise to insist that facts be accepted in public affairs only when established to an extremely high confidence level?

Other Burdens and Their Values

What is commonly termed scientific proof is only one of many burdens of proof in regular daily use. Burdens of proof are the stuff of law practice and legal systems. In civil courtrooms in the U.S., facts are accepted as proved if they are supported by the preponderance of evidence adduced at a trial, which is to say supported by 51 percent of the evidence. The standard is higher in the case of criminal trials. There, the prosecution is obligated to prove key facts beyond a reasonable doubt, a standard that defies translation into numerical terms but is certainly below 100 percent. In other legal settings different standards of proof are used. An intermediate one between these two is proof by “clear and convincing evidence.” An even lesser standard is one in which factual conclusions are treated as adequately supported unless the underlying evidence is so insubstantial that the conclusions seem not just unlikely but arbitrary and capricious. No judicial proceeding requires that facts be supported to the level of scientific proof. Indeed, criminal defendants in the United States are put to death on lesser proof than that.

For further comparison we can turn to daily life. We routinely exercise caution to avoid dangers that are unlikely to happen. Often we are unwilling to assume even small risks of harm. Who would get on an airplane, for instance, if told there was a fifty percent chance of the plane crashing, or even a five percent chance? It is hardly sensible to ignore such a danger. It is hardly sensible to brush it aside on the ground that the factual prediction of an upcoming crash has not been scientifically proven. Who would eat food that was ten percent likely to cause serious illness? As the extreme of caution we might consider the case of the United States Secret Service, charged with protecting the President. The Secret Service, we can presume, takes a death threat seriously and acts on it even if its chance of happening is one in one thousand, or one in one hundred thousand.

In this light we can reconsider our social tendency to frame climate change in terms of scientific proof. Is it not more ethical and sane to pose a much different question: Is the evidence in hand indicating that a problem looms ample enough to merit a remedial response? If that were the question, how much evidence of possible harm would we require? How likely would the danger need to be to prompt
corrective action? Presumably our answer would take into account the costliness of the correction, assuming (as we do) that actions to reduce climate change would entail net costs; that is, costs greater than the non-climate related benefits they would also generate. . . . Aside from the cost issue, important normative factors are also highly pertinent when asking how much danger is too much—factors of morality, social justice, and the wisdom of precaution.

At root, it is hardly possible to defend the use of scientific proof as the appropriate burden when talking about potentially catastrophic harm. A much lower burden seems manifestly in order. So why do we still talk about scientific proof? How did the public issue get framed like this to begin with? . . .

Reason’s Attack on Morals

For many centuries people generally, Western philosophers included, largely took for granted that the world was structured or guided so that particular actions could be objectively right or wrong, or good or bad. (Some prominent ancient philosophers had said otherwise.) Actions or states of affairs might be wrong or bad because they clashed with some transcendent ideal of goodness and justice. They might instead be inconsistent with the purposes or end goals immanent in a creature or thing. They might disobey the wishes of a god or spirit or conflict with revealed religious wisdom. The variations were many, particularly when the known world included creatures and particular places that were inhabited by potent and demanding spirits.

To trace how got to where we are today, in the ways we think about morality and its origins, we can take up the storyline with William of Ockham, a fourteenth-century English friar who as a Franciscan worked with people and nature outside the cloisters. Ockham became an early, prominent critic of the prevailing belief that ideals such as goodness and justice had real existence; that they were universals or Forms, in the language of Plato. To the contrary, Ockham contended, ideals such as these existed only within human minds as mental concepts. They were words that we used to express things within our consciousness, not labels linked to real things that existed apart from us.

In Ockham’s day morality was the chiefly province of religion, based on instruction from God. It was thus significant when Ockham asserted that it was not possible—neither by studying God’s creation and gathering sense impressions from it, nor by reasoning from those sense impressions—to draw conclusions about God or about religious matters. One could only know about God by means of revelation, Ockham insisted, by way of scripture or through direct spiritual insight. This division of sources of knowledge in effect separated the world into two realities: the reality of the empirical world given by direct experience, and the reality of God and God’s teachings known only through revelation. Put simply, there was religious truth and scientific truth, and the two were not directly linked.

Ockham’s reasoning had many consequences. In time his view helped free scientific inquiry of nature from the strictrues of the church. If nothing learned from
the study of nature told us anything about God, then no scientific conclusions could be viewed as blasphemous. As importantly, this separation detached data collection and inductive reasoning from any inquiry into the moral order. To grasp morality, some other means of inquiry was needed.

Ockham’s two-part division of reality and knowledge worked fine so long as religious faith held up and knowledge by revelation was deemed as sturdy as empirical knowledge (as he believed). But with the continued advance of scientific thinking the two realms of reality became increasingly less equal, particularly by the seventeenth century with its rising commitment to empiricism and induction. By the following century, the Enlightenment Era, faith in man’s powers and knowledge had risen high while scriptures and other revelation seemed less and less believable, in part because they lacked support from the senses and science. As science continued to rise it became ever harder to keep the two forms of reality separate. Step by step Enlightenment leaders challenged revelation, moving further down the road to secularization. Yet, as historian Carl Becker pointed out in his influential study, *The Heavenly City of the Eighteenth-Century Philosophers*, Enlightenment figures nonetheless mostly retained a firm commitment to Christian morality. They continued to anticipate movement toward some form of heaven on earth. Thus, even as they pushed aside the Nicene and Apostle’s Creeds (and on to deism in some cases) they retained faith in an overriding order, structured by both moral and physical laws and, *contra* Ockham, discoverable by human reason. With God collapsed into nature one could, by studying nature, gain wisdom about the transcendent moral order and how people were supposed to live.

The trouble with this stance was soon evident. The practical study of nature and the use of reason simply didn’t yield much in the way of moral instruction, at least much that was unambiguous. As early as the mid-century, Becker concluded, leading thinkers were admitting the feebleness of human reason on moral issues and were softening their caustic attacks on tradition and church. Nature and Nature’s god didn’t seem to have much guidance to offer. As already noted, Scottish philosopher David Hume was among the first to shift ground and propose a new foundation for morality. Our moral senses, Hume asserted, arose not within our rational minds as long believed but instead from the emotions or sentiments we experienced as we engaged with the world. By this Hume meant not transient feelings but our more deep-seated, long-term sentiments about right and wrong, sentiments that, he thought (or at least hoped), were strong and stable enough to support something close to real, binding moral standards.

Hume’s claims were listened to attentively even as the defenders of science and reason still believed that they held the keys to progress. Before the century had ended, however, another disruptive element came to unsettle into moral thought. This was the rise of liberal individualism, the rising belief (fueled by the late-century revolutions) that individuals as such were not just morally worthy (as humanists had said earlier) but endowed with rights. Public morality, it was soon claimed, had much to do with the recognition of and respect for these rights. It had to do also with the rule of law, similarly gaining strength. Moral thought should take the form of rules
that bound and applied equally to all people, so said the late-century’s leading
philosopher, Immanuel Kant. And those rules, Kant contended, should be ones that
respected the worth of individuals as such, rules that treated each person as a morally
worthy subject rather than merely as a tool or object. Moral thinking, then, properly
began with the individual human considered in isolation, not with the overall natural
world and with an effort to understand its inherent order and how people rightfully fit
into it.

This new moral reasoning in retrospect was based on human egoism, even as
early adherents (Kant included) tended to retain the moral principles of Christianity
(Lutheranism, in Kant’s case). Kant framed his moral reasoning in terms of the moral
duties borne by individuals; it was duty-based reasoning. Soon this reasoning came to
be thought about as rights-based given that an individual’s duties chiefly related to
moral obligations, first, to respect other people as morally worthy subjects, not as
mere objects and, second, to live according to moral rules that one would want to
apply equally to all other people.

Kant’s moral reasoning spread widely. In time it would become one of the
two dominant forms of Western moral thought, referred to as the deontological (duty-
based) approach. It contrasted with modes of reasoning that judged moral rightness
and wrongness based on the consequences of an action, particularly the effects on
human happiness or flourishing. Kant’s new reasoning, though, was not immune to
the problems that Hume had earlier identified. Kant had to assume that humans were
morally worthy subjects. It was an axiom that he took to be, in Jefferson’s terms,
self-evident, not one drawn from facts or pure reason. Yet if humans were worthy,
why not other creatures as well, and why didn’t moral worth reside in families or
villages or tribes along with, or instead of, individuals? Neither facts nor reason could
explain why one starting point was sounder than another.

A more significant problem for Kant came from his admonition that people
abide by rules that they would have apply to everyone. It sounded stern enough, a
version of the Golden Rule, but it said little about the content of such rules. It
allowed a person to act quite selfishly and ruthlessly so long as he was prepared to
have other people act in the same way. As for the rights that emerged out of the
recognition of individual duties, their content varied greatly based on the rules of
conduct that were crafted. So which rules should prevail?

What became clear in time was that the content of Kant’s rules, and what it
meant to treat another person as subject rather than a mere object, couldn’t be shaped
by reason alone, just as Hume had earlier pointed out. The content had to come from
somewhere else. Kant believed in God (as Hume did not) and asserted that
individuals should act out of a spirit of good will. For Kant these starting points
(augmented by speculative logic) seemed adequate. But by the next century, with
religious belief on the wane, Kant’s religious foundation seemed less sure. The more
solid grounding for morals, the only sturdy grounding perhaps, seemed to come from
some form of Hume’s moral sentiments. It came from a deep-seated sense within
people about right and wrong, doubtless shaped to varying degrees by genetic
inclination, experience, and inherited culture. . . .

57
Utility, Parts, and Wholes

Over the course of the nineteenth century, philosophers in various ways largely came to agree that moral principles simply had to arise in some manner, direct or indirect, out of human choice. They could not simply be found in nature and could not arise from pure reason alone. Nor were philosophers willing to concede authority to the church or to scriptures or other forms of revelation. A person might simply choose to embrace the church’s teachings, as Danish philosopher Soren Kierkegaard would. But it was the individual choice then that gave authority to the church. With this stress on individual choice morality increasingly came to seem subjective and personal, a matter of individual opinion based on individual experiences. The liberty rhetoric of the revolutionary era pushed in this direction. So did Kant with his insistence on individual freedom and will to believe. It was an appealing line of reasoning and a venerable one, too, with a heritage reaching back to the ancient Greek Sophists.

Yet, even as they increasingly stressed individual freedom and the power if not duty to choose philosophers did not lose track of the reality that individuals participated in a social order and had to get along with one another. People formed communities. Somehow the moral order had to sustain the welfare of these communities. Writing in the eighteenth century, Jean-Jacques Rousseau believed that the higher self was one who would (or should) identify with the good of society as a whole. The mature moral being was one whose personal desires and happiness blended with those of the community as such, so that no conflict between the two existed. Writing at the turn of the century Georg W.F. Hegel also retained emphasis on the larger social whole by insisting that the world’s parts were all connected, humans included, and that parts could not be understood in isolation. It was essential to consider also their relationships and interactions. The larger issue here—the parts and the whole—soon became central in utilitarian moral thinking, which arose in the first half of the nineteenth century in the writings of Jeremy Bentham and of James and, especially, son John Stuart Mill.

For the new utilitarians, the morality of conduct was best judged not by reference to abstract moral principles or Kantian rules but instead by calculating the effects of an action on human welfare (originally on human pain and pleasure, later on happiness more broadly understood). A moral act was one that brought the greatest net gain in human welfare compared with alternative acts that might be performed. Some versions of utilitarianism would insist that actions comply with rules, and that utilitarian calculations should focus on the comparative consequences of different rules rather than of distinct individual acts. Yet, all versions looked to the consequences of acts to judge their goodness. What was quickly apparent, though, was that this approach seemed plausible only if it took into account the happiness or welfare of everyone; it wasn’t sensible for an individual simply to maximize his own happiness and ignore the effects of his conduct on other people. It was clear too that one person’s happiness often arose in circumstances that diminished the happiness of someone else. How, then, to align the happiness of the individual with the happiness
of humankind as a whole? Bentham further complicated his calculations by contending that the happiness of certain nonhuman species ought to be considered as well.

These concerns about the larger social order, about humankind as a whole, tempered the push to expand individual rights and liberties. In some way people had to act as good community members. But where was one to find the moral limits that bound individual freedom, and what made them binding? Bentham’s original calculation, based on individual pleasure and pain, seemed to be grounded in empirically testable facts. It was an objective standard, whether a person did or did not experience pain. Bentham merely had to assume as a starting axiom that pleasure was good and pain was bad, nothing more. With the shift, though, from pleasure to happiness and to welfare generally as the operative unit, utilitarian calculations seemed more and more to defer to individual preferences. What made people happy or promoted their welfare? Answers seemed subjective, not objective. This new focus on happiness or welfare also made it harder to compare and sum-up the consequences actions had on different people. How did one add up the good and bad consequences of a particular act or proposed rule of conduct when the consequences were based on individual subjective responses and there was no metric to use in measuring and comparing them. And what about actions that made some people and others unhappy?

Like Rousseau, John Stuart Mill, the greatest of the utilitarians, hoped that people would progress morally to the point where they aligned their personal preferences with the well-being of the larger community. If that happened, the conflict would disappear. Writing soon thereafter, Karl Marx similarly hoped that the desires of individuals would in time merge with the welfare of the community as a whole as basic human needs were met. Ideally this moral uplift would lead to the disappearance of distinct social classes and even to the end of government (a tool, Marx said, used by the stronger class to exploit the weaker and thus not needed when classes disappeared). Marx, though, was far from firm in making a prediction on this, he merely hoped it would happen. Mill, too, understood that his vision of harmony was based mostly on hope and on his admitted inability to see any other way for individual happiness and group happiness to line up.

At its root, utilitarian thought was chiefly a mechanism that turned decisionmaking authority on moral issues over to individuals. Their happiness or welfare was what counted. Consequentialist moral thought generally only worked when some normative standard existed to judge the consequences. Which consequences were good and which were bad? However up-to-date and mathematically utilitarianism might be, it had no good answer except to leave individuals to decide for themselves and then to sum up their answers. But this was merely a procedual approach to morality. It did not decide what was moral; it simply prescribed who would get to decide. And this was true even when utilitarianism was put to use—as it was, quickly and often—to criticize institutions and laws and to promote reforms to augment overall happiness. Reformers still had to look to individuals and find out what they wanted.
As for the individuals themselves, utilitarian thought left them free to develop their preferences as they might choose, using various modes of reasoning, passions or mere whimsy. It provided little in the way of guidance except as it implied that they should think of themselves and what made them happy. Plainly it made moral discussion at the social level more constrained. The aim of government and public policy was simply to help individuals as such gain happiness. The good of the whole was merely the sum of the good of the parts in isolation. But where did that leave the idea of a common good, the idea of larger moral or prudential goals that society as a whole might pursue? Where did it leave the age-old idea that morality was a matter of obligations that imposed external constraints on individuals without regard for their wants and wishes?

The Moral Facts of Community Life

Looking back, the patent incompleteness of this moral reasoning as it came together in the nineteenth and twentieth centuries—both the Kantian deontological reasoning and utilitarian moral reasoning—all arose from the rejection of religion and revealed moral knowledge and from what has come to be called Hume’s is/ought dichotomy. The claim of Hume (and others, before and since) was that the empirically learned facts of the world simply did not offer moral instruction, even when the facts were manipulated using reason. The physical stuff in the world merely existed as such. There was no goodness or badness about it. Accordingly, one could not draw normative conclusions by studying the world. One could not go from the “is” of an existing thing or condition to the “ought” of what should be. One could not go from facts of the world to values; facts and values were categorically different. This dichotomy would be challenged on the ground that human fact-collecting itself was not value-free, which meant that facts as people understood them were necessarily infused with human values. But it was largely agreed that facts, to the extent they could be gathered objectively, were themselves not the source of values. Values were based on human choice. Human choices in turn were largely based on human feelings and sentiments, guided and pruned by reason; that is, by the complex mechanisms of the human brain that Freud and others would soon open to the world.

This separation of facts and values hardly meant that facts were irrelevant in making moral judgments. It meant more modestly that the basic values that were used to pass judgment had to come from some other source, even if the values were simple principles (for instance, that humans have moral value, or that human pain is bad). By the twentieth century important moral philosophers were questioning Hume’s dichotomy, claiming that the social embeddedness of individuals, their primary existence as social beings, played a key role in shaping moral values. Individuals were not simply autonomous actors. They were parts of larger systems and morality had to do with their roles in the systems. The facts of this embeddedness, they asserted, were themselves infused with values. The is and the ought were not, after all, so distinct.
This stress on the social roles of humans appeared prominently in the work of the leading American philosopher John Dewey. Dewey didn’t deny that people were individuals but he insisted on challenging and blurring the presumed line between the individual and society, much as did his slightly older contemporary, pragmatist Henry James. Individuals were embedded in society, Dewey (and James) claimed. Solidarity—fraternity, others would call it—was as important a value as independence. Dewey also believed, like others before him, that the parts of the social order could not be understood without first grasping the whole and seeing how the parts related to it. Further, the self could be realized only in and through her communal roles.

Dewey’s process-oriented thought highlighted the reality that moral thinking could not be detached from thinking about the nature of existence, from the subject of ontology. The drift of Western intellectual thought since the eighteenth century had been in the direction of greater individual autonomy. The American and French revolutions proclaimed it. Kant helped give it a philosophical grounding that Bentham and others built upon, even as they disagreed with many of Kant’s claims. Both Kantian and utilitarian thought began with the individual as such and moved outward, exploring how the moral worth of the individual might best be translated into a more encompassing scheme of moral thought. Both approaches stumbled, for the reasons given. But they gained dominance nonetheless because they fit so well with calls for ever-greater liberty (particularly in economic realms). They fit, too, with pushes to expand human rights to cover groups of people long on the lower rungs or social fringes.

By the late twentieth century, more and more observers were emphasizing how individual welfare depended on the types and health of a person’s social roles, many following lines of reasoning termed communitarian. Stark individualism just didn’t fit the ontological facts. In moral thought this would translate into a renewed interest in the moral writings of Aristotle, who had similarly portrayed humans chiefly as social beings. Aristotle’s ontological understanding led to moral reasoning that emphasized a life of virtue or, more broadly, excellence. Morality was not chiefly about abiding by particular binding rules (Kant), nor about promoting the sum of individual human happiness (Bentham), but instead about people living virtuously in and among their neighbors and fellow citizens, honorably carrying out their social responsibilities. Late in the century, Aristotle’s moral reasoning would gain an articulate proponent in philosopher Alasdair MacIntyre, whose writing directly challenged modern liberalism in its politically varied forms.

This interest in questioning individualism, in renewing the links between morality and ontology, would appear prominently in environmental philosophy. It was in the environmental area where the physical connections among people were most readily apparent. As ecologists had long pointed out, humans were embedded in larger natural systems. They were, as Aldo Leopold had famously put it, not conquerors of the land community but plains members and citizens of it, as dependent on nature for their survival as any other living creature.
These realities about nature’s functioning and human dependence have direct moral relevance. They relate also to our ways of dealing with one another given that one person’s actions in nature inevitably affect other people. This new, ecological ontology has become even more striking as we have learned more about nature’s functioning and how human welfare depends upon it; upon nature’s “ecosystem services” as the dependence is sometimes termed. Moral living requires respect for these natural processes if only because they make human life possible.

These ecological realities would lead environmental philosopher J. Baird Callicott to issue a direct challenge to Hume’s is/ought dichotomy, much as social ecology had earlier led John Dewey to do so. The facts of the natural world, the ecological realities of interdependence, do have direct moral significance Callicott has urged. Humans in fact are parts of natural communities without regard for what they know or prefer. The facts of interconnection directly challenge both Kantian moral thought and standard utilitarian thought. Both presume the autonomy of the individual and construct a moral scheme by teasing out the implications of recognizing individual moral worth. Both lines of reasoning show serious deficiencies, however, the moment the abstract individual is reconnected to nature’s lifelines. Looking back, Callicott has contended, moral thought veered off course after Hume by overemphasizing the autonomous individual. Particularly when it came to dealings with nature the better approach was the older one: the one traceable from Plato and Aristotle up to Hume and his younger Scottish contemporary Adam Smith; the one that began ontologically with humans embedded in communities.

Ecological facts, then, did play a direct role in giving rise to values. Yet ecological facts and social facts were not alone enough to flesh out a moral system. It remained necessary to draw upon values from deep-seated sentiments, as Hume said. It was necessary to turn to sentiments about the value of life; about the rightness of taking care of nature for future generations; and about the value of the whole of nature as such along with the special value of its human members. Nature’s ways were exceedingly complex. Right ways of living in it necessarily called for serious scientific efforts to learn and make sense of this complexity. In short, reason, facts, and sentiments all had their moral roles to play.

Summing Up

The wide scope of this chapter makes it helpful to organize the concluding points in summary form. They provide foundations for later parts of the inquiry.

The modern age highly values objectivity when it comes to addressing public issues. Objectivity typically means sticking with facts and logical reasoning while pushing subjective feelings and preferences off to the side. This stress on objectivity appears in various forms, including a tendency on environmental issues to turn contentious matters over to science and to expect scientists to explain whether a problem exists. Without question, the need for good scientific facts is quite high. But science is regularly called upon to answer questions that go beyond it, beyond science aptly understood as a skilled effort to gather, test, and interpret facts. When it comes
to normative issues, science cannot give answers and should not be asked to do so unless expressly supplied with normative standards to use. This overuse of science extends to scientific methodologies, particularly burdens of proof and scientific standards for accepting evidence.

As for moral thought, our predicament today is fairly plain. We’ve followed an intellectual journey over the centuries to a place where we have curtailed our capacity to engage and resolve issues at the community level. Our Enlightenment-derived commitment to objectivity leaves us without the necessary tools to exchange moral views and visions and, through rough consensus, to embrace new axioms leading to better public policies. Moral principles, we now realize, are not simply out there waiting to be found. Yes, facts are relevant in moral thinking and reasoning plays a critical role. But ultimately, our moral thinking will be grounded in our sentiments, which means, far from being pushed away, sentiments and feeling should be given a central place. They should be aired, exchanged, discussed, critiqued, and refined.

Moral orders begin—they can only begin—by people embracing axioms that simply cannot be proven scientifically or logically.

Moral reasoning ultimately arises out of sentiments and feelings mixed together with facts and clear thinking. We might think of this mixture as a heady soup, its elements running together in ways that make it impossible to specify their precise contributions. Hume was right: facts do not alone give rise to moral values. But facts play key roles not just in implementation but in the original formulation of the values. Reason, too, must be in at the beginning, if only to clarify sentiments, to put them into sensible form, and to expose them to the realities of the world.

Ultimately values gain legitimacy by social choice, as philosophers have long emphasized. Without a human valuer to create or otherwise recognize it, moral value does not exist in a meaningful sense. That process could attribute value to individual members of other species or to future generations. It could recognize value also in entities; in species as such, biotic communities, and specific landscape features. Value that arises in this way is intrinsic or inherent, value that exists independently of any contribution to human well-being. But this value still rests on human choice. That reality must be understood, just as it must be known that, because all morals arise from human choice, it is appropriate and essential for humans to be and remain choice-makers.
Health Is Membership

Delivered as a speech at a conference, "Spirituality and Healing," at Louisville, Kentucky, on October 17, 1994.

I

From our constant and increasing concerns about health, you can tell how seriously diseased we are. Health, as we may remember from at least some of the days of our youth, is at once wholeness and a kind of unconsciousness. Disease (disease), on the contrary, makes us conscious not only of the state of our health but of the division of our bodies and our world into parts.

The word "health," in fact, comes from the same Indo-

European root as "heal," "whole," and "holy." To be healthy is literally to be whole; to heal is to make whole. I don't think mortal healers should be credited with the power to make holy. But I have no doubt that such healers are properly obliged to acknowledge and respect the holiness embodied in all creatures, or that our healing involves the preservation in us of the spirit and the breath of God.

If we were lucky enough as children to be surrounded by grown-ups who loved us, then our sense of wholeness is not just the sense of completeness in ourselves but also is the sense of belonging to others and to our place; it is an unconscious awareness of community, of having in common. It may be that this double sense of singular integrity and of communal belonging is our personal standard of health for as long as we live. Anyhow, we seem to know instinctively that health is not divided.

Of course, growing up and growing older as fallen creatures in a fallen world can only instruct us painfully in division and disintegration. This is the stuff of consciousness and experience. But if our culture works in us as it should, then we do not age merely into disintegration and division, but that very experience begins our education, leading us into knowledge of wholeness and of holiness. I am describing here the story of Job, of Lazarus, of the lame man at the pool of Bethesda, of Milton's Samson, of King Lear. If our culture works in us as it should, our experience is balanced by education; we are led out of our lonely suffering and are made whole.

In the present age of the world, disintegration and divi-
“the whole problem of health in soil, plant, animal, and man [is] one great subject.”

I am moreover a Luddite, in what I take to be the true and appropriate sense. I am not “against technology” so much as I am for community. When the choice is between the health of a community and technological innovation, I choose the health of the community. I would unhesitatingly destroy a machine before I would allow the machine to destroy my community.

I believe that the community—in the fullest sense; a place and all its creatures—is the smallest unit of health and that to speak of the health of an isolated individual is a contradiction in terms.

We speak now of “spirituality and healing” as if the only way to render a proper religious respect to the body is somehow to treat it “spiritually.” It could be argued just as appropriately (and perhaps less dangerously) that the way to respect the body fully is to honor fully its materiality. In saying this, I intend no reduction. I do not doubt the reality of the experience and knowledge we call “spiritual” any more than I doubt the reality of so-called physical experience and knowledge; I recognize the rough utility of these terms. But I strongly doubt the advantage, and even the possibility, of separating these two realities.

What I’m arguing against here is not complexity or mystery but dualism. I would like to purge my own mind and language of such terms as “spiritual,” “physical,” “metaphysical,” and “transcendental”—all of which imply that the Creation is divided into “levels” that can readily be peeled apart and judged by human beings. I believe that the Creation is one continuous fabric comprehending simultaneously what we mean by “spirit” and what we mean by “matter.”

Our bodies are involved in the world. Their needs and desires and pleasures are physical. Our bodies hunger and thirst, yearn toward other bodies, grow tired and seek rest, rise up rested, eager to exert themselves. All these desires may be satisfied with honor to the body and its maker, but only if much else besides the individual body is brought into consideration. We have long known that individual desires must not be made the standard of their own satisfaction. We must consider the body’s manifold connections to other bodies and to the world. The body, “fearfully and wonderfully made,” is ultimately mysterious both in itself and in its dependences. Our bodies live, the Bible says, by the spirit and the breath of God, but it does not say how this is so. We are not going to know about this.

The distinction between the physical and the spiritual is, I believe, false. A much more valid distinction, and one that we need urgently to learn to make, is that between the organic and the mechanical. To argue this—as I am going to do—puts me in the minority, I know, but it does not make me unique. In The Idea of a Christian Society, T. S. Eliot wrote, “We may say that religion, as distinguished from modern paganism, implies a life in conformity with nature. It may be observed that the natural life and the supernatural life have a conformity to each other which neither has with the mechanical life.”
Still, I wonder if our persistent wish to deal spiritually with physical things does not come either from the feeling that physical things are "low" and unworthy or from the fear, especially when speaking of affection, that "physical" will be taken to mean "sexual."

The New York Review of Books of February 3, 1994, for example, carried a review of the correspondence of William and Henry James along with a photograph of the two brothers standing together with William's arm around Henry's shoulders. Apropos of this picture, the reviewer, John Bayley, wrote that "their closeness of affection was undoubted and even took on occasion a quasi-physical form." It is Mr. Bayley's qualifier, "quasi-physical," that sticks in one's mind. What can he have meant by it? Is this prudence masquerading as squeamishness, or vice versa? Does Mr. Bayley feel a need to assure his psychologically sophisticated readers that even though these brothers touched one another familiarly, they were not homosexual lovers?

The phrase involves at least some version of the old dualism of spirit and body or mind and body that has caused us so much suffering and trouble and that raises such troubling questions for anybody who is interested in health. If you love your brother and if you and your brother are living creatures, how could your love for him not be physical? Not spiritual or mental only, not "quasi-physical," but physical. How could you not take a simple pleasure in putting your arm around him?

Out of the same dualism comes our confusion about the body's proper involvement in the world. People seriously interested in health will finally have to question our society's long-standing goals of convenience and effortlessness. What is the point of "labor saving" if by making work effortless we make it poor, and if by doing poor work we weaken our bodies and lose conviviality and health?

We are now pretty clearly involved in a crisis of health, one of the wonders of which is its immense profitability both to those who cause it and to those who propose to cure it. That the illness may prove incurable, except by catastrophe, is suggested by our economic dependence on it. Think, for example, of how readily our solutions become problems and our cures pollutants. To cure one disease, we need another. The causes, of course, are numerous and complicated, but all of them, I think, can be traced back to the old idea that our bodies are not very important except when they give us pleasure (usually, now, to somebody's profit) or when they hurt (now, almost invariably, to somebody's profit).

This dualism inevitably reduces physical reality, and it does so by removing its mystery from it, by dividing it absolutely from what dualistic thinkers have understood as spiritual or mental reality.

A reduction that is merely theoretical might be harmless enough, I suppose, but theories find ways of getting into action. The theory of the relative unimportance of physical reality has put itself into action by means of a metaphor by which the body (along with the world itself) is understood as a machine. According to this metaphor—which is now in constant general use—the human heart, for example, is no
longer understood as the center of our emotional life or even as an organ that pumps; it is understood as "a pump," having somewhat the same function as a fuel pump in an automobile.

If the body is a machine for living and working, then it must follow that the mind is a machine for thinking. The "progress" here is the reduction of mind to brain and then of brain to computer. This reduction implies and requires the reduction of knowledge to "information." It requires, in fact, the reduction of everything to numbers and mathematical operations.

This metaphor of the machine bears heavily upon the question of what we mean by health and by healing. The problem is that like any metaphor, it is accurate only in some respects. A girl is only in some respects like a red rose; a heart is only in some respects like a pump. This means that a metaphor must be controlled by a sort of humorous intelligence, always mindful of the exact limits within which the comparison is meaningful. When a metaphor begins to control intelligence, as this one of the machine has done for a long time, then we must look for costly distortions and absurdities.

Of course, the body in most ways is not at all like a machine. Like all living creatures and unlike a machine, the body is not formally self-contained; its boundaries and outlines are not so exactly fixed. The body alone is not, properly speaking, a body. Divided from its sources of air, food, drink, clothing, shelter, and companionship, a body is, properly speaking, a cadaver, whereas a machine by itself, shut down or out of fuel, is still a machine. Merely as an organism (leaving aside issues of mind and spirit) the body lives and moves and has its being, minute by minute, by an interinvolved with other bodies and other creatures, living and unliving, that is too complex to diagram or describe. It is, moreover, under the influence of thought and feeling. It does not live by "fuel" alone.

A mind, probably, is even less like a computer than a body is like a machine. As far as I am able to understand it, a mind is not even much like a brain. Insofar as it is usable for thought, for the association of thought with feeling, for the association of thoughts and feelings with words, for the connections between words and things, words and acts, thought and memory, a mind seems to be in constant need of reminding. A mind unreminded would be no mind at all. This phenomenon of reminding shows the extensiveness of mind—how intricately it is involved with sensation, emotion, memory, tradition, communal life, known landscapes, and so on. How you could locate a mind within its full extent, among all its subjects and necessities, I don't know, but obviously it cannot be located within a brain or a computer.

To see better what a mind is (or is not), we might consider the difference between what we mean by knowledge and what the computer now requires us to mean by "information." Knowledge refers to the ability to do or say the right thing at the right time; we would not speak of somebody who does the wrong thing at the wrong time as "knowledgeable." People who perform well as musicians, athletes, teachers, or
farmers are people of knowledge. And such examples tell us much about the nature of knowledge. Knowledge is formal, and it informs speech and action. It is instantaneous; it is present and available when and where it is needed.

"Information," which once meant that which forms or fashions from within, now means merely "data." However organized this data may be, it is not shapely or formal or in the true sense in-forming. It is not present where it is needed; if you have to "access" it, you don't have it. Whereas knowledge moves and forms acts, information is inert. You cannot imagine a debater or a quarterback or a musician performing by "accessing information." A computer chock full of such information is no more admirable than a head or a book chock full of it.

The difference, then, between information and knowledge is something like the difference between a dictionary and somebody's language.

Where the art and science of healing are concerned, the machine metaphor works to enforce a division that falsifies the process of healing because it falsifies the nature of the creature needing to be healed. If the body is a machine, then its diseases can be healed by a sort of mechanical tinkering, without reference to anything outside the body itself. This applies, with obvious differences, to the mind; people are assumed to be individually sane or insane. And so we return to the utter anomaly of a creature that is healthy within itself.

The modern hospital, where most of us receive our strictest lessons in the nature of industrial medicine, undoubtedly does well at surgery and other procedures that permit the body and its parts to be treated as separate things. But when you try to think of it as a place of healing—of reconnecting and making whole—then the hospital reveals the disarray of the medical industry's thinking about health.

In healing, the body is restored to itself. It begins to live again by its own powers and instincts, to the extent that it can do so. To the extent that it can do so, it goes free of drugs and mechanical helps. Its appetites return. It relishes food and rest. The patient is restored to family and friends, home and community and work.

This process has a certain naturalness and inevitability, like that by which a child grows up, but industrial medicine seems to grasp it only tentatively and awkwardly. For example, an ordinary person would assume that a place of healing would put a premium upon rest, but hospitals are notoriously difficult to sleep in. They are noisy all night, and the routine interventions go on relentlessly. The body is treated as a machine that does not need to rest.

You would think also that a place dedicated to healing and health would make much of food. But here is where the disconnections of the industrial system and the displacement of industrial humanity are most radical. Sir Albert Howard saw accurately that the issue of human health is inseparable from the health of the soil, and he saw too that we humans must responsibly occupy our place in the cycle of birth, growth, maturity, death, and decay, which is the health of the world. Aside from our own mortal involvement, food is our fundamental connection to that cycle. But probably most of the
complaints you hear about hospitals have to do with the food, which, according to the testimony I have heard, tends to range from unappetizing to sickening. Food is treated as another unpleasant substance to inject. And this is a shame. For in addition to the obvious nutritional link between food and health, food can be a pleasure. People who are sick are often troubled or depressed, and mealtimes offer three opportunities a day when patients could easily be offered something to look forward to. Nothing is more pleasing or heartening than a plate of nourishing, tasty, beautiful food artfully and lovingly prepared. Anything less is unhealthy, as well as a desecration.

Why should rest and food and ecological health not be the basic principles of our art and science of healing? Is it because the basic principles already are technology and drugs? Are we confronting some fundamental incompatibility between mechanical efficiency and organic health? I don’t know. I only know that sleeping in a hospital is like sleeping in a factory and that the medical industry makes only the most tenuous connection between health and food and no connection between health and the soil. Industrial medicine is as little interested in ecological health as is industrial agriculture.

A further problem, and an equally serious one, is that illness, in addition to being a bodily disaster, is now also an economic disaster. This is so whether or not the patient is insured. It is a disaster for us all, all the time, because we all know that personally or collectively, we cannot continue to pay for cures that continue to get more expensive. The economic disturbance that now inundates the problem of illness may turn out to be the profoundest illness of all. How can we get well if we are worried sick about money?

I wish it were not the fate of this essay to be filled with questions, but questions now seem the inescapable end of any line of thought about health and healing. Here are several more:

1. Can our present medical industry produce an adequate definition of health? My own guess is that it cannot do so. Like industrial agriculture, industrial medicine has depended increasingly on specialist methodology, mechanical technology, and chemicals; thus, its point of reference has become more and more its own technical prowess and less and less the health of creatures and habitats. I don’t expect this problem to be solved in the universities, which have never addressed, much less solved, the problem of health in agriculture. And I don’t expect it to be solved by the government.

2. How can cheapness be included in the criteria of medical experimentation and performance? And why has it not been included before now? I believe that the problem here is again that of the medical industry’s fixation on specialization, technology, and chemistry. As a result, the modern “health care system” has become a way of marketing industrial products, exactly like modern agriculture, impoverishing those who pay and enriching those who are paid. It is, in other words, an industry such as industries have always been.

3. Why is it that medical strictures and recommendations so often work in favor of food processors and against food producers? Why, for example, do we so strongly favor the pas-
teurization of milk to health and cleanliness in milk produc-
tion? (Gene Logsdon correctly says that the motive here “is
monopoly, not consumer health.”)
4. Why do we so strongly prefer a fat-free or a germ-free
diet to a chemical-free diet? Why does the medical industry
strenuously oppose the use of tobacco, yet complacently ac-
cept the massive use of antibiotics and other drugs in meat
animals and of poisons on food crops? How much longer can
it cling to the superstition of bodily health in a polluted
world?
5. How can adequate medical and health care, including
disease prevention, be included in the structure and economy
of a community? How, for example, can a community and its
doctors be included in the same culture, the same knowledge,
and the same fate, so that they will live as fellow citizens, shar-
ers in a common wealth, members of one another?

II

It is clear by now that this essay cannot hope
to be complete; the problems are too large and my knowledge
too small. What I have to offer is an association of thoughts
and questions wandering somewhat at random and some-
what lost within the experience of modern diseases and the
often bewildering industry that undertakes to cure them. In
my ignorance and bewilderment, I am fairly representative of
those who go, or go with loved ones, to doctors’ offices and
hospitals. What I have written so far comes from my various
efforts to make as much sense as I can of that experience. But
now I had better turn to the experience itself.

On January 3, 1994, my brother John had a severe heart at-
ack while he was out by himself on his farm, moving a feed
trough. He managed to get to the house and telephone a
friend, who sent the emergency rescue squad.

The rescue squad and the emergency room staff at a local
hospital certainly saved my brother’s life. He was later moved
to a hospital in Louisville, where a surgeon performed a
double-bypass operation on his heart. After three weeks John
returned home. He still has a life to live and work to do. He
has been restored to himself and to the world.

He and those who love him have a considerable debt to the
medical industry, as represented by two hospitals, several
doctors and nurses, many drugs and many machines. This is
a debt that I cheerfully acknowledge. But I am obliged to say
also that my experience of the hospital during John’s stay was
troubled by much conflict of feeling and a good many unre-
solved questions, and I know that I am not alone in this.

In the hospital what I will call the world of love meets the
world of efficiency—the world, that is, of specialization, ma-
achinery, and abstract procedure. Or, rather, I should say that
these two worlds come together in the hospital but do not
meet. During those weeks when John was in the hospital, it
seemed to me that he had come from the world of love and
that the family members, neighbors, and friends who at vari-
ous times were there with him came there to represent that
world and to preserve his connection with it. It seemed to me
that the hospital was another kind of world altogether.
When I said early in this essay that we live in a world that was created and exists and is redeemable by love, I did not mean to sentimentalize it. For this is also a fallen world. It involves error and disease, ignorance and partiality, sin and death. If this world is a place where we may learn of our involvement in immortal love, as I believe it is, still such learning is only possible here because that love involves us so inescapably in the limits, sufferings, and sorrows of mortality.

Like divine love, earthly love seeks plenitude; it longs for the full membership to be present and to be joined. Unlike divine love, earthly love does not have the power, the knowledge, or the will to achieve what it longs for. The story of human love on this earth is a story by which this love reveals and even validates itself by its failures to be complete and comprehensive and effective enough. When this love enters a hospital, it brings with it a terrifying history of defeat, but it comes nevertheless confident of itself, for its existence and the power of its longing have been proved over and over again even by its defeat. In the face of illness, the threat of death, and death itself, it insists unabashedly on its own presence, understanding by its persistence through defeat that it is superior to whatever happens.

The world of efficiency ignores both loves, earthly and divine, because by definition it must reduce experience to computation, particularity to abstraction, and mystery to a small comprehensibility. Efficiency, in our present sense of the word, allies itself inevitably with machinery, as Neil Postman demonstrates in his useful book, *Technopoly*. "Machines," he says, "eliminate complexity, doubt, and ambiguity. They work swiftly, they are standardized, and they provide us with numbers that you can see and calculate with." To reason, the advantages are obvious, and probably no reasonable person would wish to reject them out of hand.

And yet love obstinately answers that no loved one is standardized. A body, love insists, is neither a spirit nor a machine; it is not a picture, a diagram, a chart, a graph, an anatomy; it is not an explanation; it is not a law. It is precisely and uniquely what it is. It belongs to the world of love, which is a world of living creatures, natural orders and cycles, many small, fragile lights in the dark.

In dealing with problems of agriculture, I had thought much about the difference between creatures and machines. But I had never so clearly understood and felt that difference as when John was in recovery after his heart surgery, when he was attached to many machines and was dependent for breath on a respirator. It was impossible then not to see that the breathing of a machine, like all machine work, is unvarying, an oblivious regularity, whereas the breathing of a creature is ever changing, exquisitely responsive to events both inside and outside the body, to thoughts and emotions. A machine makes breaths as a machine makes buttons, all the same, but every breath of a creature is itself a creature, like no other, inestimably precious.

Logically, in plenitude some things ought to be expendable. Industrial economics has always believed this: abundance justifies waste. This is one of the dominant superstitions of
American history—and of the history of colonialism everywhere. Expendability is also an assumption of the world of efficiency, which is why that world deals so compulsively in percentages of efficacy and safety.

But this sort of logic is absolutely alien to the world of love. To the claim that a certain drug or procedure would save 99 percent of all cancer patients or that a certain pollutant would be safe for 99 percent of a population, love, unembarrassed, would respond, “What about the one percent?”

There is nothing rational or perhaps even defensible about this, but it is nonetheless one of the, strongest strands of our religious tradition—it is probably the most essential strand—according to which a shepherd, owning a hundred sheep and having lost one, does not say, “I have saved 99 percent of my sheep,” but rather, “I have lost one,” and he goes and searches for the one. And if the sheep in that parable may seem to be only a metaphor, then go on to the Gospel of Luke, where the principle is flatly set forth again and where the sparrows stand not for human beings but for all creatures: “Are not five sparrows sold for two farthings, and not one of them is forgotten before God?” And John Donne had in mind a sort of equation and not a mere metaphor when he wrote, “If a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a man’s of thy friend’s or of thine own were. Any man’s death diminishes me.”

It is reassuring to see ecology moving toward a similar idea of the order of things. If an ecosystem loses one of its native species, we now know that we cannot speak of it as itself minus one species. An ecosystem minus one species is a different ecosystem. Just so, each of us is made by—or, one might better say, made as—a set of unique associations with unique persons, places, and things. The world of love does not admit the principle of the interchangeability of parts.

When John was in intensive care after his surgery, his wife, Carol, was standing by his bed, grieving and afraid. Wanting to reassure her, the nurse said, “Nothing is happening to him that doesn’t happen to everybody.”

And Carol replied, “I’m not everybody’s wife.”

In the world of love, things separated by efficiency and specialization strive to come back together. And yet love must confront death, and accept it, and learn from it. Only in confronting death can earthly love learn its true extent, its immortality. Any definition of health that is not silly must include death. The world of love includes death, suffers it, and triumphs over it. The world of efficiency is defeated by death; at death, all its instruments and procedures stop. The world of love continues, and of this grief is the proof.

In the hospital, love cannot forget death. But like love, death is in the hospital but not of it. Like love, fear and grief feel out of place in the hospital. How could they be included in its efficient procedures and mechanisms? Where a clear, small order is fervently maintained, fear and grief bring the threat of large disorder.

And so these two incompatible worlds might also be desig-
nated by the terms “amateur” and “professional”—amateur, in the literal sense of lover, one who participates for love; and professional in the modern sense of one who performs highly specialized or technical procedures for pay. The amateur is excluded from the professional “field.”

For the amateur, in the hospital or in almost any other encounter with the medical industry, the overriding experience is that of being excluded from knowledge—of being unable, in other words, to make or participate in anything resembling an “informed decision.” Of course, whether doctors make informed decisions in the hospital is a matter of debate. For in the hospital even the professionals are involved in experience; experimentation has been left far behind. Experience, as all amateurs know, is not predictable, and in experience there are no replications or “controls”; there is nothing with which to compare the result. Once one decision has been made, we have destroyed the opportunity to know what would have happened if another decision had been made. That is to say that medicine is an exact science until applied; application involves intuition, a sense of probability, “gut feeling,” guesswork, and error.

In medicine, as in many modern disciplines, the amateur is divided from the professional by perhaps unbridgeable differences of knowledge and of language. An “informed decision” is really not even imaginable for most medical patients and their families, who have no competent understanding of either the patient’s illness or the recommended medical or surgical procedure. Moreover, patients and their families are not likely to know the doctor, the surgeon, or any of the other people on whom the patient’s life will depend. In the hospital, amateurs are more than likely to be proceeding entirely upon faith—and this is a peculiar and scary faith, for it must be placed not in a god but in mere people, mere procedures, mere chemicals, and mere machines.

It was only after my brother had been taken into surgery, I think, that the family understood the extremity of this deed of faith. We had decided—or John had decided and we had concurred—on the basis of the best advice available. But once he was separated from us, we felt the burden of our ignorance. We had not known what we were doing, and one of our difficulties now was the feeling that we had utterly given him up to what we did not know. John himself spoke out of this sense of abandonment and helplessness in the intensive care unit, when he said, “I don’t know what they’re going to do to me or for me or with me.”

As we waited and reports came at long intervals from the operating room, other realizations followed. We realized that under the circumstances, we could not be told the truth. We would not know, ever, the worries and surprises that came to the surgeon during his work. We would not know the critical moments or the fears. If the surgeon did any part of his work ineptly or made a mistake, we would not know it. We realized, moreover, that if we were told the truth, we would have no way of knowing that the truth was what it was.

We realized that when the emissaries from the operating room assured us that everything was “normal” or “routine,”
they were referring to the procedure and not the patient. Even as amateurs—perhaps because we were amateurs—we knew that what was happening was not normal or routine for John or for us.

That these two worlds are so radically divided does not mean that people cannot cross between them. I do not know how an amateur can cross over into the professional world; that does not seem very probable. But that professional people can cross back into the amateur world, I know from much evidence. During John’s stay in the hospital there were many moments in which doctors and nurses—especially nurses—allowed or caused the professional relationship to become a meeting between two human beings, and these moments were invariably moving.

The most moving, to me, happened in the waiting room during John’s surgery. From time to time a nurse from the operating room would come in to tell Carol what was happening. Carol, from politeness or bravery or both, always stood to receive the news, which always left us somewhat encouraged and somewhat doubtful. Carol’s difficulty was that she had to suffer the ordeal not only as a wife but as one who had been a trained nurse. She knew, from her own education and experience, in how limited a sense open-heart surgery could be said to be normal or routine.

Finally, toward the end of our wait, two nurses came in. The operation, they said, had been a success. They explained again what had been done. And then they said that after the completion of the bypasses, the surgeon had found it neces-
sary to insert a “balloon pump” into the aorta to assist the heart. This possibility had never been mentioned, nobody was prepared for it, and Carol was sorely disappointed and upset. The two young women attempted to reassure her, mainly by repeating things they had already said. And then there was a long moment when they just looked at her. It was such a look as parents sometimes give to a sick or suffering child, when they themselves have begun to need the comfort they are trying to give.

And then one of the nurses said, “Do you need a hug?”

“Yes,” Carol said.

And the nurse gave her a hug.

Which brings us to a starting place.
democracy—and in some cantons by open-air meetings in which all voters participate. Every Swiss male serves a year in the Swiss Army and at the end of the year takes his government rifle home with him—where he keeps it for the rest of his life. One of my father's grandfathers came from Canton Bern.

There must be a meaning in this. I don't think I'm a gun fanatic. I own a couple of small-caliber weapons, but seldom take them off the wall. I gave up deer hunting fifteen years ago, when the hunters began to outnumber the deer. I am a member of the National Rifle Association, but certainly no John Bircher. I'm a liberal—and proud of it. Nevertheless, I am opposed, absolutely, to every move the state makes to restrict my right to buy, own, possess, and carry a firearm. Whether shotgun, rifle, or handgun.

Of course, we can agree to a few commonsense limitations. Guns should not be sold to children, to the certifiably insane, or to convicted criminals. Other than that, we must regard with extreme suspicion any effort by the government—local, state, or national—to control our right to arms. The registration of firearms is the first step toward confiscation. The confiscation of weapons would be a major and probably fatal step into authoritarian rule—the domination of most of us by a new order of "gentlemen." By a new and harder oligarchy.

The tank, the B-52, the fighter-bomber, the state-controlled police and military are the weapons of dictatorship. The rifle is the weapon of democracy. Not for nothing was the revolver called an "equalizer." Égalité implies liberté. And always will. Let us hope our weapons are never needed—but do not forget what the common people of this nation knew when they demanded the Bill of Rights: An armed citizenry is the first defense, the best defense, and the final defense against tyranny.

If guns are outlawed, only the government will have guns. Only the police, the secret police, the military. The hired servants of our rulers. Only the government—and a few outlaws. I intend to be among the outlaws.

12. THE CONSCIENCE OF THE CONQUEROR

If, as some believe, the evolution of humankind is the means by which the earth has become conscious of itself, then it may follow that the conservationist awakening is the late-flowering conscience of that world mind. A vainglorious exaggeration? Not at all, if in conservation we can see a logical extension of the traditional Christian ethic—and that of the other world religions—beyond narrowly human concerns to include the other living creatures with whom we share this planet. Not only those obviously beneficial to us, but even those that might appear to be competitors, even enemies. The broadening of the ethic cannot stop at this point; once we become generous enough in spirit to share goodwill with living things, we can advance to the nonliving, the inorganic, to the springs, streams, lakes, rivers, and oceans, to the winds and clouds, even the rocks that form the foundation of our little planet.

All is one, say the mystics. Well, maybe. Who knows? Some of us might prefer to stress the unique, the individual, the diversity of things. But it now seems well proven that all things,
animate and inanimate, living and (as we say) nonliving, are clearly interdependent. Each form of life needs the others. We see ourselves, the human race, as the apex of a pyramid of life, the point of it all—and not without justice. Through humanity the earth finds its voice. But we in turn are merely raw material for others; the microorganisms that thrive in our bodies while we live, the bacteria that feast on our flesh after death, the plants that draw nutriment from our bones would be entitled to believe that God created the human race to serve their needs. The very concept of a special creation should give pause to those Christians who hold the view, still widespread and dominant in our society, that everything on earth exists for the sake of man.

This is not to say that the Peaceable Kingdom can or ever should exist on earth. Conflict within and between species is inevitable, necessary, and up to an optimum point, desirable. When the lion lies down with the lamb, it must be for the purpose of sharing a dinner, a dinner in which one eats and the other is eaten. Otherwise the lion would starve to death. The lamb itself eats grass, those green, tender, delicate beings with whom we share what fine emotions and refined aspirations of our own. The moralistic vegetarian is a hypocrite; no self-respecting herbivore would share such a doctrine for a moment.

Competition within the species is likewise desirable—to a point. An absolute leveling of men and women would reduce humankind to the status of the social insects; good enough for ants, bees, and termites, but inappropriate to our kind and a serious injustice to those among us with the special qualities and abilities that give variety, vigor, zest, progress (yes, there is such a thing as progress), and finally glory to the human enterprise. Any Utopia, any Golden Age of Unlimited Power and Plenty, whether mythical, pastoral, or technological, where the needs and pleasures of life can be obtained without effort, would be a world of insufferable boredom, downgrading humans to the sloth and torpor of swine in a luxury sty; unworthy of us, the death of our nature.

Nevertheless, the opposite course leads to an equally fatal result. Unlimited struggle within a species would destroy that species; the human race has now reached a stage in its cleverness where, for example, we can continue to have war or science, but no longer both. The industrial way of life implies the risk of mass-produced death.

Nor are we wrong to strive for justice within a society, the fair division of wealth, charity toward the weak, the old, the foolish. Stand up for the stupid and crazy, said Whitman. Amen. The mad may be saints, the crippled may be artists, magicians, craftsmen. Human society is based on mutual aid, cooperation, sharing—without those attributes it would perish. Will perish.

What the conscience of our race—environmentalism—is trying to tell us is that we must offer to all forms of life and to the planet itself the same generosity and tolerance we require from our fellow humans. Not out of charity alone—though that is reason enough—but for the sake of our own survival as free men and women. Certainly the exact limits of what we can take and what we must give are hard to determine; few things can be more difficult than attempting to measure our needs, to find that optimum point of human population, human development, human industry beyond which the returns begin to diminish. Very difficult; but the chief difference between human and the other animals is the ability to observe, think, reason, experiment, to communicate with one another through language; the mind is our proudest distinction, the finest achievement of our human evolution. I think we may safely assume that we are meant to use it.

What are the alternatives to reason and the conservationist conscience? There seems to be only one: go on as we are going now, submitting to the blind growth of human domination over the planet, the mindless increase in population, the greed and gluttony of the rich nations, the desperate need of the poor, leading in turn to one of the two most probable resolutions.

First, an intensification of the conflicts within each nation and among the nations as the competition for dwindling natural resources becomes more severe. We can see early symptoms of this conflict in the United States, where industrialists have begun to recognize conservationists and environmentalists—not labor leaders, not government, not Marxists—as their chief antagonists in shaping the character of the American future. Business leaders have succeeded already in creating an unjustified hostility between elements of organized labor and the environmental movement. This conflict can be resolved only in
a society based on a mature, stabilized political economy that functions so smoothly we can take its health for granted, becoming aware of pain only when something is going wrong. The endless-growth economy, contrary to orthodox belief, is a diseased economy.

If efforts at internal reconciliation fail, if the environmental movement fails, we will see conflict increase, becoming more bitter as classes, factions, ethnic groups, and races compete with one another for as much as each can take from what economic wealth remains available in North America. In the course of the struggle luxuries such as wilderness and wildlife, public lands, and personal freedoms will begin to vanish, as they have already largely vanished from most of Europe, Asia, Africa, and South America. At the same time the competition among the nations will drive all closer to the edge of war, with each nation seeking to promote its own economic growth in the only way it can: at the expense of other nations. The result will be, as history demonstrates with tedious repetition, war and civil war, accompanied by famine, plague, and the descent, once again, into another dark age.

So much for the familiar and popular disaster hypothesis. The second possible outcome of population growth and industrial growth would be the creation of a planetary technocracy, a technological superstate in which we surrender our individual lives to some kind of international, computerized, scientifically engineered despotism. In a planetary order combining the best features of Huxley's *Brave New World*, Orwell's *1984*, and Stanislaw Lem's *The Futurological Congress*, we can imagine the transformation of Spaceship Earth into an orbiting food machine, automatically processing rock, air, seawater, and sewage into snack packets for a population of 10 billion drug-pacified, comatose, semihuman inhabitants. *They*—the technologists—say it can be done. But who wants to live in their world?

Commonplace nightmares. Perhaps we will find a way to muddle through and between the gruesome horns of our dilemma. The American nation (including Alaska) is one of the few places left on earth where it is still feasible to make a stand against the growth fanatics, the graph-paper mentality of the GNP economists, the replenish-and-forever-multiply theology of the Latter-Day Native-American Yahoo Church—all the de-

scendants of those hordes of avaricious peasants (our forefathers) who swarmed across the Atlantic to fall, like a plague of locusts, upon the sweet, lovely, defenseless, virgin lands of America.

In any case, America offers what may be our final opportunity to save a useful sample of the original land. It is not a question merely of preserving forests and rivers, wildlife and wilderness, but also of keeping alive a certain way of human life, a wholesome and reasonable balance between industrialism and agrarianism, between cities and small towns, between private property and public property. Here it is still possible to enjoy the advantages of contemporary technological culture without having to endure the overcrowding and stress characteristic of this culture in less fortunate regions. If we can draw the line against the industrial machine in America, and make it hold, then perhaps in the decades to come we can gradually force industrialism underground, where it belongs, and restore to all citizens of our nation their rightful heritage of breathable air, drinkable water, open space, family-farm agriculture, a truly democratic political economy. Why settle for anything less? And why give up our wilderness? What good is a Bill of Rights that does not include the right to play, to wander, to explore, the right to stillness and solitude, to discovery and physical freedom?

Dreams. We live, as Dr. Johnson said, from hope to hope. Our hope is for a new beginning. A new beginning based not on the destruction of the old but on its reevaluation. It will be the job of another generation of thinkers and doers to keep that hope alive and bring it closer to reality. If lucky, we may succeed in making America not the master of the earth (a trivial goal), but rather an example to other nations of what is possible and beautiful. Was that not, after all, the whole point and purpose of the American adventure?
Fixing the communications failure

People's grasp of scientific debates can improve if communicators build on the fact that cultural values influence what and whom we believe, says Dan Kahan.

In a famous 1950s psychology experiment, researchers showed students from two Ivy League colleges a film of an American football game between their schools in which officials made a series of controversial decisions against one side. Asked to make their own assessments, students who attended the offending team's college reported seeing half as many illegal plays as did students from the opposing institution. Group ties, the researchers concluded, had unconsciously motivated students from both colleges to view the tape in a manner that favoured their own school.

Since then, a growing body of work has suggested that ordinary citizens react to scientific evidence on societal risks in much the same way. People endorse whichever position reinforces their connection to others with whom they share important commitments. As a result, public debate about science is strikingly polarized. The same groups who disagree on 'cultural issues' — abortion, same-sex marriage and school prayer — also disagree on whether climate change is real and on whether underground disposal of nuclear waste is safe.

The ability of democratic societies to protect the welfare of their citizens depends on finding a way to counteract this culture war over empirical data. Unfortunately, prevailing theories of science communication do not help much. Many experts attribute political controversy over risk issues to the complexity of the underlying science, or the imperfect dissemination of information. If that were the problem, we would expect beliefs about issues such as environmental risk, public health and crime control to be distributed randomly or according to levels of education, not by moral outlook. Various cognitive biases — excessive attention to vivid dangers, for example, or self-reinforcing patterns of social interaction — distort people's perception of risk, but they, too, do not explain why people who subscribe to competing moral outlooks react differently to scientific data.

A process that does account for this distinctive form of polarization is 'cultural cognition'. Cultural cognition refers to the influence of group values — ones relating to equality and authority, individualism and community — on risk perceptions and related beliefs. In ongoing research, Donald Braman at George Washington University Law School in Washington DC, Geoffrey Cohen at Stanford University in Palo Alto, California, John Gastil at the University of Washington in Seattle, Paul Slovic at the University of Oregon in Eugene and I study the mental processes behind cultural cognition.

For example, people find it disconcerting to believe that behaviour that they find noble is nevertheless detrimental to society, and behaviour that they find base is beneficial to it. Because accepting such a claim could drive a wedge between them and their peers, they have a strong emotional predisposition to reject it.

**Picking sides**

Our research suggests that this form of 'protective cognition' is a major cause of political conflict over the credibility of scientific data on climate change and other environmental risks. People with individualistic values, who prize personal initiative, and those with hierarchical values, who respect authority, tend to dismiss evidence of environmental risks, because the widespread acceptance of such evidence would lead to restrictions on commerce and industry, activities they admire. By contrast, people who subscribe to more egalitarian and community-oriented values are suspicious of commerce and industry, which they see as sources of unjust disparity. They are thus more inclined to believe that such activities pose unacceptable risks and should be restricted. Such differences, we have found, explain disagreements in environmental-risk perceptions more completely than differences in gender, race, income, education level, political ideology, personality type or any other individual characteristic.

Cultural cognition also causes people to interpret new evidence in a biased way that reinforces their predispositions. As a result, groups with opposing values often become more polarized, not less, when exposed to scientifically sound information.

In one study, we examined how this process can influence people's perceptions of the risks of nanotechnology. We found that relative to counterparts in a control group, people who were supplied with neutral, balanced information immediately splintered into highly polarized factions consistent with their cultural predispositions towards more familiar environmental risks, such as nuclear power and genetically modified foods.

Of course, because most people aren't in a position to evaluate technical data for themselves, they tend to follow the lead of credible experts. But cultural cognition operates here too: the experts whom laypersons see as credible, we have found, are ones whom they perceive to share their values. This was the conclusion of a study we carried out of Americans' attitudes towards human-papillomavirus (HPV) vaccination for schoolgirls. This common, sexually transmitted virus is the leading cause of cervical cancer. The US government's Centers for Disease Control and Prevention (CDC) recommended in 2006 that the vaccine be routinely administered to girls aged 11 or 12 — before they are likely to become exposed to the virus. That proposal has languished amid intense political controversy, with critics claiming that the vaccine causes harmful side effects and will increase unsafe sex among teens.

To test how expert opinion affects this debate, we constructed arguments for and against mandatory vaccination and matched them with fictional male experts, whose appearance (besuited and grey-haired, for example, or denim-shirted and bearded) and publication titles were designed to make them look as if they had distinct cultural perspectives. When the expert who was perceived as hierarchical and individualistic criticized the CDC recommendation, people who shared those values and who were already predisposed to see the vaccine
as risky became even more intensely opposed to it. Likewise, when the expert perceived as egalitarian and communitarian defended the vaccine as safe, people with egalitarian values became even more supportive of it. Yet when we inverted the expert-argument pairings, attributing support for mandatory vaccination to the hierarchical expert and opposition to the egalitarian one, people shifted their positions and polarization disappeared.

**Rooting for the same team**

Taken together, these dynamics help to explain the peculiar cultural polarization on scientific issues in the United States and beyond. Like fans at a sporting contest, people deal with evidence selectively to promote their emotional interest in their group. On issues ranging from climate change to gun control, from synthetic biology to counter-terrorism, they take their cue about what they should feel, and hence believe, from the cheers and boos of the home crowd.

But unlike sports fans watching a game, citizens who hold opposing cultural outlooks are in fact rooting for the same outcome: the health, safety and economic well-being of their society. Are there remedies for the tendency of cultural cognition to interfere with their ability to reach agreement on what science tells them about how to attain that goal?

Research on how to control cultural cognition is less advanced than research on the mechanisms behind it. Nevertheless, two techniques of science communication may help.

One method, examined in depth by Geoffrey Cohen, is to present information in a manner that affirms rather than threatens people’s values. As my colleagues and I have shown, people tend to resist scientific evidence that could lead to restrictions on activities valued by their group. If, on the other hand, they are presented with information in a way that upholds their commitments, they react more open-mindedly.

For instance, people with individualistic values resist scientific evidence that climate change is a serious threat because they have come to assume that industry-constraining carbon-emission limits are the main solution. They would probably look at the evidence more favourably, however, if made aware that the possible responses to climate change include nuclear power and geoeengineering, enterprises that to them symbolize human resourcefulness. Similarly, people with an egalitarian outlooks are less likely to reflexively dismiss evidence of the safety of nanotechnology if they are made aware of the part that nanotechnology might play in environmental protection, and not just its usefulness in the manufacture of consumer goods.

The second technique for mitigating public conflict over scientific evidence is to make sure that sound information is vouched for by a diverse set of experts. In our HPV-vaccine experiment, polarization was also substantially reduced when people encountered advocates with diverse values on both sides of the issue. People feel that it is safe to consider evidence with an open mind when they know that a knowledgeable member of their cultural community accepts it. Thus, giving a platform to a spokesperson likely to be recognized as a typical traditional parent with a hierarchical world view might help to dispel any association between mandatory HPV vaccination and the condoning of permissive sexual practices.

It would not be a gross simplification to say that science needs better marketing. Unlike commercial advertising, however, the goal of these techniques is not to induce public acceptance of any particular conclusion, but rather to create an environment for the public’s open-minded, unbiased consideration of the best available scientific information.

As straightforward as these recommendations might seem, however, science communicators routinely flout them. The prevailing approach is still simply to flood the public with as much sound data as possible on the assumption that the truth is bound, eventually, to drown out its competitors. If, however, the truth carries implications that threaten people’s cultural values, then holding their heads under water is likely to harden their resistance and increase their willingness to support alternative arguments, no matter how lacking in evidence. This reaction is substantially reinforced when, as often happens, the message is put across by public communicators who are unmistakably associated with particular cultural outlooks or styles — the more so if such advocates indulge in partisan rhetoric, ridiculing opponents as corrupt or devoid of reason. This approach encourages citizens to experience scientific debates as contests between warring cultural factions — and to pick sides accordingly.

We need to learn more about how to present information in forms that are agreeable to culturally diverse groups, and how to structure debate so that it avoids cultural polarization. If we want democratic policy-making to be backed by the best available science, we need a theory of risk communication that takes full account of the effects of culture on our decision-making.

---

**Dan Kahan** is the Elizabeth K. Dollard professor of law at Yale Law School, New Haven, Connecticut 06511, USA, e-mail: dan.kahan@yale.edu.


---

See Editorial, page 269.