
SCIENCE AND THE PUBLIC PROCESS: Why the Gap Must Close

Daniel Yankelovich

PROLOGUE: *The advance of science and technology has periodically threatened our most cherished traditions and beliefs. Thus the persecution of Galileo in the seventeenth century finds its echo in the creationist challenge to the teaching of evolution in the public schools. More subtle tensions are expressed in the rise and fall of public confidence in science as measured by opinion polls—high during the 1950s, much lower during the mid-1970s, rising again today.*

Scientists have tended to associate such challenges and tensions with ignorance and backwardness; to ignore them rather than meet them head-on. Likewise, scientists have been slow to leave the protective isolation of the laboratory and to involve themselves in the public policy process. The result has been a dangerous gap between the technological sophistication of our tools—weapons, industrial processes, analytical procedures—and our social ability to manage them.

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There is a troubling disparity between the scientific sophistication of our culture and its social and political backwardness, a disparity that hovers over every aspect of our civilization. It is most threatening in the context of the nuclear arms race. We and the Soviets have evolved a strategic policy—the policy of deterrence—that presupposes a high level of rationality on both sides, a rationality that must never stumble nor lapse. Each superpower assumes that the other will place survival above all other human values.

How sound is this assumption? In recent years we have seen a resurgence of religious fundamentalism that does not give earthly survival the highest priority. Consider the Iran-Iraq war: countless Iranian children and old men have been given perfunctory military training and then sent to the battlefield to be slaughtered in human wave attacks. When initiatives were taken to send some of the younger boys back to Tehran after their capture by Iraqi forces, the Imam Khomeini did not want them back. “We do not want heroes,” he said, “we want martyrs.” Khomeini was expressing a view that has taken a strong hold on the Moslem world, where irrational violence and self-sacrifice have come to be regarded by many extremists as the only path to salvation.

We do not have to look so far afield to see evidence of this. In his illuminating book, *Religion in the Secular City*, Harvey Cox, the Harvard theologian, writes of his encounters with the current fundamentalist spirit in the United States. He describes church services in the Southwest in which the Books of Daniel and Ezekiel, with their predictions of a world consumed by fire, are cited as forecasting the nuclear conflagration to come. These services are rich in apocalyptic symbolism. Cox quotes a Texas minister’s reaction to the prospect of nuclear war: “Let it come. We welcome it.” The minister reassures his listeners that all true believers will be swept up in the ensuing rapture just prior to the moment of world destruction. Here, too, as well as in the Moslem world, other values are placed above mere survival.

After reading the Cox book, I was curious about how widespread such attitudes are and conducted a number of group interviews in various parts of the country on the nuclear arms race. With disconcerting frequency I found that in speaking of the possibility of nuclear holocaust, people would say such things as “God won’t let it happen to us,” or “God will grant us victory over the atheistic Communists,” or “The Bible has predicted trial by fire, so perhaps this is what the Bible means.” In a national survey, the Public Agenda Foundation found that two out of five Americans, 39 percent of the population, believe in this Biblical prediction of Armageddon and accept it with a certain fatalism. Surveys show a widespread conviction that the world is moving toward nuclear destruction.

In the process of studying cross sections of Americans, I see instances of powerful nonrational forces stirring beneath the surface of everyday life. For example, a few years ago millions of Americans said they would gladly have “nuked” the Ayatollah Khomeini in retribution for seizing American hostages in Iran. The Soviet downing of a Korean airliner evoked a powerful urge for vengeance among Americans. Opinion polls showed that President Ronald Reagan’s response—fierce to European observers—was faulted by many Americans as too weak and wanting in aggressiveness. Later, they had second

thoughts about their own initial reactions, but in the days immediately following the incident millions of Americans were sure that the Soviet leadership had deliberately and knowingly murdered innocent civilians. In such a mood, many would have endorsed almost any act of retaliation.

During the war in Vietnam, especially in its early years, Americans found it easy to dehumanize the Vietcong and the North Vietnamese. Erik Erikson describes a psychological process he calls “pseudo-speciation.” This is the tendency to treat any group of people as if they were another species—thereby giving moral sanction to acts against them that would not be condoned against one’s own species. This is what Hitler did to the Jews, the Turks to the Armenians, the Cambodian Communists to their fellow Cambodians. Unhappily, it is not a rare phenomenon. Indeed, the ease with which it has occurred in this bloody century should remind us how close we are to primitive ancestral responses.

These fierce emotions exist side by side with CT-scanners, gene splicing, and supercomputers—the marvels of our science-based technology. Our culture combines the highest accomplishments of science with such peculiar institutions as the nation-state and such primitive notions as a reliance on war to settle differences over territory or ideology. In a nuclear age we make casual use of inflammatory rhetoric and hold fast to the ingrained tendency to react in terms of national pride and to think in terms of winning and losing. It is a strange mix of tribal residues and technological wonders.

What, if anything, can be done about such an unstable and dangerous situation? How can we bridge the gap between our scientific sophistication and our political backwardness? How can we bring the cool, dispassionate rationality of science to the task of creating a safer and more orderly world?

In scientific circles, it is always assumed that the public and society at large must catch up with science and technology. We hear lectures on the need to teach the public greater science literacy. We agonize aloud in symposia about how science must communicate its message better to the public or how the country should be made more sophisticated about matters of science. It is always the public that must learn more about science. Little is said about what science must learn about the public.

Surely, this perspective—that only the public has to change—is too one-sided. It is true that the public lacks sophistication in scientific matters. Certainly, the public must develop a greater appreciation for science. But the converse is also true; we need to consider the possibility that science, too, may have to change. The issue, let me emphasize, is not to make scientists into more skillful “communicators” with the public. The challenge goes deeper than that. It is a matter of changing the structural relationship between the scientific community and the larger society.

The relationship is not static. Public attitudes toward science have shifted dramatically over the past thirty years. In the aftermath of World War II, the public developed an awe of science and its promise. Throughout the fifties and the sixties, science and technology—and the public does not distinguish clearly between them—were almost universally credited with a decisive role in gaining victory in war, prosperity in peace, enhancing national security, improving our health, and enriching the quality of life.

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The enormous prestige of science and technology in those years had two dramatic effects. The first was to stimulate a naive belief in “science magic”—an assumption that science and technology could solve any and all problems. Surely a country that could go to the moon could overcome the more mundane problems on earth—problems of poverty, urban decay, illiteracy, and pollution.

A second effect was more subtle, but it was pervasive. There developed a popular ideology of science, largely positivist in origin, that distorted the understanding of science and the scientific method. This ideology held that science offered a superior path to truth, perhaps even the exclusive path. But what was meant by science was not what scientists actually did, but a highly reductionist and mechanical image of science as an impersonal, objective process unaffected by ordinary human passions or modes of perception.

This is a mentality that Max Weber called “instrumental rationality.” Its most typical characteristics encompass a tendency to systematize knowledge; to break it into its component parts so that it can be made measurable and manipulable. It is a mindset that ignores values and ends in favor of means; that focuses on the external and objective rather than the internal and the subjective. It is a conviction that almost everything can be reduced to physical or chemical phenomena and that only those things that are measurable are real. In Vietnam it produced the language of body counts and kill ratios.

Public support of science in the fifties and sixties was almost universal but what was supported was a distorted picture of the methods whereby the work of science was performed. It was assumed that science had no room for human understanding, experience, wisdom, insight, inwardness, mystery, adventure, humanness.

Perhaps it is not surprising that in the late sixties and early seventies there was a sharp reaction against science and technology. This reaction was against the stereotype of the positivist outlook, against the reductionist approach that searched for reality only in that which was tangible and measurable.

In this shift of public attitudes toward science, three related elements stood out. The first was an indictment of science and technology as ravaging nature and threatening “Spaceship Earth.” Pollution and the destruction of the environment came to be associated with the scientific-technological enterprise, particularly on the nation’s campuses. One of the dominant cultural themes of the time was a yearning to “return to nature.” Young Americans held a highly romanticized vision of nature as a benign and sacred object. The purpose of life was to find some way to live in harmony with nature. Science and technology were deemed to be nature’s enemies.

A second element in the shift of public attitudes was the identification of technology with the abuses of materialism and industrial civilization. Here one found the theme of the dehumanizing effects of technology, as personified in the popular image of computers and their depersonalizing effects. The slogan of the times was: “Human beings; do not fold, spindle or mutilate.”

A third element was the challenge to science’s epistemological monopoly on truth. In the late sixties and early seventies, the new youth culture stressed inwardness, subjectivity, and the struggle to escape from a closed, mechanistic universe. For a brief period, young Americans flirted with Eastern religion,

Zen, and Mysticism. They rejected positivistic science as too narrow, too rationalistic, and too constricted in its vision of reality.

The effects of these three critical themes revealed themselves quite clearly in survey research. In the fifties and early sixties, it was almost universally held that science and technology would find a way to solve the problems of society and should therefore be supported unqualifiedly. Surveys showed that 80 to 90 percent of the American public held such beliefs.

By the mid-seventies, however, unqualified public support for science had slipped to a bare majority (52 percent). The most striking feature of the decline was its impact on young Americans. Older people kept the faith. The belief that "technology and science will find a way to solve the problems of our society" continued to be held by 72 percent of people older than fifty. But only 29 percent of college youth expressed such confidence. Younger, well-educated Americans had turned against science as the preferred mode of problem-solving for America.

Now, in the 1980s, we are living through yet another change. No longer is there a widespread perception of science and technology as opposed to nature. There is less romanticizing of nature than there was in the sixties, and our dependence on technology is now more realistically accepted. Indeed, far from being opposed to nature, science is now seen as a means for revealing the wonders of nature. Technology is no longer perceived as being inherently anti-nature in character. As a result, today it is possible for people to be pro-environment without being anti-technology.

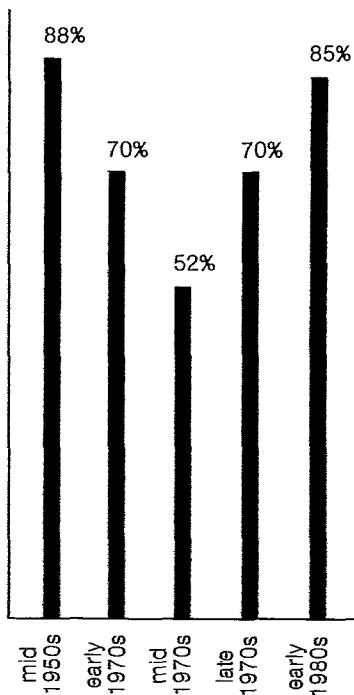
There has been an even greater change—an almost total reversal of outlook—with respect to the notion that science and technology exert a dehumanizing influence on society. As the rebellious spirit of the sixties recedes, science and technology are no longer associated with the barbaric and dehumanizing side of industrial civilization. In fact, the pendulum has swung the other way. Now freedom and creativity are linked with the scientific outlook. A total change in the popular image of the computer is a dramatic symbol of this shift. The computer is no longer seen as dehumanizing and depersonalizing. Instead, it is the very expression of freedom and autonomy.

More profound is the change in public attitudes toward science as a path toward truth. We are witnessing in the society at large a slow erosion of the positivist world view with its assumption that knowledge is based on natural phenomena as verified by empirical science. There is much less emphasis today on the conflict between mysticism and science, while science itself is seen as more open, less finished, less certain. As the future unfolds, I believe we will see an increasing rejection of the reductionist approach and a growing emphasis on the role of wisdom, experience, judgment, and insight in connection with the scientific enterprise, rather than as opposed to it.

This shift of attitude toward science is reflected in the findings of survey research. Once again, there is near consensus on the largely positive effects of science. Asked to judge the net effect of science, more than 80 percent of Americans now conclude that "science and technology bring more benefits than problems."

It would appear that the public has worked through a rather complex set of attitudes toward science over the past thirty years, shifting from naive

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acceptance to equally naive rejection to a more balanced judgment that combines admiration and respect with tempered expectations. But what about the relationship of science to the public?

One reason for the remarkable success of science is that it has insisted on its own autonomy. It has negotiated an unwritten "social contract" with the larger society that ensures a creative separateness from involvement with goals, values, and institutions other than its own. Scientists have said, in effect, to the rest of us: "Leave us alone to do our own work in our own way. Support us and give us the resources we need. Have patience and faith. Do not demand quick, utilitarian payoffs. Do these things and you will be amply rewarded."

To an impressive extent, science has held up its end of the bargain. Its insistence on autonomy has worked brilliantly. The "social contract" has allowed science to pursue long-term fundamental questions and to build slowly on the basis of its new knowledge. Science has been able to do this in the context of a society such as ours, which in most domains is impatient, excessively pragmatic, and thinks only in the short-term.

But this same social contract is responsible for the widening disparity between the sophistication of our science and the relatively primitive state of our social and political relationships.

I am convinced that as the gap between our successes in science and technology and our failures in resolving human problems become more obvious, the pressure will grow to revise the old social contract. This could end the creative isolation that leaves the scientist free to pursue the goals of science irrespective of consequences. It is difficult to know along what lines this revision will take place. Much depends on what role science and scientists themselves decide to play in shaping that decision.

I recently heard a distinguished scientist say, "Maybe we have to find a way to stop science. Maybe that is the only way we can save ourselves." I do not believe that "stopping science" is either possible or desirable. But I do believe scientists must now begin to reduce their isolation even if this complicates the progress of scientific accomplishment. And, almost surely, such an effort *will* impede the progress of science, because the more tasks one takes on, the slower the progress one can make on any one of them.

Let me suggest two strategies. The first is for scientists, as individuals, to do more of what Freeman Dyson seeks to do in his book *Weapons and Hope*. It does not matter whether one agrees or disagrees with Dyson's conclusions and arguments. The point is that in his book Dyson enters the dialogue on arms control as a citizen who also happens to be a scientist. Both roles are important because he addresses questions on which a large body of conventional wisdom exists, much of which may be wrong or misleading.

As a scientist, Dyson brings a perspective that is unique, especially on those occasions when he succeeds in illuminating the nonscientific bases of judgments that parade as scientific fact. To the extent that important issues can be seen in a new light, the light of human values informed by scientific knowledge, this is an immense service to the larger society—and it is something individual scientists can do.

Science in its institutional forms—the professional associations, faculties, and academies—can also join the debate as social-political entities concerned

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with the health of the larger society. There are a handful of pressure points where the disparity between scientific accomplishment and social arrangements are most acute. Gene splicing and the other marvels of biotechnology are exciting to scientists but raise fears of unknown consequences in some quarters. For factory workers who worry about their jobs, research in robotics is a ticket to welfare dependence. As a second strategy, official science may wish to gain a better understanding of these pressure points and help to formulate action to relieve them, even though they involve knowledge that transcends scientific competence in the narrow sense.

This knowledge cannot be achieved simply by upgrading the scientific literacy of the public. It also requires upgrading the political literacy of scientists as a prerequisite for two-way communication. There are many pressure points where such a process of give-and-take is needed, for example, in sensitive environmental issues such as toxic waste disposal and acid rain or the calculation of risks in the use of chemicals in agriculture and foods. But the single most important pressure point is the threat to our national security represented by the Soviet Union and the nuclear arms race. In this issue, complex technical questions are interwoven with geopolitical perceptions, misperceptions, ideologies, and emotions. Scientists who are comfortable only with the technical aspects cannot enter the dialogue as full participants; they must be conversant with the other parts of the puzzle as well.

In our public policy arena, professions such as law and economics are well represented, while scientists are underrepresented, even though their contribution may often be critical to sound policymaking. There is a price of admission: it is the ability to move easily between the world of science and the world of politics and commerce. This cannot be done by those who are incapable of doing first-rate science. It has to be done by the best people, and they have to give their best effort to mastering a new and messy discipline—one that will take time and energy away from their scientific work.

By way of compensation, such involvement will prepare the groundwork for a sounder, more effective relationship between science and those who wield political power.

Since the birth of the nuclear bomb, scientists have been especially aware of the Faustian component in their unwritten social contract with power and have agonized over the question of the moral responsibility of the individual for the consequences of scientific knowledge. This is an important issue, but it should not be confused with the present subject. My concern is with the absence of an effective scientific presence in the public debate on which successful democracy in our age depends.

Sooner or later, the decisions that determine our survival must be endorsed by the American electorate. In this critical but noisy process, science can play many roles. It can, for all practical purposes, be absent as an effective influence, or it can be reduced to the presentation of technical testimony that trivializes the role of science. It can be muffled, confused, and naive—or, it can make itself heard on the side of sanity and wisdom. Unfortunately, the lesser alternatives are likely to prevail unless science as an institution seizes the initiative in changing its unwritten contract with the rest of us.