The Role of Science in the Orwellian Decade

The next 10 years may prove Orwell more right than wrong, for in Newspeak there was no word for science.

Leonard M. Rieser

Advice from the Past

It is a long-standing tradition of the AAAS for the Retiring President to address the members at the annual meeting. As far back as anyone can remember, this event has taken place in late December, at the end of his year as Chairman of the Board of Directors. But now, for the first time, this occasion takes place in February, with the year as chairman still ahead. I am thus forced to live with my projected wisdom for the remainder of the year.

This is the second time in the 125-year history of the Association that we have met in San Francisco. The first was in 1915, when W. W. Campbell entitled his address "Science and civilization" (*1*) and emphasized the double purpose of that meeting: To encourage "the development of science in the Pacific region" and to unite "with other organizations in celebrating the completion of the Panama Canal" (*1*, p. 227). Over the years, presidential addresses have increasingly reflected the objectives of the Association by emphasizing the ties between the advancement of science and the well-being of mankind.

We meet again in San Francisco to explore "Science: the challenge of today—the outlook of the future." We have not strayed from Campbell's concern for humankind, but now we have a greater concern for our future.

The title of my address is intended to focus on our concern for the future and to give credit to George Orwell's extraordinary literary premonition of today's human condition. Only a decade remains until 1984, the date Orwell used for his stinging, prophetic, anti-utopian novel published 25 years ago. I find the book more ominous today than I did on first reading. Now it seems less like fiction. There is more doubt and uncertainty now than at any other time in recent history: doubt in our political process and in our priorities; skepticism with respect both to intelligent and rational thought and to the contribution of science and technology; and serious doubt about commitment to honesty and justice. All of this is exacerbated by the positive feedback of opinion polls, by staged televised pronouncements, and by economic uncertainties that are more severe than we have known since the Great Depression—uncertainties that result from a total absence of planning. There is a lack of confidence in leadership. At the same time, there is the urge to be led, which is always manifest when there is a crisis of major import.

The Orwellian decade is here! The decade before 1984. Every future decade holds challenge and a promise, but so much has happened in the last 5 years, indeed in the last several months and weeks, that I think it is not an exaggeration to insist that we are at a crossroad and to question the promise of that future which is upon us. As Roderick Seidenberg (*2*) has pointed out, ". . . we seem for the first time in history closer to the future than the past, as though the very speed of our transit created a vacuum, a hiatus, between ourselves and our heritage."

Not only are we entering the Orwellian decade, but it is scarcely 2 years before our nation's bicentennial. We must begin our third century with a clearer sense of purpose and more studied, realistic, and agreed-upon goals than we share as a nation today. When citizens of other nations depend upon us in so many ways—not simply economically and militarily—we find ourselves unsure of our destiny and, therefore, an uncertain model to follow. With some justification, the nation has found itself asking: When did it happen? Why didn't we have more warning of such impending crises? And why did problems become crises?

The answers are unsettling and can be found in many places. I have had to go no further than the addresses of past presidents of this Association. They are an accumulation of good ideas, of unheeded warnings, and of sensible propositions rarely implemented. They become frightening in the context of Orwell's premonition.

Let me return to Campbell (*1*, p. 228):

> The minds of all thoughtful people are dwelling daily upon another great application of science—the European and world-wide war. During the past twelve months the resources of the leading European nations have been applied with the utmost intensity to purposes of destruction—to turning the hands of civilization backward. The most recent discoveries in science and the latest inventions are utilized in dealing death to the foe, from the air, from the land, from the sea, and from under the sea. It is a fact that the efficiency of the engines of death in all nations is measured by the state of science in those nations. By way of comment upon this lamentable truth, what shall we who advocate the advancement of science say for the faith that is in us?

He argued that the rational methods of science must be applied to national and international affairs, but he concluded by warning that (*1*, p. 238):

> The various activities of the world contribute to the advancement of civilization in proportion as they contain the ideal and the unselfish. That which is purely practical, containing no element of idealism, may sustain existence and to that extent be valuable, but it does not civilize.

Charles Walcott, in his address entitled "Science and service" (*3*), spoke of the need to apply science in the service of every human being on the earth's surface. He warned of the impending environmental disaster in words that are so familiar today that I repeat them here (*3*, pp. 3 and 4):

> The United States' unprecedented growth and her present commanding economic position have been made possible by abundance of natural resources. Individual and

The author is Vice-President–Dean of the Faculty, Dartmouth College, and Retiring President and Chairman, Board of Directors, AAAS. This article is adapted from the presidential address given at the AAAS annual meeting on 27 February 1974 in San Francisco.

public economic policies have been predicated on this abundance. Minerals, forests, fur and game animals, agricultural soils, range lands, fish, and water resources were all seemingly inexhaustible in supply, and all have been appropriated and exploited recklessly and wastefully.

Walcott spoke thus in 1924, a time of relative prosperity.

In 1937, during a decade of depression, Edward Conklin spoke on "Science and ethics." His thesis was that there was no excuse for the scientist who "dwells permanently apart from the affairs of men" (*4*, p. 595). He pointed out that (*4*, pp. 599–602):

> Man's conquest over outer nature has outrun his conquest over his own spirit, and consequently the gifts of science, which might be unmixed blessings if properly used, become new dangers when used for evil purposes. . . . Science has flourished under a freedom which it has not created, and it is sad to see that today, as in former centuries, it is left largely to religious bodies to defend freedom of thought and conscience, while great scientific organizations stand mute. . . . The greatest problems that confront the human race are how to promote social cooperation; how to increase loyalty to truth, how to promote justice, and a spirit of brotherhood; how to expand ethics until it embraces all mankind. These are problems for science as well as for government, education and religion.

In 1954, during the height of the Cold War and just before Sputnik, Warren Weaver spoke on "Science and people" (*5*). Weaver was singular among AAAS presidents. This is his 80th year, and we continue to seek his counsel on Association affairs. I salute him tonight as I remind you of his observations.

He began by asking, "What things have men really done well?" His response was as follows (*5*, p. 1255):

> Probably the most conspicuous, the most universally recognized, and the most widely applied success lies in the understanding and control of the forces of physical nature. Coupled with this, I would place the progress that has been made—even though it is but a start—in the understanding of organic nature.

He went on to speak of other successes, having to do with conduct (*5*, p. 1255):

> I would suggest, for example, that the Ten Commandments, the Golden Rule, and the rest of the Sermon on the Mount have the generality within their realms that Newton's laws of motion have in theirs, plus the fact that no religious Einstein has found it necessary to insert correction terms of higher order. . . . The second further success that seems of major proportion is to be found in the degree to which life can be and has been enriched by the arts. Thus, it is my own conviction that the poet has done a job that science must thoroughly respect, and perhaps should envy.

Weaver considered science a common part of the lives of all men (*5*, p. 1258):

> Every man is to some degree a scientist. It is misleading that a tiny fraction of the population is composed of individuals who possess a high degree of scientific skill, while most of the rest are indifferent or poor scientists. This creates the false impression that there is a difference in kind, when it is actually only one of degree.

Weaver recognized that, just as science is essential to the public, the public is essential to science. His main conclusion was that "Science belongs to all the people." Science for the people is not a new slogan.

These statements of my predecessors were made in times of war, depression, and prosperity. They spoke of idealism, the international nature of science, the importance of ethical considerations, and science as one of the great intellectual enterprises shared, to some degree, by all intelligent persons.

We did have warnings of the problems we face today. What has happened now has been happening for 50 years. Problems have become crises because no one acted. One can only conclude that words are not enough. So many important ideas have not been implemented and, in many cases, not even heeded. Time has moved on relentlessly.

Orwell's Prediction

Another way to examine science and the human condition is through the mind of the creative writer. Instead of warning of serious threats to his contemporary society, Orwell extrapolated a society of his own. His last novel, *1984* (*6*), was published in 1949. Strictly speaking, we are entering the pre-Orwellian decade; but because Orwell's description of Western society in *1984* is so pessimistic, I prefer to think of 1984 as the end of the decade rather than the beginning. The present decade is the only opportunity to heed his warning. We cannot wait to learn whether or not the negative utopia he created in 1949 comes to pass and then react to correct it.

Orwell's society, called "IngSoc" for English socialism, is characterized by dreariness and helplessness and hopelessness on the part of the intelligent community, and a droning routine life for the proles, the vast majority who carry on the workaday labors.

All information flow forward and backward is controlled through an elaborate Ministry of Truth, with the motto: "Whoever controls the past controls the future. Whoever controls the present controls the past."

History is rewritten with complete thoroughness on a daily basis, utilizing an elaborate facility for information storage. There is two-way aural and visual contact with the public by telescreen, which cannot be turned off except in the homes of inner party members. For weapons to fight wars, there are rockets and atomic bombs, but neither has the sophistication of today's arsenals. It is not an advanced technical society, nor is *1984* science fiction—hopefully, it is political-science fiction.

The slogans are "War Is Peace," "Freedom Is Slavery," "Ignorance Is Strength."

Wars are fought continually between Oceania and either Eastasia or Eurasia. Only when told by the central authorities does one know with which country one is at war. War is essential to the economy; it is, as Orwell wrote (*6*, p. 157):

> . . . a way of shattering to pieces, or pouring into the stratosphere, or sinking in the depths of the sea, materials which might otherwise be used to make the masses comfortable, and hence, in the long run, too intelligent. Even when weapons of war are not actually destroyed, their manufacture is still a convenient way of expending labor power without producing anything that can be consumed.

Thinking and speaking are both controlled. The vocabulary is altered to a jargon called "Newspeak" (*6*, p. 251):

> Words like honor, justice, morality, internationalism, democracy, science, and religion had simply ceased to exist. A few blanket words covered them, and, in covering them, abolished them. All words grouping themselves round the concepts of liberty and equality, for instance, were contained in the single word "oldthink."

Children are trained in doublethink to use words like "blackwhite," permitting one to believe and know that black is white, and to forget one ever believed the contrary. The mutability of the past is a central tenet. Doublethink is a "vast system of mental cheating. It not only allows the party to change history, it eventually enables it to arrest the course of history" (*6*, p. 177).

To create *1984*, science, like justice, has to be eliminated (*6*, p. 159):

> In Newspeak there is no word for science. The empirical method of thought, on which all the scientific achievements of the past were founded, is opposed to the most fundamental principles of IngSoc. And even technological progress only happens when its products can in some way be used for the diminution of human liberty. In all the useful arts the world is either standing still or going backwards. The fields are cultivated with horse plows while books are written by machinery.

Orwell provided us with a picture of a society that hangs in a never-advancing history—where rationality and the use of intelligence must be forbidden, and where justice, morality, and science have to be eradicated, not only in practice, but even from the vocabulary.

One thing is certain: Orwell would not consider our 1974 to be his 1984. We're not there yet, but there are signs in our own country that should be cause for serious alarm. Even a hurried look convinces me that *1984* could evolve from where we are today.

The *New York Times* on 12 December 1973 described a "Committee on public doublespeak" (*7*, p. 46):

> About a year ago, instructions went out to all United States Government agencies to eliminate the use of the word "poverty" from all official documents and to replace it with "low-income." The Pentagon made semantic history when it coined the abominable phrase "protective reaction strike." The pronouncement that declared "inoperative" all previous Presidential statements on Watergate will long be remembered.

In a recent interview, Daniel Ellsberg (*8*) spoke of government secrecy, particularly in the Pentagon, stating that 500,000 individuals have access to information classified top secret (more doublespeak). He describes a huge bureaucracy that keeps need-to-know lists up to date and decides who is in and out of the secret government. He was asked specifically whether this could lead us to *1984*? He replied (*8*, p. 36):

> Yes. Definitely so. I was particularly struck . . . when I went back to look at *1984*, in 1971, to read about a war "on the vague frontiers whose whereabouts the average man could only guess at," which had gone on for twenty-five years when the book opened. December 1971 . . . was the 25th anniversary of our involvement in the Vietnam War.

We are all familiar with recent manifestations: the attempt to rewrite history by denying bombing raids or distorting file copies of cables, the tapping of telephone lines, and the recording of conversations. It would be possible to cite many more examples.

But despite these manifestations, we are far from being there. The general dreariness of *1984* could only be realized in our culture as a result of severe shortages of energy, the exhaustion of natural resources, more serious pollution of air and water, the disappearance of supplies, and the elimination of choice. In short, the finiteness of our planet could move us toward the dismal society if national leaders continue to address the issues of mankind through phrases and processes frighteningly close to Newspeak and Doublethink and if we continue to fail to heed the warnings that we have ignored for 50 years. We have not seen the light at the end of the Orwellian tunnel, and there is still a danger that before 1984 we shall enter a tunnel at the end of the light.

The Limits of Time

A number of realities emerge for me as I contemplate where we could be 10 years hence if we do act positively and where we might be if we simply let time run its course. There has been general acceptance of the phrase "only one earth." We should now agree that there is only one time. The relentless accumulation of agenda must force us to recognize that we will not get a second chance to meet the challenge of the next decade. In order to avoid 1984, we must seize the time now—and on a national, indeed international, scale.

We were given a start by John Platt in his article "What we must do" (*9*). He warned of a growing crisis of crises and urged the selection of tasks by priority of time available for solution. He called for a large-scale mobilization of scientists and for social inventions to meet the diverse challenges. That was 5 years ago. There have been some very encouraging responses, such as nuclear détente, some slowdown in population growth, action on the environmental front, and acceptance of limits to growth. However, had Platt applied his wildest imagination, it is not likely he could have predicted today's scenario. Must problems become crises before we mobilize ourselves? A top government official, speaking on the energy situation recently, stated that "we had simply to wait for the crisis to come in order to have public support for a major program to cope with it." This response assumes that even an intelligent population cannot and will not deal with problems except as crises. I reject this notion.

The scientific and technical community must participate with government and the private sector to find ways to communicate with the people at a signal-to-noise ratio that permits them to understand the issues and make a rational response. Then we can deal with the big issues as problems. We cannot address crises using complex and obfuscating language in declarations that are later "rendered inoperative." *It is too Orwellian.* The government of the people must communicate with a style and integrity worthy of an intelligent and educated people. If citizens can be expected to understand a 40-page explanation of income tax regulations, they can be expected to understand factual information, complex arguments, and the alternative solutions to the major problems to which their taxes are being applied.

The making of critical choices in our complex system requires technical study and planning, accompanied by debate and political action.

Planning must not be on a one-shot basis limited to the 2-year time constants of congressional terms, nor can it be simply technical planning. I agree with Athelstan Spilhaus, who 2 years ago urged "careful and continuous long-range planning—planning . . . which is also sensitive to people's 'wants.' These often may be ill-defined psychological needs in mobility, communications, recreation, culture, and beauty which keep us intellectually well and humanly alive" (*10*, p. 711). The planning board he conceived would be funded and responsible to the legislative branch and would represent not only "economics, industry, and natural and social sciences, but, equally importantly, the arts, architecture, and the humanities" (*10*, p. 715).

The creation of the Office of Technology Assessment under the leadership of Emilio Daddario, and its selection of food, health, materials, energy, and pollution as priority areas needing urgent assessment, are encouraging. But none of these issues can be considered in isolation. In our country of 200 million, we are trying to maintain the stability of a very complex society, and we must protect ourselves from the positive feedback that can lead to accumulation of crises and then dis-

asters. All planning must reflect the fact that there is only one earth and only one time. But there must not be only one agency or only one plan. The government does not have sole responsibility. A tremendous obligation and opportunity exists for the private sector, but the same wholistic approach must be taken. (One can only hope that the time will come when it can truly be said by all of us that what is good for General Motors is good for the country.)

The great scientific and technical societies and other professional associations can be far more effective than they have been in the past in planning and in sharing their conclusions with the public. Such organizations will have to invent ways of participating more meaningfully in the solution of the major issues. Committee meetings alone are not the answer.

The major problems of food, energy, and environmental pollution are not, in most cases, solvable within a single nation. We cannot be energy- and resource-independent by 1980, nor by any other date. Not only is science itself an international endeavor, the effects of the applications of science cannot be contained within national boundaries. We shall see new constraints, for which there is little precedent, on national sovereignties.

Conversely, many problems can better be solved at the regional and state levels—again a challenge to national sovereignty, but a reduction of the threat that "Big Brother knows best."

Ways must be found to introduce more technical competence into the federal and state legislative arenas. The new Congressional Fellow Program, sponsored by AAAS and several other professional associations, will constitute meaningful technical input to debates on major issues, provided the number of fellows increases drastically. There is a need at the state and federal levels for additional persons with scientific and technical experience augmenting their broad prospective to become part of the actual legislative process by running for elective office, and being elected.

We can and must find a way to plan for a very complex system and then to legislate within our traditional political process. This means we must learn to educate ourselves and communicate on technical matters at a new level of understanding and to make major adjustments in our habits in a short time. Such adjustments in our food or energy requirements will often demand restraint, but restraint can provide the stabilizing negative feedback so necessary to dampen the escalation of problems into crises. A Vermonter using water from his well does so sparingly in late summer. An entire community can and will do likewise with its water supply if honest and intelligent explanations are forthcoming. Such self-restraint curtails neither liberty nor the pursuit of happiness. It may even enhance the community, as is so often the case with shared adversity.

Science and Justice

Finally, let us turn to science per se, not as precursor of technology. *1984* denied both science and justice. They are closely coupled, and we who are concerned with the advancement of science must commit ourselves to both to avoid disaster. Science in this sense cannot be explained or justified by arguments relating to the technical state of the nation or the world. Science, like the arts or literature, is necessary to a free society. It establishes a method of intelligent thought and thereby enhances liberty. It dignifies the human spirit, as do art and poetry. Scientific inquiry is an expression of freedom. It is neither hero, villain, nor scapegoat, as Phillip Morrison (*11*) points out:

> . . . the task for the good and the wise is to ensure access for the minds of all humankind to the truths of science, each to his measure. Science is no longer the property of the West, any more than it belongs to Galileo's Florence. It is everyone's in potential and in practice. It ought to be made real to all by education, by sharing, by reinterpretation, by strict adherence to the goals of human dignity and equality. Modern science transcends the divisions of the species; it flourishes in China as in Kenya, and it needs the work of all conditions of humanity, some as makers, most as viewers and appraisers.

The highly trained scientist depends on a society that has his or her confidence, and we must share our knowledge in a way that merits such response. There is a growing connection between science and the human condition. Weisskopf (*12*) refers to "curiosity and compassion." Weaver spoke of "curiosity and faith." Salomon suggests (*13*), "There can be no science without conscience." In *1984* both science and justice are eliminated.

Those who have been privileged to gain scientific training have a special obligation not only to pursue their own studies, but to join with all intelligent persons in maintaining a society in which science can flourish. Conklin pointed out 40 years ago that "science has flourished under a freedom which it has not created." Thus, where justice is lacking, scientists must continue to speak out. Whether it involves world starvation or international harassment, we are our brothers' keepers. Even when a minority is involved, such as in our archaic penal system, an intelligent society should not tolerate it and wait for the problem to go away. Crises can have their origins in unpredictable quarters.

In the next decade science has many roles to play. We are all citizens on a single planet and we are in this decade together. There is no place or time in which to hide. We may achieve great technological breakthroughs and create important social inventions. Our curiosity will drive us to continue to seek evidence for life on *other planets*. However, *we* shall continue to live here.

It will be 1984 in a very short time. If by then we achieve a world society that is the antithesis of the one Orwell described (and I am optimistic), it will be because we conducted our scientific and political affairs with the recognition that there is intelligent life on earth.

References

1. W. W. Campbell, *Science* **42**, 227 (1915).
2. R. Seidenberg, *Anatomy of the Future* (Univ. of North Carolina Press, Chapel Hill, 1961), p. 1.
3. C. D. Walcott, *Science* **61**, 1 (1925).
4. E. G. Conklin, *ibid.* **86**, 595 (1937).
5. W. Weaver, *ibid.* **122**, 1255 (1955).
6. G. Orwell, *1984* (Signet, New York, 1961).
7. "Relevant lesson," *New York Times* (12 December 1973), p. 46.
8. D. Ellsberg, quoted by J. Wenner, *Rolling Stone* (6 December 1973), p. 36.
9. J. Platt, *Science* **166**, 115 (1969).
10. A. Spilhaus, *ibid.* **175**, 711 (1972).
11. P. Morrison, "America, future of man: science—hero, villian or scapegoat?" copyright 1973, Regents, Univ. of California (distributed by Copley News Service, 15 January 1974).
12. V. F. Weisskopf, *Science* **176**, **138** (1972).
13. J. Salomon, in *Scientists in Search of Their Conscience*, A. R. Michaelis and H. Harvey, Eds. (Springer-Verlag, New York, 1973), p. 180.

The Role of Science in the Orwellian Decade

Leonard M. Rieser

Science **184** (4135), 486-489.
DOI: 10.1126/science.184.4135.486