

Evry Schatzman was the recipient of the Distinguished Skeptic Award at the 1992 CSICOP Conference in Dallas and was a speaker at the Saturday luncheon. This article is based on those remarks.

A Threat to Science

EVRY SCHATZMAN

We are living in a critical epoch. Everything is changing on a time scale shorter than the interval between two generations. The state of the world 30 years from now is so uncertain that it is impossible to make any predictions. In this situation, what is the possible role of science? I am raising this question here because I think CSICOP can play an important part in the necessary actions.

I am perhaps pessimistic, but I think there is a threat to science throughout the world. This appears to be in contradiction to the results given by the current *Science Indicators*, a report of the National Science Board (NSB), briefly analyzed in the Fall 1992 SKEPTICAL INQUIRER. I shall try to explain why I nevertheless stick to the idea that there is a threat to science.

First, what do we call science? A line in the NSB report, "Eighty percent agree with the proposition that even if it brings no immediate benefits, basic science research should be supported by the federal government," brings us to the main point. Science can be opposed to technology. Science discovers laws of nature, and technology uses this knowledge to build tools, instruments, and machines. In laboratories, a new tool can help to discover a new law of nature, but the tool itself does not depend on unknown properties. Surprisingly, the confusion between science and technology is found in the writings of many philosophers, in their thinking that basic scientific research and technology are not different. Basic scientific research explores the unknown. A discovery is unknown before being made. Technology is based on the use of known properties of matter. The first statement among several used by the



The spreading public misunderstanding and mistrust of science is dangerous in these rapidly changing times.

NSB to elicit public attitudes toward science was: "Science and technology are making lives healthier, easier, and more comfortable." Eighty-two percent of American and 74 percent of French adults agreed with the statement. If we consider the present ecological movement, which often suggests that science is at the origin of pollution and fosters the belief that the atom bomb is an emblem of science, the data published by the NSB are surprising. Was there a bias to the questions?

There are a variety of attitudes toward science: Some people admire science because it brings truth. Some people do not trust science because what they get from quantum mechanics is that it does not bring truth. But the aura of science is such that lots of people are convinced that there are scientific proofs that astrology and other such pseudosciences are right, and many of them complain that these matters are not taught at the universities and are not studied in research centers.

Let us leave now the general public and go to the political level. Politicians are interested in the applications of science when there is a possibility that they will lead to new industrial developments, increased production, and improved economic growth. The problem is that scientists cannot promise anything; it is not possible to predict the benefit of discoveries that have yet to be made. Consequently, politicians have a tendency to cut the budget of scientific research in fields that have not produced any benefit and do not show promise of benefit on the horizon. In this respect, the very small number of political representatives who come from the scientific community are very important; but most politicians have no knowledge of the nature of science and scientific research, and this is the point

Reason Against Dogmatism

At the Union Rationaliste, we advocate the use of reason against dogmatism and of science against pseudoscience, and defend humanism against the continuous attempts of the Catholic church to control education, morals, and, if it were possible, the state. This last question has been a major part of our activities during the past several years, which does not mean that we forgot about astrology, homeopathy, and other pseudosciences. We took part in the action against the strange affair of "water memory," invented by Jacques Benveniste to justify homeopathy. The trouble with that story is that some scientists, in a discrete and anonymous way, helped Benveniste, whose laboratory was supported by homeopathic drug firms. *Science et Vie*, a well-known and excellent magazine of the popularization of science, was condemned for defamation, and during the preliminary investigation Benveniste received help from people with political power. Altogether this raises important and deep sociological questions.

—Evry Schatzman

I would like to stress now.

Most politicians, being ignorant in science, rely on two kinds of information: on one side, the history of the applications of science from World War I to World War II, and on the other side, the dissertations of thinkers and philosophers. On the first side, we have an example.

Twenty years ago, *Physics Today*, the monthly magazine of the American Physics Society, mentioned that the new generation of politicians, having no experience of the incredible applications of scientific discoveries during World War II, were not as convinced of the value of basic scientific research as their seniors had been. This was the explanation of the sudden drop in the amount of state support for science. On the other side, the situation is perhaps worse in Europe than in the United States. Constant reference to quantum mechanics and to Heisenberg's uncertainty principle gives to a large well-educated but not scientific public the idea that it is not possible to have confidence in science, to trust science. The consequence is quite clear: Why should the state invest in a domain that cannot be trusted?

This brings us to the question of how to teach science in order to make clear that science is part of culture. But we have to consider the difference between teaching science as a tool, eventually as a professional tool, and teaching the nature of science.

Scientific discourse gives a representation of natural processes; the major property of this knowledge is that it is operational. We here meet a philosophical problem. Theory is a representation of reality. Theory can be incomplete, but it can predict new phenomena, one of the best examples being the experimental discovery of the wave properties of electrons after the discoveries of Louis de Broglie. In this respect, the French school of physics in the first half of the century was much influenced by positivism. Experimental data were the only reliable things; theory was always considered as speculative. I am a theoretician, and I had to fight hard in my younger years to have theory accepted by the French scientific

community.

These statements about theory apply particularly to Prosper Blondlot, who "discovered" N-rays. I think he was essentially a poor physicist, reflecting the state of French physics early in this century, probably completely ignoring Maxwell's electromagnetic theory of light and not deliberately committing fraud. The discovery of the weakness of his N-ray experiments took place early enough for the French Academy of Sciences to deliver its award to Blondlot for all his work rather than for his discovery of N-rays.

I think we cannot stress sufficiently the wonder of realizing that an experiment based on a law of nature can be successful. This can be done at an elementary level and shown to pupils by nice experiments they can conduct themselves. The enthusiasm generated by discovering that a scientific statement corresponds to an observable phenomenon seems to me part of culture.

It is important to note that, if teachers themselves are not convinced that a scientific statement expresses a real property, they will not be able to carry the message to their pupils. When I am speaking about the threat to science, I am also thinking of a slow disaggregation of the message to pupils, with the possibility that in a few years people will consider scientific work to be like an activity of entities on another planet, of beings foreign to Earth.

What worries me is the potential decay of science in an epoch where the time scale of all events is decreasing and becoming shorter than the time interval between two generations, 20 or 30 years. Let us assume that no World War III will occur. The world population will have increased by 50 to 100 percent. Migration will have become a great worry. Energy

problems will have to be solved on a planetary scale. Specialists claim that Earth could easily feed 50 billion people, but producing food is not only a technical problem: food production, for social reasons, is already difficult in many countries and can become worse. I always have the feeling that politicians are talking of tomorrow's problems with nineteenth-century thoughts and language, as if we had eternity ahead of us.

We are not going to build an ideology, the new version of the future, the new utopia that will help us to cross the turn of the century. But at least we should approach these problems. People have strange beliefs, yes. But there is a lack of security, an uncertainty of social life, an absence

of hope, a need for a vision of a happy future, a weakness of people's personalities that appears to be compensated for by beliefs that give the feeling of safeness. These sociological and psychological problems have to be understood if we want to fight efficiently against unsupported beliefs. Approaching these questions also belongs among the duties of CSICOP. This is part of our task; it will help the defense of science, and I am sure that we can do it.

Every Schatzman is president of the French Union Rationaliste, founded by the great physicist Paul Langevin in 1931. Schatzman is a member of the French Academy of Sciences and has been teaching astrophysics at Paris University.

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