# The False Images of Science

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The False Images of Science

By GERALD HOLTON

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Of the influences that shape man's actions, none is more powerful than the images we carry in our heads. Every subject is apt to invoke in our minds a specific image, made up of concrete information, misinformation, folklore, desire and prejudice. Thus, how people see themselves as a nation determines to a large extent how they will respond to any new challenge. The roles we play in our family life, particularly with respect to our children, depend greatly on what roles we assign ourselves in the society around us.

In the same way, our images of science vastly affect the relationship between science and society. Practically, these images determine the level and the sources of financial support, the quality and quantity of instruction offered, and the development of new scientists. The effects on professional morale and the goals scientists set for themselves—in short, on the scientists' image of their own work—are also considerable. But even more important is the role images play in deciding this urgent question: Can scientific activity be an integrated part of our culture, or will it be forced to develop independently?

Right or wrong, ideas are powerful. Therein lies the chief danger of false images. Like bad grammar, bad images become dominant when they gain wide currency, and so undermine communication among thoughtful people. It is high time, therefore, to consider the prevailing public images of the role of science, using the most straightforward language possible.

Pure Thought and Practical Power. Each person's image of science is different from the next, but all are composed of seven main elements. The first goes back to Plato and portrays science as a tonic with double benefits—science as pure thought helps the mind find truth, and science as power provides the tools for effective action. The main flaw in this image is that it omits a third vital aspect. Pure science allows us to understand the physical world and, through its applications, allows us to control and change

About the Author

Gerald Holton, professor of physics at Harvard University, is active in three fields—physics, teaching and scholarly editing. Doctor Holton pursues experimental research on the properties of materials under high pressures; he teaches and writes in the fields of physics and the history and philosophy of science; and he is also editor-in-chief of Daedalus, the journal of the American Academy of Arts and Sciences. Born of Austrian parents, Doctor Holton is thirty-seven years old. Photograph by Arnold Newman
that world. But science also has a mythic function; that is, it generates an image of the world that is a mental and cultural reality and provides some of the metaphysical foundations on which our society functions. It affects our values and our ideas of what is possible or desirable or good. It shapes our imagination and our way of thinking about things.

As a contrast, the methods of art, of science, and of the other cultural institutions are different. Art, for example, creates values; it generates the mental images that we use to organize and construe our world. Science, on the other hand, is a way of knowing, a way of organizing our experience, and it provides the tools for understanding and manipulating the world.

This is a contrast of methods, a contrast of values, and a contrast of ways of knowing. But there is also a contrast of ends. Art aims to create beauty, science aims to create understanding and control. Art aims to create the world we want to live in, science aims to create the world we can live in.

The contrast of methods is important, but the contrast of ends is even more important. Art aims to create the world we want to live in, science aims to create the world we can live in. Art is about values, science is about knowledge. Art is about beauty, science is about understanding. Art is about the world we create, science is about the world we can create.

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like a tree, ring by ring. Einstein did not prove the work of Newton wrong; he provided a larger setting within which some contradictions and inconsistencies of the older physics disappeared.

But the impact of science as an ecological disaster can be subjected to a more severe critique. Regardless of science's part in the corrosion of absolute values, have those values really given us a safe anchor? A priori absurdist nihilism has been carried over the globe in completely contradictory variations. Most of the humanistic philosophy has been carried out under the banner of some absolutist philosophy, from the Artec massacre of the auto da fé of the Spanish Inquisition, from the massacre of the Hispanics to the Nazi gas chambers. It is at best an optical illusion which makes the fourteenth-century scholastics look so sterile and dreary to modern critics of the recent, "scientific" periods, just as the life of the "noble savage," so esteemed by eighteenth-century philosophers, has been seen in what it is, and how it is.

If, therefore, some of the new philoso-

phists, inspired rightly or wrongly by science, reject earlier bases of authority as faulty—because the founders of this nation did—then they point out that "abundance" and contradistinction are not the same thing that was.

In looking for a new and reorder basis on which we can together live in the world, we shall find science indispensable. We can hope to reconnect with the remainder of society to the needs and potentialities of people only if we know more about the inner workings of man. Already science has much to say that is valuable and im-
portant for solving the problems of our time.

The 60's generation of students who en-
counter science in the culture will have a profound impact on the later part of this decade. Those who know science will have a major impact on the future of society. The challenge of science will have a profound impact on the later part of this decade. Those who know science will have a major impact on the future of society.

For readers who wish to pursue the subject further, the following books are recommended:

- Horkheimer, Max: The Adversary System (Addison-Wesley Publishing Company) $5.95
- Horkheimer, Max: The Case for Modern Man (Beacon Press) $4.50
- Frankel, Charles: The Contemporary Mind (Beacon Press) $6.95
- Bronowski, Jacob: The Universal Human Spirit (Harvard University Press) $2.95
- Blanshard, Paul: Education in the Age of Science (Basic Books) $4.95

What remedies suggest themselves? At the least, science must again be made a natural part of every intelligent man's common literacy—not because science is more important than other fields, but because it is an important part of the whole jigsaw puzzle of knowledge. This would reduce absurd, though at work and at every level of education—for example, a good part of a great deal of work could be the rule in good colleges fifty years ago. It would demand imaginative new curricula, strengthened standards of achievement, more recognition of excellence—whether exhibited by instructors or by students. Adult education, including the study of the arts and the interlus-

cultural aspects of science through mass media, is an obvious measure merging the support and participation of our best minds.

Here and there, to be sure, some efforts are being made in the right direction, but the total is pitifully small. Virtually nobody has been hobbled by the ideology of the cultivate men and women turning up new things and have been shamed. The old way—the work of many hands—has been broken. Few intellectuals are now prepared to see us all work with our hands. And meanwhile science advances faster and faster every day, widening the rift between science and culture.

To restore some to kind of re-

priestly role of the visionaries of the past, men—to bring science into an orbit above one of the facts of life, beyond the field of our common culture—that is the great challenge before intellectuals to-day; and nothing better illustrates the urgency and difficulty of this task than the false images prevailing about science.