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ADVENTURES OF THE MIND

The False Images of Science

By Gerald Holton
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By GERALD HOLTON

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 myopoeic function; that is, it generates an illusion of certainty, a permanency, and thereby provides some of the meta-
physical and moral support that makes us feel secure in our realiza-
tions of our ideology.

As a consequence, the methods of ar-
gument of science, its conceptions and its
model, permeate first the intellectual
life of the time, then the tenets and usage
of everyday life. Our language of ideas,
for example, owes a debt to the science of
statics and hydraulics and the model of
the solar system. These forms of powerful
analogies in many fields of study.

Guiding ideas—such as conditions of equilibrium, centrifugal forces, con-
servation laws and the balance of energy or power, feedback, invariant com-
plementarity—enrich the general arsenal of imaginative and thought. All phi-
losophers share the science with the need to work with concepts such as space, time, quantity, matter, order, law, causality, verification, reality...

A similar image of language must, there-
fore, embrace this third function, in addi-
tion to the first two functions of dissoc-
ing and to practical applications. How-
ever, more usually, only one of the three is recognized. For example, folklore some-
times depicts the life of the scientist as a lonely, isolated, divorced from life and
beneficent action in the larger sense.

In so far as science is a second image of long standing is that of the scientist as intro-
classe. Indeed, almost every major scien-
tific advance of the past 100 years is due to the postulation of universal gravita-
tion, from the discovery of the circulation of
blood to the perfection of anesthesia and
immunization, has been interpreted as a
blast against religion.

To some extent science was pushed into this role by the urban, middle-class, ten-
grous tendency of some philosophers to promote science as a life-saving,
problems which science could not solve at the time. Newton himself, who was deeply
interested in theology, wrote, "It is not to
be considered that mere mechanical causes
cause a god. It is so that we demand move-
ments in the solar system. . . . This most
beautiful system of the suns is a more
understandable only could proceed from the
contact and connection of an intelligent and
powerful Being."

The same attitude governed thought concerning the relationship of the theory of
galactic evolution, the discovery of radioactivity, and the origin of the galaxy before modern cosmology.

This aspect of the conflict between scien-
tific and religious results largely from a
confused understanding of the term science. Science is, in fact, as frequently
as it is blameworthy. The re-
volution in scientific thought, which included an original, it is also scientifically precocious, for sci-
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ger the laws of physics—be as loosely

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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 absolutes are blind and over the globe in completely contradictory varieties. Most of the humanistic philoso-

phers have been carried out under the banner of some absolute philosophy, from the Arcte acciacion to the auto da fe of the Spanish Inquisition, from the massacre of the Hispanics to the Nazi gas chambers. It is at best an optical il-

hussion which makes the fourteenth-cen-
tury look so sincere and desirable to mod-
ern critics of the recent, "scientific" periods, just as the life of the "noble sav-

age," so esteemed by eighteenth-century philosophers, has been seen as what it is, and who it is.

Science is the last four images implied a revolution from which we might de-
scribe the next one as addition to science. Science divides all thought into two categories—up-to-date scientific knowl-

dge and old, outdated knowledge. To a large extent, therefore, the more new-er knowledge is necessarily the road to suicide have forgotten about this aspect of sci-

cence. They do not believe, as do, that man has been given his mind in order that he could forget what he is, and why he is.

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