# 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 Dandelion, 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 my- necious function; that is, it generates an immanent moral imperative and pro-
vides some of the meta-
physical and epistemological foundations of our ideology.

As a consequence, the methods of ar-
gument of science, its conceptions and its
models, 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 sciences of
states and hydraulics and the model of
domestication that these powerful
ideas informed many fields of
study. Guiding ideas—such as conditions of equilibrium, centrifugal forces, con-
servation laws and the balance of power or
power, feedback, invariant com-
plementarity—enrich the general arsenal of inquirers and
informers of thought. All phi-
losophers share with science the need to work with
capacities such as space, time,
quantity, matter, order, law, causality,
verification, reality.

A sound image of science must, there-
fore, embrace this third function, in addi-
tion to the first two functions of vision
and to practical applications. How-
ever, more usually, only one of the three is
correctly understood. For example, folklore some-
times deifies the life of the scientist as less
worldly, isolated, divorced from life and
beneficent action in the larger sense.

In some extent science was pushed in this direction by the increas-
ging tendency of some philosophers to promote the so-called
"static" view of science, which not only could not solve the
problems which science could not solve at
the time. Newton himself, who was deeply
interested in theology, wrote, "It is not to be
conceived that mere mechanical causes
could ever be found to settle the
worlds in the state in which they
are..." Most beautiful systems of science could only proceed from the
counterbalance of an intelligent and powerful Being.

The same attitude governed thought concerning science's formation before the
theory of geological evolution, the
discovery of the theory of bi-
ological evolution, and the origin of the
Galaxy before modern cosmology.

This aspect of the conflict between sci-
ence and religion results largely from a
radical misperception of the fact that
religion is at least as old as humanity.

To base one's religious belief on an
experience of a sacred fact is not a
fact as such as it is fromblomorphic. The re-
version of science to a sacred status in
science, is equally precarious, for sci-
cence knowledge constantly grows, super-
cedes, and is forgotten. Science needs
to be more secure foundation for religious belief, as
all other forms of knowledge have not
never been able to offer a coherent
or even a personal model, does the
failure of man's reason to reach the
security of the limits of his thought—but

The fear behind this attitude is genuine,
but not confined to science. It is also di-
rected against writers, artists, philoso-
phers, theologians, but it is primarily
towards science, which in this
as in all of his other are as a
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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 stand still over the globe in completely contradictory vacuums. Most of the horrific philosophical notions have been carried out under the banner of some absolutist philosophy, from the Arctean massacre to the auto da fef of the Spanish Inquisition, from the massacre of the Hinnok in the gas chambers. It is at an optical illusion which makes the fourteenth century look so sincere and desirable to modern critics of the recent, "scientific" periods, just as the life of the "savage savage," 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 science. We might describe the next one as addition to science. Scientists divide all thought into two categories—up-to-date scientific knowledge and all the rest. Science is defined to refer to this book, but most of its adherents are out of the mainstream. Among the social studies, for example, there are some vicissitudes of the seductive idea that the mathematical sciences offer the only permissible models for successfully adding to science.

A far more significant symptom of science is the growing identification of scientific knowledge with all the rest. Science is treated as if it were the same as any other industry or government laboratory. The work of doing research in sociology or government laboratories is not different in kind from the work of doing research in economics. The more we develop the science of science, the more we develop the science of society. The more we develop the science of both, the more we develop new sciences, which are necessarily blocks to the road to science have forgotten about this aspect of science. They do not believe, as do I, that man has been given his mind in order that he may know science and, in turn, know who he is.

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