The False Images of Science

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<thead>
<tr>
<th>Citation</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Citable link</td>
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ADVENTURES OF THE MIND

43.

The False Images of Science

By GERALD HOLTON

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The False Images of Science

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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...
that world. But science also has a mytho-
poetic function; that is, it generates an
intuitive cosmology and provides some of the me-
chanisms by which we make sense of the physical
realities of our everyday experience.
As a conscious being, the methods of argu-
ment of science, its conceptions and its
models, permeate first the intellectual
life of the time, then the tenets and visions
of everyday life. Our language of ideas, for
example, owes a debt to the science of
statics and hydraulics and the model of the
universe. The development 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, invariance, comple-
mentarity—enrich the general arsenal of
imaginative devices from which humanity
leaps across different worlds with science the need to work
with concepts 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 those referring to its
fundamentals and to practical applications.
However, more usually, only one of the three is recognized. For example, folklore some-
times depicts the life of the scientist as a lonely,
isolated, revered from life and
beneficial action in the larger sense.
"Science" as a second image of long standing is that of the scientist as iconoc-
clast. Indeed, almost every major scien-
tific discovery involved a challenge to the postulation of universal gravita-
tion, from the discovery of the circulation of
blood to the perfection of anesthesia
anesthesia, has been interpreted as a
blast against religion.
To what extent science was pushed in this direction is a measure of the dan-
grous tendency of some philosophers to promote scientific research as the solution to all 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 be given to so many marvellous
connections [in the solar system]. . . . This
most beautiful system of the suns, with
planets could only proceed from the con-
cracy and disposition of an intelligent and powerful Being.
"The same attitude governed thought
concerning the world's formation before the
theory of geological evolution, the
discussion of the _origin of life_ and the
origin of the galaxy before modern cosmology.

This aspect of the conflict between scien-
test and religion results largely from a
fallacious conflation of the two. To be
falsehood is as blasphemous. The
result of the conflation of science and
religion is, equally preclusive, for scien-
tific knowledge continually grows,
subsequently, but in scientific thought
secures the foundation for religious beliefs, as
a theory. Science today has taught, is neither the capacity nor the failure of man's
neither the limits of his science—but faith.

Today political overtones make a wider understanding of the scientist's formation appear more urgent and more difficult. "Religious propaganda," a recent dispatch in _Iron
Curtain countries advised, must be coun-
teracted by "scientific authentic propa-
ganda" distributed by local societies for
the "dissemination of political and scien-
tific thought.

The iconoclastic image of science has, however, not been effective, neither the
able to an elementary misunderstanding of
its functions. For example, the histor-
ian Arnold Toynbee stresses change
and technology and with usurping the place
of Christianity as the prop of the entire
system of the sciences of the technology of
science the "self-estrangement" of man
becomes less useful in the search for
what is ultimate—that is, religious—concerns
well.
But this image fails to recognize the
multitude of influences that have shap-
ted—or a person. Neither to Christianity
nor to science can one properly assign
more than a limited part in the interplay
between man's psychological and bi-
ological life. One can hardly say that
the olympic games, and the
opportunities and accidents of his history
on the other. Moreover, to set science
and religion at odds, to view them as com-
plementary, is to negate the valuable
possibilities of synthesis. As Alfred North
Whitehead wrote in _Science and the
Inquiry_. "Science could have said "the
various general forces, apart from the more
imputes of the various sciences, which in-
fluence man. . . . [On their relationship]
develops the future course of history."
In short, the "force of our re-
ligious intuitions, and the force of our
sciences together—by thus rendering
them are complementary rather than
conflicting. The way many scientists and
theologians state the issue today makes it
seem as if we must choose between two
and powerful forces. This is like
forcing a child to choose between his
malnourishment and the temptation to
physically, to destroy man.

The electorate is fickle in 
ISTRY's novel, Lafoula's _Adventures_, the
naturalist turned unfelcome, Albe
strayed as his niece who dares speak to him
lied to his party, of some of the party
of starved rats, half of them partly
in a laboratory, the weight of the rats
which are dying faster.
In the current version, the stupid, evil
scientist is the mad researcher of science
or, the nuclear destroyer—inevitable
and necessary—or, the scientific de-
velopment, traitorous if he refuses. Accord-
ingly, the scientist is a double edge,
whether positive or negative. It is
certainly not positive. It is the arts to
language, it blights culture and, when ap-
plied to human affairs, tends to regener-
tation and to the impoverishment of life.
"Science without science, the scientific excitement
into eating the fruit of the tree of know-
ledge—thereby dooming science.

The fear behind this attitude is genuine,
but not confined to science. It is also di-
rected against writers, artists, philoso-
 phers, theologians, and religious men in
fact. Science is, as Voltaire said, as much as is as foolishly as it is blameworthy. The
result of this conflation of science and
religion is, equally preclusive, for scien-
tific knowledge continually grows,
subsequently, but in scientific thought
secures the foundation for religious beliefs, as
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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, has those values really given us a safe anchor? A priori absolutes stand around the globe in completely contradictory vacuums. Most of the holistic philosophies that have been carried out under the banner of some absolute philosophy, from the Arcte meditation to the auto da fé of the Spanish Inquisition, from the massacre of the Hispanics to the Hiroshima gas chambers. It is at best an optical illusion which makes the fourteenth century look so sincere and desirable to modern critics of the recent, "scientific" periods, just as it did to the title of the "savage age," so esteemed by eighteenth-century philosophers, has been seen, in what it is, and who he is.

Science literature in the last four images implied a revelation from science. We might describe the one next as addiction to science. Science divides all thought into two categories—up-to-date scientific knowledge, and all previous, incorrect knowledge. This article is only a manifestation of this, but most of its agents are only theories. Among the social studies, for example, there are some of the seductive ideas that the mathematical sciences offer the only permissible models for successfully predicting the future.

A far more significant symptom of science is the growing identification of science with truth. Science is the authority of today. In modern society, in his work, in his thinking, his talking, his acting, he has been driven by the scientific method of thinking.

What people 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 require special, thorough work at every level of education—for example, a good part of the present work as used to be the rule in good colleges fifty years ago. It would demand imaginatively new curricula, strengthened standards of achievement, more recognition of excellence—whether exhibited by instructors or by students. Adult education, including the new kind of postgraduate study of the cultural aspects of science through mass media, is another obvious measure meriting the support and participation of our best minds.

And here and there, to some extent, these efforts are being made in the right direction, but the total is pitifully small. Virtually nobody has been horrified by the title of cultivated men and women turning out graduates who have been broken. Few intellectuals are now prepared to act as social work, as used to be the case. And meanwhile science advances faster and faster every day, widening the rift between science and culture.

To restore to some kind of renaissance, the intellectual demand for the contemporary intellectual to understand the difference between the world that is now the domain of the intellectual culture of our country—this is the great challenge before intellectuals today. And nothing better illustrates the urgency and difficulty of this task than the false images prevailing about science.

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

- Bronowski, Jacob. The Common Sense of Science. Harvard University Press. $2.00.