

METAPHOR AND SCIENCE

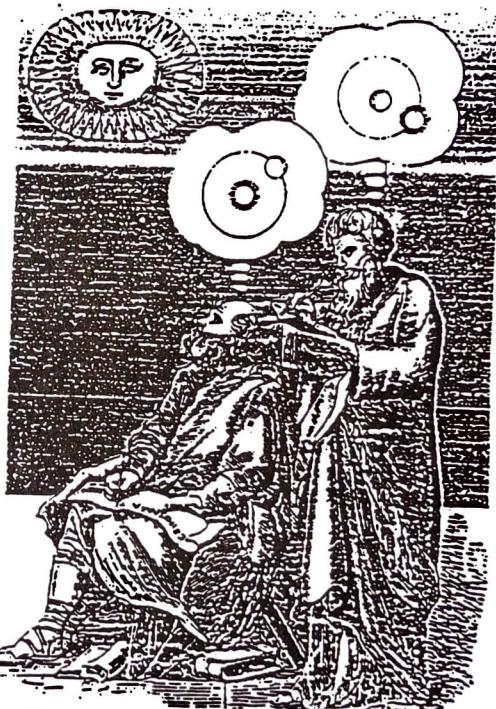
Science is a human construction. It is what happens when human beings together try to make sense of their experience of nature. Works of science are ways of understanding created through human effort which, like works of art, can be interrogated for what they say about ourselves and our development. By finding out about our science we find out about ourselves.

—JOSEPH SCHWARTZ, *The Creative Moment: How Science Made Itself Alien To Modern Culture*

“...Man seeks to form, in whatever manner is suitable, a simplified and lucid image of the world, a world picture,” a coherent view of how the cosmos of experience hangs together, “and so to overcome the world of experience, by striving to replace it to some extent by that image. That is what painters do and poets and philosophers and natural scientists, all in their own way. And into this image and its formation each individual places his or her center of gravity of the emotional life, in order to attain the peace and serenity which cannot be found within the confines of swirling personal experience.”

The picture of the world which the physicists is building is only one among all the other possible ones. But it “demands rigorous precision in the description of relationships.” Therefore, the physicist must be content with studying first an idealized world, where for example all friction is negligible. “This allows him to portray the simplest occurrences which can be made accessible to our experience.” The more complex phenomena of the real world cannot be immediately attacked with the necessary degree of logical perfection and accuracy. Therefore, at the beginning of a problem the scientist strives for “supreme purity and clarity, but at the cost of completeness.”

—GERALD HOLTON quotes Albert Einstein from his book *Science and Anti-Science*



The number of rational hypotheses that can explain any given phenomenon is infinite.

At the final stage you tell me that this multicolored universe can be reduced to the atoms and that the atom itself can be reduced to the electron. All this is good and I wait for you to continue. But you tell me of an invisible planetary system where electrons gravitate around a nucleus. You explain this to me with an image. I realize then that you have been reduced to poetry: I shall never know.

Have I the time to become indignant? You have changed theories. So that science that was to teach me everything ends up in a hypothesis, that lucidity founders in metaphor, that uncertainty is resolved in a work of art.

—ALBERT CAMUS, *The Myth of Sisyphus*

So much of science consists of things we can never see: light “waves” and charged “particles”; magnetic “fields” and gravitational “forces”; quantum “jumps” and electron “orbits.” In fact, none of these phenomena is literally what we say it is. Light waves do not undulate through empty space in the same way that water waves ripple over a still pond; a field is only a mathematical description of the strength and direction of a force; an atom does not literally jump from one quantum state to another, and electrons do not really travel around the atomic nucleus in orbits. The words we use are merely metaphors. “*When it comes to atoms,*” wrote Neils Bohr, “*language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images.*”

—K. C. COLE, “On Imagining the Unseeable,”
Discover (December 1982)

...metaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature.

...metaphor is a matter of *imaginative rationality*. It permits an understanding of one kind of experience in terms of another, creating coherences by virtue of imposing gestalts that are structured by material dimensions of experience. New metaphors are capable of creating new understandings and, therefore, new realities.

—GEORGE LAKOFF and MARK JOHNSON
Metaphors We Live By

—but metaphors are not “just” metaphors; metaphors are the tools of thought. No one can think about consciousness without them.

—DANIEL DENNETT
Consciousness Explained