

TRUTHFULNESS IN SCIENCE AND ART

For the philosopher of science Karl Popper, the first of the only intellectually important goals was the formulation of problems. "Science begins with problems, and ends with problems." (1974, p. 132) His meaning is clearer when we speak not of "science" but instead of "scientific research programs" (Lakatos). The same approach to knowledge was expressed more explicitly by N. Postman and C. Weingartner: "Knowledge is produced in response to questions. And new knowledge results from the asking of new questions; quite often new questions about old questions." (1969, p. 23) Such a "questioning system of thought brought us to today's world," according to the author of *The Day the Universe Changed*, James Burke. (1985, p. 17)

When non-scientists think about scientific knowledge, they are apt to see it as merely a record of facts, as a repertory of answers. But this is certainly a mistake. The facts themselves do not push us towards setting to work on problems, and answers cannot be taken as givens. Only good questions can lead to good answers. As Postman and Weingartner put it, one needs "relevant and appropriate and substantial questions" (1969, p. 23) in order to arrive at relevant and appropriate and substantial answers. Answers are strictly correlated with questions already asked, and their truthfulness is relative to the same questions. Scientific knowledge and truthfulness cannot then be the result of any accidental encounters with the facts but make their appearance within a search for specific answers in specific enquiries.

Jacob Bronowski, scientist and poet, historian of science and culture, viewed science and art as very similar in their demands for truthfulness. "Science," he wrote, "takes for ultimate judgment one criteria alone, that it shall be truthful." (1963, p. 123) At face value, one can hardly disagree with that statement, but its whole worth depends upon what is meant by "truthfulness." "We do not mean by truth," he continued, "some chance correspondence with the facts." (Idem) Doing science does not mean producing a record of facts "but the search for order within the facts. And the truth of science is not truth to fact ... but the truth of the laws which we see within the facts" (Ibid., p. 130).

We are not merely observing and predicting facts; and that is why any philosophy which builds up science only from facts is mistaken. We know, that is, we find laws, and every human action uses these laws, and at the same time tests them and feels toward new laws.... The laws of science, like those we use in our private behavior, remain helpful and truthful whether they contain words like "always," or only "more often than not." What matters is the recognition of

the law in the facts. It is the law which we verify: the pattern, the order, the structure of events. (Ibid., pp. 129–130)

The facts – incomplete and ambiguous as they must always be when we separate them out from future experiences and past interpretative schema – are science's point of departure for its enquiries rather than the goal towards which its search aims. But that *is* their authentic significance for science, facts *are* something to be problematized, to be questioned about the regularity or laws of their connections and differences.

Science must be described as an activity and that very much like what we call having an adventure. To have an adventure is doing and experiencing something out of the ordinary. It is the shattering of the inert, insistent, and oppressive sphere of everyday reality that imprisons the leaps of the imagination as if it were a bowl of glass. Each adventure is the incorporating into the familiar round of our days of the unforeseen, unthought of, the novel. Science, like the having of adventures, combines the elements of certainty and uncertainty in one's life.

The scientist, even as the adventurer, is ignorant as to whether he shall arrive at the point for which he sets out, and the knowledge that he does not know the outcome – the answer to his enquiry – is the very condition of his action. The scientist asks questions of reality because he does not know the answers, or indeed, if all of his questions are answerable. To the non-adventurer and non-scientist, to the "practical man," this way of proceeding may appear to be madness. (Perhaps that is one of the reasons why the "practical man" has nightmares about the irresponsible and mad activities of scientists.)

Scientists begin with the effort, not to invent a novel idea or vision of the world, but to rightly see, to unveil or discover some regularity or law in the world which is to be found through their enquiries. To paraphrase Bronowski, science does not teach us to worship what is known but to question it. (Cf. 1973, p. 360.) But scientists find themselves at the start in an inherited situation with acquired patterns of behavior appropriate to this situation – the world appears to them already in terms of some unreflected-upon interpretations of what exists. Their "research programs" are projected into the world in terms of what they understand to be the kinds of affairs which make up that world. For example, modern science sought to discover that which, as regards the separate, autonomous, and self-contained individual "things" which they believed made up reality, is always the same in their relationships to each other.

These interpretations of affairs, which are, in fact, beliefs – the repertory of our active convictions as to the sort of things that exist – constitute the very ground of our sciences. Yet with the repeated experience of some significant degree of non-conformity between the way these affairs are related and how one expected them to be related, this ground of beliefs can shift, and cracks open up. Then scientists may turn their efforts towards the discovery of new sorts of relations and may uncover new kinds of affairs. That is to say, they begin to ask new questions.

“Science,” wrote Bronowski, “is a language.” (1963, p. 131) I want to amend that to read instead: “It is a conversation,” that is, science is to be viewed as an interaction between the enquiring scientist and the responding world. Ortega y Gasset had it right: by our searching questions we call out the thing which is not there before us and the thing responds, makes itself manifest. (See 1971, p. 304.) But let us not overlook the limited nature of this exchange, for whatever other responses the world could make to unasked questions (if indeed we knew what to ask) are now enclosed in silence. Truthfulness comes from reality’s self-disclosure of its order, but always in terms of when and where one meets it, from one’s historical and cultural position. Note that different qualities and different quantities of information about the ordering of the world are thus afforded by different points of view.

As Ortega wrote:

That a science is “true” for the very reason that its doctrine is changeable, flies in the face of the traditional idea of truth, and can be cleared up only by renewing *a radice* the general theory of truth itself and by making us see that, as this is a human matter, it is affected by man’s condition, which is that of being *mobilis in mobile*. (1960, p. 37)

Does this mean that truthfulness is something merely relative to the observer? Certainly not! As Ortega said, “We must recognize variations in thinking not as changes in yesterday’s truth which convert it into today’s error, but as changes in man’s orientation which lead him to see other truths that are different from those of yesterday. It is not truths that change, but man....” (1960, p. 26) Is this then to say that truths about the ordering of the world are only our subjective interpretations of them, and so to be led to an Idealist understanding of meanings? Not in the least! Truthfulness is a quality that a human being’s relations to affairs takes on through the latter’s self-presentation. In as much as affairs can manifest themselves in different ways in conjunction with a human being’s diverse ways of acting, so truthfulness belongs to all of these.

Truthfulness comes into our relations with others through our actions and the response of the affairs towards which our actions are directed. But truthfulness in science also “rests upon an act of free human judgment,” according to Bronowski. In science “every act of judgment is a division of the field of our experience into what matters and what does not.” (1963, pp. 131, 132) That is, it divides the world into what we regard as relevant and what we regard, for the purpose of finding answers to our questions, as irrelevant. And the moment one does that, one is bound to be satisfied with what is only an approximation. This can certainly lead to good laws, that is, if what we judge to be irrelevant is not very relevant, they will be good laws. But it does not follow that they will then give you a complete picture at all of the ways in which the world is ordered. Thus there is no absolute truth accessible to us, no God’s eye vision of reality.

Bronowski makes this point nowhere else as strongly as in the chapter titled: “Knowledge or Certainty” in his *Ascent of Man*. Paintings, he wrote, “do not so much fix the face as explore it ... each line that is added strengthens the picture but never makes it final. We accept that as the method of the artist. But what physics has done now is to show that this is the only method to knowledge. There is no absolute knowledge.” (1973, p. 353) There is progress in science, Bronowski held, “because it has understood that the exchange of information between man and nature, and man and man, can only take place within a certain tolerance.” (Ibid., p. 365) Further he implored us to remember that “science is a tribute to what we can know although we are fallible. In the end the words were said by Oliver Cromwell: ‘I beseech you, in the bowels of Christ, think it possible you may be mistaken.’” (Ibid., p. 374)

The truthfulness of science depends upon our acknowledging and recognizing the unity of its parts. We do this, Bronowski said, “by a highly imaginative creative piece of guesswork, but we finish with something which is only a gigantic metaphor for that part of the universe which we are decoding.” (1978a, p. 70)

For Bronowski, a metaphor has an imaginative likeness to something in reality, but such a likeness is rather what our attention is drawn to by a simile. I say that a metaphor is rather “a path through woods which we take to a clearing” where some affair may reveal itself that would have otherwise escaped our view. At the same time a metaphor is our call to that affair to manifest itself, as Ortega wrote. “*Name* is that which serves to *call* someone. The word *calls* to a thing which is not there before us, and the thing ... responds, makes itself manifest” and “*the metaphor is the authentic naming of things....*” (1971, pp. 303, 304)

In Bronowski's view, "what impresses us as truth is the orderly coherence of the pieces. They fit together like the characters in a great novel, or like the words in a poem. Indeed, we should always keep that last analogy by us always." (1963, p. 131) "There is a common quality in science and poetry – the quality of imagination." (1978b, p. 5) He further declared that "we have had to push out the boundaries of the relevant further and further. Every time we do so, we have to revise the picture totally ... by an act of the pure imagination." (Ibid., p. 60) "All created works, in science and art, are extensions of our experience into new realms.... When it matches our experience and at the same time points beyond it, this is the meaning of truth that art and science share." (1978b, p. 32)

Science was described by Ortega as "pure exact imagination because it is clear that nothing can be more exact than a fantasy ... something invented *ad hoc* so that it may be exact..." (1971, p. 299) Lest you think that this is pure sensationalism on Ortega's part, compare what he said above with the words of that most rigorous of rationalists, Descartes, who in his *Discourse on Method* recommended "assuming an order, even if a fictitious one, among those [objects] which do not follow a natural sequence relatively to one another." (1955, p. 92)

Agreeing with Bronowski, Ortega wrote that "scientific theory neither more nor less than poetry, of which it is the twin, belongs to the unreal world of fantasy. The real aspect of science is its application, its practice." (1971, p. 300) Elaborating upon Ortega's theme, we could say that modern science is concerned with generating modern myths, which it calls theories. These myths give exact, and consequently clear and certain orderings of imaginary objects, and this, Ortega wrote, "makes possible an *unequivocal* comparison between the order of imaginary objects and real phenomena; one that discovers whether these latter allow themselves to be arranged in a system or series isomorphic with the former." (1971, p. 32)

Let us take as examples Newton's and Einstein's interpretations of the effect of gravity upon a moving body. For Newton, gravity's effect is conceived in terms of a force of attraction that is proportional to the product of the masses of two bodies and inversely proportional to the square of the distance between them. Einstein held, however, that it is the shape of space-time that determines the motions of objects or of light crossing it because their gravitational fields distort the space-time around them.

Both of these theories of gravitational effects deal with many of the same observed events, and the figures they give for such instances of motion are sometimes nearly the same. Would it make sense to say, though they share

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