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UNDERSTANDING THE WORLD: THE "MIXED QUESTION" TEST

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Part 2 of 3

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The first step to be taken in dealing with this problem is to consider two competing positions in the philosophy of science. One is the instrumentalist, the other the realist, view of science.[10]

10 These two views of science are essentially philosophical in character, whether they are advanced or held by men who classify themselves professionally as philosophers or by men who classify themselves professionally as scientists.

THE INSTRUMENTALIST VIEW. Scientific theories are nothing but instruments of calculation and prediction, mediating between observed data and new data to be observed or effects to be controlled or produced by technology. They are not intended to be descrip-

tions of reality. They are to be judged as operationally successful or unsuccessful, as effective or ineffective in yielding further experimental results or technological applications, but not as true or false in any sense of *true* or *false* that means agreement or non-agreement between theory and reality. According to the instrumentalist view, science, as James Conant points out, is not engaged in a process of map-making, progressively achieving better and better approximations in the charting of reality. "Science," he writes, is "a series of interconnected concepts and conceptual schemes arising from experiment and observation and fruitful of further experiments and observations. The test of a scientific theory is its fruitfulness . . . its ability `to suggest, stimulate, and direct experiment.' . . . A scientific theory is not even the first approximation to a map; it is not a creed; it is a policy—an economical and fruitful guide to action by scientific investigators."[11]

11 *Modern Science and Modern Man,* New York, 1952, pp. 54-57.

According to Karl Popper, "instrumentalism can be formulated as the thesis that scientific theories—the theories of the so-called 'pure' sciences—are nothing but computation rules (or inference rules); of the same character, fundamentally, as the computation rules of the so-called 'applied' sciences. (One might even formulate it as the thesis that 'pure' science is a misnomer, and that all science is 'applied')."[12] Still another way of making the same point would be to say that the instrumentalist treats scientific knowledge as essentially know-how instead of as know-that—heuristic know-how combined with productive know-how. Just as the line between pure science and applied science then disappears, so does the line between science and technology.

12 *Conjectures and Refutations,* New York, 1962, p. 111. For a fuller statement of the instrumentalist view, see pp. 207-224, *passim.*

If we take a purely instrumentalist view of physics, such theoretical entities as atoms and the particles of nuclear physics become nothing but "convenient fictions," having operational significance only. They are not to be interpreted as referring to any existent reality. If one were to adopt an instrumentalist approach to the philosophical defense of common-sense opinions, the result would be similar. The experienced chair, conceived as an individual substance, would be regarded as a "theoretical construct," a convenient fiction posited to serve some theoretical interest or practical purpose.[13]

13 Cf. W. V.O. Quine, "Two Dogmas of Empiricism," in *Clarity Is Not Enough,* edited by H. D. Lewis, London, 1963, pp. 129-132.. Theoretical constructs, rec-

ognized as convenient fictions, may play a useful role in both scientific and philosophical thought. The character or limits of their usefulness is not in question here. The only point being made is that, in an instrumentalist view, the "theoretical entities" of atomic and nuclear physics are *nothing but convenient fictions.*

THE REALIST VIEW. There are several different versions of the realist view of science (or of philosophy), but all agree in regarding science (or philosophy) as knowledge of a knowable reality, as mapmaking in the sense in which maps can be more or less accurate, better or worse approximations to the actual shape of the terrain being explored, studied, or thought about. The realist view may involve different conceptions of knowledge—as *episteme* or as *doxa—and,* if knowledge is *doxa,* it may involve different accounts of how the relative truth of theories or conclusions is to be tested; but what is common to all versions of the realist view is the affirmation that theories can be true or false in the sense of agreement or non-agreement with an independent and determinate order of real existences. They can, at the very least, be falsified by experience, even if they can never be completely verified or rigorously demonstrated to be true. This minimum statement of the realist view presupposes that theories can be true as well as false, even though we may never be able to establish their truth in any final or certain manner.[14]

14 Cf. Karl Popper, *op. cit.,* pp. 99-107, 119. It should be pointed out in passing that the realist view of scientific or philosophical knowledge can embrace a pragmatic or instrumentalist theory of truth, where that means no more than a statement of the ways of testing the truth and falsity of theories; but it firmly rejects the complete conventionalism (no determinate reality to be known, no agreement or non-agreement with reality, no truth or falsity to be tested, no standards of worth to be applied to theories except those of convenience or satisfaction of purpose) to which pragmatism sometimes leads and which is part and parcel of the instrumentalist view of science or philosophy. Cf. what was said on this point above, in Chapter 4, pp. 74-75.

Whatever version of the realist view is adopted, it stands opposed to the instrumentalist view of science on four counts, as indicated by the following statements, each of which directly negates an instrumentalist tenet. (1) Scientific theories are to be interpreted as descriptions of reality. (2) They are to be judged as true or false, where this means agreement or non-agreement with reality. (3) Progress in science does consist of better and better approximations to an accurate charting of nature. (4) Theoretical entities, such as atoms and sub-atomic particles, are not merely convenient fictions; if the physical theory which posits them is confirmed by empirical data, or at least is not falsified, then claiming truth for that theory amounts to asserting the real existence of these entities.[15]

15 On this last point, see Grover Maxwell, "The Ontological Status of Theoretical Entities," in *Minnesota Studies in the Philosophy of Science,* Vol. III, Minneapolis, 1962, pp. 3-27. See also Ernest Nagel, *The Structure of Science,* New York, 1961, Chapter 6; and cf. J. J. C. Smart, *op. cit.,* pp. 16-18, 27-49.

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The next step to be taken is to ask how the problem with which we are concerned is affected by these opposed views, not only of science, but also of philosophy; for, as we have seen, they are as applicable to philosophy as to science.[16] We are confronted with four possible combinations of these views: an instrumentalist view of science combined with an instrumentalist view of philosophy; an instrumentalist view of science combined with a realist view of philosophy; a realist view of science combined with an instrumentalist view of philosophy; and a realist view of both. What consequences does each have for the problem with which we are concerned?

16 As pointed out in Chapter 4, one of the two basic presuppositions of this book is that of realism; and this, as we saw, involves the rejection of pragmatic conventionalism, according to which the theoretical constructions of philosophy, as well as those of science, are nothing but convenient fictions which serve some practical purpose. In addition, we saw, in Chapter 3 (see pp. 58-59), that one view of philosophy, taken by Gilbert Ryle and W. F. Sellars, tends to reduce philosophical knowledge to know-how. To regard philosophy as nothing more than a kind of know-how or to regard its theoretical constructions as nothing but convenient fictions is to take an instrumentalist view of it.

AN INSTRUMENTALIST VIEW OF SCIENCE COMBINED WITH AN INSTRUMENTALIST VIEW OF PHILOSOPHY. For those who adopt this combination, the problem as here stated vanishes. As here stated, the problem arises from an apparent conflict between scientific and philosophical theories, when both are interpreted as know-that and as asserting that certain of their theoretical constructions give us knowledge of real existences. But even though the problem as stated becomes a pseudo-problem for the instrumentalist view of both science and philosophy, another question with which we are concerned remains of interest—the question of the relative superiority of science or philosophy. The question must be somewhat modified; for, instead of asking which gives us a better understanding of reality, we must ask, Which is more useful?

As applied to the view of material objects taken by philosophy on the basis of common experience and the view of them taken by theoretical physics on the basis of experimental data, the question may not be answerable because each, serving a different purpose, may be useful in its own way. The scientific view has an obvious

technological usefulness totally lacked by philosophy; and the philosophical view has an obvious usefulness in the ordinary transactions of life. We cannot say which is more useful.

This, however, does not completely dispose of the matter. If the judgment can ever be made that a particular scientific theory is more useful than a particular philosophical theory, both serving the same purpose, that judgment would not be a scientific, but a philosophical, judgment. Furthermore, it is not scientific know-how, but philosophical know-how which shows us that the apparent conflict between science and common-sense is only a pseudo-problem. It is also not scientific know-how, but philosophical know-how which helps us handle the apparent conflicts between different branches of science. In all these respects, philosophy can claim to be superior to science, even in an instrumentalist view of both. Its superiority is in the dimension of understanding; not, of course, in understanding reality or the nature of things, for there is no reality or nature to be understood in the form of know-that. Its superiority in understanding is a superiority of know-how in the realm of theorizing.

AN INSTRUMENTALIST VIEW OF SCIENCE COMBINED WITH A REALIST VIEW OF PHILOSOPHY. Again, our problem as stated vanishes, but now for a different reason. There can be no conflict, not even an apparent conflict, between the atomistic or nuclear theory and common-sense notions or philosophical theories about the sensible material objects of common experience. If it is improper to claim descriptive truth for scientific theories, then such theories, no matter what their content, cannot be involved in conflict with philosophical theories, for which the claim of truth is made. There can be no conflict between scientific know-how and philosophical know-that. If the theoretical entities of physics—the atoms and their elementary particles—are *nothing but convenient fictions,* their use in scientific calculations, predictions, or experimental processes cannot possibly challenge the reality of the familiar sensible objects of common experience.

There is, however, a second consequence here, and one that has a bearing on the comparative merits of science and philosophy. In the instrumentalist view, science gives us only know-how, no know-that—no knowledge of reality in that sense of "knowledge" which involves truth as agreement with reality. In a realist view of philosophy, philosophy does give us knowledge of reality. Hence to the question, *Which renders the world more intelligible?* we must answer, *Philosophy.* Science, in the instrumentalist view, offers us no understanding of reality at all.

Leaving aside history as knowledge of past particulars, philosophical theories and common-sense opinions would then constitute our only general first-order knowledge of that which is and happens in the world. In addition, there would be no mixed questions in philosophy, at least none involving both science and philosophy as knowledge (know-that) about the same objects or the same regions of reality.

A REALIST VIEW OF SCIENCE COMBINED WITH AN INSTRUMENTALIST VIEW OF PHILOSOPHY. Here as before, the first consequence is the same (no problem, because no conflict); but here the second consequence is exactly the reverse of what it was in the preceding case. It is science alone that gives us general first-order knowledge of reality; it is science alone that enables us to understand the world. Philosophical theories serve some other purpose, largely emotional in character; or they satisfy individual predilections and interests. Philosophy may even give us theoretical know-how that is useful in handling scientific theories, in themselves, in relation to one another, or in relation to common-sense; but philosophy does not give us any know-that about reality or the nature of things.

Professor Smart, who adopts "an unashamedly realistic view of the fundamental particles of physics," not only defends "the physicist's picture of the world as an ontologically respectable one," but also maintains that "the physicist's language gives us a *truer* picture of the world than does the language of ordinary common sense."[17] In an instrumentalist view of our common-sense opinions about the familiar objects of ordinary experience, or of the philosophical conceptions that are developed in defense of such opinions, the latter are not less true; they are simply not true at all. Atoms and their elementary particles are the ultimate realities; men, cats, roses, and chairs are now "philosophical constructions" or "theoretical entities," which may be useful as convenient fictions.

17 *op. cit.,* pp. 18, 47.

A REALIST VIEW OF BOTH SCIENCE AND PHILOSOPHY. The reader has already been reminded that a realist interpretation of philosophical thought is one of the two basic presuppositions of this book.[18] Hence, the state of affairs envisaged in the first and the third views above are not, for me, tenable alternatives. The possibility described in the second above, however, is quite compatible with the position concerning philosophy taken in this book. Nevertheless, over and above the persuasive evidence and arguments that have

been advanced for affirming the real existence of atoms and nuclear particles, the basic presupposition of realism, to which I am committed, inclines me to espouse a realist view of science as well as of philosophy. What consequences now follow from the adoption of this fourth alternative?

18 See Chapter 4, pp. 74-75.

Insofar as science and philosophy have different objects of inquiry, no conflict occurs between them. As we have seen, certain questions cannot be answered by investigation; others cannot be answered without investigation. The answers that philosophy gives to questions of the first sort cannot conflict with the answers that science gives to questions of the second sort. There are, however, some mixed questions—questions which require us to relate what is asserted by scientific theory, on the one hand, and what is asserted by philosophical theory, on the other. These, as already pointed out, can arise only when both science and philosophy are regarded, realistically, as modes of inquiry aiming to achieve knowledge, or to arrive at relatively true descriptions of reality.

For example, there is the mixed question about the nature of man: any philosophical theory which defends the common-sense view of man as radically distinct from, and superior to, all other terrestrial organisms must be related to what is hypothecated in the biological theory of man's evolution, and to the conclusions about human and animal intelligence that have been reached by laboratory and clinical psychology on the basis of the special data obtained by investigation. Similarly, any philosophical theory of the human mind which sets the processes of reason or intellect apart from and above all the operations of the sensitive faculties, including memory and imagination, must be related to the conclusions about thinking and problem-solving that have developed out of cybernetic research and computer technology. Still another example of a mixed question is the problem with which we have been concerned in this chapter—the problem of relating the philosophical theory which defends the truth of the common-sense opinion about the sensible, material objects of everyday experience (or, in other words, affirms their reality as experienced) to the theory of matter developed by atomic and nuclear physics on the basis of much experimental evidence.

It would take an extended discussion to present a satisfactory solution of any one of these extremely difficult mixed questions. It cannot be done at the end of this chapter or even within the limits of this book.[19] What I propose to do, instead, is simply to state the criteria of a satisfactory solution of such questions; and I hope that,

in doing this, I can throw some light on the one test of philosophical theories which has not yet been discussed (namely, the "mixed question" test) as well as assess the relative merits of science and philosophy for man's understanding of the world in which he lives.[20]

19 Look forward to the possibility of a second series of Encyclopaedia Britannica Lectures at the University of Chicago in 1965, in which I shall deal with the mixed question about man and the related mixed question about the human mind.
20 See Chapter 9, p. 149; and also Chapter 10, p. 166.

LETTERS TO THE EDITOR:

You might be interested in one of the uses I make of my membership: Guidance in the clear, coherent and concise use of words. The essays you send serve as exemplars to be studied for content and methodological guidance by real and would-be writers (like me!). Our work is largely theoretical/conceptual (with some applications). The guidance we gain from observing how others write persuasively or merely descriptively about their thoughts, attitudes and opinions in my judgment, is invaluable. That's because in one sense, scientists like people laboring in other word-based professions, are at heart "word salespeople". Ultimately, we have to express what we do and then persuasively describe why it matters. In our case, what we manufacture and present to the world is words rather than auto parts, televisions, or hay bails. Word are the heart of our craft. Learning how to use them effectively and efficiently can mean the difference between ambitions realized and disappointment. We may not be as philosophically sophisticated as other members of your organization, but we're smart enough to recognize something worth more than it costs!

Thanks for your efforts, Max.

George Dudley

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