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THE QUESTIONS SCIENCE CANNOT ANSWER

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SCIENCE AND PHILOSOPHY

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Any consideration of science and philosophy presupposes some difference between them. According to the way in which we understand that difference, we will draw a sharp or shadowy line between the two domains; we will take one or another view of the relation between science and philosophy; and we will place different values on the importance of the contribution each makes to our society and our culture. I would like to illustrate this by describing briefly three ways of making the distinction, which I regard as false.

In his last book, *Some Problems of Philosophy*, **William James** pictured the philosopher as working on the periphery of science. The domain of science is the whole area of well-established knowledge. There everything is seen in a clear light. But on the borders or outskirts of this realm, one finds problems which have not yet been solved by the method of the scientist. Here things are much less clear. As one moves from the bright lights of the city of knowledge to its dimly illuminated suburbs, one finds philosophers at work, speculating about but not solving the problems which scientists will later solve when the city grows and extends its periphery. When that happens, what used to be suburb will be incorporated into the city, and the philosopher will move further out into underdeveloped areas.



According to this view of the philosopher as pioneering in the suburbs or as living and working in the underdeveloped areas of knowledge, there is no difference between the scientist and the philosopher so far as their problems are concerned. The difference between them lies only in this: that the philosopher lacks and the scientist possesses a method of solving problems in a way that confers upon the solutions the status of established knowledge. The sign that solutions have such status is that they are agreed upon by all or by most who are competent to judge. That the philosopher is merely able to speculate or theorize but not to solve problems is indicated by the fact that the “solutions” each philosopher offers are his own, and are seldom if ever shared by his colleagues. Life in the suburbs cannot help being a war of each against all.

Sometimes philosophers tire of this endless quarreling and,

forsaking their birthplace, move into the city to enjoy a little harmony and peace in their declining years. Sometimes scientists, especially after they have won Nobel Prizes or have been invited to become Gifford Lecturers, feel the lure of the suburbs, where one can live a less formal and more fanciful existence, and they decide to sojourn there for a summer or two, or to become regular commuters. Some even decide to take up permanent residence there, returning to the city only on the occasion of the great association meetings, when they try to excite, if not edify, their less adventuresome colleagues by reports of their explorations beyond the city limits.

We are not concerned with where any individual chooses to live and labor, but with the conditions and character of the life and work that he engages in when he is a scientist or a philosopher. According to this view, all real advances in knowledge are made by the solid work of scientists, though philosophers may prepare for some of these advances by their forays on the periphery of science. The fact that the growing city tends progressively to engulf the adjacent suburbs bespeaks the continuity of science and philosophy.

Some who hold this view of the difference and the relation between the two areas emphasize the continuity by looking upon the ultimate problems of science at any time as its philosophical problems, and by treating the established facts on which philosophy builds its speculations as its scientific basis. Philosophy and science are thus not two distinct domains, as two sovereign states are. They are only two aspects of one and the same sphere of activity, difficult to distinguish in the borderline cases. The whole enterprise is properly described as an inquiry into the nature or shape of things, and we simply call one phase of the activity “scientific” and another phase “philosophical.” According to the temperament of the man who does such name-calling, the words “scientific” and “philosophical” are respectively eulogistic and pejorative, or the reverse.

Science and Philosophy Discontinuous

A second view of the difference between science and philosophy can be expressed by employing the same imagery. Here, as before, the scientist has a method for solving problems in a way that permits his solutions to be shared by all competent workers in his field; whereas the philosopher deals with problems which he can never solve that way. His characteristic task is to speculate about the problems men must perennially face, even if they can never

reach agreed-upon solutions of them.

According to this view, the problems of the philosopher are such that they cannot be solved by an improvement or extension of the methods of science. The spheres of science and philosophy are discontinuous rather than continuous. They deal with radically different kinds of problems, not with the same type of problem in different ways at different times. The philosopher is not a suburbanite, but a dweller in the wilderness, far removed from the city and, like the vastness of a mountain range, never in danger of being engulfed by it. Some men prefer the well-laid-out and gregarious life of cities, and call it “civilization”; some, the path-finding and solitary conquest of a mountain top, and regard the unshared view they finally achieve as more “soul-satisfying.”

Whichever vocation their temperaments lead them to choose, the men who become scientists and those who become philosophers have almost no contact with one another. On the rare occasions when they meet, they find communication difficult. They hardly speak the same language, and each has so little taste or even tolerance for the activity of the other, that the sooner they part company again the better each feels.

Sovereignty of Science

Still a third view of the difference between science and philosophy can be briefly summarized by another modification of the metaphors I have been using. The whole earth is the territory of science. Its sovereignty is global. Different portions of the earth are the provinces of particular sciences, of which some are older, more firmly established, and better governed than others. There still remain some undeveloped or primitive areas which have not yet been claimed and cultivated, but the future holds only three possibilities: either (1) some new science will take them over, or (2) some old science will extend its sway over them, or (3) they may remain forever terra incognita, as the polar regions once were. But in any case there is no place for philosophy on earth, for that is wholly the domain of scientific knowledge, which includes the analytic truths of mathematics, mathematical logic, and logical semantics as well as the verified conclusions or measured probabilities of empirical research.

According to this view, philosophers are up in the air—in the clouds, as it were, or above them. The atmosphere in which they are free to roam is a realm of airy opinion, not knowledge grounded in solid rock. Some who manage to get above the clouds

may have a clear and unimpeded vision of the earth, but the shapes *they* see, how ever systematically arranged and edifying to behold, are nothing but mirages—projections of their own imagination. But whether their vision is clear or cloudy, they are all seers, each with his own world view, for which he claims absolute and exclusive truth as a representation of all things on the earth below as well as in the heavens.

The scientists who rule the earth are willing to be tolerant of these dwellers in cloud-cuckoo land as long as they, in turn, are willing to remain there and play games of truth and consequences with each other. But, like flying saucers off their course, the philosophers too often come down to hover over the scientists on earth, and pretend to speak, from their superior vantage point, a deeper and more all-embracing truth about the nature of things.

The scientists would welcome them on earth if it were not for this pretension. After all, there is room for poets on earth, and even some pleasure to be derived from their insights in moments of relaxation from the serious business of science. But the philosophers are poets masquerading as scientists, and very superior scientists at that. They are seers who pretend to be sages, seeing much further and deeper into the reality of things than their earth bound brethren. The scientists cannot tolerate for long the irritating presence of such alien and competitive spirits. They wish there were only some way of permanently exiling them to the misty regions whence they come, or at least of passing some law to punish them for their fraudulent pretensions, which might even legalize burning the books they so frequently leave behind them to corrupt the youth and bemuse the whole community.

The Positivists

Strangely enough, their wish has been fulfilled by a group of earth-bound men who, though calling themselves “philosophers” rather than scientists, also assume the name of “positivists” or “analysts” to separate themselves sharply from the airy, foggy ones whom they call “traditional philosophers.” Starting as a little sect and revolutionary party, this group has become more and more numerous and its members have now established themselves as the leading official philosophers in our centers of learning, where they are accepted by the scientists as kindred rather than alien spirits, whose labors in the fields of logic, semantics, and what is called the “philosophy of science” make them welcome as useful co-workers in the domain of science rather than merely enjoyable entertainers, as the self-confessed poets are.

The law exiling the traditional philosophers, to be enforced by punitive measures, including book-burning, was first drafted by **David Hume** in 1777. It was formulated as the closing paragraph of his *Enquiry Concerning Human Understanding*, in which he felt that he had established the validity of two and only two forms of inquiry—(1) mathematics, which he described as “abstract reasoning concerning quantity and number,” and (2) empirical science, which he described as “experimental reasoning concerning matter of fact and existence.” In contrast to these, he felt that he had shown that the inquiries of traditional theology and philosophy, which he lumped together under the heading of “divinity or school metaphysics,” eventuated in mere opinion, the very opposite of the analytical truths of mathematics or *logic* and of the measured probabilities of empirical science. Therefore, he felt entitled to conclude as follows:



When we run over libraries, persuaded of these principles, what havoc must we make? If we take in our hand any volume—of divinity or school metaphysics, for instance—let us ask, Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames; for it can contain nothing but sophistry and illusion.



Hume’s positivistic proclamation did not at once become law. But since his day the legislative efforts of **Auguste Comte**, Ernst Mach, and Karl Pearson in the nineteenth century, and the much more precise formulations of the English analysts and the American positivists, the latter encouraged by the radical empiricists and pragmatists, have succeeded in enacting the ostracism of traditional philosophy that Hume called for.

In this country, the pragmatists furnished the oratory and eloquence for moving the learned world of scientists and scholars to adopt the law, and the positivists provided the enabling legislation for its enforcement. Instead of book burning as a punitive measure, they recommended something less incendiary but just as effective—nonreading of the books of traditional philosophy, together with an undeclared ex-communication of those who still persisted, in philosophical journals or at philosophical meetings, in talking about the problems with which those books once dealt.

According to this view, which is today the most prevalent of the three contemporary views we have so far examined, traditional philosophy may have had problems that were distinct in character, from the problems with which modern science successfully copes. But they were not problems that could ever be solved by any method whatsoever in a fashion that would yield truth or probability. Only those problems that the methods of science are competent to solve yield solutions which have the status of valid or verifiable knowledge. The questions which the sciences—natural, social, historical—cannot answer by their methods either (1) cannot be answered at all, or (2) can be answered by nothing better than mere opinions having the status only of private or personal “truth” for the individual who asserts them without the support of public evidence.

The three views are alike in one essential respect. All of them affirm the foregoing characterization of the questions science cannot answer. They may differ with regard to the continuity or discontinuity of science and philosophy, or in their evaluation of philosophical speculation in relation to scientific research. But they agree in identifying the domain of science with the realm of knowledge, in the sense of ascertainable truth or probability; and in treating philosophy either as a disguised form of poetry or as the undisguised expression of merely personal opinions for which men may claim truth but for which they cannot offer certifying evidence open to the general inspection of inquiring minds.

The Support for Philosophy

Against these three views, *which* I said in the beginning I regard as false, I would like to offer a fourth, which I think is true. According to this fourth view, there are questions which science cannot answer but which, nevertheless, can be answered and can be answered by philosophical knowledge, capable of evidential support, rather than by unfounded personal opinion. The questions which philosophy can answer and science cannot are radically dif-

ferent in type from the questions science can answer and philosophy cannot; and this difference in the problems and objects of philosophical and scientific inquiry is correlated with the fundamental difference in their methods of inquiry. The methods of each are adapted to solving problems of a certain limited sort, and so long as science and philosophy are each characterized by their own distinctive methods, neither will ever be able by its methods to solve the problems amenable to the methods of the other, and neither will ever be able to advance knowledge beyond the limited competence of its own methods.

Yet the methods of both are methods of learning what is true or probable, and so the methods of both, properly applied, are able to increase the store of human knowledge, each with respect to its own objects and problems. Both, in short, are methodical pursuits of objective truth; and though the way in which each establishes its conclusions is as different as the way in which each conducts its inquiries, the conclusions are either true or false, more probable or less probable, by the same ultimate criterion, namely, by the measure of their accord with existent realities or facts.

Apart from the distinction between science and philosophy, we are all acquainted with analogous distinctions among separate disciplines. The method of history is different from the method of natural science. The kind of questions the historian tries to answer by means of his method are radically different from the kind of questions the natural scientist tries to answer by means of his. The one is concerned with the occurrence and conjunction or sequence of particular events; the other, with correlations among phenomena, which can be expressed in general laws or probability statements. The scientist knows that he cannot solve a single genuinely historical problem by his methods, now or ever; just as the historian knows that he cannot solve a single problem in physics, chemistry, or biology by his.

The same relation obtains between the mathematical sciences, on the one hand, and the experimental or empirical sciences, on the other. Even though mathematics and physics are closely wedded in the hybrid discipline of mathematical physics, we know the difference between the mathematical and the physical problems of mathematical physics, and know that experimental methods cannot produce new mathematical formulations, just as mathematical methods cannot produce new experimental data. Advances in mathematical physics require, first, separate advances in pure mathematics and in experimental physics; only after both have been accomplished, can they be combined fruitfully. Otherwise,

we have the situation, familiar to all of us, either of mathematical theorizing in advance of experimental data or of experimental findings waiting for mathematical formulation.

Autonomy of Disciplines

The layman, unacquainted with the specialized techniques of the pure sciences, is fully aware of a similar distinction in the field of applied sciences or the learned professions. He knows that it would be absurd to ask an engineer to cure an illness, just as it would be absurd to ask a physician to build a bridge. He knows, in short, that different technical disciplines are definitely limited by their special methods to solving certain problems only, and not others. The fact that the engineer cannot solve certain problems does not mean to the layman that they cannot be solved by someone else, whose method is adequate for that task. He does not expect the same kind of answer from an engineer and a physician, nor does he expect the reasoning of both to be the same, nor the kind of evidence they offer in support of their answers. But he feels assured that the answer each gives is one that he can rely on, because it has been obtained by a method devised for that purpose and employed by a competent practitioner.

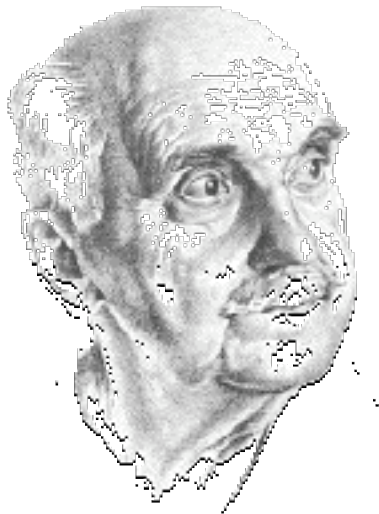
Above all, he knows better than to consult a physician about the soundness of an engineer's solution of a construction problem, or to consult an engineer about the soundness of a physician's solution of a medical problem. He knows, in other words, that the autonomy of separate disciplines, which lies in the difference of their problems and methods, also makes each relatively independent of criticism by the other. If the practitioner of one discipline cannot, by his own methods, solve the problems which belong to another discipline, neither does he have grounds for criticizing the solutions proposed by the practitioners of that other discipline. It takes a mathematician to criticize a mathematical solution for the same reason that it takes a mathematician to solve a mathematical problem in the first place.

I am asserting that science as a whole—including the natural, social, and historical sciences—stands in relation to philosophy, as history to botany, mathematics to physics, or engineering to medicine. To give this assertion meaning I must briefly indicate the difference in their methods.

The method of philosophy, like that of science, employs observation and reflection, which is to say, data and theories. Both involve sense-experience and reasoning. But the philosopher, like the

mathematician, does not need any more experience than is available to every man by the ordinary use of his senses while awake. Just as the mathematician is properly an arm-chair thinker, so is the philosopher. It would be just as absurd for a philosopher to conduct an empirical investigation to obtain special or additional data in order to solve his problems, as it would be for a mathematician to do so.

Yet the philosopher differs from the mathematician in that he must appeal to the ordinary experience of mankind as supplying the evidence, available to every one, in support of the theories he advances. In this respect, he is like the empirical scientist rather than the mathematician; but where the scientist must always go beyond ordinary experience and by his methods of research obtain "scientific data" to support his conclusions, the philosopher needs no special "philosophical data," nor has he any method of obtaining them.



In his Preface to *Skepticism and Animal Faith*, **George Santayana** with measured irony describes the posture of a philosopher who understands both the power and the limitations of his method. Speaking of himself, he writes:

There is one point, indeed, in which I am truly sorry not to be able to profit by the guidance of my contemporaries. There is now a great ferment in natural and mathematical philosophy, and the times seem ripe for a new system of nature, at once ingenious and comprehensive, such as has not appeared since the earlier days of Greece.... But what exists today is so tentative, obscure, and confused by bad philosophy, that there is no knowing what parts may be sound and what parts merely personal and scatterbrained. If I were a mathematician I should no doubt regale myself, if not the reader, with an electric or logistic system of the universe expressed in algebraic symbols. But for good or ill, I am an ignorant man, almost a poet, and I can only spread of feast of what everybody knows. Fortunately, exact science and the books of the learned are not necessary to establish my essential doctrine, nor can any of them claim a higher warrant than

it has itself, for it rests on public experience. It needs, to prove it, only the stars, the seasons, the swarm of animals, the spectacle of birth and death, of cities and wars. My philosophy is justified, and has been justified in all ages and countries by the facts before every man's eyes; and no great wit is required to discover it, only (what is rarer than wit) candor and courage. Learning does not liberate men from superstition when their souls are cowed or perplexed; and without learning, clear eyes and honest reflection can discern the hang of the world and distinguish the edge of truth from the might of imagination. In the past or in the future, my language and my borrowed knowledge would have been different, but under whatever sky I had been born, since it is the same sky, I should have had the same philosophy.

It would take more space than is at my disposal to distinguish, with logical and ontological precision, philosophical from scientific problems, and to define the special character of the separate objects with which science and philosophy each alone can deal, because of the power as well as the limitations of the methods peculiar to each. Nor can I here defend the view I take of science and philosophy, by answering all the objections which I know from long experience that positivists and scientists cannot help raising. They have every right to ask such questions as: Why, if philosophy is concerned with objective truth and has a method adequate to solving its own problems, are philosophers unable to agree among themselves, as competent scientists of the same generation in a given field are? And why are philosophers unable to make the kind of progress in their work that scientists make in theirs?

To answer these questions, and many others equally searching, requires a book not an essay. But I can point out that the nerve of all the answers I would give lies in the insight that the way in which philosophers agree, disagree, and deal with their disagreements is as different from the way scientists do these things, as the objects and methods of philosophy are different from those of science. The same applies to progress. One should not expect the same kind, rate, or conditions of progress in philosophy and science. Philosophy is misjudged, in regard to progress or to agreement and disagreement, if it is judged in these respects by standards which are applicable only to science.

Utility of Knowledge

Just as philosophy and science differ in their problems and methods, so do they correspondingly differ in the value or utility of the

results they achieve. When, in the years I used to teach philosophy, a student would come up and say “This is all very interesting, but of what use is it?” I answered him by saying “Of no use at all—in your sense of utility.” I had learned from experience that the contemporary student has only one standard of utility in mind when he asks about the utility of knowledge—that which is applicable to science, but not at all to philosophy.

The utility of science is technological or productive. It builds bridges and cures diseases. But scientific knowledge can also, of course, be used to bomb bridges and to scatter disease on the winds. Science gives us atomic or thermonuclear energy for constructive or destructive purposes, but it does not tell us whether to make peace or war, or how to govern a just and free society, or how men can become wise and happy after they have been made powerful and comfortable.

Philosophical knowledge produces absolutely nothing. But where science has a technological or productive utility, philosophy has a practical or moral utility. It cannot tell men how to make things, but it can direct them toward making a good rather than an evil use of them. It directs the conduct of the individual life and of society by the moral and political truths it is able to teach about war and peace, justice, liberty, and law, duty, virtue, and happiness.




When **Bacon** said “knowledge is power,” he was thinking only of productive power, and hence only of scientific knowledge. Power without wisdom is a dangerous thing, since it can be used for good or evil; and the more power we have, the greater is the catastrophe we risk bringing upon ourselves by its misuse. That is our situation today, in a world dominated by science, from which philosophy has been effectively exiled.

To return once more to the metaphors I used at the beginning, let me conclude by saying that philosophy is not in the suburbs of the city of knowledge, nor out on the mountain tops, nor up in the

clouds. Philosophy should be pictured rather as one great state in the federal republic of knowledge, in which science is another. Each has a certain autonomy; each exercises the sovereignty of its methods in its own realm.

Yet they can also be functionally related to one another, they can have commerce with another in the exchange of their special commodities; each can serve the interests of the other and be served by the other in its own way. Above all, they can coexist in peace and harmony if each recognizes and respects the rights of the other under the logical principles which both divide and unite them as members of a federation of sovereign yet independent disciplines.

One word more. We have been considering the question of the difference and relation between science and philosophy. Does the man who tries to answer this question answer it in virtue of his competence as a scientist or in virtue of his competence as a philosopher? .

Since any answer to the question ultimately rests on a theory of the nature of knowledge itself, and about the kinds of knowledge, I submit that the question is a philosophical rather than a scientific question. It obviously cannot be answered by the methods of science. Now a man may refuse to answer it because he recognizes that it is a question science cannot answer, and because he holds that the questions science cannot answer cannot be answered at all in any valid way. But if a man does try to answer it and, more than that, claims objective validity for his answer, he thereby admits not only the distinction between philosophical and scientific questions, but also the possibility of objectively valid answers to the questions philosophy can and science cannot answer. He cannot, therefore, consistently answer the questions about the relation of science and philosophy by taking any of the three views that I have said are false views of the matter. 

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