

PART I

**SCIENCE AND THE PHILOSOPHY OF NATURE:
READINGS OF THE COSMOS**

THE DISPARITY OF DISAGREEMENT IN SCIENCE AND PHILOSOPHY

MICHAEL AUGROS

The persistence of disagreement among philosophers might never have been deemed a peculiarity of philosophy were it not for the comparative agreement among scientists. The idea that philosophy needed to be begun again from scratch, on the grounds that its practitioners had not yet hit upon the right method of philosophizing—witness their disagreement—was, if not entirely new with modern minds such as Bacon, Galileo, and Descartes, at least more impressively and credibly proposed in their day than ever before, thanks to the rapidly developing “scientific” approaches to nature. With Newton especially, science—self-consciously divested not only of a resting Earth and celestial spheres, but even of substantial forms, final causes, and natural motions—seemed to be making good on its promise: the world could be fully understood without recourse to those unverifiable phantoms of the natural philosophers.

Not that the scientists are entirely free of disagreement themselves. But disagreements among them are rarer, and usually on the cutting-edge of their various disciplines, and often get resolved in the end. Or they touch on matters which the scientists themselves do not believe they can settle by their methods—which is to say that the disagreements are not properly scientific ones, but perhaps philosophical after all. And their disagreements are almost always confined to fairly particular questions, while they agree on an entire world-view, on a whole series of conventions and methods, and they work in concert toward common goals, and recognize one another’s achievements. The physicists have a common physics, whereas there appear to be almost as many philosophies as there are philosophers.

Why this difference? That is the question I aim to pursue in this little essay. It is a large question, and a complete answer might fill a book; here I hope only to sketch out some of the principal elements which any complete answer would include.

I. REFINING THE QUESTION

With any “why” question it is important to be certain first that the fact for which one seeks a cause is indeed a fact. Is it a fact that philosophers disagree more than scientists do? A “professional philosopher” (if that is not an oxymoron) might object that, in all his publishing and conference-going, he finds a large measure of professional agreement among his peers. He finds that certain individuals are universally recognized experts; that certain conventions for determining competence, or for awarding degrees or honors, for hiring and promoting and tenuring and publishing, are generally received in the academic world he inhabits. How does this differ from the state of affairs in the scientific world?

There are two possible answers. Either this seeming concord is confined to a single school of philosophy at variance with a host of other schools, or, if it is universal, this is because “professional philosophers” rarely engage in philosophy, but instead for the most part study only philosophy, which is to say they study the history of philosophy. That is a very different thing from what is going on in science. The scientists study reality, and they agree. The philosophers study other philosophers—because only then can they agree, and only with difficulty. The philosophers that get studied, of course, themselves studied reality, and disagreed. How different “science” would be if scientists could agree on nothing except what other scientists have said!

So the question is not “Why do professional philosophers disagree about what philosophers have said?” The question is “Why do philosophers, to the extent that they attempt to understand reality, disagree more often and more profoundly than scientists do?”

One very common answer goes roughly like this: “Scientists are precisely those with the right method for studying reality; hence their success and agreement. Philosophers, whatever they might be, are not scientists, and hence lack the right methods, or refuse to use them; hence their failure to get at the truth and their consequent inability to get one another to agree.”

Certainly, that is possible. More than that, the mere fact of their disagreement proves that many people called “philosophers” have indeed failed to understand reality, and very likely this happened at least in some cases as a result of adopting the wrong principles and

methods. But is this the only possible kind of explanation for their disagreement? Must we say that all those called “philosophers” have failed to understand reality, and have done so by the mere fact that they did not employ those methods that are commonly regarded today as “scientific”? Is it the case, in other words, that only the methods called “scientific” are productive of sure knowledge about the world? If so, it is worth being sure of it. To put this idea to the test, we must identify the most general features of scientific knowledge, and ask, more concretely, whether those are the only ones through which one may obtain genuine knowledge of the real world. Methods which belong only to one part of science would obviously not be those we seek—one cannot say “Any investigation of reality made without the aid of a centrifuge is doomed to fail,” since that particular instrument is not needed even in most parts of science.

What, then, are the common features of science which we might think are indispensable means for reaching the truth of things? Well, every branch of natural science makes use of testable hypotheses, and reasons to the truth or likelihood of these by checking their logical consequences against experience as deliberately and as carefully as possible. One may here discern two kinds of foundations underlying science: one rational, the other experiential.

On the rational side are the principles from which science reasons. Leaving aside those drawn from separate and independent disciplines such as mathematics and logic, the remaining principles proper to natural science are the sort that are judged in light of their consequences. Science is so characterized by its testable hypotheses that nearly all general statements in science start off as such, and many are forever subject to future revision in light of new experience. Scientific theories are composed of such statements and never of purely mathematical or purely logical statements.

On the experiential side we find the contact of science with the world. If its inventive hypotheses are to be anything more than pure flights of fancy, they need tethers to connect them to reality—and these are the careful observations by which science puts its ideas to the test. These may be sophisticated experiments, or simple measurements, or observations made with the aid of instruments, but it is common to every sort of experience which is properly “scientific” that it is careful, deliberate, thought-out, pursued with a definite purpose, and to some degree hard-won.

Putting these two foundations together, we may form a rough definition of the contemporary sense of “science” thus: *The study of reality by means of general statements testable by careful and purposefully procured experience.* This might not cordon off a definite species of knowledge, and it might not bring out everything essential about that knowledge, but it is generally agreed that “science” is particularly characterized by its use of hypotheses and careful observation.

Well, then, what sorts of methods must the philosophers employ, such that they would be doomed to failure? It must be admitted that philosophers have their own principles from which to reason, and many of them appeal to experience—in this they do not differ from the scientists. But their principles must not be empirically testable statements, lest philosophers become indistinguishable from scientists. And again, those of them who appeal to experience as a kind of evidence must not appeal to the same kinds of experience that scientists consult, or they will again be indistinguishable from scientists. What remains to them will be opposite sorts of principles and an opposite type of experience.

What sort of principle is opposed to a testable hypothesis? If it is not a testable hypothesis, then it is not judged by its consequences, but rather its consequences are judged by it. Such is a “self-evident” principle, which needs no testing, no proving, but is known to be true, with certainty, as soon as one understands the meaning of its terms. For example, “Equals added to equals make equals,” or “Nothing both is and is not at the same time and in the same way.” Philosophers might disagree as to which statements should be accorded “self-evident” status (for instance, is “What begins to be needs a cause” self-evident or not?), but those who claimed to know with certainty any general truth at all laid down some statements as self-evident, as things known once and for all, and as things impossible to overturn in light of any future experience. Such are the sorts of principles found among the philosophers, and not so much the “testable” type. (It is true that Socrates often took up a general statement as a kind of hypothesis—e.g. “Virtue can be taught”—and then “tested” it by seeing what followed from it; but this sort of procedure was more investigative than decisive, and Socrates himself did not lay claim to a great store of philosophical knowledge.)

So much for the general character of philosophical principles. What kind of experience might philosophers appeal to? What sort of

experience is opposed to the type sought out by scientists? If it is not careful, deliberate, sought-out, then it is the sort of experience that comes to us automatically and for free. And if it is the sort of thing to which a philosopher might appeal in order to convince others, it cannot be locked up in his own private experience, or something confined to a few individuals, but must be common to everyone, the sort of experience every normal person has and cannot avoid having—in a word, common experience. It is true that many philosophers rejected the idea that such experience affords important insight into reality; it is also true that many philosophers denied the reliability of experience in general, or said that our rational knowledge is more or less independent of experience. But at least “common experience” remains a possible resource available to a philosopher while keeping him distinct from the scientist, and in fact there were plenty of philosophers who took full advantage of common experience—most notably Aristotle. You may not find the phrase “common experience” in Aristotle, but one look at his *Physics* makes it plain that he accords a good deal more merit to ordinary experience of the world than today’s physicists do.

II. FIRST ATTEMPT AT AN ANSWER

Now we may ask our question again, this time with more focus: “Why were those philosophers who studied the world in light of self-evident principles and common experience unable to convince all subsequent philosophers? Why don’t such principles enable the philosophers to agree as the scientists do?”

The answer would appear obvious. Self-evident principles and common experience both seem to be ill-suited to any serious study of the world. Many a “self-evident” principle has turned out to be an embarrassing falsehood: “The Earth is at rest,” “Water is an element,” “Heavier things fall faster,” to name but a few. Many a “common experience,” too, because of its crudity and because it presents to us messy complexities and not the simple laws and causes composing them, has led us astray in our formulation of natural laws—for instance, in common experience all things that begin to move come to a stop fairly quickly, and when two bodies collide, it often appears that one accelerates or stops the other, while the other does not at all affect the one (as when a man runs into a brick wall). If we follow the lead of common experience in these matters, we are led to deny Newton’s First and Third Laws. The kinds of principles and experiences available to

philosophers therefore appear to be unreliable instruments for understanding reality. Little wonder, then, that when pressed into service for which they are poorly fitted, they should yield errors and doubts and disagreement. In a word, common knowledge is suitable only for common purposes, whereas a knowledge of the world worth boasting about would have to be an uncommon knowledge, and uncommon knowledge cannot proceed out of common knowledge. And so it would seem that we have our answer.

Would that it were so! But the matter is more difficult than that. For one thing, it is simply untrue that uncommon knowledge cannot proceed out of common knowledge. Elementary mathematics may begin from statements familiar to everyone, such as “Things equal to the same thing are equal to one another,” but from these, and from these alone, it is able to reason rigorously to implications which not everyone sees, including many that are counter-intuitive. “Common knowledge” can contain implicitly many things not commonly seen.

More than that, the examples cited above were not quite fair. “The Earth is at rest” is not really self-evident, as though one could know the truth of it simply by knowing the meaning of the terms; it was an interpretation of the fact that we do not experience the Earth to move, while we do see the heavens spinning relative to us. And it was proposed in this way by the ancients, and never as a self-evident statement. Similarly “Water is an element” was not thought to be manifest through mere familiarity with the definitions of its terms, but was thought to be true partly because we do not see, with the naked eye, any heterogeneity in the parts of water, but only pure water all the way down, as it were; there was also the idea that water is so abundant, and so versatile, and so necessary for life, that it must either be a basic component of things, or very close to it (which is true!). Hence “Water is an element” was never proposed by the ancients as an axiom, but as a theory which they thought had been abundantly confirmed.

Continuing in this vein, although the definition of “heavier” implies “a stronger tendency downward,” to conclude from this that the stronger tendency must manifest itself in the form of being “faster” is a pure assumption. In these cases, and also in the case of seeming counter-examples to Newton’s Laws, one is actually forming a crude theory based on a very suggestive, but inadequate, experience of things. If we look to genuine cases of self-evidence, such as “Equals added to equals make equals,” which are known simply by

understanding the meanings of the terms and their combination, these are necessarily true, and are even employed by science, although with little fanfare.

Neither can the use of common experience explain the disagreements among philosophers. So long as we do not trespass from the realm of experience into that of theory, common experience is both reliable and also relied upon by science. "Some things move," while perhaps a boring statement, is known by ordinary experience and independently of special observations. And the general conceptions of "motion," "direction," "whole," "part," "one," "many," "equal," and countless others, are derived only from common experience, and are presupposed by the scientific elaborations of what these are or how to quantify them. Above all, it is important to note that there can be no science without supposing that *the human senses are so constructed as to present us with reliable data about reality*, as when we use our eyes to look through microscopes and telescopes and to read digital read-outs. And yet there can be no scientific test of this statement. Similarly *The human brain is so made that it can arrive at the truth by its concepts and reasoning*; no brain-science can verify this, since all science, including brain-science, must presuppose it. It is taken as a matter of ordinary experience. (I here ignore the rather disingenuous proposal that all of science is merely a "game," and hence makes no claim to the truth of any of its ideas; some science, it is true, limits itself to model-making, but presumably this is because it can do no better, or not for the moment.)

Here we are confronted with a remarkable paradox. We find more agreement among scientists than among philosophers, and yet the principles and experiences to which philosophers confine themselves are not only used also by the scientists, but they are also more certain than the kinds which characterize science! Consider the following statements:

- (1) Some things move.
- (2) Light moves.
- (3) Light moves *in vacuo* at 186,000 miles per second in all reference frames.

Statement (1) is a matter of ordinary experience, while the verifications of (2) and (3) require experimentation and measurement. And yet (1) is more certain than either (2) or (3). In fact, it is impossible

to be certain of (3) without being certain of (2), and it is impossible to be certain of (2) without being certain of (1), whereas it is possible to be certain of (1) without being certain of (2) or (3). So long as we do not push beyond what common experience itself tells us, it affords greater certainty than the more precise knowledge we may obtain by more precise kinds of experience. In fact, the more precise a statement becomes, the more it asserts, and therefore the more difficult it is to be certain of it, whereas the more general a statement is, the more noncommittal it becomes, and the more sure we can be of its truth. As has been observed by many thinkers, there is a kind of inverse ratio between certainty and precision.

And consider these statements:

(4) Every action is of one thing upon another
(or "Nothing acts on itself").

(5) To every action there is a reaction.

(6) To every action, there is an equal and opposite reaction.

Statement (4) is self-evident; there must be some distinction between what acts upon and what is acted upon, as between pusher and pushed, or scratcher and scratched; even when something "scratches itself" this is only because one part scratches a different part. Statement (5) is less evident, stating (for instance) that whatever pushes is also pushed back in return by the thing it pushes. Statement (6) specifies the magnitude and direction of the reaction. Here again, the order of certainty, from greatest to least, is from (4) to (6). This fits with the fact that the first statement is of the self-evident variety, while the last is a testable hypothesis.

If the philosophers differ from the scientists in that they make no particular use of testable hypotheses and precise observations, but confine themselves to what they can say on the basis of self-evident principles and common experience, why do the philosophers disagree more than the scientists? Self-evident statements are more certain than testable hypotheses, and ordinary experience provides us with surer data than precise observations do.

Could it be that philosophers push self-evident statements and the data of common experience beyond their proper application? Certainly that has happened in many cases. Aristotle mistakenly believed that there must be a correspondence between the most basic sense—touch—

and the most basic corporeal qualities, so that the objects of touch could be used to define and identify the elementary bodies. He was too confident in the competence of ordinary experience to give us insight into such deep questions. If he realized that making the Earth rest and the heavens move was to go one step beyond what we simply experience, he must have thought the alternative too fantastic to contemplate. Surely the history of philosophy provides examples in sufficient numbers of philosophers trying to get more out of certain principles than they really contain. But the history of philosophy also shows that philosophers do not very often disagree about what follows from what—this happens, but it is not typical. Far more often they disagree over the principles and experiences at the very foundations of their thinking. And now that we are approaching the true answer to our question, we are also most struck with its paradoxical nature. Although the principles of philosophy should be self-evident, the most indubitable points of all, it is most of all about the principles that philosophers disagree.

III. A SKETCH OF THE TRUTH

To appreciate the true solution of the difficulties, one fundamental distinction is of particular relevance: the power to convince people (and hence to cause agreement) is not entirely identical with the intrinsic certainty and rigor of one's thinking. It takes very little study of logic to realize that induction is less rigorous than syllogistic reasoning, and yet a little experience also shows that inductions often win more people over than syllogisms do. A mathematical proof might be quite perfect in rigor, but so difficult to follow that most people are more convinced by measurement instead, although this is not perfectly exact. Probably one cause of this strange state of affairs is that we are rational *animals*, embodied reasoners, and so while we are drawn by the rigor of rational procedures, we are also drawn by the certainty of sensation, and of things close to the concreteness of experience, such as examples and induction.

But I am here interested only in the general fact: convincing-power is not simply identical with intrinsic certainty and rigor. Bearing this in mind, I will propose three reasons why the certainties at the foundation of philosophy, while more sure in themselves than those distinctive of modern science, are yet less apt to produce a general agreement. I will follow up with some secondary causes responsible for

the continuation of agreement among scientists, and of disagreement among those who philosophize.

Two minds are able to reach agreement only when they each submit to a recognizable common standard, acting as judge between them. That is why the certainties most apt to produce smooth and steady agreement in large numbers of people are those things of which we are certain (1) exteriorly rather than interiorly, (2) by effort rather than by nature, and (3) by sense rather than by understanding.

1. Exterior Certainties vs. Interior Ones

What is in my mind might be the same as what is in yours, or what is in my inner experience of myself might be very similar to what is in your inner experience of yourself, but these things are not as obvious as the sameness of some exterior object we may both look at and handle. So, although what I experience in myself might be more certain to me than what the ruler indicates about the length of the object on the table, insofar as many data of my inner experience are ever-present and are very immediate to me and are conditions of my experience of everything else, nevertheless the ruler upon the table might well be a less ambiguous standard by which to reach an agreement with you. Perhaps I can be certain, through various outward signs, that you experience within yourself certain data just like I do within myself—but then how do I bring these before your mind, so that I might get you to reason with me from them to common conclusions? I have no choice but to use words, and these admit of such subtleties and shades of meaning that it might be very difficult for me to get you to attend to the specific things in yourself which I have in mind. Here, exterior objects have a distinct advantage: I can point to them, and although I might still need words, I have less dependence upon them, in order to get precisely the same item before your mind and mine, than I do when I attempt to single out some element of your interior experience, all mixed up, no doubt, with a bunch of other things in you I cannot see.

Now scientists, in their zeal for agreement, have agreed to ignore as much as possible these “internal data,” for instance the notion of a “self.” Many philosophers, on the other hand, have attempted to inventory these data, and categorize them, and reason to their consequences. Few philosophers have tried to found philosophy entirely on the data of internal experience, but many have made use of those data.

This sort of difference has led people to speak of science as “objective” and philosophy as “subjective”—which is very close to saying that there are no real and verifiable truths in philosophy, no real truths discoverable by introspection, but only preferences and groundless imaginings. But if statements such as “I am in pain”, or “I am hungry,” or “I am thinking of a triangle,” are not statements of fact, what could possibly be? In the name of “objectivity” our science has sometimes redefined “pain” and “hunger” and “thinking” by the outwardly observable signs or results of these things which we experience only within ourselves, but this is to whittle down reality to the portion of it to which we can point, and on which we can most readily agree.

There is also the much more reasonable desire to get beyond the limitations of our own bodies as detectors—“how hot it feels to me” is often both too vague to settle the question “whether this is hotter than that” and too unreliable for discerning how much of my perception is due to the heat of the object and how much is due to my own body temperature. And this is to say nothing of how limited our own bodies are in determining the warmth of things because of the short range of temperatures which are safe and possible for us to feel. Hence there is the desire to leave ourselves out of the equation as much as possible, to distance ourselves as much as possible from the object. Hence, too, there is the decided scientific preference for the sense of sight (and digital read-outs) over the sense of touch.

The preference for certainties that will most readily produce agreement will therefore steer us away from objects which we can verify only by looking within, such as “self” and “being alive” and “seeing” and “understanding,” as these signify things experienced directly by each of us only within himself (as opposed to the “hollowed out” definitions of these in purely functionalistic and externally verifiable terms). Each one of us experiences within himself, and only within himself, a knowledge of universals, such as “what it is to be a circle.” But this experience, precisely because it is not of an object we can point to here between us on the table, is commonly accessible only through the medium of words, which introduce many ambiguities and possibilities for miscommunication. “The scale reads 140 pounds,” on the other hand, is subject to misinterpretation only by the willful.

2. Certainties Attained by Effort vs. Those Provided by Nature

We know best of all the things we ourselves produce, to the extent that we have produced them. We understand clocks and cars and computers better than we understand atoms and animals. (We can, in some sense, produce atoms and animals in the lab—but we are really just providing the materials and conditions for these things, and then the laws of nature take over and produce the things.) In accord with this principle, we acknowledge most readily the certainties which we have achieved by our own efforts, whereas those which arise in us naturally, automatically, can operate in our thought without ever calling our notice to them explicitly. You might remember the day you first learned the Pythagorean Theorem, and you can't easily apply it without realizing you are doing so. You probably don't recall the first time you learned that *What is less than the lesser of two things is also less than the greater*, and it is just possible you never bothered to reflect on the fact that you knew that until you read this sentence. But the things we are more aware of, more conscious of, which are in our minds in a more distinct and explicit way, and which we cannot use except by conscious and deliberate choice, are more apt to come out in discussions with others, and are to that extent more capable of producing agreement than the things whose influence in our thought we hardly notice, and which we are not accustomed to put into words. So the standards of science, such as the hypotheses we have deliberately formed and tested, and the observations we purposely set out to make, are more apt to cause agreement than those of philosophy, since self-evident things and ordinary experience can quietly pervade our thinking without demanding effort on our part.

Also, what we have won by effort seems more valuable than what is free and automatic, and hence the latter is more easily despised or dismissed; so even if you can summon up the same idea or experience in someone else's mind, he might not think it important in light of something else which seems opposed to it, and which, like the Pythagorean Theorem, was the fruit of significant labor.

We also tend to prefer those standards which lie more in our control than those which do not. If we agree that this procedure or measurement will decide who is right, then it becomes a matter of doing the procedure properly. If we fail the first time, we can try it again. If you and I disagree about something which we both know to be true, but I fail to recognize that I know it both because your manner of

expressing it sounds strange to me and because I am unaware of the effort I am expending in my own knowing of the thing you say I know, then there is little you can do to persuade me.

Many procedures, too, are external actions, such as experiments and measurements, whereas naturally known certainties result from natural action within our minds and perceptions. But exterior certainties are more apt to produce agreement, as I noted earlier. So here we have another reason that the certainties of science, which so often result from procedures, are more capable of producing agreement than are the certainties from which philosophy can begin.

3. Certainties of Sensation vs. Certainties of Reason

Since the external senses bear on external objects, and reason lays hold of generalities which cannot be (in a literal sense) laid on the table before us, the evidence of the senses will take precedence over that of reason so far as producing agreement is concerned. It is for this reason that science prefers inductive generalizations to self-evident principles. Even if Euclid's postulate that straight lines in the same plane and inclined to each other at less than two right angles must intersect is taken to be true and self-evident, one cannot expect it to enjoy the kind of general assent which the conservation laws have earned. This fifth of Euclid's postulates, if true, would be known by seeing that the subject implies the predicate, a seeing which can happen only in the mind. There can be no empirical verification of it, since the definition of the Euclidean "straight line" offers nothing for the physicist to test (which is why the physicist must have his own meaning of "straight," e.g. "the path of a ray of light in a vacuum"). That energy is neither created nor destroyed, by contrast, is not taken by scientists as something self-evident; it is maintained precisely because no convincing counter-examples have yet been found.

This fits with the idea that what results from a procedure we perform is more a cause of agreement than what results naturally. If we understand the meaning of the Fifth Postulate, we naturally and automatically see its truth (assuming it is in fact self-evident). There is no reasoning or any other kind of repeatable procedure involved. But "Energy is neither created nor destroyed" is the product of repeated measurements.

Again, where possible, the scientist prefers sheer observation to carefully tested theories. Newton's *Principia* was good science, but the

argument for universal gravitation was long and prolix—better to *measure* the force of gravitation between two terrestrial bodies, if we can. The more we can turn matters of theory into matters of observation, and the less theory-laden the observation, the better.

So science prefers the certainties of sensation to the certainties of reason as its foundation. Consequently, the scientists take great care to refine their methods of observation, their equipment, and to distinguish themselves and their theories (so far as possible) from the raw data. Perhaps this is another cause of disagreement among the philosophers: too few of them bother to do the analogous thing with their certainties. Self-evident principles are often overlooked, or else confused with similar things that need proof. Sometimes even falsehoods are mistaken for self-evident things. And the data of common experience are often carelessly expressed, or else small (but incorrect) inferences from common experience are mistaken for experience itself. Insofar as many philosophers take little trouble in the beginning, because things seem so obvious in the early steps, it should come as no surprise if philosophers differ widely from one another in the end. Imagine what would happen if the majority of scientists, in their haste to discover great things, were content to use their instruments in whatever condition they found them in, and did not calibrate them, maintain them, refine them, and did not take care to be sure they were all using the same standards of measurement and the like, since these matters seem so small and trifling. What would become of the scientists? They would be plagued by disagreements!

And so it happens that the certainties from which philosophy ought to begin are in fact more certain in themselves than those peculiar to science, but they are at the same time less capable of producing widespread agreement. To these reasons I will now add some reasons for disagreement in philosophy that are secondary, but by no means trivial.

“Science” in the modern sense exhibits a decided preference for those certainties which are more apt to produce acknowledged agreement. As such, it might almost be defined as the investigation of the world by principles and methods which will result in agreement, to the exclusion of those which have proved not to do this. This does not mean the principles and methods thus laid aside are false, or uncertain, and even less that they are unimportant or trivial. In fact, it is precisely insofar as we are uncertain about our own methods, experiences,

perceptions, calculations, insights, reasonings, and the like that agreement with others takes on greater significance for us, as a confirmation of what we have achieved. In Proposition 4 of Book 3 of his *Principia*, Newton takes great pains to show the agreement of the astronomers as to the facts. Tycho Brahe's value for the distance of the Moon in units of Earth-radii, for example, differs significantly from the value assigned by others, and Newton feels obliged to explain this disagreement, which (he argues) turns on Tycho's erroneous theory of refraction. Taking this error into account, Tycho's observations harmonize with those of other astronomers. Earlier, Copernicus excused his project of beginning astronomy from scratch partly on the grounds that the Ptolemaic astronomers could never reach agreement upon the details of celestial mechanics.

It is due not to the inherent certainty of scientific methods that the agreement of experts is so necessary a supplement, but to their great sophistication, and hence to their great capacity for error. But from this need will spring up a whole culture of agreement:

(1) Given the importance of agreement in science, scientists have attached consequences to agreement and disagreement. Grants, tenure, hire, promotion and the like are given to those adhering to the paradigms, and are withheld from those who run too much against the grain. However productive and reasonable such a system might be, it does tend to become a self-perpetuating culture of conformity. One gains admittance only by adopting certain ways and accepting certain doctrines.

(2) Once this culture of agreement exists, and makes steady progress of a certain kind, people are naturally impressed by and attracted to it as a relief from the cacophony of disagreement in other fields.

(3) And who will be left to enter into philosophy? Only those undaunted by disagreement, which might be for good reasons, or for bad. Certain temptations arise for the philosophers which do not arise for the scientists. In science, a culture of agreement, one does not ordinarily make a name for oneself by overturning the main foundations. Scientists are penalized for disagreement if it cuts too deep (if, say, someone were to seek a grant for a perpetual motion machine). In philosophy, where no such premium is placed upon agreement, a certain irreverence for regnant ideas, when paired with the right personality and a certain brilliance, can bring rich rewards in terms of money and recognition.

(4) Once philosophers are characterized by their disagreement, one is faced with the question *Why?* The most facile answer, although I have tried to show it is incorrect, quickly becomes the most accepted: Philosophy is neither true nor false, or at any rate is not verifiable, and so it is one of the “humanities,” like literature, and should be taught as such, as indeed it is today. Philosophy may be presented as interesting or dull, daring or cowardly, innovative or unoriginal, but in our universities it is rarely presented as true or false. The various “philosophies” are presented like so many stories, and students are left to decide for themselves which, if any, is true; or else they are given to understand that “true” and “false” do not apply to philosophy. Meanwhile, science is taught dogmatically, with students expected to believe things on authority, usually without any promise of being shown the supporting evidence in good time. And the scientists agree as to what things need to be believed, what things need to be taught, and in what order, while philosophers do not agree about similar things in their own field. But there will be no good teaching of philosophy until there is agreement about what to teach and in what order, and no agreement about those things until there is good teaching of philosophy—a vicious circle.

(5) Furthermore, science is taught to everyone very early, even in our elementary schools, whereas there is no common education provided today which is conducive to philosophy—there is, for instance, no more teaching of Latin and Greek, no more reading of the literature which would cultivate a healthy respect for the ancients, and hence for the universals of human experience. Our students are left instead with the unilateral experience of modernity, of technology, and on every side are confirmed in their prejudice of modern man’s unqualified superiority to his predecessors. It used to be thought in centuries past that, precisely because of the difficulty of grasping philosophical principles clearly and firmly, and hence in the conscious manner required for successful philosophizing, it was not possible to begin philosophy *ex nihilo*. One had to approach it after much study of more accessible matters, such as the liberal arts of elementary geometry, speculative grammar, logic, music theory and the like, before one could appreciate the principles of philosophy. One had to see those principles first in particular cases, and see the same sorts of principles arising again and again in different matters, before one was ready to grasp the principles stated abstractly and in all their universality. If that old view is correct, then it is no wonder that so few

minds go into philosophy (as opposed to the history of philosophy) today—there is no education preparatory for it, and no general community of those engaged in it.

(6) Given the disagreement among philosophers and schools of philosophy, it looks presumptuous for any one philosopher or any one group of philosophers to say “We are right; everyone else is at least partly wrong.” So there is an obstacle to any new growth of agreement among philosophic minds.

It is for reasons such as these that philosophers do not enjoy such agreement as one finds among the scientists, and are not likely to in the future. The facile alternative explanation which conceives of philosophy as a “subjective discipline” takes no account of the certainty of self-evident statements and of the data of ordinary experience, nor of the dependence of science itself upon them, nor of the fertility of these sources of knowledge.

IV. CONCLUSION

On the other hand, to return to a point made earlier, I think a complete answer to the question, “Why do philosophers disagree, while the scientists agree?” must to some extent deny the assumption behind the question. What I mean—and I fear I might seem to contradict myself—is that there is in fact significant agreement among philosophers. One might wonder whether it is altogether true that philosophers have done nothing but disagree, or that there has never been anything in the history of philosophy like sustained continuity and progress. But the point I wish to make here is that the philosophers do all agree upon the principles of philosophy, even if some agree only unwittingly. The kinds of certainties from which philosophy can begin, while more easy to overlook than those of science, are less easy to deny with consistency. Someone may with his mouth deny the principle that *Contradictories are never simultaneously true*, but invariably this will be because he thinks he has found things that contradict it—which is to say he thinks he must deny the principle precisely because he really accepts it, although unwittingly. Or the person who demands a reason for saying *Reason ought to govern one's faculties* demonstrates, by his very question, that he thinks reason ought to govern his decisions about how to govern himself, which means he sees that reason should govern, although he may not see that he sees it. In this way, then, all philosophers are and always have been in agreement as to the

principles of philosophy. They all know them alike, as to their unreflective use of them, but some recognize that they know them and are willing to follow wherever they might lead, while others, less careful about the beginnings, for various reasons are unable to see that they see certain things, or are unable to appreciate the value of what they see. Meanwhile, those who see more clearly than others may be acquitted on the charge of presumption insofar as they do not pretend to a secret knowledge others do not possess. "See my opponents," they might say in their defense, "even *they* agree with me, if you listen to them in their unguarded moments." There is something reassuring in this—where one's peers do not all agree voluntarily, they nonetheless all agree.

For those not committed to convincing others, nor in need of affirmation from the public or from an academic community, but content to know that where they begin is correct, and that even those disagreeing must in some way, deep down, agree, philosophy has an added appeal: its foundational principles and experiences, which are more difficult for us and hence are the more disputed certainties, are also the most profound. They are the exclusive doorways into those perennial questions about the good for man, about immortality, about the meaning behind the natural world. Science is notoriously silent on such questions, and presents us with a world hollowed out—the price of restricting ourselves to what we can agree about. But everyone naturally desires and even believes in some kind of wisdom, a knowledge of good and evil which is no mere opinion, but is founded on truth—which is to say everyone believes in philosophy.