CHARLES S. PEIRCE
THE ESSENTIAL WRITINGS

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Preface by Richard Robin

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Introduction

Charles Sanders Peirce

I

Charles Sanders Peirce was born in Cambridge, Massachusetts in 1839 and died in Milford, Pennsylvania in 1914. In a recent assessment of Peirce as a philosopher, Ernest Nagel wrote that "there is a fair consensus among historians of ideas that Charles Sanders Peirce remains the most original, versatile, and comprehensive philosophical mind this country has yet produced."[1] Although Peirce published a wide variety of papers and reviews, he published only one book (*Photometric Researches*, Leipzig, 1878) and that was not in philosophy. In 1923, Morris R. Cohen edited a volume, collecting some of Peirce's published papers, under the title of *Chance, Love and Logic*, but it was not until Harvard University Press published volumes one through six of *The Collected Papers of Charles Sanders Peirce* in 1931 to 1936 under the editorship of Charles Hartshorne and Paul Weiss and volumes seven and eight in 1958 under the editorship of Arthur W. Burks that American philosophers began to be aware of the range and depth of Peirce's work.

Since the appearance of *The Collected Papers*, a considerable interest in the philosophy of Peirce has developed, both in this country and abroad. A wide range of book-length studies, an extensive group of articles, an association of Peirce scholars—The Charles S. Peirce Society—and a quarterly journal, *The Transactions of the Charles S. Peirce Society*, all evidence the growing recognitions of Peirce's importance.

[1]Ernest Nagel, *The Scientific American*, 200 (1959): 185.

Although Peirce is best known as the founder of the philosophical doctrine known as pragmatism—and had a considerable influence on William James and John Dewey—it is becoming increasingly clear that Peirce was first and foremost a scientist. The philosophical problems he was most interested in were those of the scientist. For this reason among others he belongs in the tradition of Aristotle. He was a precursor of philosophical scientists like William James, who was a physiologist; P. W. Bridgman, a physicist; and Michael Polanyi, a chemist.

Peirce's father, Benjamin Peirce (1809–90), was a distinguished professor of mathematics at Harvard University; Peirce himself received a bachelor of arts degree from Harvard in 1859, a master of arts in 1862, and a bachelor of science in chemistry in 1863. He worked as an assistant at the Harvard Observatory from 1869 to 1872 and made a series of astronomical observations there from 1872 to 1875. Solon I. Bailey says of these observations, which were the base of Peirce's book *Photometric Researches*, "The first attempt at the Harvard Observatory to determine the form of the Milky Way, or the galactic system, was made by Charles S. Peirce. . . . The investigation was of a pioneer nature, founded on scant data."[2]

Peirce was employed for over thirty years by the United States Coast and Geodetic Survey as a physicist.[3] He did significant work on the determination of the gravitational constant and ultimately left the Coast and Geodetic Survey in a dispute with his superiors about the reliability of the pendulum technique used for making such determinations. His position has only recently been vindicated and a whole series of subsequent observations are now considered questionable.[4]

Peirce made major contributions also in mathematics and logic. C. I. Lewis has remarked that, "The head and front of mathematical

[2]Solon I. Bailey, *The History and Work of Harvard Observatory, 1839–1927*, Harvard Observatory Monograph No. 4 (New York: McGraw Hill, 1931), pp. 198–199.

[3]In 1963 the Coast and Geodetic Survey commissioned a survey ship, *Peirce CSS 28*, named after Charles Peirce. At that time the Director of the Coast and Geodetic Survey, Rear Admiral H. Arnold Karo, wrote me that, "In addition to being a logician and philosopher, Peirce made many important scientific and technical contributions to the Coast and Geodetic Survey during his thirty years of service in the bureau."

[4]Victor F. Lenzen, "An Unpublished Scientific Monograph by C. S. Peirce" in *The Transactions of the Charles S. Peirce Society*, 1969 V, no. 1, p. 5–24.

logic is found in the calculus of propositional functions as developed by Peirce and Schröeder. . . ."[5]

Peirce invented, almost from whole cloth, the study of signs. Ogden and Richards say that, "By far the most elaborate and determined attempt to give an account of signs and their meanings is that of the American logician C. S. Peirce, from whom William James took the idea and the term Pragmatism, and whose Algebra of Dyadic Relations was developed by Schröeder."[6] The range of Peirce's interests was such that he has been compared to Leibniz.

Nevertheless, Peirce received little recognition from American intellectuals during his lifetime. His personality traits were such that he often offended men of eminence. He taught for a few years at Johns Hopkins and gave a few public lectures at Cambridge, Massachusetts. Most of his income came from book reviews and from his work for the Coast and Geodetic Survey. In 1891 he inherited a house in Milford, Pennsylvania and lived there until his death in 1914. He died in the greatest poverty, unknown except to a few friends. Upon his death his wife sold his unpublished manuscripts to Harvard University. Difficulties in editing the cartons of manuscripts protracted the process of making the papers generally available to scholars. Only recently have all the papers been made available on microfilm through the Harvard University Microreproduction Service, and an annotated catalogue has been published so that American scholars can now study the Peirce papers carefully and fully.[7]

II

Perhaps because the material published in *The Collected Papers* dealt primarily with matters of philosophical concern, the first phase of Peirce studies was based on the belief that Peirce was primarily a philosopher who only incidentally made his living as a scientist. Largely due to the

[5]C. I. Lewis and H. L. Langford, *Symbolic Logic* (New York: The Century Company, 1932), p. 21.

[6]C. K. Ogden and I. A. Richards, *The Meaning of Meaning* (London: Routledge and Kegan Paul, Ltd., 1949), p. 279.

[7]Richard S. Robin, *An Annotated Catalogue of the Papers of Charles S. Peirce* (Amherst: The University of Massachusetts Press, 1967).

efforts of Victor Lenzen, American philosophers are coming to realize that Peirce was first of all a scientist. His interest in philosophical problems was that of a scientist. Max H. Fisch has written of Peirce that in his own day "he was known and valued chiefly as a scientist, only secondarily as a logician, and scarcely at all as a philosopher. Even his work in philosophy and logic will not be understood until this fact becomes the standing premise of Peircean studies."[8]

The present collection is intended to present the broad spectrum of Peirce's thought. However, the focus of the selections is on those questions that Peirce regarded as basic: the nature of potentiality, the validity of the process of scientific inquiry, and the problem of the definition of concepts. These questions are basically metaphysical in nature and have pervasive philosophical implications.

For Peirce these problems did not come from a background of previous philosophy but rather from his concerns in science. The problem of the nature of potentiality came from his concern to understand the notion of a scientific law. While this led him back into a study of the views of earlier philosophers, and particularly of the medieval scholastics, still the origins of his interest came from his scientific concerns not from philosophy as such. He developed a detailed position about the nature of potentiality in his "scholastic realism."

The problem of the validity of the process of scientific inquiry obviously came from his background in science. This problem was of great interest to the nineteenth century which, as a result of the work of Darwin, had a pervasive concern for articulating the methods of scientific inquiry and the methods of religious inquiry. Peirce's work here led him to his view of scientists as a community of investigators and to his definitions of truth and reality as the culmination of the work of such a community.

Peirce's peculiar genius is perhaps nowhere more evident than in the manner in which he came to formulate his theory of the definition of concepts—his doctrine of pragmatism. He here picked up almost casu-

[8]Max H. Fisch, "A Draft of a Bibliography of Writings about C. S. Peirce," in Edward C. Moore and Richard S. Robin, eds., *Studies in the Philosophy of Charles Sanders Peirce, Second Series* (Amherst: The University of Massachusetts Press, 1964), p. 486.

called metaphysical or scholastic realism. This side of his thought has been neglected, in spite of the fact that Peirce himself said that "Before we treat of the evidences of pragmaticism, it will be needful to weigh the pros and cons of scholastic realism. For pragmaticism could scarcely have entered a head that was not already convinced that there are real generals" (5.503).

Peirce, therefore, did not think that his pragmatism was metaphysically neutral. He thought it was grounded in the metaphysics of scholastic realism. His pragmatism grew out of his interest in the controversy over the nature of universals. Bertrand Russell, in commenting on Peirce's interest in this problem, said, "I think Peirce was right in regarding the realist-nominalist controversy as one which is still undecided and which is as important now as at any other time."[9]

The realist-nominalist controversy is often interpreted as an issue revolving around the question of whether there are real Platonic entities. There is enough discussion of this question in the controversy to provide some grounds for this interpretation. But to accept this view is to make a shift in emphasis that leads to an important misunderstanding of the problem. Peirce's irritation with this version of the controversy led him to make a rather extreme statement. "The notion that the controversy between realism and nominalism had anything to do with Platonic ideas is a mere product of the imagination which the slightest examination of the books would suffice to disprove" (8.17). Although overstating the situation, this statement should at least serve to indicate that, for Peirce, the primary emphasis in the controversy was not on the problem of Platonic entities.

The crucial issue is this: All of our knowledge consists of concepts. These concepts are such that they may be predicated of different objects and hence they are universals. But objects in the external world appear to be particular determinate individuals. The question, then, is whether anything in the external world corresponds to our concepts of it. If all our knowledge is universal, and if all that exists is particular, then our concepts have no external analogue and are mere fictions; they do not

[9] In the foreword to James Feibleman, *An Introduction to Peirce's Philosophy* (New York: Harper, 1946), p. xv.

faithfully reveal the external world and cannot therefore be said to be real knowledge of it.

If one holds that the concepts in the mind correspond to something in the external world, then he thinks that the *concepts* are real, not fictional, and hence he is a realist. Of course, one way to be a realist is to argue that there are Platonic entities. But one who holds such a view is called a realist not because he believes there are real Platonic entities (although this is true, too) but because he believes that the universals in the mind are real, i.e., correspond to something in the external world. As Peirce says (1.27 n.1), some of the realists may have believed that there were real Platonic entities, but their realism (in the medieval sense) did not consist in *that*, but only in their believing that the mental entity was real, i.e., corresponded to an extra-mental entity. Obviously, to prove that the mental entities correspond to something outside of thought it is necessary to show that in some sense there are real extra-mental entities; but the important point for understanding the scholastic controversy or Peirce's realism is that realism does not consist primarily in holding that the *extra-mental* entities are real, but rather in holding that the *mental* entities are real because they correspond to something outside of the mind.

During the Middle Ages, four solutions to this problem were proposed: The first was extreme realism, or platonism, whose most famous proponent was John Scotus Eregina (c.810–c.877). According to this view there are universal entities existing in an extraphysical realm. The ideas in the mind correspond to these entities. The objects in the physical world reveal them. Thus there are universal entities both within and without the mind. Therefore, the mental entities are real.

At the opposite extreme from this view was nominalism such as that developed by Roscellinus (fl.1100). Nominalism models the idea on the thing. Since the thing is particular, the idea is particular. There are no general ideas because there are no general things. What are called general ideas, or concepts, are merely names, *nomina*, or even noises, *flatus vocis*. Thus there are no universal entities either within or without the mind. Therefore, universal entities are not real, in fact they are not even fictions, for there are no such things even within the mind.

A mediating view between these two extremes was a conceptualism such as that of Peter Abelard (1079–1142). On this view the mind experiences only particulars, but by a process of comparison attains generalized concepts. These mental entities are compounds of particular experiences. Thus, there are universal entities within the mind, but none outside the mind. Therefore, the mental entities are not real.

The fourth position with regard to this problem was called moderate realism. This position was in the current of the Aristotelian answer to the problem. Following a suggestion made by Avicenna (980–1037), the Mohammedan commentator on Aristotle, this position was developed in the works of Albert the Great (c.1193–1280), Thomas Aquinas (1225–74), and Duns Scotus (c. 1270–1308). As the moderate realists set the problem it was this: All knowledge is in terms of concepts. If these concepts correspond to something that is to be found in reality they are real and man's knowledge has a foundation in fact; if they do not correspond to anything in reality they are not real and man's knowledge is of mere figments of his own imagination.

The moderate realists rejected extreme realism, nominalism, and conceptualism. They rejected extreme realism because of the objections Aristotle made against Plato. They rejected nominalism because on that view knowledge of the sort we would call scientific knowledge was not possible.

Science, and knowledge generally, is of the nature of concepts or general formulae; but if, as the nominalists hold, man has no general ideas, only particular experiences and general names, and if there is nothing in reality corresponding to these general names, then the general names are names of mere fictions and all science is fictitious. From this point of view conceptualism is but a form of nominalism. The conceptualists do not go so far as to say that man has no general concepts, just names, but they hold that the concepts do not correspond to anything in reality. In man's mind there are concepts, in the world there are particulars; this being so, concepts are but fictions.

As their solution to the problem, the moderate realists argued that each external object has an essential nature, or an essence. This essence *qua* essence is neither universal nor particular; it just is. It is neutral. It

cannot exist in a separate realm by itself, but it can exist either in an object or in a mind. When it exists in an object it appears as a particular; when it exists in a mind it appears as a universal; but in neither case is it either particular or universal in itself. The conceptual universal is the essence in one form, the external particular is the essence in another form, but since the essence is the same in both cases the universal has an external referent and therefore is real.

Because they adopted this solution to the problem these men were called *realists;* because they did not take the extreme view of platonism —that the universal existed out of any mind or any object—they were *moderate* realists.[10]

Even from this cursory examination of the controversy it is possible to see that the basic problem involved goes to the heart of contemporary discussions of theories of meaning. Man has certain ideas. If these ideas are meaningful (in the medieval terminology, real) they must ultimately refer to something in the external world. Any idea that does not refer to some external entity is meaningless (in medieval terminology, fictional). On this view anyone who argues that a given concept is real must be able to show the existing object to which it refers. If he cannot indicate such an object the concept is a fiction.

That Peirce saw the issue in this light may be seen from his statement of the medieval problem: "The question . . . is whether *man*, *horse*, and other names of natural classes, correspond with anything . . . independent of our thought" (8.12). The moderate realist position—that the referent of a concept is to be found in the experience of a specific object —provided the impetus for Peirce to develop his pragmatic position: The ultimate meaning of an idea is to be found in our experiences of specific objects.

The three basic concepts in Peirce's epistemology are what he calls firstness, secondness, and thirdness. These are terms that Peirce uses in a categorial rather than a substantive sense, and which therefore have

[10]In working out the details of the moderate realist position Scotus and Aquinas differed. Peirce accepted Scotus's final analysis and hence allied himself with the Scotistic wing of Aristotelian realism (5.77 n.1). Although the detailed issues here are of interest, we cannot examine them in the present brief sketch which is intended merely to show the affinities between the general moderate realist position and Peirce's pragmatism

different referents in logic, metaphysics, epistemology, etc. He describes them variously as three modes of reality (6.342), three categories of being (1.417), or three universes of experience (5.455). As they appear in his epistemology they are closely analogous to some of the basic concepts of scholasticism. A firstness is an idea (6.455)—not an actual idea but only the potentiality of an actual idea. For this reason Peirce often calls it a possibility (1.25). It is not an hypostatization such as Plato's forms are, but neither is it an existent thought in some mind. One might argue that it is therefore a nothing. A firstness is between a mere nothing and an existent thing. The difference between a firstness and nothing is that it is possible for a firstness to become actual whereas nothing cannot. Nothing is defined by Peirce as the self-contradictory (6.352), so that that which is a possibility is not a nothing, i.e., is not self-contradictory. Because it is not, it is possible that it should become actual. In this way it is more than a nothing but less than an actual thought. A firstness is something that can enter a mind, but considered in its state as a pure firstness it is only the possibility of an idea, not an actual idea.

What Peirce is seeking to describe is a realm analogous to Platonic ideas (6.452) or unactualized scholastic essences (1.432, 6.337), although he is apparently striving to avoid hypostatizing either firsts or the realm of firstness. The similarity of firstness with the medieval view of unrealized essences may be seen by comparing firstness with Minges's statement of Scotus's opinion on unrealized essences.

> Scotus . . . does not attribute to the universals or abstract essences . . . an existence of their own, independent of the individual beings in which they are realized . . . In the state of mere ideality or possibility before their realization, things have an essence, an ideal conceivable being, but not an actual one . . .[11]

An example of a firstness would be the possibility of a simple sense experience—the possibility of a color sensation, such as "redness"; or the possibility of a pain sensation, such as "toothache." Peirce does not wish to do as Plato did and say that these possibilities exist as actualities. They exist only as possibilities of experiences that may become actualized.

A secondness is an actually existing object (1.419). Peirce analyzes an

[11] Parthenius Minges, "Duns Scotus," *Catholic Encyclopedia*, Vol. V (1909).

existent object into qualities and matter (1.527). The qualities are firstnesses which have become embodied (1.527). But as such they are still not actualized ideas; they only become actualized when they are experienced by some mind (1.422, 1.25). When a secondness is experienced, the qualities produce a percept in the mind. Peirce uses "percept" in a sense analogous to contemporary usage of sense-percept, sense-datum, or sense-image. The percept is the result of a psychological process of sensation that is subconscious in its operation (5.182). The percept appears in consciousness as a kind of image (5.115) or feeling (5.116).

A percept in Peirce's thought is the analogue of the scholastic first intention. A first intention is the first immediate "given," the inarticulate apprehension of an object prior to any conscious recognition of its nature. Both Peirce and the moderate realists subscribe to the Aristotelian doctrine of immediate perception. "The realist will hold that the very same objects which are immediately present in our minds in experience really exist just as they are experienced out of the mind; that is, he will maintain a doctrine of immediate perception" (8.16). The object is exactly as it is perceived, or the perception is exactly like the object. Because of this doctrine of immediate perception, first intentions are sometimes spoken of by the scholastics as though they were the object. Peirce also does this. "The percept is the reality" (5.568). Epistemologically, then, a secondness, a percept, and a first intention are equivalent terms.

A thirdness is a meaning, a general concept (1.339); it is Peirce's analogue of the scholastic second intention which is the abstracted concept—the "universal" idea "abstracted" from the percept. Peirce uses the term "generals" to describe these ideas. We would call them concepts. Peirce's metaphysical realism, then, consists in his view that the general concepts that go to make up meanings are real. That is, they have a real external counterpart in the percept—which is the equivalent in consciousness of a firstness present in the perceived object.

His position is that every thirdness (abstract concept) must refer to a secondness (sense-percept) to be meaningful (real), that is to say, that every idea must refer to some percept. In scholastic terminology his view consists in asserting that no second intention (abstracted concept) is

meaningful except insofar as it refers to a first intention (sense experience). Stated in detail his position is as follows: A percept rises to consciousness as a concept by the application to the percept of attention, or "the power of abstraction" (5.295). "By the force of attention, an emphasis is put upon one of the objective elements of consciousness" (5.295). That is, the entire percept, as such, does not rise to consciousness, but attention, like a searchlight, plays over first one part of the percept and then another part, abstracting various elements from the percept and bringing them to the level of consciousness as concepts. Thus, in any judgment about a percept there are at least two abstracted concepts—the subject of the judgment and the predicate of the judgment.

As an example let us take the judgment: "This stove is black." On the basis of this judgment we make the abstraction of "blackness"; that is, we consider blackness in itself. This blackness as considered in itself is not a fiction; it is not a product of my imagination. It is real. It has an external counterpart, namely the blackness that is in the stove. All that is meant by saying that blackness is real is that there is something that has blackness in it, that is, something which is black. Since this is so, blackness is not a fiction but a reality. "It is perfectly true that all white things have whiteness in them, for that is only saying, in another form of words, that all white things are white; but since it is true that real things possess whiteness, whiteness is real" (8.14).

Furthermore; since it is also possible to abstract blackness from the perceptual judgment, "This chair is black," then blackness is found in both the stove and chair. But the fact that blackness is found in two different objects shows that blackness is indeterminate with regard to what it is predicated of. Since it is indeterminate as to what it may be predicated of, it is general. Hence, blackness is a real general.

A final point is that if blackness is found in two objects, it is not that the *same* blackness is found in both of them but that blackness as found in both of them is the same.

This was one of the points brought out in the controversy in reference to the nature of universals. As Sir William Hamilton says, not even the humanity of

Leibniz belongs to Newton, but a different humanity. It is only by abstraction, by an oversight, that two things can be said to have common characters (2.415)

Thus, to assert that all men are mortal does not assert that the same mortality belongs to all men, it asserts that the mortality that belongs to each man is similar to the mortality that belongs to each of his fellow men. It is only when we speak loosely and treat concepts as pure abstractions, or pure firstnesses with no reference to their exemplification, that we identify the mortality of A with that of B. When we express ourselves more rigorously, we cannot say that the mortality of A is identical with the mortality of B, but only that the mortality of A is similar to the mortality of B.

Two other examples taken from one of Peirce's early (1868) articles help to clarify his point. In speaking of triangularity, he said,

The nominalists, I suspect, confound together thinking a triangle without thinking that it is either equilateral, isosceles, or scalene, and thinking a triangle without thinking whether it is equilateral, isosceles, or scalene (5.301)

That is, the nominalists are right in holding that whenever we think of *a* triangle we must think of one that is equilateral or isosceles or scalene. But they are wrong in holding that this is all we can do. By abstraction we can abstract the general concept of triangularity from the percept of any particular triangle, and think of it without thinking *whether* it is equilateral, isosceles, or scalene.

This point is stated more fully in a second example referring to the general concept "man."

. . . scholastic realism is usually set down as a belief in metaphysical fictions. But, in fact, a realist is simply one who knows no more recondite reality than that which is represented in a true representation [i.e., a percept]. Since, therefore, the word "man" is true of something, that which "man" means is real. The nominalist must admit that man is truly applicable to something, but he believes that there is beneath this a thing in itself, an incognizable reality. His is the metaphysical figment. . . .[12] The great argument for nominalism is that there is no man unless there is some particular man. That, however, does not affect

[12]Peirce means here that the nominalist denies that the percept and the reality are identical. The nominalist introduces an unknowable thing in itself as the cause of the percept.

the realism of Scotus, for although there is *no man* of whom all further determination can be denied, yet there is a *man*, abstraction being made of all further determination (5.312)

Consider the general concept of man-ness as rational animality. This concept is real if there is something in the physical world that corresponds to it. The nominalists object that there is not. They say there is this man and that man, but there is no man-ness, no rational animality. The Scotists (and Peirce) answer: (1) You admit that there is a man; (2) any man has the following characteristics: (a) generic animality, (b) specific rationality, (c) other individuating and particularizing determinations that make him *this* man; and (3) but since *every* man exemplifies the generic and specific qualities, i.e., rational animality, there is something in the world that exemplifies rational animality, and since a concept is real if it is exemplified in the physical world, this concept is a real concept. Although man-ness is not exemplified by itself without any particularizing determinations, it is exemplified in every man. To see it, all we need to do is to ignore the particularizing features. What is left is man-ness.

This is not conceptualism. For, according to conceptualism, we form an abstract concept by abstracting from a number of different objects, no one of which completely exemplifies the concept. Thus the concept of "chairness" would be obtained by examining a number of different chairs and abstracting one feature from this chair, another feature from that chair, another from a third, etc. By combining these ideas in our mind we formulate a conception of chairness that is not completely exemplified anywhere in the world and is therefore only a convenient fiction, a mnemonic aid for summarizing a group of experiences. According to the moderate realists, it is not necessary to experience a number of chairs to form the concept; it may be formed by experiencing only one chair.

It should now be clear wh, Peirce considered himself a Scotist. Scotus tells us that the species "man" is real because it may be found in any man by making a distinction between the species in any man and his other accidental characteristics. Peirce tells us that the species "man" is real because it may be found in any man by abstracting it from his

accidental or particularizing characteristics. Obviously these two views come to much the same thing.

IV

With this statement of Peirce's metaphysical realism as a background, let us now examine his pragmatism and see what he meant when he said that "pragmatism could scarcely have entered a head that was not already convinced that there are real generals" (5.503).

In the broadest sense pragmatism is a theory of meaning. That is, it is a theory about how to state the meaning of terms or concepts or ideas.

If the meaning of a term is stated loosely or vaguely or poorly, misunderstandings will be the result. It is therefore important to have a method for determining the meaning of a term as precisely as possible. The title of the essay in which Peirce first stated the pragmatic doctrine was "How To Make Our Ideas Clear." In this essay he points out that a single unclear idea may lead us astray for a whole lifetime of work. Unclear ideas are like trying to follow a road on a foggy night—they lead us off the path, down dead ends, and off cliffs. An entire nation may be led astray for centuries by unclear ideas. It is, then, important to have clear ideas.

Peirce tells us that pragmatism "is a method for ascertaining the real meaning of any concept, doctrine, proposition, word, or other sign" (5.6). Now clearly, as a method, pragmatism may be used by different philosophers to study the meanings of different terms. Thus William James used it to study the meaning of the term "truth." It does not follow from this that pragmatism is James's theory of truth. Pragmatism is only a method which James used to state what he meant by truth—although he thought other people meant a similar thing. John Dewey (1859–1952) used pragmatism to explore the notion of "value," but it does not follow from this that pragmatism is a theory of value. Pragmatism is a method for ascertaining the meaning of terms. It is a slightly different method in the hands of Peirce and James and Dewey. Let us look first at Peirce's version.

In an effort to develop a theory of the meaning of ideas Peirce begins by examining ideas to see what types there are. He concludes that there

are three types of ideas, which he states in terms of his three categories of firstness, secondness, and thirdness. He says that the idea of a firstness is an idea of something by itself, in no relation to anything else. Thus the idea of redness is a firstness—not the idea of any thing that is red but simply redness *qua* redness. The idea of a secondness involves two things; it is the idea of something acting upon something else, or the idea of being acted upon by something else, so that the idea of a secondness is an idea of an action; whereas the idea of a firstness is an idea of a perception. Finally, an idea of a thirdness is an idea that involves three things, where one of them represents another to a third. An example of this kind of an idea is a sign. A sign represents some object to some interpreter. Thus a red traffic light represents the action of stopping to some driver. These three types of ideas are not reducible to one another. Thus the idea of A acting on B is more than the idea of A plus the idea of B, so that a secondness is not reducible to firsts. Finally, Peirce concludes that all other types of ideas are reducible to these three.

Peirce calls these "the indecomposable concepts." They may be understood better by recalling that Peirce is a chemist. What he believes he has found here are types of ideas analogous to atoms in chemistry. Atoms cannot be reduced to other atoms, but any physical compound can be expressed as a combination of atoms. What Peirce proposes then is that just as chemistry expresses the nature of a physical compound by stating the atomic elements that go to make it up, that we seek to state the nature of a complex idea by enumerating the atomic ideas that go to make it up. The doctrine of pragmatism then emerges as a device for discovering the atomic ideas that constitute the explication of a complex idea.

As Peirce sees it, the chemist has a procedure for formalizing his statements by embodying them into a chemical formula. Pragmatism must also formalize its statements. In what form shall we put them?

Peirce observes that no theory of meaning can explicate the meaning of firsts and seconds. If a man does not know what redness is, we cannot tell him verbally. If he does not know what being acted upon—being stuck by a pin, for example—is, we cannot tell him. Firsts and seconds

are what in contemporary terminology are called "brute givens"; they cannot be defined verbally. The only type of idea definable verbally is a thirdness, what Peirce calls an "intellectual concept." So pragmatism becomes a method for listing the firstnesses and secondnesses—the sense-experiences and the actions—involved in a thirdness: a concept.

Such a list, if simply stated in a random fashion, would not be as helpful as if it were ordered. Peirce observes that the sense-experiences and actions are related to one another—they do have an order. If we are trying to explicate our idea of an automobile, for example, we note it contains the idea of turning the key in the ignition and the idea of hearing the motor start. Now the idea of turning the key is an idea of acting on the key and is therefore a secondness, the idea of hearing the motor start is the idea of a sense-experience and is therefore a firstness. If I think about it I note that these ideas are related. They are related by my idea that if I turn on the key, then the motor will start—that is, if I act so as to produce this secondness, then I will experience that firstness. In this interpretation, that the firstnesses and secondnesses that go to make up concepts are related, Peirce discovers his form for expressing the meaning of the idea. He calls such a relation (If action A, then experience B) a *consequence*. A common misunderstanding of Peirce occurs here. He is not talking about consequents. He tells us that "In the language of logic 'consequence' does not mean that which follows, which is called the *consequent*, but means the fact that a consequent follows from an antecedent (4.433 n.1). So that a consequence is not the antecedent (the action) nor the consequent (the experience) but the assertion that the consequent follows from the antecedent.

If we then list all the actions and all the sense-experiences associated with the idea of automobile so that they are ordered in terms of consequences, that list of consequences would contain the meaning of the idea of automobile.

Finally, Peirce calls these consequences "practical consequences" not because they come from practical experience but because they serve as a guide to future practice. Thus when I wish to start my car my practice is to turn the ignition key. In doing so my behavior is determined by

my belief in the consequence that, if I turn the key, then I will have the experience of the car starting.

The list that we will make up to give us the meaning of an idea will be a list of the practical consequences of the idea—and so we come, at last, to a statement of the pragmatic maxim: "In order to ascertain the meaning of an intellectual conception one should consider what practical consequences might conceivably result by necessity from the truth of that conception; and the sum of these consequences will constitute the entire meaning of the conception" (5.9).

Because Peirce thought of this analysis as being concerned with the way in which our ideas guide our practice he called it "pragmatism."

There are three major interpretations that may be placed on the pragmatic method. In considering a practical consequence one might emphasize the antecedent or the consequent or the consequence, i.e., the relation between the two. Depending on where we place the emphasis we get either the pragmatism of John Dewey, or of William James, or of Charles Peirce.

Thus if we emphasize the antecedent, the action, if we think of ideas as basically modes of behavior, the result is the "instrumentalism" of John Dewey. This is a form of pragmatism that emphasizes the dynamic nature of ideas; their roles as a plan for action, for altering the world; as instruments for acting on things. If we emphasize the consequent, the particular experience that results from the action, we get the pragmatism of William James with its insistence upon explicating ideas in terms of where they take us in experience, where they lead to. If we emphasize the consequence, the relation between the antecedent and the consequent we have the pragmatism of Charles Peirce. For him this relation was always general: thus "If A, then B" does not refer to any particular A or B but prescribes a general relation between actions of the sort A and experiences of the sort B, which has held in the past, does hold now, and will hold in the future. It expresses what Peirce called a "would-be," the experiences that would be had if you acted in manner A. This emphasis on the general nature of meanings with their reference to the future was what Peirce insisted upon. The absence of it in William James's version, with its emphasis on the particular experiences in the

present, was what led Peirce to develop the name "pragmaticism" for his own version.

V

We may now see why Peirce considered his pragmatism to be grounded in his metaphysical realism. Pragmatism is a method for defining concepts. But concepts are general, they are not particular. The concept of "automobile" applies to all automobiles, not only particular existing automobiles. A percept is particular, it is of only one automobile, but a concept is general. A great deal of our knowledge, and certainly all scientific knowledge, is general. Newton's law of gravitation applies to "all" physical objects. But if our knowledge is general and all that exists is particular—as the nominalists would have it—then our general concepts are of mere fictions and cannot be meaningfully defined. On the other hand, if real general objects exist then our concepts may be of them and hence may be "real" in medieval terminology. They are not simply memory aids; they define real general forces and real general objects.

If one is a nominalist and believes that there is no such thing as "triangularity" anywhere—that triangularity is only a fiction—then there is no place that he can look to see what triangularity really is. But if he is a realist and believes that triangularity may be found in any triangle, then he knows where to find triangularity and he knows how to define it—it may be defined as what one will experience when one examines any triangle. Therefore, if we list the possible experiences one might have of a triangle, these experiences will define triangularity.

Now how would we go about listing these experiences? We could just list possible experiences, but the list by itself might not suffice to enable the individual, for whose benefit the definition is being made, actually to obtain those precise experiences. The best approach would be to prescribe for him a certain action such that if he accomplishes it, he will then have the experience required. Such a prescription would be a plan or a guide for action. One who undertakes the action will have the requisite experience and will then know, by experience of it, the property being defined. Of course, such a plan for action would necessarily be

complicated, but if it is sufficiently detailed so as actually to give a perceptual acquaintance with the property being defined, then it would serve as a definition. Peirce gives an example of this procedure:

> If you look into a textbook of chemistry for a definition of *lithium*, you may be told that it is that element whose atomic weight is 7 very nearly. But if the author has a more logical mind he will tell you that if you search among minerals that are vitreous, translucent, grey or white, very hard, brittle, and insoluble, for one which imparts a crimson tinge to an unluminous flame, this mineral being triturated with lime or witherite rats-bane, and then fused, can be partly dissolved in muriatic acid; and if this solution be evaporated, and the residue be extracted with sulphuric acid, and duly purified, it can be converted by ordinary methods into a chloride, which being obtained in the solid state, fused, and electrolyzed with half a dozen powerful cells, will yield a globule of a pinkish silvery metal that will float on gasolene; and the material of *that* is a specimen of lithium. The peculiarity of this definition—or rather this precept that is more serviceable than a definition—is that it tells you what the word lithium denotes by prescribing what you are to *do* in order to gain a perceptual acquaintance with the object of the word (2.330).

Thus on Peirce's view a concept may be defined by saying that: If you act in a certain manner, then you will have certain experiences, and the sum of the ideas resulting from these experiences constitutes the meaning of the concept being defined. This is Peirce's version of pragmatism.

> Now this sort of consideration, namely, that certain lines of conduct will entail certain kinds of inevitable experiences is what is called a "practical consideration." Hence is justified the maxim, belief in which constitutes pragmatism, namely,
>
> *In order to ascertain the meaning of an intellectual conception one should consider what practical consequences might conceivably result by necessity from the truth of that conception; and the sum of these consequences will constitute the entire meaning of the conception* (5.9)

Such a definition can only be accepted if one believes that concepts are real; that is, if one believes that the concepts have a real external counterpart. If one believes this, and wants to know where to look for this counterpart, then a pragmatic definition will give one a practical guide for actions that will result in an experience of the counterpart. But if one does not believe that concepts are real, then when one follows out

the pragmatic definition one will not believe that what one experiences will be the external counterpart, or the referent of the concept, for one does not believe that the concept has any referent. In short, to accept pragmatism is to accept metaphysical realism with reference to concepts.

As Peirce says (1.27), the realist-nominalist controversy is a question to which only two answers are possible: yes and no. If one admits that concepts are general ideas and then asks, is there anything in reality that stands in a one-to-one relation to the concept, an affirmative answer is possible only on a realist position; a negative answer relegates concepts to the realm of fictions.

VI

It is not difficult to see how the pragmatic maxim would be applied in the case of comparatively simple objects such as an automobile. I can make my idea of an automobile clear by listing all of the ways in which I would act and all of the experiences I would expect from any object that I would call an automobile. If you and I disagree about what an automobile is, we can each make our own listing and by comparing them we can discover where we differ. If I have on my list a practical consequence that is lacking from yours, and if I assert that the consequence should be on the list and you deny it, we can put the matter to the test by going to an automobile and acting in the manner prescribed by the antecedent and observing whether we get the sense-experience prescribed in the consequent. If the experiment succeeds—if we obtain the sense-experience—then I have grounds for asserting that that consequence is part of what is meant by something being an automobile. If the experiment fails—if the sense-experience is not had—then you have grounds for denying that that consequence is part of what is meant by something being an automobile. Thus we have an experimentalist theory of meaning—which is what Peirce thought he was explicating when he developed pragmatism.

It is not so easy, however, to see how the pragmatic maxim would apply in dealing with abstract properties such as reality or truth. In the essay "How To Make Our Ideas Clear" Peirce applies the notion to

develop a definition of reality. In the immediately preceding essay on "The Fixation of Belief," he argues that there are three characteristics that are desirable in that which we accept as a basis for fixing our beliefs: (1) it must control our thinking, our thinking must not control it; (2) it must be publicly observable; and (3) it must lead to a common opinion.

Peirce says that the scientific method seeks to fix beliefs in terms of these three characteristics by proposing "reality" as that which would fix belief—as opposed to earlier methods that had proposed authority as a way of fixing beliefs, or what is agreeable to reason or what is agreeable to personal taste.

In defining reality Peirce uses two definitions. In the first definition he says that "The real is that which is not whatever we happen to think it, but is unaffected by what we may think of it" (8.12). In the second definition he says, "The opinion which is fated to be ultimately agreed to by all who investigate is what we mean by the truth, and the object represented in this opinion is the real" (5.407).

According to the first definition, an object is not affected by my thinking of it (experiencing it); it remains unchanged by my experiencing it. Since my experiencing it does not change it, it will appear the same way to you if you subsequently experience it. Since it does not change from my experience to yours, a real object may be defined as an object that will appear the same to every observer. A second characteristic that follows from the first definition is that an object is real if its nature is independent of *how* I happen to think it to be. Compare this with the situation when a dramatist is creating a character for a play. The nature of the character is dependent on how the dramatist happens to think him to be. If he thinks of him as happy then he is happy; if sad, then sad. We call such a character a "fiction" not a reality because his nature depends on how he is thought to be. However, suppose that I think that Napoleon was stupid. An historian would properly object that Napoleon could not have been stupid and have accomplished what he did accomplish—so that Napoleon is a reality since his nature remains unaffected by how I happen to think him. We all recognize that a characteristic of reality is that "thinking does not make it so."

Suppose that by using these criteria we seek to find objects in the world that satisfy them, i.e., real objects. I undertake to examine one of these objects critically to see what its real features are. I make a careful study of it and find it to have five properties. I examine the object carefully, and I am convinced that it really has these five properties. But this is not adequate to satisfy our criteria. For we said that the real properties would appear the same to every man. Accordingly, I call in another observer. He studies the object and applies the same techniques that I have applied, but he is unable to find property *y* that I found. If he is a competent investigator and his results are verified by other investigators, I know that property *y* cannot be real, for the real is by definition what is knowable to any man. Since property *y* is not knowable to other observers it cannot really be present in the object but must be a subjective element that I introduced into the object by virtue of some idiosyncrasy in me, not in the object.

Of course, there may also be some property among the four remaining that is subjective and due to some idiosyncrasy in both observers. If so, they do not know the object as it really is. To find out if this is the case they must call in a third observer. But for all they know there may be some subjective idiosyncrasies common to all three observers. The only way they can check this is to call in a fourth observer. But it is easy to see that this will be an indefinitely long process involving a whole community of observers in the whole of time. The opinion to which this community ultimately comes will be considered by them to be the truth and the object they will certainly describe with no subjective elements in it—if they continue long enough—will be the real object.

But this is Peirce's second definition of reality. The opinion that is fated (certain) to be ultimately agreed to by all who investigate (the community of investigators) is what we mean by the truth, and the object represented in this opinion is the real.

This definition satisfies Peirce's statement as to what is required to attain fixed beliefs. It gives a method that controls our thinking rather than our thinking controlling it, it is public and it will lead, if carried far enough, to a common opinion.

Its disadvantages are that while it is self-corrective—subsequent investigators will correct idiosyncrasies introduced by earlier investigators—the method does not tell us at any one point in time that it has removed all subjective elements so that our knowledge is never absolute—it is always fallible—we can only say of it that it is the best we have. And of course there is no guarantee that by following the method we will ever find final answers to our question—we can only hope. Peirce says that "the assumption that man or the community (which may be wider than man) shall ever arrive at a state of information greater than some definite finite information, is entirely unsupported by reasons. 'There cannot be a scintilla of evidence to show that at some time all living beings shall not be annihilated at once, and that forever after there shall be throughout the universe any intelligence whatever. . . . 'The only assumption on which he can act rationally is the hope of success" (5.357).

Finally, we should note that this is a definition in accord with the pragmatic maxim, for it defines reality in terms of human experiences. If all competent observers—those who have divested themselves of all personal idiosyncrasies—perform identical experiments on a real object then they will observe identical results.

VII

As Peirce developed his scholastic realism in his later work he turned his attention to the notion of a scientific law. Here he asserted that a scientific law was a general idea in the mind that has a real counterpart in general forces operating in the physical world. Since these general forces control the future they are potential forces not just actual forces as the nominalist would have it—who sees a scientific law as simply a summary statement of actual events that have occurred in the past.

Peirce put it thus:

> With overwhelming uniformity, in our past experience, direct and indirect, stones left free to fall have fallen. Thereupon two hypotheses only are open to us. Either 1. the uniformity with which those stones have fallen has been due to mere chance and affords no ground whatever, not the slightest, for any expectation that the next stone that shall be let go will fall, or 2. the uniformity with which stones have fallen has been due to some *active general principle*, in

which case it would be a strange coincidence that it should cease to act at the moment my prediction was based upon it.

That position, gentlemen, will sustain criticism. It is irrefragable.

Of course, every sane man will adopt the latter hypothesis. If he could doubt it in the case of the stone—which he can't—and I may as well drop the stone once and for all—I told you so!—if anybody doubts this still, a thousand other such inductive predictions are getting verified every day, and he will have to suppose every one of them to be merely fortuitous in order reasonably to escape the conclusion that *general principles are really operative in nature*. That is the doctrine of scholastic realism (5.100–101).

The view that Peirce expresses as number one in this quotation is what he considered to be the nominalistic position on natural law. He states it elsewhere as the view "that the facts are, in themselves, entirely disconnected, and that it is the mind alone which unites them. One stone dropping to the earth has no real connection with another stone dropping to the earth" (6.99). This position with its insistence on particular events as being united only by the mind is what leads Peirce to identify it with medieval nominalism.

He stated his own realist position to be that "No collection of facts can constitute a law; for the law goes beyond any accomplished facts and determines how facts that *may be*, but all of which never can have happened, shall be characterized. There is no objection to saying that a law is a general fact, provided that it be understood that the general has an admixture of potentiality, so that no congeries of actions here and now can ever make a general fact." (1.420).

For the realist there are forces in the universe that provide for the actual regularity when the law is being instanced but that are a potentiality for regularity when it is not.

To account for laws and to explain their nature Peirce develops a philosophy of objective idealism. Because he sees no way for matter to give birth to mind, he takes mind as basic and sees matter as a form of mind. Since mind can take on habits, the material universe becomes "mind hidebound with habit" where the habits are laws of nature. He argues that habits are never precise so there is always an element of absolute chance in the universe—a doctrine he calls tychism. He says also that habits tend to spread and to connect with one another to make

larger networks of habits—a doctrine he calls synechism—so that the universe is a process moving from complete tychism (chance) at the beginning to complete synechism (order) at the conclusion through the medium of habit-forming. He sees this evolution as a process proceeding through an inward principle of creative love which he calls agapasm.

The ultimate resolution of all the parts into a single continuum of love will be God. "Every reality then is a Self, and the selves are intimately connected, as if they formed a continuum. Each one is . . . a quasi-map of the entire field of selves, which organic aggregate is itself a Self, the Absolute Idea of Hegel. So far as a philosophical conception can be identified with God it is God."[13]

The universe is God's purpose working itself out in the world. "The universe is a vast representamen, a great symbol of God's purpose, working out its conclusions in living realities" (5.119). This purpose is to infuse everything with "that Reasonableness for the sake of which the Heavens and the Earth have been created" (2.122).

Although Peirce never developed these views in detail, it is clear that he did not feel that his scientific empiricism precluded metaphysics. The general view suggested here by Peirce foreshadows in many ways that which was to be developed in the first part of the twentieth century by other science oriented philosophers—most notably in the work of Alfred North Whitehead.

Among his contemporaries Peirce made a significant impact on only two of them, Josiah Royce and William James. The publication of Royce's *The World and the Individual* (1899–1901) brought Royce into close contact with Peirce and his work. As a result of this, Royce stated in the Preface of his *The Problem of Christianity* (1913), "As to certain metaphysical opinions which are stated, in outline, in the second volume of this book, I now owe much more to our great and unduly neglected American logician, Mr. Charles Peirce, than I do to the common tradition of recent idealism. . . ."[14]

James and Peirce were friends at Harvard and continued to be close friends until the death of James. They exchanged many letters on

[13] *The Nation*, 75 (1902) 95.
[14] Josiah Royce, *The Problem of Christianity* (New York: Macmillan, 1913), I, p. xi.

philosophical problems and were close friends long before the pragmatic movement became of philosophical interest. In 1897, James dedicated his first book on philosophy, *The Will to Believe*, to Peirce with these words: "To My Old Friend, Charles Sanders Peirce, To whose philosophic comradeship in old times and to whose writings in more recent years I owe more incitement and help than I can express or repay." Peirce evidenced his reciprocation of this attachment in his later years when he used to sign his name as "Charles Santiago Sanders Peirce"—the "Santiago" being Spanish for "St James."

Although differences in age made for less direct association between Peirce and John Dewey, the influence of Peirce has been acknowledged by Dewey on a number of occasions. In his *Logic: The Theory of Inquiry*, for example, Dewey says, "The readers who are acquainted with the logical writings of Peirce will note my great indebtedness to him in the general position taken."

Much of Peirce's work in science, in mathematics, and in logic has now been superseded by the work of other investigators. But the problems that he posed concerning a theory of meaning, the processes of scientific inquiry, the nature of a scientific law, and how it can be envisioned as including generality and potentiality are still very much with us and have occupied a great part of the concern of philosophers of the twentieth century.

VIII

It will be useful to compare the position of Peirce with that of contemporary positivism. An examination of publications by positivists indicates that they are not completely satisfied with their own criterion of meaning.[15] Such an examination reveals a basic problem that positivists have been implicitly striving to solve; namely, the problem of the meaning of potentiality and the consequent difficulty of allowing propositions involving potentiality to be meaningful.

[15] E.g., the articles by R. Carnap and C. G. Hempel (as well as Bertrand Russell's more complete disavowal of positivism) in the *Revue Internationale de Philosophie*, vol. 4 (1950); H. Feigl's "Existential Hypotheses," in the *Philosophy of Science*, vol. 17 (1950) pp. 35–62; and A. J. Ayer's preface to the second edition of his *Language, Truth and Logic*.

In its earliest formulations—in the writings of Auguste Comte (1798–1857)—positivism was based upon an epistemological nominalism that says that we can have empirical knowledge only of the realm of sense-experience, and everything found in that realm is an actualized particular. Therefore, if we use the term "empirical knowledge" to apply only to those ideas that have a referent in sense-experience, we can have knowledge only of actualized particulars. If we claim to have a concept that does not denote either an actualized particular or, at best, a series of such particulars, we are referring to a fiction.

In its beginnings, in the writings of Comte, positivism had as its basic motivation the elimination of trans-empirical metaphysics. Proceeding from this motive Comte began with a strict adherence to the nominalistic principle. His original formulation advised us that a proposition was empirically meaningful only when it could actually be verified. Propositions for which the actual verification—or disverification—was at the moment impossible, were meaningless. From this position Comte attained his notorious assertion that propositions about the chemical constituents of the stars were meaningless—because at that time no technique had been developed for determining the truth or falsity of such propositions. Similarly, the proposition "On the other side of the moon there are St. Bernard dogs running around in circles with their tails in their mouths" was meaningless because of the impossibility in the foreseeable future of actually seeing the other side of the moon.

But it soon became evident that a strict adherence to this meaning criterion would not do. It ruled out too many propositions that obviously had a meaning, and it did not actually suffice even for the purposes of science. Unless an observer knew the meaning of a proposition before he was actually able to verify it, if he did develop a technique for dealing with the proposition, he would have no way of recognizing the verification, when it occurred, as referring to the proposition with which he was concerned. That is, unless one knew, in advance of the actual experience, what was meant by St. Bernard dogs running around on the other side of the moon, he would be unable to recognize the actual experience, if and when it occurred, as a verification of the proposition in question. From this consideration it follows that a proposition must have

some meaning even before it can actually be verified.

Because of difficulties of this order, the logical positivists of the Vienna Circle relaxed the criterion to what has come to be known as the less rigorous formulation: A proposition is meaningful if it can, in principle, be verified. If in theory we know how to verify a proposition, that is, if we know what experience would, if actualized, prove or disprove it, then it is meaningful. This formulation may be seen, for example, in Rudolph Carnap's articles in 1936–37 on "Testability and Meaning."[16] In substituting confirmability for verifiability Carnap says, "When we call a sentence S confirmable, we do not mean that it is possible to arrive at a confirmation of S under circumstances as they actually exist. We rather intend this possibility under some *possible circumstances* whether they be real or not.[17]

This relaxation of the meaning criterion is important as marking the thin edge of the wedge. Nominalism begins to be left behind. It is no longer necessary for a proposition to be actually verifiable to be meaningful; it is sufficient if it would be possible to verify it. But the departure from nominalism is not so drastic as might appear, since the possible experience is reducible to an actual experience. "A *sentence* S is called *confirmable* . . . if the confirmation of S is reducible . . . to that of a class of observable predicates."[18] The possible experience is like a traditional paper bank note; the bank note had no value in itself, but had value only so far as it was based upon a piece of precious metal that could be produced under certain specified conditions. So a potentiality of experience has no reality *qua* potentiality, its only reality is that of the actual experience that could be produced under certain specified conditions.

However, in Carnap's discussion of dispositional predicates we see a more radical deviation from nominalism. He says, "Those predicates of the thing-language which are not observable, e g., disposition terms, are reducible to observable predicates and hence confirmable."[19] The inter-

[16] R. Carnap, "Testability and Meaning," *Philosophy of Science*, vol. 3 (1936), pp. 419–71, and vol. 4 (1937), pp. 1–40.

[17] Ibid., vol. 3, p. 457.

[18] Ibid., p. 456.

[19] Ibid., p. 466.

esting question here is the reference to a nonobservable predicate. If this means that there are properties that cannot be actualized in experience, it is a complete break with the actualities of nominalism. I shall return to this question in a moment. Before dealing with it I should like to show that Ayer seems to talk in a very similar fashion. In reformulating the verifiability criterion, Ayer talks of "indirect verification"; he says that "a statement is indirectly verifiable if it satisfies the following conditions: first, that in conjunction with certain other premises it entails one or more directly verifiable statements which are not deducible from these other premises alone; and secondly, that these other premises do not include any statement that is not either analytic, or directly verifiable, or capable of being indirectly verifiable."[20] Ayer criticizes even the less rigorous formulation of the meaning criterion as "too harsh . . . for it would seem to imply that it was illegitimate to introduce any term that did not itself designate something observable."[21]

From both Carnap's treatment of dispositional properties and Ayer's reformulation of the verifiability criterion it would appear, then, that positivists will now allow as meaningful what is not, even in theory, actually observable. The successive stages of the position seem to be: (1) a term is meaningful only if its referent is actually observable; (2) a term is meaningful if its referent is theoretically observable; (3) a term is meaningful if its referent is actually and theoretically unobservable, provided its referent has consequences that are actually or theoretically observable.

These changes in the positivistic meaning criterion reveal an increasing shift away from nominalism. If we allow "actuality" to denote what enters into human experience, that is, what is observed, we need to introduce terminology for referring to objects that are not actualities. A

[20]A. J. Ayer, *Language, Truth and Logic* (London: Gollancz, 1947), p. 13. There is an interesting anticipation of this formulation in the writings of Chauncey Wright, the nineteenth-century American positivist. Wright says, "Thus, while ideal or transcendental elements are admitted into scientific researches, though in themselves insusceptible of simple verification, they must still show credentials from the senses, either by affording from themselves consequences capable of sensuous verification, or by yielding such consequences in conjunction with ideas which by themselves are verifiable." Chauncey Wright, *Philosophical Discussions* (New York: Holt, 1877), p. 47.

[21]Ayer, op. cit., p. 14.

set of definitions such as the following seems to be necessary. (1) *x* is an actuality means *x* is observed; (2) *x* is an actualizable means *x* is not now an actuality but may in theory become an actuality; (3) *x* is a potentiality means *x* is not an actuality but is (a) actualizable or (b) has consequences which are either actual or actualizable; (4) *x* is real means *x* is either an actuality or a potentiality; (5) *x* is a fiction means *x* is neither an actuality nor a potentiality.

The above (1), the first part of (4), and (5) are clearly within the framework of the positivistic meaning criterion. What positivists would be less inclined to accept, and what Peirce would wish to maintain, is that (2) and (3) are not identifiable with any class of (1) and that (4) must include potentialities as well as actualities. In short, one might maintain these two theses: (a) the potential cannot be identified either logically or empirically with the actual, and (b) the potential is as real as the actual.

It has been generally recognized that a potentiality, e.g., a dispositional property, can not be logically defined in terms of actualities if by definable is meant translatable, i.e., that the definiens may, at discretion, be substituted for the definiendum. Such a definition would define solubility, for example, as, *x* is soluble means if *x* is put in water, then *x* will dissolve. If such a definition were accepted, then any object whatever could be shown to be soluble by the ordinary definition of the if-then relation according to which the relation holds if the antecedent is false, for we would merely need to substitute the phrase "if *x* is put in water, then *x* will dissolve" for the predicate "soluble" as applied to any object, *x*, and then show that *x* was never put in water, thus falsifying the antecedent and validating the relation and hence demonstrating the existence of the property.

To avoid this difficulty Carnap has proposed that we do not attempt to introduce dispositional predicates by translatability but by reduction, which is a process of introducing a term such as "soluble" by a series of sentences of the sort, "If *x* is put in water, then if *x* is soluble, then *x* dissolves."[22] The necessity for introducing dispositional predicates by

[22] Carnap, loc. cit., pp. 439 ff.

reduction is due to the fact that logically the dispositional predicate cannot be defined in terms of actualities, i.e., is not translatable into or identifiable with a class of actualities.

It is sometimes suggested that the impossibility of eliminating dispositional predicates by substituting sense-data predicates (eliminating potentialities by substituting actualities) is a purely logical difficulty that could be solved by a more careful analysis of the if-then relation as found in subjunctive conditionals. That this is not the case may be seen by noting that the difficulty that we have just seen on the logical level is also present on the epistemological level in empirical situations.

Suppose that I am about to release an ordinary pencil and I ask a scientist whether it will fall. He knows the law of gravitation and therefore asserts that it will fall. When he knows the proposition "The pencil, if released, will fall," what is it that he knows? Certainly he does not literally know the future actual event of the pencil falling. He cannot peer into the future and see something that has not yet occurred. We might say that he only anticipates this future event. But to anticipate is to know something that will be actualized only in the future. The event is not actualized now and hence cannot itself be an object of knowledge. What is known now is the potentiality of this event occurring in the future, this potentiality is real now, and it is the potentiality —not the future actuality—which is the object of knowledge.

A future actuality is never known *qua* actuality; it is always known only as a potentiality. What a scientist knows whenever he knows something about the future—and whenever he knows a law he does know something about the future—is a potentiality and not an actuality.[23] Peirce's position is that a definition of law can not be reduced to a statement about actualities; every law must contain an element of potentiality insofar as it denotes possibilities that are not now and which, if for example I do not release the pencil, may never become actualities.

[23] Of course, a scientist's knowledge of the future is not coercive. A botanist who knows Mendel's laws does not know whether there will be any sweet peas in 1990, but he does know that if there are any sweet peas in 1990 that are the descendants of any flower alive today, the descendants will exhibit certain characteristics that are potentially present in the contemporary flower. He does not know these future characteristics as actualities, he only knows them as potentialities.

There is, however, a difference between the potentiality involved in the pencil falling at some future time and the potentiality of a dispositional property. The potentiality of the pencil falling is what I have called an actualizable, that is, it may, under appropriate conditions, become actual. There is a one-to-one correlation between the potentiality of the pencil falling and the actuality of the pencil falling with reference to all the properties of each except those involved in the difference between being a potentiality and an actuality. This is not the case, however, with a dispositional property. A dispositional property is never actualizable. What are actualizable are certain consequences of the property but not the property itself. A dispositional property is a potentiality for acting in a certain manner. The disposition, as a disposition, cannot be identified with the acting. To say that a lump of sugar has solubility is not to say that it is dissolving now, but is to say that it has now the potentiality of dissolving at some future time. The actual dissolving is not the same as the potentiality—a piece of sugar that is actually dissolving is an instance of dissolution, not of solubility.

An adequate philosophy of science must admit both real laws and real dispositional properties. Both of these involve potentiality. Any philosophical approach that renders potentiality meaningless must be inadequate as a theoretical base for science. Nominalism, or the attempt to identify all meaning with actualities, does make potentiality meaningless. If all that we know are actualities, then the concept of potentiality is meaningless. The nominalist can ascribe meaning to the concept of an actual property or an actual instance of a law by telling me what experience may be expected at times when the property is actualized or the law is exhibited. But if he is to describe to me the meaning of a now potential property or a now potential law—i.e., a dispositional property or a present knowledge of a future regularity—he must not use experiences referring to the property or the law as actualized in future experience but must explain its nature *now* when it is unactualized. And the terms used to describe the unactualized entity are only meaningful on the nominalistic view if stated in terms of actualities. But what actualities can describe an "un-actuality"?

If we ask what a potentiality really is, there are, in general, only two

possible answers. We can either make a Humean analysis of potentiality, in which case we argue that the potentiality is not really in the object but only an idea that we put into it, or we can argue with Peirce, that potentiality is a real feature of the object. If we accept the first alternative we have no basis for prediction as to how the object will behave. For if the potentiality is *merely* an idea in my mind, there is no reason why objects should act in accordance with my idea of how they will act. If in fact they did do so, I could never have a false view about a scientific law; if I ever got an idea into my head about how objects behaved, then they would act in that way. It is obvious that the world does not change its mode of behavior to adapt itself to my ideas but rather that the converse is the case.

IX

Peirce has often been referred to as a "seminal" philosopher. One of the more provocative of his remarks concerns the verifiability of metaphysics. In 1897 he wrote:

> Thus, in brief, my philosophy may be described as the attempt of a physicist to make such conjecture as to the constitution of the universe as the methods of science may permit, with the aid of all that has been done by previous philosophers. I shall support my propositions by such arguments as I can. Demonstrative proof is not to be thought of. The demonstrations of the metaphysicians are all-moonshine. The best that can be done is to supply a hypothesis not devoid of all likelihood, in the general line of growth of scientific ideas, and capable of being verified or refuted by future observers (1.7).

It has been a subject of some speculation as to what Peirce could have meant by the verification of a metaphysical proposition. Peirce has been dead for over fifty years. It might be fruitful to examine his metaphysics in the light of this statement in an effort to determine whether the line of growth of scientific ideas has verified or refuted it.[24]

Another way in which the matter might be put is this: What would

[24]The reader will find of interest an article that examines Peirce's evolutionism from this point of view; see Thomas A. Goudge, "Peirce's Evolutionism—After Half a Century," *Studies in the Philosophy of Charles Sanders Peirce, Second Series*, eds. Moore and Robin (Amherst: University of Massachusetts Press, 1964), p. 323 ff.

happen if metaphysics took physics seriously? What kind of a system would we get? Would it resemble that of Peirce? There is a great deal of similarity between Peirce's ideas and those recent philosophers such as Whitehead, Russell, Reichenbach, and Popper, who have taken science seriously.

The central doctrine of Peirce's metaphysics is his belief that there are real generals. Where does it stand in the light of contemporary science? The term "general," as we have seen, was applied by Peirce to entities that were indeterminate in respect to some property. Thus the concept of a "triangle" is indeterminate with respect to whether it is obtuse or acute. Insofar as the concept is indeterminate, it is general. We all understand how mathematical properties are general, but metaphysics must deal with physical objects. Are there any physical objects that are general?

Peirce tells us that a general property "surrenders to the interpreter the right of completing the determination for himself" (5.505). He says that he does not mean by a general sign, a vague sign. He does not mean that the object has a fully determinate structure but the observer is ignorant as to the character of some property. He means by "general," a property that is genuinely indeterminate—it has no fixed character in some respect.

Is there any interpretation of modern science in which there are genuinely indeterminate properties, that have no fixed character, and that leave their determination open?

This metaphysical question is translatable into an empirical hypothesis that would have the following operational form: There are real objects that have properties that extend over a range of interpretations any one of which may be selected by an observer. Such objects are real general objects.

If we take modern science seriously, does it appear to support the view that there are real general objects or to refute it? I do not feel that most physicists take relativity physics seriously enough and very few philosophers seem to me to do so. What is meant in relativity physics by saying that the property of length is relative? Does it mean that an object has some one length that is its real length and that measurements obtained

by other observers are somehow "unreal"? Not on any possible interpretation of relativity.

The Lorentz transformation equation for length says that:

$$length = \sqrt{\frac{1 - v^2}{c^2}}$$

In this equation all the values on the right-hand side are constants except the one representing the velocity of the observer. It follows, therefore, that the length varies with the velocity of the observer. That is, the property of length extends over a range of interpretations any one of which may be selected by the observer if he only chooses the right velocity in relation to the object he is measuring. To say that there is some one length that remains unchanged through these transformations and which is "the" length is to make a statement that is not verifiable empirically and that would, if true, undermine the whole of relativity physics.

Now, how does one translate this range of interpretations into a scientific object? Do we say that there is some one interpretation that is unique, that is more real or more authoritative than any of the others? To do so is to revert immediately to an absolutistic or nonrelativity physics. On the other hand, if we take this operational result seriously, what can we say about lengths that extend continuously over a range? It seems to me that we can only say of length that it is a general property —that it extends over a range of interpretations, any one of which may be selected by an observer depending upon his velocity.

Since the Lorentz transformation equations cover time and mass measurements as well as measurements of distance, these properties also become general properties. In fact, the prescribed variations of mass have been experimentally verified with particles moving at high speeds in accelerators. Now, if the temporal and spatial dimensions of objects are general, and if the mass measurements show mass to be a general property, what remains that is particular in the physicalistic sense? It would seem to me that what we have are general objects not particular objects. The physicist may not wish to draw this conclusion, but what better can a metaphysician do?

Of course, we have physical evidence not only of a mass continuum and a space continuum but also of a time continuum. We all know that as we look out at the stars we are looking into the time continuum. We see some stars as they were a few years ago, others as they were centuries ago, and still others as they were thousands and millions of years ago. If we reverse our orientation, then we realize that observers on these stars will see our planet as it was years ago, centuries ago, or millions of years ago. If we occupied these stars would we see our own history unfold? Does it somehow still exist as part of the time continuum?[25]

However we answer this question, it appears to me that science at the macrocosmic level lends credence to the notion that there are real generals.

Let us look briefly at the microcosm. I think it is perfectly clear on at least one interpretation (the so-called Copenhagen or "hard" interpretation of subatomic physics) that what the principle of indeterminancy is saying is that small particles have either a generalized location or a generalized mass. In "The Architecture of Theories" Peirce wrote, "When we come to atoms, the presumption in favor of a simple law seems very slender. There is room for serious doubt whether the fundamental laws of mechanics hold good for single atoms, and it seems quite likely that they are capable of motion in more than three dimensions." This seems to me a remarkable statement to have been made in 1891. I believe that subsequent physics has lent credence to it in the principle of indeterminacy.

If we turn from physics to biology, what do we find? Are biological properties determinate or indeterminate? We know now that gene-determined biological characteristics are not as unilaterally determined by the chemistry of the chromosomes as we once thought. The genes apparently can act within a range of choices. Which choice will be made depends upon the environment as much as upon the genes. Temperature variation and diverse chemical conditions introduced into the envi-

[25] That intrepid explorer of the time continuum—the cartoon character Alley Oop—relies on just this principle. (Furthermore, he explores the continuum utilizing a time-machine invented by Dr. Wonmug—and as any astute student of German knows, "wen-mug" is a translation of "Einstein," which in English means "one mug" of beer.)

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ronment of the developing embryo operate to demonstrate the range of choices. For example, the number and position of the eyes of certain minnows are a function of the salinity of the sea water in which the eggs develop. If the amount of magnesium chloride in the water is excessive, the embryo will develop a centrally placed, single ("cyclopean") eye. In reporting this result, Stockard wrote,

> In other words, the genetic composition of these fishes causes them to develop two eyes in normal sea water, but the same genetic composition gives rise to a single cyclopean eye when an excess of magnesium chloride is added to the sea water. If sea water normally had the composition which causes fish to develop with the cyclopean eye, and an experimenter should develop the eggs of fish in a solution of the same composition as our ordinary sea water, he would find them giving rise to fish with two lateral eyes instead of the median one, and these two-eyed specimens would appear to this imaginary investigator as monsters.[26]

I suspect, myself, that the so-called higher animals are "higher" only because they are more general in their structure and behavior, and that man's success is due in large part to his having specialized in remaining general. He has retained his amateur status. People talk about a sex "instinct" and a food "instinct," but I suspect this is only loose talk.

I once asked a learned anthropologist what he thought the chances might be if an untutored male and female human were cast at an early age upon a desert isle, that they might learn the sex act well enough to reproduce their kind. He said he would not give them better than a fifty-fifty chance.

If someone were to invent a process tomorrow whereby human energy needs could be satisfied by some kind of photosynthesis—so that all one needed to do to get a balanced energy input cheaply and effectively would be to pass once a day in front of a machine that emitted certain kinds of electromagnetic waves—it is not unlikely that in a few generations "eating" as we know it would become some kind of a sin. The process of putting the cadavers of animals into the stomach would soon become more obnoxious than nudism (once "natural") is now. The point is that even eating is not an instinct.

[26] C. R. Stockard, *The Physical Basis of Personality* (New York: Norton, 1931), pp. 109–110.

The generality of human behavior is often cited by biologists. Bentley Glass says, "It remains true that man is the most plastic and malleable of animals in respect to his behavior, that his superiority over other animals resides in this, that by his intelligence he can make prompt and effective adjustment to altered surroundings, to a degree quite impossible for other species."[27]

What is it biologically that controls and orders and determines life? One sensitive observer sees on the biological scene something general —something more than a collection of particular individuals. In *The Firmament of Time*, Loren Eisley has this to say:

> Yet for all this flood of change, movement and destruction, there is an enormous stability about the morphological plans which are built into the great phyla—the major divisions of life. They have all, or most of them, survived since the first fossil records. They do not vanish. The species alter, one might say, but the *Form*, that greater animal which stretches across the millennia survives. . . .
>
> Many years ago I was once, by accident, locked in a museum with which I had some association. In the evening twilight I found myself in a lengthy hall containing nothing but Crustacea of all varieties. I used to think they were a rather limited order of life, but as I walked about impatiently in my search for a guard, the sight began to impress, not to say overawe me.
>
> The last light of sunset, coming through a window, gilded with red a huge Japanese crab on a pedestal at one end of the room. It was one of the stilt-walkers of the nightmare deeps, with a body the size of a human head carried tiptoe on three-foot legs like fire tongs. In the cases beside him there were crabs built and riveted like Sherman tanks, and there were crabs whose claws had been flattened into plates that clapped over their faces and left them shut up inside with little secrets. There were crabs covered with chitinous thorns that would have made them indigestible; there were crabs drawn out and thin, with delicate elongated pincers like the tools men use to manipulate at a distance in dangerous atomic furnaces.
>
> There were crabs that planted sea growths on their backs and marched about like restless gardens. There were crabs as ragged as waterweed or as smooth as beach pebbles; there were crabs that climbed trees and crabs from beneath the polar ice. But the sea change was on them all. They were one, one great plan that flamed there on its pedestal in the sinister evening light, but they were

[27] Bentley Glass, *Science and Liberal Education* (Baton Rouge: Louisiana State University Press, 1959), p. 111.

also many and the touch of Maya, of illusion, lay upon them.

I was shivering a little by the time the guard came to me. Around us in the museum cases was an old pattern, out of the remote sea depths. It was alien to man. I would never underestimate it again. It is not the individual that matters; it is the Plan and the incredible potentialities within it. The forms within the Form are endless and their emergence into time is endless. I leaned there, gazing at that monster from whom the forms seemed flowing, like the last vertebrate on a world whose sun was dying. It was plain that they wanted the planet and meant to have it. One could feel the massed threat of them in this hall.[28]

Students of Peirce will be reminded of the formulation mentioned earlier in which Peirce expressed the problem of the reality of generals when he said, "The question . . . is whether *man*, *horse*, and other names of natural classes, correspond with anything . . . independent of our thoughts" (8.12). I take it that Eiseley would have agreed with Peirce that natural classes are not just human constructs, that they are biologically in things.

What conclusion do we draw from this kind of scientific situation as to the validity of Peirce's doctrine of the reality of generals? Certainly this kind of analysis does not give "demonstrative proof" of Peirce's metaphysics, but then he did not expect that. It does seem to me that the doctrine of real generals continues to be consistent with "the general line of growth of scientific ideas," as Peirce hoped it was.

I do not feel, however, that Peirce scholars, or philosophers generally, have taken this matter seriously enough. What seems to me at issue, and I feel strongly that this is what Peirce saw to be the real issue, is whether general potentiality is as real as individual particularity.

If we say that there are real general objects or real general forces we are certainly saying that there are, for example, a variety of potential lengths that now exist, any one of which can be actualized by selecting an appropriate frame of reference. The interesting philosophical question is, what is the ontological status of these potential lengths while they are potential? I do not find it useful to contrast potentiality with reality because I think potentiality is part of reality. Potentiality really exists. It exists in objects in many ways and is as ontologically real as

[28]Loren Eiseley, *The Firmament of Time* (New York: Atheneum, 1966), pp. 82–84.

anything else about them. It may, in fact, be all that is ontologically real.

There is a strong tendency in contemporary philosophy to talk about potentialities as "dispositions," and to define dispositional properties and then feel that the matter is taken care of. This seems to me a philosophically regressive interpretation. As indicated in the previous section these views define these properties in terms of their effects. Thus, "sugar has solubility" becomes "sugar will dissolve if put into water." But this seems to me to evade the issue. I do not want to know what effects may be produced in the future by solubility, I want to know what its nature is now. What is there in sugar right now that I am trying to characterize when I say sugar has solubility? I do not believe that a present potentiality can be defined in terms of future actualities. A present potentiality exists right now. It may or may not become actualized in the future. But if it never becomes actualized it still exists *now* as a potentiality. What is its character now as a potentiality?

This seems to me, as it did to Peirce, and I think it did to Aristotle, an important problem. If we can solve it, many of the problems about counter-factual propositions, about scientific processes, and about cause and effect will be solved with it. From the epistemological point of view a basic purpose of science is to know the future—to make predictions. What a scientist seeks to know is not past actualities—they are history—nor even present actualities, for the immediate present is beyond control. He seeks to know the future in order to control it so far as possible. His business is to assert meaningful propositions about events that are not yet actualized. In some cases, as a result of his knowledge of as yet unactualized events, he seeks to find means of preventing those events from ever becoming actualities.

If we accept Peirce's view that the potentiality is a real feature of the object, we must, if we are to make this assertion meaningful, deny that all that is real are particular determinate individuals. We must reject the nominalistic epistemology and admit a position that allows for real indeterminate potentialities. If we admit that the function of knowledge is to enable us to control the future, then we must take potentialities seriously, for the future as known in the present consists entirely of potentialities, some of which will be actualized and some of which will

not. Any epistemological approach that holds that potentialities are meaningless cannot be adequate as a practical basis for human behavior nor as a theoretical basis for science. An epistemology that takes into account the facts of human behavior and the working practices of science must recognize that potentialities, while they cannot be identified with any class of individuals, are nevertheless real. And the reason they are real is because, as Peirce first showed us, the world is general