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THE PHILOSOPHY OF C. S. PEIRCE.

Rice University, Ph. D., 1965
Philosophy

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THE PHILOSOPHY OF C. S. PEIRCE

by

WILLIAM HATCHER DAVIS

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

Thesis Director's signature:

Houston, Texas

May, 1965
THE PHILOSOPHY OF C. S. PEIRCE
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FOREWORD

Oliver Wendell Holmes, Jr., once wrote to a friend of his concerning Peirce: "I feel Peirce's originality and depth—but he does not move me greatly—I do not sympathize with his pontifical self-satisfaction. He believes that he can, or could if you gave him time, explain the universe."\(^1\) Holmes was not striving for humor in that last remark—\textit{Peirce really did} think he could explain the universe—or at least make a good stab in that direction. On this point, however, Peirce did not so much differ from all other metaphysicians in being as in not being very particular about concealing his ambitions.

This present work takes as its starting point Peirce's assertion (5.348)\(^2\) that the problem of how synthetic reasoning is possible is the "lock on the door of philosophy."
The first step in understanding Peirce's epistemological position is an examination of some of the central positions of Cartesianism—all of which, from Peirce's viewpoint, are in


error and have pernicious consequences. Descartes looked for the foundation of knowledge in primitive intuitions. Peirce's alternative to this is that knowledge is a process of flowing inferences.

Peirce divides synthetic reasoning, as contrasted with analytic or deductive reasoning, into two divisions, inductive and abductive. The latter, original with him, is understood as the hypothesis-building process. My second chapter is concerned with examining this form of reasoning. I have also tried to shed some light on the long-standing problem in Peirce's interpretation concerning his pragmatic criterion for the exclusion of meaningless hypotheses. I argue that his pragmatic maxim was always meant by him to be interpreted in a very wide sense and never in a positivistic sense. One of the few times Peirce ever admitted making a mistake is when he confesses that he was in error in stating once that his pragmatic maxim was too nominalistic. His mistake was in thinking that he had made a mistake.

The third chapter is an elaboration of Peirce's statement that "approximation must be the fabric out of which our philosophy has to be built." (1.404) Paradoxically, the admission that all ampliative reasoning is fallible, instead of leading one into a sceptical position, points the only way out of scepticism. In this section two other thoughts are developed: (1) Knowledge is a self-corrective process; (2) Knowledge grows organically and not from primitive axioms.
The fourth chapter examines the role of instinct in the abductive process and concludes with some general reflections upon the wider implications of Peirce's epistemology.

This work is not intended to be a mere exposition. I have felt free to criticize and amplify Peirce's position. Most of my 'critical' remarks are favorable. Against Peirce, however, I suggest that abduction and induction are much more closely related forms of reasoning than he allows. I argue that induction collapses into a form of abduction—which, if true, is all the more to Peirce's credit, since it radically revises an age-old concept in a direction that he was the first to suggest.

Peirce is a delight to study. He argues in a "tough-minded" way for "tender-minded" conclusions. This kind of philosophical creature is a rara avis.
CHAPTER I

INFERENCE: ESSENCE OF ALL THOUGHT

Charles Sanders Peirce may be classed unambiguously among the process philosophers, of whom there have been many in American thought—particularly James, Dewey, and Whitehead. A process philosophy has its peculiar advantages and problems, but Peirce applied the idea of process to the phenomenon of cognition in a truly radical and original way. For Peirce, the thinking of a thought, or the reading or hearing of a sentence, or even the perception of a sense datum, is analogous to hearing a musical phrase with the sense of flowing from note to note and the relief of the resolution at the end. In this first section we will examine this view—a view which characterizes thought as inference in contrast to intuition in the Cartesian sense.

The name of Descartes is of primary importance in this connection. Max H. Fisch has rightly said, "The castigation of Descartes—his faked universal doubt, his intuitions and introspections, his clear and distinct ideas, his dualism, his exaggeration of the ego, his mechanization of nature—has been a constant theme of American philosophy . . . . Rightly or wrongly, all the evils of modern philosophy have been fathered upon him."³

³Fisch, op. cit., p. 20.
Peirce was the first of the American philosophers to attack the presuppositions of Cartesian thought. It was one of his very earliest philosophical themes. His famous paper on Cartesian philosophy, "Questions Concerning Certain Faculties Claimed for Man," appeared in the Journal of Speculative Philosophy in 1868, when Peirce was twenty-nine years old. This paper is worthy in every way of its author and betrays no youthful shallowness. Almost every study of Peirce's philosophy commences with an examination of this essay on "Faculties" and its sequels.

This work will be no exception—for good and pressing reasons. In the first place, Peirce's "Faculty" essays are among the very few which he wrote where he was able to stick very closely to his subject and to follow a line of argument straight through without permitting himself to go off on all kinds of interesting diversions, as was his usual habit. More important than that, the essays provide an exceptionally good introduction to many of Peirce's most basic epistemological positions, because in them he questions, and very effectively questions, some of the axioms or cornerstones of Cartesian philosophy and, by extension, of most modern philosophy—at least up to his time.

Peirce's essays have as their main purpose the proof that all cognitions whatever are inferential in nature and not immediate and intuitional. All thought is a process; it requires time and is continuous. The implications which
Peirce draws from these points are remarkable both for their manifoldness and for their suggestiveness. Peirce says that synthesis—the process of inference whence comes all new information—is the key to the door of philosophy. Whether this is true or not, it is true that it is the key to Peirce's system.

The doctrine that cognitions are or can be intuitive cuts clear across rationalist-empiricist lines. Traditionally, both of these schools have held to some form of intuition—either of first logical principles or of raw sense data. Thus it is important to see how Peirce attacks the intuitionist theory and to have some understanding of what he is opposing, before one can hope to see his own alternative either clearly or sympathetically.

A. There would be no telling of an intuition if we had one.

In the first essay of this "Faculties" series, Peirce first poses this question:

Whether by the simple contemplation of a cognition independently of any previous knowledge and without reasoning from signs, we are enabled rightly to judge whether that cognition has been determined by a previous cognition or whether it refers immediately to its object. (5.213)

This proposition is rather technically worded to guard against misunderstandings, and it is difficult to understand. Peirce's question is really this: Can we tell an intuition from other kinds of knowledge? A cognition that "refers immediately to its object" is an intuition, whereas a cognition
that refers to previous cognitions represents a mediate kind of knowledge, as in all processes of deduction or inference. Peirce in his answer denies that we can distinguish mediate knowledge from our unmediated intuitions. He bases this denial that we have any such thing as an unmediated intuition at all. When its implications are understood, this becomes a very shocking doctrine, for almost every philosopher has held that at least some of our knowledge must be intuitive. If all of our knowledge were mediated, there would seem to be an infinite regress, and knowledge would have no foundation from which developed and mediated knowledge could rise.

Descartes held that we have intuitive knowledge of ourselves, and from this base all other knowledge could be developed. Kant, for another example, held that the forms, e.g., of space and time, were forms of intuition—immediate and unmediated and fundamental to all other knowledge. Empiricists held that the deliverances of our senses are the most immediate and fundamental sources of knowledge, and that these deliverances are unmediated by any other prior cognitions and therefore are intuitive. Murray G. Murphey rightly estimates the basic importance of the move of Peirce's when he writes:

The denial of intuition is Peirce's boldest stroke against the British school, for Locke, Berkeley, and Hume all require the existence of intuition as an axiom. Thus Hume based his whole argument upon "our fundamental principle, that all ideas are copy'd from impressions," where by "impressions" is meant
"all our sensations, passions, and emotions, as they make their first appearance in the soul." To deny this principle undercuts the whole Treatise.

For Peirce, an 'intuition' is a "premise not itself a conclusion." If one denies the existence of any intuitions, then every premise of all knowledge is itself a conclusion, the chain of knowledge must go back indefinitely and lacks a sure anchor. If true, this means that synthetic or ampliative knowledge is not developed or grounded in the way mathematical or analytic knowledge is supposed to be. This, indeed, is the case for Peirce. In fact, for Peirce, the effort to ape mathematics has been the root of an unbelievable amount of philosophical mischief, and has led to most unfortunate consequences. One of these consequences is the effort to find axioms (intuitions) for all knowledge corresponding to Euclid's axioms in geometry as an indubitable base and foundation for all other knowledge. The second major error, stemming from this effort to ape mathematics, is the attempt to make everyday knowledge as logically air-tight and certain as our knowledge of mathematical systems is supposed to be. (Only "supposed to be" for very subtle human errors may be introduced into even deductive reasonings).

Peirce's position certainly requires defense, but it poses a formidable objection, even if the existence of intui-

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tions is granted: Can we intuitively distinguish between cognitions that are intuitions and others that are not? This Peirce denies. Historically there has certainly been no agreement on which of our cognitions are intuitive—which ought to be surprising if we really know them intuitively. Moreover, one can ask of any intuitive recognition of an alleged intuition whether it may be mistaken or not. To this question the only possible answer (within the framework of an intuitionist theory) is that it is intuitively certain that the intuition is correct. And this judgement can itself be questioned ad infinitum. "Supposing that a man really could shut himself up in such a faith, he would be, of course, impervious to the truth, 'evidence-proof.'" (5.214) One cannot establish a bed rock upon which to erect all knowledge, for the foundation itself may always be questioned. This argument, once properly understood and appreciated, can by itself make many of Peirce's most difficult doctrines become quite comprehensible and plausible. (This point concerning the infinite regress involved in the quest for certainty will be more fully treated in the section on "Signs" and later, in the section, "Knowledge grows organically.")

B. As a matter of fact the mind works inferentially.

Having shown that even if primitive intuitions occurred, we should have no way of identifying them, Peirce goes on to show that all real cognitions draw upon former ones for
their significance, so that all premises are themselves conclusions. Peirce first points out the notorious difficulty witnesses have in distinguishing between what they have really seen and what they have inferred. Professional magicians depend for their living upon the mind's power or compulsion to think in certain ways, ways determined by long-standing habit. Everyone admits that dreams arise from the association of ideas, which is to say from previous cognitions, and yet it is not at all uncommon for a person to become confused as to whether something really happened or was merely dreamed. So it is at least clear that even a dream, which as Peirce says, "as far as its own content goes, is exactly like an actual experience," (5.217) does not rely upon pure, primitive intuitions.

When Peirce speaks of an "inference," he means any cognitive activity whatever, not merely conscious abstract thought. Specifically, he includes perceptual knowledge and even subconscious mental activity. For example, everyone had once thought that the third dimension was immediately intuited, but now it is readily admitted that it is inferred from muscular adjustments in the eyes. The blind spot in the human eye, where the optic nerve enters the retina, ordinarily goes quite undetected and is filled up by the mind's power of inference. (Anyone can make the experiment of placing a coin a little to the left of his face on a table, closing his right eye, and moving the coin to the right while staring with the
left eye at a spot directly in front of his face until the coin vanishes from his peripheral vision. The interesting thing to observe is that when the coin is removed and one continues to stare at the spot directly in front of one, there is no "black hole" observed in the blind spot, but the surface is completely filled in by the mind. No matter what color the top of the desk is, the blind spot will automatically take on that color. So adept is the mind at filling in this gap that a special effort has to be made before we are even aware that it exists.

The recent discoveries of Dr. George Land\(^5\) concerning the fact that the eye can 'see' all the colors of the rainbow when, in fact, only two different wavelengths are present (and these may be two different shades of the same color) suggest that somehow (no one now knows how) the mind is inferring all the colors from a very minimal amount of information indeed, and that the mind's power of 'filling in' missing data is in this case almost incredible.

Again, "A man can distinguish different textures of cloth by feeling; but not immediately, for he requires to move his fingers over the cloth, which shows that he is obliged to compare the sensations of one instant with those of another." (5.221) A particularly illuminating example is taken from our perception of tone. This sensation arises

from the mind's noting the rapidity with which sound waves are conveyed to the brain. The mind cannot tell a tone until it has had a chance to hear several of the sound impulses and judge their frequency. Thus the sensation of pitch is determined by previous cognitions. Peirce even argues successfully that our concept of two-dimensional space is not immediate, but inferred. This is so because it is inconceivable that any single nerve ending on the retina could give the notion of two dimensional space, and therefore the concept comes from an inference from many single, discrete nerve endings.

There being, however, a very great number of nerve-points affected by a very great number of successive excitations, the relations of the resulting impressions will be almost inconceivably complicated. Now, it is a known law of mind, that when phenomena of an extreme complexity are presented, which yet would be reduced to order or mediate simplicity by the application of a certain conception, that conception sooner or later arises in application to those phenomena. In the case under consideration, the conception of extension would reduce the phenomena to unity, and, therefore, its genesis is fully accounted for. (5.223)

Thus Peirce has developed his argument both against the mind's having any immediate intuitions and against its having the capacity to identify them if it had them. The paper is so far very well argued.

C. Knowing is a process in time.

The fact that tones and pains are cognized by their frequency instead of by their intensity is particularly enlightening, because it brings to the fore the crucial role played by time in the cognitive process (as appears from all
the above illustrations). According to Peirce’s theory, all knowing is inferring, and inferring requires comparison throughout a span of time. Knowing is a process, which cannot be immediate and intuitive. Even something as apparently immediate and intuitive as pain is known only by a process of comparison, since the mind judges pain, like tone, by the frequency, not intensity, of nerve impulses. (But time is required to judge the intensity of pure quantity too).

In 5.284 Peirce makes the important point that no experience whatever is an "instantaneous affair, but is an event occupying time" and coming to pass by a continuous process." Moreover, past thoughts do not cease to exist instantaneously, but rather fade away ("gradually die out") and follow the law of association as long as they survive. The point which Peirce is raising here goes to the depths of his metaphysical theories, particularly synechism (continuity), to which we shall return. In part, these considerations on the knowing process support a process metaphysics, and in part the latter supports the former, but it is crucial at this point to see at least that Peirce believes he has very good reasons for holding that all cognitions are inferences which require time—particularly so if time is in the warp and woof of the universe so that there is by the

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6Compare on this point William James essay, "Does Consciousness Exist?"--W.H.D.
very nature of the case nothing which is not an event. In Peirce's own words, "... from our second principle, that there is no intuition or cognition not determined by previous cognitions, it follows that the striking in of a new experience is never an instantaneous affair, but is an event occupying time, and coming to pass by a continuous process."
(5.284)

D. There is no intuitive self-consciousness.

Next Peirce raises the question whether we have an intuitive self-consciousness. Here, of course, he is hitting at Descartes' cogito doctrine, and this is perhaps a more difficult target. On the surface it seems highly probable that any sensation at all has as its logically necessary concomitant the idea of a mind or a self to be registering that sensation. Particularly in the case of pain, it is not merely some abstract mind that feels but the pain is in a quite irreducible sense mine. Of course it is not necessary to suppose that one is always consciously meditating on the fact that one is a self, but the mere analysis of the idea of a sensation seems logically to presuppose a feeling center peculiar to one organism. Unfortunately, a little examination

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7Cf. A. N. Whitehead, Science and the Modern World (N. Y.: The Macmillan Co., 1925), p. 159: "Physical endurance is the process of continuously inheriting a certain identity of character transmitted through-out a historic route of events." For Whitehead the forms or "eternal objects" are not events, but the physical and cognitive world are in process.
shows that this problem is far more complex than Descartes' statement of it would suggest. First, Peirce hedges himself about with a protective definition. He insists that this intuitive self-consciousness which people claim be really a consciousness of oneself, "not a mere feeling of subjective conditions of consciousness, but of our personal selves." (5.225) This view of the matter might very well be far more strict than what Descartes either meant or needed—that is, he may have only desired with his argument to show that the "subjective conditions of consciousness" exist. But by insisting on the strict view Peirce has little difficulty in showing that in babies, for example, a really developed sense of personal identity is quite late in coming. Peirce uses his famous argument that self-consciousness grows from an increasing awareness of ourselves as centers of ignorance and error. If everything always went our way (to put his argument a little differently than he does), if our merest wish served to accomplish the most amazing facts, we might never come to distinguish ourselves from the world (or even from God!). As it is, our failures and errors teach us about our separate existence. This argument, persuasive as it is, is not so effective, it seems to me, as an even simpler argument, as follows. Memory is necessary to a real self-consciousness (else it might be a new "I" that pops into existence every instant); but memory is fallible, and hence there is no certain intuition of self-consciousness. To all of this, Descartes could
still reply: (1) There are thoughts, sensations, etc., (2) The notion of 'sensation' itself seems necessarily to imply some kind of mind or feeling center or analogous system (though that mind might not be the same one from moment to moment). This much might be indubitably certain. But whether this foundation is broad enough to support any further philosophical framework seems doubtful. In any case Peirce would deny that (2) above certainly follows from (1), for in any process of reasoning, no matter how simple or how purely deductive, a chance for error arises, and an error may have occurred between the thought of (1) and the apparently logically necessary concomitant (2). There just are no certainties for Peirce ("certain" being taken in its 'metaphysical' or 'ultimate' sense rather than its psychological sense). There may be the certainty of immediate feeling, but this is no proposition, no knowledge. Only the immediate feeling is certain (and this, of course, is poetic language, since feelings are never spoken of as certain or uncertain; all that one can mean by this is that a feeling as felt is felt), but the proposition that there is an immediate feeling is not certain, for a thought (or, for that matter, a feeling) takes time (cf. 5.284), and memory may fail during the lapse of time, or logical errors may creep in. Thus Peirce seeks to establish his doctrine that we have no intuitive self-consciousness, but that even self-consciousness is a complex inference.
We may observe here that Peirce also asks whether we have the power of introspection or whether our whole knowledge of the internal world is derived from the observation of external facts. People tend to think of introspection as an intuitive power. But Peirce points out in the first place that introspection need not be intuitive. (5.245) For the purposes of this essay, this is all he needs to affirm, and that he can affirm it in justice seems evident from some of the arguments he has raised already—for example, the very basic point that judgment takes time, and the mind uses the time in order to compare, and any final judgment is therefore of the nature of an inference rather than an intuition. But Peirce, not satisfied with this, takes the bold step of denying that we have any power of introspection, properly speaking, at all. He points out that the emotions, which one might think we know by introspection, are really known by reference to external facts. For example, we say that something is vile or abominable, and, Peirce says, we attach the emotion to the thing, and not to our viscera. But this seems to ignore feelings such as ennui, melancholy, or 'the blues,' where many times one cannot find any external cause for the feeling, nor think of any thing to do to dissipate it. Peirce here seems to be arguing for too much. This discussion has given the commentators trouble. Gallie\textsuperscript{8} passes it by in his discussion

of this essay, and Buchler tries to elucidate Peirce's point in the hope of making it appear more plausible. Although his elucidation is accurate, it does not make the doctrine more credible. ("[Peirce] does not deny that we can carry on such examination of the quality of feelings, but holds that in so doing we represent the feeling as the quality of an object, not as something purely psychical."\textsuperscript{9}) The whole issue is unfortunate, since Peirce's main point can stand even with the power of introspection, provided only that it is not considered immediate and intuitive. Is introspection more than the turning of one's attention to one's memory? It could be regarded as a form of remembering--remembering one's own feeling. Consciousness never succeeds in turning upon itself any more than a dog can catch its own tail. All consciousness can do is examine the immediate past. The examination of memories is certainly no more intuitive than the examination of anything else and no more infallible.

E. Peirce's Divergence from Kant.

In an extended footnote Peirce argues that his theory against intuitions is not so far removed from Kant's epistemological views as might at first appear. Kant's theory of categories, being, as Peirce likes to call it, nominalistic (or subjectivistic), is therefore at root wholly unaccep-

table to Peirce, and yet a key word in Kant is "synthesis," where the mind harmonizes the deliverances of the senses into its forms. Kant certainly did not think of synthesis as a form of inference; but it is easy to see how Kant's synthesis can be conceived in a way not too far removed from Peirce's view of the matter. Peirce says, in fact, that his theory is nothing but the detailed account of Kant's synthesis. (5.223n2) This is perhaps a little misleading, since for Peirce space and time themselves are synthesized (cf. 5.223) and Kant's notion of synthesis is not as clearly formulated as Peirce's, found in the latter's doctrines of induction and abduction. Peirce says:

There can be no doubt of the importance of this problem. According to Kant, the central question of philosophy is "How are synthetical judgments a priori possible?" But antecedently to this comes the question how synthetical judgments in general, and still more generally, how synthetical reasoning is possible at all. When the answer to the general problem has been obtained, the particular one will be comparatively simple. This is the lock upon the door of philosophy. (5.348, my emphasis)

The very word 'synthesis' itself has the implication of a process of construction. For Kant, of course, there would be a difficulty in saying that a cognition is an event in time, since time, on his view, is itself a form of intuition and we cannot know about the mind as it is in itself. On the other hand, it is still true that on the empirical or psychological side mental phenomena are in process and in time, for Kant. So it is true that there is some basic sim-
ilarity here, although Peirce's statement that his theory is nothing but a detailed account of Kant's idea of synthesis is, as said above, somewhat misleading. Furthermore, Kant uses the word "synthesis" in a technical sense which acquires its special meaning only in the total context of Kant's epistemology.

F. Thought is sign activity.

Some of the notions implicitly contained in the above remarks are made explicit in Peirce's sequel article called, "Some Consequences of Four Incapacities." In this article, Peirce gives his earliest formulation of his sign theory. The main point of the article is that all mental action, all inference is a form of sign activity, where the word 'sign' is interpreted very freely to include any "feeling, image, conception, or other representation." (5.283) Most thinking, however, is conducted in signs that are "mainly of the same general structure as words." (6.338) Now since all thought whatever is a process, it follows that mental action consists of a continuous flow of signs. (5.284) If the thought process were to be frozen and examined, nothing except an immediate feeling would be discovered (the "firstness" of thought); no "meaning" could be found. The reason for this is that a sign is not only a sign of something, but also a sign to some interpretant. (5.289) If there is nothing to interpret the sign, it loses its character as a sign. Therefore it is essential that more signs follow any given
sign in order to interpret it. "At no one instant in my state of mind is there cognition or representation, but in the relation of my states of mind at different instants there is. In short, the Immediate . . . runs in a continuous stream through our lives; it is the sum total of consciousness, whose mediation, which is the continuity of it, is brought about by a real effective force behind consciousness." (5.289) A tune consists only in separate notes sounded one at a time. Alone, the notes have no significance; together, they may have a great deal. "Thought is a thread of melody running through the succession of our sensations." (5.395) The meaning of any sign is therefore entirely virtual, depending upon an interpretation. (5.289 and cf. 5.504 n.)

Peirce everywhere emphasizes the triadic nature of real sign activity. (cf. 2.274) Reasoning, being sign activity, is also triadic in nature, and Peirce points to Aristotle and Kant as having vaguely seen this. (6.321 and cf. 1.372f.) There may be a real sign without an actual interpretant, so long as there is a possible one. (2.92) Obviously, a word in a book is a real sign while the book is not being read—but it would not be a sign without some possible mind in which it would arouse a cognition.

Interpretation must take place in a mind. (2.242) Peirce, however, does hint at the possibility of a non-mental interpretant, as when he suggests the possibility of a vegetable serving as an interpretant, and where he says that
"thought is the chief, if not the only, mode of representation."
(2.274, my emph.)

Peirce suggests there are three kinds of interpretants of signs. First is an emotional interpretation, as when the sign of music gives rise to a feeling. (5.475) Second is the energetic interpretant as in the response to a command. (ibid.) Third, is the "logical interpretant" which is a sign's repercussion on the ensuing thought life of the individual, and "ultimately" upon his habits of behavior. (In 4.536 he refers to these three types of interpretation as the "immediate," the "dynamic," and the "final" interpretants.)

The history of philosophy from Aristotle has recognized the "universal" character of ideas, as contrasted to the specificity of actual existences. In Peircean terms, every real triad (as a sign) involves "generality." Every genuine triad must "imply something concerning every possible object of some description . . . ." (1.476) Every idea to that extent is general, but all ideas have a further tendency to generalize: "... wherever ideas come together they tend to weld into general ideas; and wherever they are generally connected, general ideas govern the connection . . . ." (6.143)

For Peirce, thoughts are continuous. They do not break in suddenly, but gradually. They can start in time, but only continuously. (5.327) (Recall that one does not immediately hear a tone--the mind has to judge (not consciously, to be sure) the frequency of the vibrations. Here the
cognition is starting in time, but continuously.)

Ideas are conveyed only by other ideas, and therefore if matter gives rise to ideas in our mind, that is a further proof of the ideality of matter itself. If, indeed, matter is "dead" and embodying eternal, unchanging laws (as it is not, for Peirce), even so, it conveys ideas to us only by virtue of the "spirit" it embodies. (6.158). On this point Peirce elsewhere speaks of the laws of nature as themselves being of the nature of signs. The immediate continuity of mental processes means that the past is never really past to a mind, but still really alive and present, only infinitesimally dying out. (6.134) No thought terminates suddenly. Our attention may shift suddenly, but the old thought fades away into the subconscious. Peirce says that an amoeba feels and that when it is irritated there is an active motion set up which slowly spreads through the organism, dying out while it spreads. (6.133) And, moreover,

Since space is continuous, it follows that there must be an immediate community of feeling between parts of mind infinitesimally near together. Without this, I believe it would have been impossible for minds external to one another ever to become coordinated, and equally impossible for any coordination to be established in the action of the nerve-matter of one brain. (6.134)

And again,

A finite interval of time generally contains an innumerable series of feelings; and when these become welded together in association, the result is a general idea. For we have just seen how by continuous spreading an idea becomes generalized.
The first character of a general idea so resulting is that it is living feeling. A continuum of this feeling, infinitesimal in duration, but still embracing innumerable parts, and also, though infinitesimal, entirely unlimited, is immediately present. And in its absence of boundedness a vague possibility of more than is present is directly felt. (6.137f.)

A man's self, his personality, consists in the unity of his mental processes: "Now the organism is only an instrument of thought." But the identity of a man consists in the consistency of what he does and thinks, and consistency is the intellectual character of a thing; that is, is its expressing something." (5.315)

Man's "glassy essence" consists in this process of continuous interpretation of signs. Thus, the sign is the man. (5.314) All thinking is a form of talking to oneself: the self of the present addresses the self of the future. (5.421)

There is no need to suppose that there must necessarily be some kind of deep mystery in saying that thought involves sign activity. A computer uses the "on-off" condition of thousands of cells in order to manipulate information, and puts this information out on sheets of paper full of signs. This is not strictly a mental phenomenon; but if there is a radical difference between living minds and machines, it probably does not lie in the fact that one uses signs and the

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10 Contrast this with Bergson, Dewey, for whom thought is an instrument for the organism. W.H.D.

11 Compare on this point Whitehead: "... the life of man is an historic route of actual occasions which in a marked degree ... inherit from each other." Process and Reality (N. Y.: Harper and Bros., 1929), p. 137.
other does not. Certainly the mind makes use of information somehow stored in its cells—and the alterations in these cells serve as signs. This is all true regardless of one's theory on the mind-body problem.

On the other hand, one cannot say that the particular signs employed in the thought process are the thoughts. "Oh, no; no whit more than the skins of an onion are the onion. (About as much so, however.)" (4.6) Goudge suggests another analogy: "... the matter of thought is signs in the sense in which the chessmen constitute the matter of a game of chess." 12 Signs, says Peirce, are the phenomenal manifestation of ourselves: "This does not prevent [their] being a phenomenon of something without us, just as a rainbow is at once a manifestation both of the sun and of the rain." (5.283)

Peirce sometimes talks like a behaviorist, as when he says, "the man and the external sign are identical," or "my language is the sum total of myself; for the man is the thought." (5.314) Goudge does not know what to make of this. 13 But it seems clear that Peirce means by this that man, taken as a self, a personality, a 'spiritual' being, is the unity of his sign activity—not man taken as a body. That this is a valid distinction to make is evident from Peirce's plain confession that he does not know how words influence the physical body. He says it is madness to deny

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13 Ibid., p. 238.
that words produce physical effects. "But how thoughts act on things it is impossible for us in the present state of our knowledge, so much as to make any very promising guess; although . . . the problem is not beyond all hope of ultimate solution." (5.106) He then goes on to say that it is not any more clear how 'physical' laws influence matter. He finally says:

Here we have that great problem of the principle of individuation which the scholastic doctors after a century of the closest possible analysis were obliged to confess was quite incomprehensible to them. Analogy suggests that the laws of nature are ideas or resolutions in the mind of some vast consciousness, who, whether supreme or subordinate, is a Deity relatively to us. I do not approve of mixing up Religion and Philosophy; but as a purely philosophical hypothesis, that has the advantage of being supported by analogy. Yet I cannot clearly see that beyond that support to the imagination it is of any particular scientific service. . . . (5.107)

In any case, it seems clear that Peirce recognizes the mind-body problem (though, of course, ultimately he is an idealist -- still, body, as an effete kind of mind, is very different), and therefore cannot be called a behaviorist.

There is another very interesting problem in connection with Peirce's theory of signs. George Gentry raises it in an essay called, "Habit and the Logical Interpretant." 14 and Buchler also discusses it. 15 Gentry points to a much

15 Buchler, op. cit., pp. 112 and 154.
later essay of Peirce's, "A Survey of Pragmaticism," (1906) where Peirce says that the logical interpretant of a sign is "essentially" a habit. He says in this essay that "it is no explanation of the nature of the logical interpretant (which, we already know, is a concept) to say that it is a concept." A concept is a logical interpretant, but "only imperfectly so." A concept, as an interpretant, "partakes of the nature of a verbal definition, and is as inferior to the habit, and much in the same way, as a verbal definition is inferior to the real definition." But a habit "is the living definition, the veritable and final logical interpretant." (5.486 and 491)

To Gentry this later position is a radical revision of the earlier view that the interpretant of any sign must be another sign. Gentry considers the later theory that the final interpretant of a sign is a habit as much the better one in that it frees one from the infinite "regressus" and "pro-gressus" involved in the notion of the continuity of signs.  

It appears to me, however, that it is easy to show that Peirce had no notion of revising his early theory by this later exposition. His consistent position was that a concept is known by the habit it produces, but the most important habit which a concept produces is not an external habit--a habit for "doing"--but rather a habit for thinking. To be sure, concepts have practical, outward implications,

\[16\text{Gentry, op. cit., p. 89.}\]
a la James's theory. But they also have implications for the further thought-life of the individual—some being fruitful (i.e., with a high unifying power) and some not. How signs influence the body and have their "practical" effects, he has already confessed he does not know. But these physical effects are unimportant compared to the effect which a concept may have on the mind's further search for the truth.

And as for the problem of an infinite regress and progress, Peirce holds that thoughts not only spread within an individual's mind, but also between the minds of different people. He holds that the whole universe, for that matter, is continuous, through and through, so if one can not accept his doctrine of synechism (continuity) one can not follow Peirce very far. The problem of an infinite regress of signs is a sub-problem under the problem of continuity in general. Synechism is a metaphysical doctrine with wide implications reaching far beyond our topic. It suffices in this context to say that Peirce defended it by trying to show the fallacy in Zeno's paradoxes. There was for Peirce no more mystery attached to the problem of how a thought begins than there was to how a movement of any kind begins—and no less. (cf. 5.333f.; 6.177ff.)

It is really not such a difficult thing to believe that all knowledge is; or may be, in a continuum of some kind. Readers familiar with Whitehead's so-called fallacy of "misplaced concreteness," will recall that he objected to
the doctrine that things must be at some one place and could not be everywhere at once. Things, rather, are everywhere they act, and they act everywhere. If reality is in a continuum, as Peirce, Whitehead, and modern physics seem to suggest, why can't mental reality be in one too? In fact, if physical reality is in a continuum, how can mental reality avoid being in one?

It follows from Peirce's doctrine that no thought can be considered as intuitively clear and simple and perfectly self-explanatory. All thoughts require other thoughts to make them clear, and these thoughts require others too. Now if there is no such thing as an intuition--a firm foundation for all deductive or ratiocinative knowledge, a basis, clear, indubitable, and axiomatic, then we are either lead into a complete scepticism, or an alternative something like Peirce's.

We should perhaps consider the possibility that knowledge may be essentially circular, or if not circular exactly, then involving some kind of infinite regress, and lacking an axiomatic basis. At one point, talking about the relation between "evolutionary love" and the continuity of thought, Peirce drops this remark: "... the two propositions will lend one another mutual aid. The reader will, I trust, be too well grounded in logic to mistake such mutual support for a vicious circle in reasoning." (6.315) The case is precisely analogous to an effort to discover what is the "key" organ in the human body, what is the cornerstone of life.
Clearly the heart is nourished by the lungs and stomach, while they in turn are fed by the heart and blood. The brain lives off of the vital fluids supplied to it by all of these organs in concert, while it serves to bring the body in the proximity of external sources of food, and take the body from sources of external danger. In short, the body is an organism. In a similar fashion the inferences of the mind do not rest on primitive axioms, but mutually support one another. The most famous case of this mutual support is perhaps found in the fact long-observed that induction depends upon the orderliness of nature, which, itself, is known by an induction (or, rather, abduction, I would say—see below).

The image might be changed from that of an organism to one that brings out other features characteristic of the knowing process. Perhaps the knowing process involves something on the order of a jig-saw puzzle, where each new bit adds significance to the whole, although each bit is incomplete in itself and there is no real foundation piece upon which all else is built. Any piece will do to start with, where nothing is infallible in principle, though much does not fail in practice.

Philosophy ought to imitate the successful sciences in its methods, so far as to proceed only from tangible premises which can be subjected to careful scrutiny, and to trust rather to the multitude and variety of its arguments than to the conclusiveness of any one. Its reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected. (5.265.3)
Whatever the exact truth is in these matters, Peirce has shown almost conclusively that it is nothing like what Descartes had in mind. Even if knowledge is not absolutely continuous, it may be virtually so. Gallie asks whether it is possible to determine precisely when a person begins to speak, walk, or have his first thought. There is no way of answering such a question in fact and maybe never even in principle. Is a word uttered accidentally "speech," or in simple, uncomprehending imitation, or with only the vaguest intimation of what it stands for? Where does imitation leave off and 'speech' begin?

In summary, this essay raises some most primitive questions, and the answers suggested to them intimate the whole of Peirce's philosophical viewpoint. It is important to observe that the attack on Descartes is meant to undercut virtually all of philosophy since Descartes, insofar as subsequent philosophy has tended to work from some of these same essential Cartesian presuppositions in one form or another. All of these later philosophers looked for some sure foundation of knowledge, whether relying upon 'rational insight,' or clear and distinct ideas, or the alleged immediate deliveries of sense. All had an exaggerated respect for deduction, and a disregard for the facts of common sense, with the exception of the common sense philosophers.

Anyone who understands and sympathizes with Peirce so far is in a good position to follow him further as he works out some of these ideas. Peirce's system is highly interde-
pendent, and the commentator faces the same difficulty Peirce himself did—the difficulty of explaining or discussing any one theory or thread of thought without showing how the whole system bears on the problem and, in most cases, makes it much more probable than might seem to be the case at first glance. Almost every essay Peirce wrote wound up being a summary of his whole system, with emphasis on one of its facets.
CHAPTER II
HYPOTHESIS OR ABDUCTION:
THE ORIGINATIVE PHASE OF REASONING

In Peirce's early "Faculties" essays he refers to cognitive processes of all types as "inferences." (cf. 5.237. 219) As we have seen, the point of these essays is to deny that there is any such thing as an immediate intuition of any kind, and the word "inference," or better yet, "synthesis," represents well his alternative view that all cognitive processes are at least movements of the mind from one thing to another. He compares thought to music in that its essence involves movement and that it has a natural end, i.e., belief and habit. For Peirce, there are three kinds of reasoning processes: deduction, induction, and abduction. Some of his greatest insights are found in his understanding of these modes of thought, and much of his philosophy is implicit in his explication of them.

A. Abduction and induction compared.

Deduction and induction Peirce understands roughly in the traditional way. Abduction is the creative act of making up explanatory hypotheses. It is a mental process of the greatest possible importance, the nature and significance of which Peirce studies carefully and deeply for perhaps the
first time in the history of thought. There are some interesting things to say on the subject of Peirce's view of deduction, but for the moment it suffices to remark that it is generally orthodox. He agrees with tradition that deduction is analytic in essence and that no really new information is to be got by using it. Synthetic knowledge, new information, can come only from induction and abduction. Now, though Peirce goes to great lengths to show the difference between these latter two forms of synthetic reasoning, it is not the case even for Peirce that they are entirely different and separate from each other. They are very much akin to each other, and there is a strong tendency, as we will try to demonstrate, for induction to collapse into a form of abduction, so that one can almost say that all synthetic reasoning is abductive.

But first, let us emphasize the differences between induction and abduction. Peirce plainly declares that the two are not to be confounded (2.632), and also comments upon the ease with which one can "distort" hypothetic inference (abduction) "into the appearance of an induction." (2.642) (Observe that this is the opposite of the reduction which I am tempted to make.) Peirce goes to the trouble of listing four reasons for maintaining the distinction. (2.641-2.644). The first is that induction is a much stronger form of inference than abduction, since a creative hypothesis can be wildly wrong, whereas, it is harder for an induction to be com-
pletely and totally wrong. Second is the fact that induction reasons from certain observed facts to postulated facts of the same kind, while abduction points to a fact of a different kind altogether, one which presumably unifies many diverse facts. Napoleon's real existence is an abduction which explains many facts. Induction, traditionally understood, hardly makes this kind of a leap, but contents itself, says Peirce, with judging a proportion. (Cf. 2.642) Thirdly, there is an important 'physiological' difference between the two, inasmuch as induction yields a rule or a habit while abduction yields a mental unity with an accompanying sense of relief, and is thus the 'sensuous' (2.643) element of thought rather than the 'habitual.' And finally, if we distinguish between induction and abduction, the classification of the sciences is facilitated, according to Peirce. That is, 'classificatory' sciences are inductive, and 'theoretical' sciences (geology, biology, etc.) are hypothetic. (Cf. 2.644)

Despite Peirce's reasons for distinguishing between induction and abduction we must go on to recognize that these two forms of reasoning are really similar in an even more fundamental way. Peirce virtually admits this in several passages. He says,

... when we stretch an induction quite beyond the limits of our observation, the inference partakes of the nature of hypothesis. It would be absurd to say that we have no inductive warrant for a generalization extending a little beyond the limits of experience, and there is no line to be drawn beyond which we cannot push our inference; only it becomes weaker
the further it is pushed. Yet, if an induction be pushed very far, we cannot give it much credence unless we find that such an extension explains some fact which we can and do observe. Here, then, we have a kind of mixture of induction and hypothesis supporting one another; and of this kind are most of the theories of physics. (2.640)

To my mind it appears that every induction involves an abduc-
tion, though one of a low order of creativity. When beans are drawn from a bag and the relative frequency of their col-
ors are noted (to take a favorite example of Peirce's), it is an abductive leap, a hypothesis, to say that the same propor-
tion probably prevails throughout the bag. Induction proper is then merely testing the hypothesis by drawing out more beans and seeing if the proportion is preserved. Peirce says in 5.171 that "Abduction is the process of forming an explana-
tory hypothesis. It is the only logical operation which intro-
duces any new idea; for induction does nothing but deter-
mine a value, and deduction merely evolves the necessary con-
sequences of pure hypothesis." But if abduction is "the on-
ly operation which introduces any new idea," then it seems one ought to say of it that it is the only truly synthetic operation. Induction, on this view, becomes really only a form of what Peirce calls "probable deduction"—as when one deduces from the premise, "Three-fourths of all men are col-
ored; here is a man; therefore, the chances are three out of four that he is colored." The first premise is an hypothesis which occurs to one who has examined racial statistics—though as we say, not a greatly 'creative' hypothesis, but
a hypothesis for all that. Another place where Peirce almost inadvertently lends support to my view that abduction is the only creative act of mind is in 2.624 where he says:

Induction is where we generalize from a number of cases of which something is true, and infer that the same thing is true of a whole class. . . . Hypothesis is where we find some very curious circumstance, which would be explained by the supposition that it was a case of a certain general rule, and thereupon adopt that supposition.

The fact that the word "generalize" is common to both of these sentences is what is suggestive to me, for a kind of generalization occurs in both cases. One certainly does not "generalize" in the usual sense of that term in deduction (or, if this is contested, I will gladly admit the other side too, since that would support the kinship of deduction with abduction, on which see below). Peirce used the word "generalization" to refer to induction narrowly conceived, as when one generalizes from a sample to all phenomena of the same kind. One does not "generalize," he says, to Napoleon's existence. (Cf. 2.714) One hypothesizes that. But I would suggest that a generalization in this narrow sense (which for the sake of the argument we can grant is the common usage of the word, though I doubt it) is still just a form of hypothesis-building. As Peirce himself argues, induction always serves to test a hypothesis. "Induction is an Argument which sets out from a hypothesis, resulting from a previous Abduction, and from virtual predictions, drawn by deduction, of the results of possible experiments, and having
performed the experiments, concludes that the hypothesis is true in the measure in which those predictions are verified . . . . " (2.96, my emph. Cf. 5.145, 170, 590-591; 2.755, 777, 6.472, 527, 100, and 7.202ff.) And again Peirce says: "The one primary and fundamental law of mental action consists in a tendency to generalization. Feeling tends to spread; connections between feelings awaken feelings; neighboring feelings become assimilated; ideas are apt to reproduce themselves. These are so many formulations of the one law of the growth of mind." (6.21)

In summary, new knowledge comes through abduction--induction and deduction serve to test abductions. I am happy to be in agreement on this point with Buchler, who very clearly says: induction and abduction are not independent, and the conclusion of any induction is identical with that of some abduction, that is, it is some hypothesis. Any synthetic proposition, in so far as it is for the first time entertained as possibly true, must be the result of an abduction."¹⁷

I can only say that these considerations seem to be of a more fundamental nature than the reasons Peirce advanced for distinguishing between these two forms of reasoning, and I find it a very attractive abduction, indeed, with much explanatory and unifying power, to suppose that induction is really a low and almost mechanical form of abduction, and

¹⁷Buchler, op. cit., PB, p. 134, and cf. Goudge, op. cit., pp. 197ff., where he reaches much the same conclusion on this matter.
that synthetic reasoning and abduction are the very same process.

B. Abduction as Unification

Thus far in this essay we have made do with a none-too-explicit understanding of what Peirce meant by abduction. In the next two sections, I would like to make an effort to explicate in some detail the process of abduction as Peirce understood it.

"Abduction" could be regarded as a new word for a very old philosophical insight. And this insight is that the mind has this tendency to seek out, if not impose, unity upon phenomena. This apparent thirst of the mind for unity and coherence is most persistent. The quest for unity seems to be of great intensity, and seems to lie at the very root of the system-building tendency in philosophy, as well as at the root of physical researches, or, really, of intellectual activity of any kind. Peirce at one point says that "the function of conceptions is to reduce the manifold of sensuous impressions to unity and ... the validity of a conception consists in the impossibility of reducing the content of consciousness to unity without the introduction of it." (1.545) And again he says, "It is a well known law of mind, that when phenomena of an extreme complexity are presented, which yet would be reduced to order or mediate simplicity by the application of a certain conception, that conception sooner or later arises
in application to those phenomena." (5.223) The importance of this "law of mind" is evident. It is not induction in the traditional sense of that word, for one does not induce the existence of Napoleon from various monuments, documents, etc. It is a creative leap of inference, far more constructive and far more liable to error than an induction from simple enumeration of things. And the heart and soul of the matter is the unity the mind finds in a good hypothesis. The craving for a unified view of things is as real as any physical craving of man, and more powerful than many of them. Peirce says that "hypothesis produces the sensuous element of thought, and induction the habitual element." (2.643) Whenever the nervous system is disturbed in a complicated way, says Peirce, the result is a single harmonious disturbance which I call an emotion. Thus the various sounds made by the instruments of the orchestra strike upon the ear, and the result is a peculiar musical emotion, quite distinct from the sounds themselves. This emotion is essentially the same thing as a hypothetic inference, and every hypothetic inference involves the formation of such an emotion." (ibid., my emph.) This is a very interesting insight. Why a unified conception or a good hypothesis should give rise to this emotion is the problem discussed in the section on instinct. Meanwhile, another way of bringing home Peirce's point is to observe that, as he understands it, all sensations or perceptions partake of the nature of a unifying hypothesis. Peirce says, "A sensation
is a simple predicate taken in place of a complex predicate; in other words, it fulfills the function of an hypothesis." (5.291) Sensations can be and usually are almost infinitely complex. The sensations received by the player of table tennis are not only very complex, but the time in which he has to unify them in his mind and judge appropriate responses is very limited, yet the mind harmonizes the data and makes appropriate reactions with remarkable ease. Actually, the same principle applies to every act of perception, but it is especially easy to see the abductive process at work in the phenomenon of ordinary vision where the mind does so much filling in and inferring in a creative way. Everyone of us has had the experience of seeing a drawing or a photograph which, at first, made no sense at all. The mind struggles to get a grasp on the scene, and finally, as if in a flash, the connection and harmony becomes apparent, and we see what the drawing or photograph is of. This is abduction. Peirce uses the example of music to good effect on this point too. We never hear a melody. We only hear one tone or set of tones at a time. Memory and anticipation must work together with the presently heard tone. Thus in even so simple an act as listening to a melody the mind is called upon to fill in creatively. In the case of extremely foreign or strange music it is unable to do this, and we can not even tell what the melody is though we hear all the notes! (cf. 5.395f.)
If it seems strange when Peirce says that even ordinary perception is an inference from premises to a unifying conception, Peirce has an explanation for this: "... a fully accepted, simple, and interesting inference tends to obliterate all recognition of the uninteresting and complex premises from which it was derived." (7.37)

Now, bearing in mind the point made in the preceding section, that abduction and induction are similar and that there is some justification for arguing that induction is a form of abduction, notice that Peirce says of induction itself that it is a "species of 'reduction of the manifold to unity'." (5.275) And then, after discussing abduction, Peirce concludes that "it is ... also a reduction of a manifold to unity." (5.276)

These quotations serve two useful purposes: First, they support my point that induction and abduction are very fundamentally related forms of inference because they both reduce a manifold to unity, and, second, that the heart of the matter, the heart of the hypothesis-building process, and thus of all synthetic knowledge, is found in this effort of the mind to reduce complexity to harmony and unity. That the mind can so often succeed in its effort to do this proves something about nature to a realist like Peirce--i.e., that nature is a harmonious whole and has achieved already a degree of 'reasonableness.' But more to the point for the purposes of this study are the implications of this understanding
of the knowing process for the question of what constitutes a good hypothesis, and certainly one characteristic of a good hypothesis is that it brings a harmony to a complex situation, or "reduces a manifold to unity." There is, of course, much else to be said on the subject of what constitutes a good hypothesis, but this one thing is surely fundamental and important.

Before abandoning this rather general discussion of abduction, there are two or three other points which may help us understand more clearly what Peirce means by abduction. First, abductions typically "come to us in a flash." (5.181) An abduction "is an act of insight, although of extremely fallible insight." (Ibid.) All of the component ideas in an abduction may have been present in the mind before the abduction was made, but the new combination of ideas, or the relation between them is what is new in an abduction. Perhaps the most common example of abduction, where its nature stands out, is in the experience most people have had at one time of solving problems in geometry, and trying to devise proofs. Sometimes one had to stare at the problem for some long period of time before the whole solution appeared before the mind's eye in a moment of "insight." But more on this later.

Secondly, although abduction is thought of as a creative leap of the mind, this does not by any means imply that the leap has never been made before by anyone or that it is
original in the history of human thought—although indeed new theoretical discoveries are abductions. But abduction properly describes the situation in which one man is trying to explain something to another, and the latter finally—perhaps after repeated hearings of the explanation—exclaims, "I see!" When a man "catches on" he has performed an abduction. An abduction, or a "catching on" is accompanied by a sensuous quality already mentioned—the sensation of harmony and unity which the mind has upon seeing things a certain way so that they fit together naturally.

It seems clear that Peirce's line of thought is well worth pursuing in that, first, the matters under discussion are of basic philosophical importance, and, secondly, Peirce's suggestions as developed so far at least, are provocative. But they raise more questions than they solve—as developed so far, again. What about this "sensuous" element to the abductive process, whence does it arise, and what does it prove, if anything?

Another important point to consider in discussing abduction is that for Peirce the whole essence of explanation is contained in this phenomenon. Every explanation is an abduction and vice versa. In one place (1.487) Peirce says, "... it is to be assumed that the universe has an explanation, the function of which, like that of every logical explanation, is to unify its observed variety." In 2.636 he says that induction classifies, and abduction explains.
Boler says:

Peirce is even tempted to say that only abduction explains, although he modifies this to some extent. He feels that an explanation requires something other than the facts to be explained (6.273), and since neither deduction nor induction supplies a new idea, each fails to do anything more than restate the facts themselves.

The modification to which Boler refers is that sometimes "Peirce seems to allow for a looser sense of explanation that includes induction." This is not surprising in view of the vague line Peirce sometimes draws between induction and abduction.

The great plausibility of Peirce's understanding of the nature of "explanation" seems to me to hide the greatness of Peirce's theory. The theory is so good that it appears obvious and almost not worth saying. But it is an art that conceals art. To have elaborated and clarified what explanation is, and to have done this in a way that relates coherently to fundamental epistemological considerations seems to me a truly remarkable philosophical feat, although I am aware that there are germs of this theory in the history of philosophy, particularly in Kant.

C. What kinds of abductions are meaningful, significant, admissible?

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19 Ibid., cf. 2.716-17 and 6.612n.1.
Peirce's theory of abduction includes a notion which we have so far failed to take notice of, and that is that apparently some abductions, no matter how good they may appear to be from the point of view of harmonizing all the data, can not be admitted as bona fide abductions. This opens a topic of wide significance, because (1) it is at the heart of Peirce's theory of pragmaticism, and (2) it causes different interpretations of Peirce. It is quite impossible to overestimate the significance of this problem, and this is especially true in view of the battle in modern philosophy between the positivist and metaphysical camps—if we may be permitted a rather large generalization. It is also important because it is possible to conclude that Peirce fought this battle within himself.

The problem arises in two forms which we can state briefly in order to see in perspective the discussion which will follow: First, the pragmatic maxim is supposed to serve to clarify difficult notions and ideas. Peirce entitles one of his articles, "How to Make Our Ideas Clear." Second, the maxim is supposed to be able to show up some concepts as either empty and meaningless or identical with some others. Thus a concept like that of "silver" can be examined from the pragmatic viewpoint. But any hypothesis is also itself a concept, and can be examined from this same viewpoint, and according to the theory, some hypotheses can be shown to be empty and meaningless, and, thus, no real hypotheses.
Whether or not the pragmatic maxim is up to these tasks and if so in what sense and to what degree is the whole problem in embryo. Since it is by all accounts an issue crucial to a fair understanding of the notion of abduction, we shall have to probe it in some detail and make some rather sustained effort to evaluate the consistency of Peirce's doctrine; the meaning of it as well as its truth.

First, a few general words on the subject of how one ought to go about reading a man like Peirce. Everyone will admit in the abstract that many of the apparent contradictions and conflicts in Peirce's work result not from any feebleness of intellect or memory on his part, nor in most cases from any basic weakness in his philosophy, but rather from his almost incredible depth and many-sidedness, and a genuinely felt sympathy with widely varying viewpoints. But after admitting this in the abstract, many critics succumb to the temptation of ignoring or explaining away those aspects of Peirce's thought they find disagreeable to themselves, and showing how, on Peirce's own principles, he never could have seriously meant those parts of his philosophy, and even if he did, he could not have defended them. Critics who have not Peirce's breadth of approach thus find it difficult to make sense of certain aspects of his system. Different critics find different aspects of the system valuable. "Evidently," as James Peibleman has said, "each of
us is going to have his own Peirce.²⁰ It so happens that modern tendencies toward positivism have brought out Peirce's empirical side, whereas, "the Peirce of Dr. Buchler is a confused thinker who did much useless work in metaphysics, but who had some brilliant logical insights which were altogether unconnected with his other work,"²¹ I think it is fair to say that in Peirce's own estimation at least, no part of his work was unconnected with the other parts.

Not only has the true Peirce been somewhat distorted by undue emphasis on his logic and empiricism, but also the school of James and Dewey has taken yet another aspect of Peirce's thought, his pragmatism, and gone on to develop yet another side of Peirce. In the case of James and Dewey, of course, they have developed their own systems and do not have the responsibility of a critic to do Peirce's own philosophy justice. They used it as a springboard for their own thought. The only danger is in confusing James's or Dewey's pragmatism with Peirce's.

In this section, now, we wish to examine the implications of Peirce's pragmatic maxim, with emphasis on its relation to abduction and the admissibility of hypotheses. I will confess at the outset that this is undertaken in the hope of showing Peirce to be considerably more consistent on

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²¹Ibid.
these points than his critics have generally allowed. This
is a most important point since, as mentioned above, it has
been the subject of a continuing debate ever since the ap-
pearance of the Collected Papers, in which all sides of
Peirce are fairly represented. But, we might add, while we
are speaking generally, that perhaps what really needs to be
shown is not so much Peirce's consistency on this or that
point, as the truthfulness of this rule: namely, that in
dealing with a man as wide and deep in his sympathies and
approach as Peirce is, one needs always to interpret what he
says in the broadest possible sense and never in the narrow-
est. This will have the effect of eliminating many or most
of the apparent conflicts in his philosophy. This is just
the opposite procedure from that one should follow in study-
ing a man like Kant, who always used words with a very nar-
row meaning—and not always the same meaning for the same
word.

One formulation of Peirce's maxim is as follows:

Consider what effects, that might conceivably have
practical bearings, we conceive the object of our
conception to have. Then, our conception of these
effects is the whole of our conception of the ob-
ject. (5.2)

No end of trouble and contradictions face the critic
who interprets this maxim too narrowly. It just happens in
this case that a strict interpretation of the maxim--taking
each of the words seriously--is in fact wide enough for all
of Peirce's purposes (for he gave the maxim a careful formu-
lation), and difficulties arise, not from taking the maxim seriously and literally, but rather from forcibly narrowing its application.

For example, W. B. Gallie claims to find a serious problem in the fact that for any given concept, say the concept of 'wine,' no one is actually able to list in a strict, scientific and complete sense, all of the sensible consequences that are implied in it. Gallie points out that Peirce says many times that the whole meaning of a concept is in its possible practical consequences. But, Gallie reasons, if the whole meaning of a concept consists in a complete list of its empirical consequences, then the maxim is much too narrow to be of any use in ordinary affairs. Perhaps such a list could be drawn up for rigorously scientific concepts such as silver, or hardness, weight and force. But even the most common notions such as that of wine defy rigorous treatment.

We may therefore conclude that if Pragmatism, in its narrower form, were to be applied to most of our everyday, as opposed to our scientific, conceptions of different kinds of substance, nothing but useless pedantry would result.22

Gallie gives this thought considerable development, showing in several examples what he means and how Peirce's maxim fails. He discusses wine, time, the detective and his murder case, and the jar of alcohol on the laboratory shelf

22Gallie, op. cit., p. 168.
and how its continued existence is perilied by the charwoman
and the lab boy, all of which cases are designed to show the
futility of applying Peirce's maxim to anything but technical
scientific notions.

In all of this Gallie is fighting nothing but a straw
man--a creation of his own narrow reading of Peirce's maxim.
The pragmatic maxim does in fact say that the meaning of a
notion consists in all its conceivable practical consequences:
but it does not say or even imply that all of these practical
consequences have to be spelled out thoroughly and rigorous-
ly before the concept has any meaning at all. What the maxim
does imply is that enough of these consequences must be
spelled out in order, first, to insure that the concept has
sense, that is, can be tied down to the world of possible
sensible effects, and, second, to insure that the concept can
be distinguished from other similar concepts. In other words
the pragmatic maxim first proves that a concept is not empty
if it can be tied down to conceivable practical effects, and,
second, brings out its distinguishing features. The maxim
clears up hard words. Peirce never says that every possible
consequence must be listed in order to have a significant con-
cept. Of course, if every practical effect could be enume-
rated that would indeed constitute the entire meaning of the
concept--but this is an ideal, and I doubt that Peirce be-
lieved that it could ever be perfectly fulfilled in the case
even of the most rigorous scientific term because every term
whatever has a certain penumbra of vagueness, and if not the
term itself, then the terms used to explicate it. In fact,
who can doubt that to spell out all the possible empirical
consequences of an hypothesis or of a word like 'silver'
would be as pedantic in science as a similar treatment of
the word 'wine' would be in everyday life? The nearest
Peirce ever comes to supporting this interpretation of Gallie's
is where he says: "Retroduction / abduction/ is the provi-
sional adoption of a hypothesis because every possible conse-
quence of it is capable of experimental verification . . . ."
(1.68, my brackets) But the point even here is not that
"every possible consequence" must be tested, but merely must
be capable of being tested (but not necessarily tested dir-
ectly! Cf. 2.642f., and 5.597 and 599) Peirce says that
all the operations of chemistry have failed (in his day!) to
decompose hydrogen, but there is a priori reason to doubt
that all possible operations of chemistry have been tried on
this element or any other.

In another place Peirce says that hypotheses should
be "tested by experiment so far as practicable." (6.524, my
emph.) Wennerberg says, "W. B. Gallie has, I think, misunder-
stood the import of the pragmatic maxim." He supports this
conclusion with considerations similar to the ones I have

\[2\] Ibid., pp. 134f.

\[24\] Compare also Hjalmar Wennerberg, The Pragmatism of
offered above.

Gallie is aware that his narrow interpretation of the maxim is not the only possible one, and gives a wider interpretation, which coincides exactly with what I would say is the only reasonable interpretation of the maxim.\textsuperscript{25} There is no justification for his narrow interpretation. All of Peirce's references to the fact that the sum of the practical consequences gives us the meaning of a notion do not constitute an imperative for us to actually list all of them, but only express an ideal. The spirit and letter of the maxim are completely fulfilled when enough consequences are listed to show the concept to be different from other concepts and to show it to be a non-empty concept.

This brings the discussion to a much more important misunderstanding of the pragmatic maxim—a misunderstanding not limited to Gallie but including almost all critics with an empirical leaning. In a word, this misunderstanding consists in the idea that by all rights the pragmatic maxim ought to exclude metaphysical propositions of any kind from having meaning or admissibility as explanatory hypotheses. In this case it is possible to see some ground for the misunderstanding, but even in order to do this the maxim must be interpreted very narrowly indeed, and it is all but obvious that Peirce himself never meant the maxim to be used

\textsuperscript{25}See Gallie, \textit{op. cit.}, pp. 170f.
in this fashion.

We have already given some attention to the problem of what Peirce meant by hypothesis and abduction, and we will also need to study some of the specific applications Peirce himself gave of his maxim to metaphysical notions. Only in this way can a fair estimation be gained of Peirce's real intention in his maxim.

Peirce fully realized the difficulties involved in justifying induction and abduction as forms of argument. And he was perfectly serious when he suggested that the theory that each true induction is a miracle directly inspired by God was worthy of some respect. He of course did not believe it, but pointed out that as a solution it recognized the difficulty in its fullness, and tied its answer to an ultimate view of the universe. (2.690) His own justification of induction rests partly on his belief that man's mind has a kinship with nature, and partly upon the nature of induction itself (see 5.591f.), and partly on his realism. The matter hangs together organically.

Now, Peirce considered that his philosophy was a carefully integrated whole, and especially he thought of his pragmatic maxim as in close connection with his theory of hypothesis.

If you carefully consider the question of pragmatism you will see that it is nothing else than the question of the logic of abduction. That is, pragmatism proposes a certain maxim which, if sound,
must render needless any further rule as to the admissibility of hypotheses to rank as hypotheses, that is to say, as explanations of phenomena held as hopeful suggestions; and, furthermore, this is all that the maxim of pragmatism really pretends to do, at least so far as it is confined to logic, and is not understood as a proposition of psychology. (5.196)

This is a key sentence in that it has afforded encouragement to those who incline to find a modified positivism in Peirce—although to find such encouragement one has to overlook the context and in particular the last sentence of this very paragraph (see below).

Peirce anticipated that his maxim would be taken as if it were another formulation of the positivism of Comte and Poincare, and was at pains to deny any connection between his maxim and their position. (2.511n. and 5.198) Comte's positivism, as Peirce understood it, ruled out any hypothesis that could not be directly tested. Pushing this rule to its extreme, as Peirce rightly said was our duty, shows that nothing can be known about history—which is absurd. Nor does it permit predictions. Peirce has therefore ruled out at least the stark forms of positivism as being the correct interpretation of his maxim.

Kant, in his first Critique, had a good deal to say on the subject of hypotheses. It might be thought that there would be some similarity between Kant and Peirce on this point considering Peirce's long study of Kant and also because of certain remarks Peirce every so often scatters
throughout his writings, such as, "Kant (whom I more than admire) is nothing but a somewhat confused pragmatist." (5.525)

Kant gives extended treatment to the notion of hypothesis in his appendix to the Transcendental Dialectic, "The Regulative Employment of the Ideas of Pure Reason." In this section Kant argues that in spite of the fact that reason is led by various teleological connections in the world to form the idea of a creator God, such an idea cannot be called a true hypothesis because it has to do with no object of possible experience. The idea, strictly speaking, is empty. Nevertheless, the idea, if held critically, may serve as a principle to regulate empirical inquiry. A genuine hypothesis for Kant had to deal with an object of possible experience. Thus the scientific hypothesis that there existed "antediluvian monsters" was legitimate (although this quite overlooks the difficulty of finding the sense in which the past is subject to possible experience.) It is evident from this brief statement of Kant's view that there is here a strong streak of the positivism Peirce deplored in Comte, and that Kant's view, though somewhat closer to Peirce, is not identical with Peirce's view. This will be somewhat more clearly seen below.

There is, however, a possibility of bringing the two men closer together. According to Peirce's maxim, we must ask, "What practical consequences does the idea of a creator

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God lead to?" Answer (from Kant): "It leads us to investigate the world as if it were the product of intelligent creation." This, then, is the actual meaning of the word 'God' according to the maxim. In this sense it is not an empty concept, but there is nothing in this approach to offend Kant. Kant said, of course, a great deal about God that we are ignoring here, and I only mention this as an interesting line of thought that perhaps warrants fuller treatment. It will become clearer below that the gulf between Kant and Peirce is very wide and probably could not really be bridged by the line of thought indicated here.

Just what did Peirce mean by his pragmatic maxim, and what did he mean to exclude by it? Peirce goes some way toward answering these questions in these two sentences: "Suffice it to say once more that pragmatism is, in itself, no doctrine of metaphysics, no attempt to determine any truth of things. It is merely a method of ascertaining the meanings of hard words and of abstract concepts." (5.464) The fact that "in itself" the maxim teaches no doctrine of metaphysics shows again Peirce's desire to avoid positivism. Pragmatism of itself solves no real problem. More to the point perhaps is this unambiguous statement:

For my part, I cannot admit the proposition of Kant—that there are certain impassable bounds to human

27 See Feibleman, op. cit., p. 297. Of course, Comte would say as much of his own maxim.
knowledge; and, even if there are such bounds in regard to the infinite and absolute, the question of future life, as distinct from the question of immortality, does not transcend them. (6.556)

Interestingly enough, in support of this thesis he points to Comte's prediction that man can never determine the chemical constitution of the stars.

And finally, in all fairness to those who interpret the maxim more strictly than I think necessary, it must be acknowledged that there are places where Peirce himself seems to give it a narrow interpretation (especially in 1.68, quoted above), and particularly the way in a later article he seems to back away from too narrow an interpretation of the maxim—implying that even if he never committed himself in words to too radical an application of the maxim he nevertheless felt an impulse later on to put it in a broader perspective. This occurs in an article of 1902 where he said that the maxim was "only a step" in his fuller philosophy of synechism. And he pointed out that after an idea had been purified by an application of the maxim, "a still higher grade of clearness of thought can be attained by remembering that the only ultimate good which the practical facts to which it directs attention can subserve is to further the development of concrete reasonableness; so that the meaning of the concept does not lie in any individual reactions at all, but in the manner in which those reactions contribute to that development." (5.3) But even here he has not in the least abandoned the maxim, but rather called for a wide understanding of it.
Now in exactly what sense are we to understand Peirce when he says that the maxim determines the fitness of an hypothesis to be entertained? The best way to answer this is to examine several cases where Peirce applied the maxim and see how he himself used it. For a maxim so important in Peirce's system, he proved somewhat bashful about applying it to specific cases, and especially to those extreme cases in which we are so extraordinarily interested. Nevertheless, there are, among others, applications of the maxim to the concepts of time, substance, and hardness. There are in addition hints as to how the maxim should be applied to the idea of God. For further illustrative purposes I will apply it to the idea of absolute motion.

1. Time

Peirce's application of the pragmatic maxim to the concept of time (5.458ff.) is perhaps somewhat cursory, but I would not want to associate myself with Gallie's judgment that it is "surely simple-minded to a degree." That remark presupposes that someone else has had more success in rendering clear our idea of time than Peirce had. There is no consensus to this effect.

To be brief, Peirce finds the "practical" meaning of time to be something on this order: the past represents those events over which we have no control; the future, those

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28Gallie, op. cit., p. 169.
over which we have a measure of control; and the present, 
those which we are endeavoring to control. He is perhaps 
weakest in his formulation of the idea of the present, as 
he has rightly said, "As for the Present instant, it is so 
inscrutable that I wonder whether no sceptic has ever at-
tacked its reality." (5.459) This, as I say, is cursory, 
but it does fulfill to a sufficient degree the requirements 
of the maxim to show that time is not a meaningless concept 
and that the concept of the past, for example, can be "prac-
tically" distinguished from that of the future. This analy-
sis is not as thorough perhaps as it could be, but it is at 
least a step on the way to clarifying a hard word indeed and 
should not be dismissed. It is a good example of the way 
Peirce intended his maxim to be used.

2. Hardness

Much of what can be said of the concept of 'time' ap-
plies equally to the concept of 'hardness.' These are ab-
stract ideas which cannot be dismissed as ultimately irredu-
cible notions. Abstract ideas, along with every other idea, 
must "give account of themselves," in the words of Peirce's 
editors.29

A diamond may be said to be hard, because what is 
meant by 'hard' is, pragmatically, the ability to resist be-
ing scratched by many substances. A diamond that burned up

295.v and see 5.207.
before anyone had a chance to scratch it, can be said to be hard because it "would have" resisted scratching:

For to what else does the entire teaching of chemistry relate except to the "behavior" of different possible kinds of material substance? And in what does that behavior consist except that if a substance of a certain kind should be exposed to an agency of a certain kind, a certain kind of sensible result would ensue, according to our experience hitherto. As for the pragmaticist, it is precisely his position that nothing else than this can be so much as meant by saying that an object possesses a character. (5.457)

3. Bucharist

The cases so far considered are rather straightforward applications of the maxim. However, Peirce's analysis of the notion of substance is an instance of going to an extreme case to set his doctrine in clearer relief. Peirce takes the instance of the Catholic-Protestant controversy over the Bucharist. The Catholics maintain that the bread and wine are transformed or transubstantiated into the literal body and blood of Christ. They acknowledge that the elements retain the "accidents" of bread and wine, but contend that in their "substance" they are flesh and blood. In Peirce's estimation this is a fine example of a sham battle, and his reasons for so believing should be evident. But then he adds a mysterious closing sentence: "It is foolish for Catholics and Protestants to fancy themselves in disagreement about the elements of the sacrament, if they agree in regard to all their sensible effects, here and hereafter." (5.401)
How seriously he meant this I do not know, but if we assume he meant it seriously, it shows how very, very broadly he understood his pragmatic maxim. Consider the implications of the idea of "sensible effects hereafter." Well, the pragmatic maxim quite explicitly says that our idea of a thing consists in all its conceivable sensible effects.

I would not want to rest a great deal on this case alone, but the simple truth is that Peirce continually applies his maxim to just such extraordinary and "metaphysical" notions and these applications more than anything else explain his real intention in the maxim. What he says about the hypothesis of God will, I am confident, confirm this point.

On this point it is well to observe that in a late (1902) essay, Reasons' Rules, Peirce seems to reject his earlier treatment of the problem of transubstantiation. He says that the difference between the Catholic and Protestant views is real and consists in different future expectations:

The implication is that the layman may sometime know, presumably will, in another world; and that he may expect that if he ever does come to know, he will find the priest to be right. Thus, analysis shows that even in regard to so excessively metaphysical a matter, the belief, if there can be any belief, has to involve expectation as its very essence. (5,541)

The Protestant and Catholic thus have different expectations about what the future will reveal on this question and presumably one may say from this that their beliefs differ.

4. Absolute and Relative Motion.
Before considering the relation of the pragmatic maxim to the idea of God, we will take the opportunity here to examine the notion of absolute motion. Newton held that space and motion were absolute. By this he meant that even if there were only one object in the universe, it might be (significantly) said to move. Berkeley held the contrary view. Movement, he said, was nothing but change of distance between one body and another. Thus, if there were only one body in all of space, it could not be said to move, for there would be nothing relative to which it could move. This is an interesting argument, for Newton and Berkeley would agree that there are no practical differences between each other's hypothesis: that is, no sensible difference can be detected whichever hypothesis one adopts. At this point in the discussion, one is tempted to say that under Peirce's maxim there is no difference between the hypothesis of relative and absolute motion. But now Newton comes forward with a suggestion worthy of his genius. Consider, says Newton, the case of circular motion. Suppose the one object in the universe is a contrivance of two heavy weights connected with a rope of some length. True enough, there is no other object in the universe relative to which one can say that this contrivance is moving. But if one arranges a spring-scale to measure the tension in the rope, one can tell if the apparatus is spinning. If the apparatus is not spinning, no tension will be registered in the rope; but if the apparatus is spinning, centrifugal
force will pull on the rope. Thus, one can tell if there is motion even if there were only one thing in the universe.  

Clearly the experiment can never be tried. But, "consider what effects, that might conceivably have practical bearings . . . ." Newton's experiment is a thought experiment and can be nothing else. Yet he has shown in some sense a conceivable difference between his hypothesis and that of Berkeley, and no one can avoid at least feeling that he has clarified what we mean by these two "hard words." This is a wonderful case of clearing up to some degree a very hazy and confused difference between notions by following Peirce's injunction: that is, thinking of some conceivable practical difference between notions. One is constrained to believe that in some way or another Peirce has made a real contribution to philosophy at this point.

(Incidentally, Peirce knew of this controversy and sided with Newton. In 7.484ff. he examines Mach's modern arguments against Newton's view and gives them a pretty sound trouncing. Murphey, in his brief discussion, labors under the impression the Einstein's theories have served to refute

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See Isaac Newton, "Absolute and Relative Space, Time, and Motion," and George Berkeley, "Criticism of Newton's Doctrines on Space," in Arthur Danto and Sidney Morgenbesser (edd.), Philosophy of Science (New York: The World Publishing Co., 1960), pp. 322 to 335. One may very well raise the question: Is this contrivance described above "one thing"? If not, since it has parts, what would "one thing" be?
Newton's view, but I do not know how relativity theory has this implication, and doubt, in fact, that it does.

D. $\mathbb{E}$ God.

Peirce's treatment of the problem of theism "may be taken as an illustration of his metaphysical method stretched to its limits," says Manley Thompson. Peirce in 1905 stated clearly that his maxim would show that "almost" every proposition of "ontological metaphysics" was either gibberish or absurd. This, he said, made his philosophy a kind of "propositionalism"—but differing from positivism in three regards: (1) it retains the "precious essence" from metaphysics, (2) its "full acceptance of the main body of our instinctive beliefs," and (3) its insistence on scholastic realism. (5.423) Even in such a passage as this, designed on the surface to put alarm into the metaphysicians, there is really very little positivism left after all the qualifications are made. Realism is certainly a highly metaphysical doctrine.

$\mathbb{E}$ God

I wish to linger for a while over the problem of God's existence and discuss it in some detail, first, because what Peirce says on the subject is vastly interesting; second, because, as Manley Thompson indicates, it is an extreme test case of Peirce's theories on abduction and the admissibility

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31 Murphey, p. 382.
of hypotheses, and the results of this test case are very enlightening, and third, because it is in its own right one of the major problems of philosophy. But the second reason is paramount. A great number of Peirce's most illuminating remarks on his theory of abduction are made in the context of his discussion of God. Wennerberg says, "In A Neglected Argument for the Reality of God Peirce has given his best presentation of how he thinks that an inquiry in accordance with the scientific method ought to be performed."32

Long ago Kant observed that the problems of God, freedom, and immortality are the metaphysical questions par excellence. This is true in all three cases partly because of the vital bearing these problems have on all human life and conduct. These are not differences which make no difference. Other speculative questions such as, what constitutes a 'relation,' or an 'event,' are very interesting, no doubt, and, in so far as the whole of reality is interconnected, having bearing on all speculative questions, but they are, or at least seem to be, far removed from the real problems of human life, in a way that the problems of God, freedom, and immortality are not. But there is more justification for calling these the metaphysical question par excellence, than their bearing on human interests alone. For they also cut through virtually all other questions in such

a way that if they were solved many other major questions would fall into place, at least in general outline. This is particularly true in the case of the problem of the existence and nature of God. This is the problem of all problems both in a theoretical and a practical sense. There are few philosophical systems, if any, which do not find in this crucial issue, although it is very fashionable to pretend indifference to the question. This indifference mostly takes the form of an unstated presupposition that either it is so clear that God exists that argument is not called for to support the point, some even saying that such arguments are blasphemous, but also inasmuch as unbelievers may only be considered wholly perverse and wicked, or, on the other hand, that all modern thought has long since acknowledged that 'God is dead' and it would be a waste of time to kick a dead horse. But in fact, the question, in one form or another, has agitated man ever since the time of the Pre-socratics and is likely to continue to do so into the indefinite future. And, again, it is silly to act as if the question made no philosophical difference. Sartre, at least, has not made that pretense. He said once, in a frank moment, that his whole philosophy "is nothing else but an attempt to draw the full conclusions from a consistently atheistic position."33

To say that the doctrine of God is both important and interesting is not, however; to say that one must start with it and take as a presupposition one side of the question or another. Peirce at least has not done that. What he says about God is almost a direct outcome of philosophical positions he apparently had developed quite independently of any conscious consideration of how they might affect the question of theism. His defense of theism rests directly upon what he had come to believe on the subjects of abduction, instinct, and realism. These points he supports by considerations which have nothing to do with theism, and even those who disagree with Peirce's theism can surely admit that the hypothesis of God was no unnatural one for a man with Peirce's beliefs on these other points. Moreover it is in harmony with Peirce's emphasis on induction that so great a question as God's existence should come at the end rather than at the beginning of inquiry.

In Peirce's famous essay titled, "A Neglected Argument for the Reality of God," he begins with a summary of the outline of his whole philosophical system, especially the categories. This resume was certainly necessary if he was ever to hope to make his considerations on the subject of theism at all intelligible, much less persuasive, to his readers. After this resume he then expresses his opinion that if there is a benign God, there ought to be an argument for his existence "obvious to all minds, high and low alike." (6.457)
And not a mere abstract argument, but one "applicable to the
class of life." This brings to mind Hume's amused comments
at the opening of his section on Scepticism in his Enquiry:
How is it, Hume wonders, that the theologians on the one hand
debate whether any man can be so blind as to be an atheist,
and on the other busy themselves trying to devise proofs of
God's existence? But it is not at all inconceivable that
the 'theologians' are faced with the problem of making clear
to confused minds what in itself is clear and obvious in the
extreme--this at least is the way Peirce conceives his prob-
lem. He says, in this context, that "... facts that stand
before our face and eyes and stare us in the face are far from
being, in all cases, the ones most easily discerned." (6.162)

Peirce's main approach to God is through what he im-
pishly calls 'musement.' What he means by this is a kind of
mental play:

I have often occasion to walk at night, for about
a mile, over an entirely untravelled road, much of
it between open fields without a house in sight. The
circumstances are not favorable to severe study, but
are so to calm meditation. If the sky is clear, I
look at the stars in the silence, thinking how each
successive increase in the aperture of a telescope
makes many more of them visible than all that had
been visible before. The fact that the heavens do
not show a sheet of light proves that there are
vastly more dark bodies, say planets, than there are
suns. They must be inhabited, and most likely mil-
ions of them with beings much more intelligent than

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David Hume, "An Enquiry Concerning Human Understand-
ing," The English Philosophers From Bacon to Mill, Edwin A.
we are. For on the whole, the solar system seems one of the simplest; and presumably under more complicated phenomena greater intellectual power will be developed. What must be the social phenomena of such a world! How extraordinary are the minds even of the lower animals. We cannot appreciate our own powers any more than a writer can appreciate his own style, or a thinker the peculiar quality of his own thought... Let a man drink in such thoughts as come to him in contemplating the physico-psychical universe without any special purpose of his own; especially the universe of mind which coincides with the universe of matter. The idea of there being a God over it all of course will be often suggested; and the more he considers it, the more he will be enwapt with Love of this idea. He will ask himself whether or not there really is a God. If he allows instinct to speak, and searches his own heart, he will at length find that he cannot help believing it. I cannot tell how every man will think. I know the majority of men, especially educated men, are so full of pedantries—especially the male sex—that they cannot think straight about these things. But I can tell how a man must think if he is a pragmatist. (6.501)

Peirce elaborates on musement, saying that he does not mean by it what we would call reverie—an aimless, imbecilic wandering of the mind. But rather a more or less careful thought, lacking only a determined direction or purpose. Peirce likens it to play where one has "a lively exercise of one's powers." (6.1458) A reverie would have too little discipline—like playing tennis without a net.

He points out that it would not be scientific to sit down with the purpose of persuading oneself of God's existence, and, moreover, one would always suspect oneself of not reasoning fairly. One might say something here about the charge that is often leveled against theists, and to which Peirce might be considered open. And that is that our reasonings are or may be (Freud was confident enough for the former
expression) the illegitimate fruit of our unconscious desire to believe. This charge must be entirely dismissed as positively valueless and that for two irrefutable reasons. (1) The charge may with equal propriety be leveled against those of a contrary opinion, or against anyone with any opinion at all, at least if some kind of plausible explanation accompanies it, and thus nullifies itself. The charge implicitly denies the power of reason, and thus undercuts all rational discourse whatever, including whatever considerations may have been thought to lead to it itself. (2) No man can do anything more than reason honestly. If he permits conscious predilections to have weight with his reasonings, this will perhaps be dishonest. (On the use of the word 'perhaps' here, see the next paragraph). He can only hope that no illegitimate longings have slipped into his line of thought. If they have, he is still powerless to do anything about them, for, being unconscious of them, his position is hopeless. And the same applies to any man and any man's position whatever.

But, in this regard, we may anticipate our last chapter enough to point out that it is a cornerstone of Peirce's philosophy that human instincts, so far as they bear on judgment as well as on action are far from pernicious in their influence, but positively helpful. Freud's position that all men have a natural longing to believe in God is taken as true by Peirce, and not used of itself as a proof for God as in-
ferior thinkers have been wont to do, but used as a proof in the wider context of his whole philosophy of science and of knowledge which proposes to explain how the mind comes to any truth whatever. But this is not surprising, since Freud's approach was a kind of determinism and materialism, and opposed in almost every particular to Peirce's view of the world.

It is interesting again to observe the circularity involved in Freud's view and in Peirce's as well, and the difference between them.

But let us return to the idea of 'musement.' The mind must be given free reign when searching for an explanatory hypothesis. Creative leaps are notoriously unpredictable and cannot usually be forced. In the case of God and musement, the hypothesis has already been suggested, in that most people have heard talk of God from their earliest years. What Peirce is evidently trying to do is to get people to 're-discover' the hypothesis on their own, so that they will be able to see for themselves and from the 'inside' what a magnificent hypothesis it is, how beautifully it serves to interconnect all phenomena. And people, when they see this for themselves, will hopefully experience the same thrill of discovery and inner conviction of certainty that accompanies almost all important creative steps, whether they be in science, mathematics, music, or whatever, even when these steps are merely being retraced by the thinker. As has already been
pointed out, and as Peirce would be among the first to acknowledge, this instinctive and powerful feeling of certainty is no infallible guide—although as Poincare points out in his brilliant essay on creativity, such a feeling rarely if ever accompanies an hypothesis which would not have been beautiful and fitting and appropriate in at least a limited regard—even if it is a false hypothesis. But Peirce does not feel that the hypothesis of God stands anything to lose by reflection made upon it in a cool moment, when the flush of 'discovery' or 're-discovery' has passed. On the contrary, he holds that the hypothesis grows in power and beauty the more it is reflected upon. He believes that the hypothesis "will find response in every part of man's mind," (6.465) and consequently the hypothesis grows in power the more it is examined from every different perspective.

But there are several points that need to be cleared up. First, people who are accustomed to a certain kind of highly rigorous thought, perhaps scientists and mathematicians in general, will be inclined to object that this 'musement' is nothing in the world except a funny name for sloppy thinking—or if not 'sloppy thinking' exactly, then at least speculation of a very uncontrolled kind, that might conceivably lead on to any kind of guess which might strike one as clever and powerful. This charge has a good deal of truth in it from a certain viewpoint, but it is the viewpoint which badly needs correcting. Peirce observes that the kind

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35See Appendix A.
of 'free-thinking' he is encouraging in the process of muse-ment (is this what free-thinking has come to!) is precisely the kind of thought which is used in all significant discovery of matters of fact. To look toward the kind of rigid, 'controlled' thought one finds in deductive mathematics is again to commit that fallacy which underlies so much modern philosophy and which has already been explicated in some de-tail. But Peirce allows there is a second reason why people will suspect musement, and perhaps to a lesser extent, will suspect everything he has said on the wider subject of abduc-tion and instinct, and that is that people who have used that kind of thought, particularly the philosophers, have been so dogmatic as regards their conclusions, which, of course, never agree. But dogmatism is at bottom the same kind of sin the 'mathematical' philosophers make: the belief, or, only slightly better, the hope, that their conclusions are demonstrable or certain. It is, then, equally a mistake for the muser to become dogmatic as it is for the 'tough-thinker,' as he fancies himself, to scoff at musement on principle.

But there is another point which can profitably be raised in connection with musement, and that is, what kind of thought does Peirce have in mind exactly? Well, of course, it is part of the point of musement that one cannot answer that question 'exactly,' since the muser is supposed to come to the hypothesis by his own path so that he will feel the force of the discovery to the full extent. But any path will
suffice, in Peirce's view. The doctrine of God finds "response in every part of the mind" so the effect is the same whether one contemplates beauty, morality, life, physics, psychology, or philosophy in general. The only limitation is that one must not undertake a too vigorous logical analysis, first, because the subject of God, of all possible subjects, is most vague and unsuited to pre-mature efforts toward exactitude, and, second, because logical analysis is no way to make creative discoveries, but rather one is supposed to go on "automatic control" (6.462) in this experiment!

But on the question of what line musement will take, Peirce at least has given us samples taken from his own experience. For example, the things he described in the above quotation where he described the process of musement. Another sample is found later: "In growth, too, we find that the three Universes conspire; and a universal feature of it is provision for later stages in earlier ones. This is a specimen of certain lines of reflection which will inevitably suggest the hypothesis of God's reality." (6.465)

This argument mentioned here is a somewhat more subtle point that might at first appear. It is, in fact, the same point which seems to have been responsible for setting Bergson off on the construction of his very provocative evolutionary philosophy—not, be it noted, a naturalistic or mechanistic theory of evolution at all, but rather an evolution involving a highly occult force which works in a way
quite beyond the power of the human mind to fathom. It was this very phenomenon of uncanny "conspiracy," as Peirce calls it, which was the key to Bergson's theory, particularly the "conspiracy" that seems to be involved in the rise of highly complex organs and instincts which have these two features: (1) The whole life cycle of the organism depends upon them, and (2) An intermediate stage of development cannot be imagined. Such things as the web-spinning mechanism of the spider, the origin of wings in reptiles, birds, mammals, and insects, the instinct and organs for the building of functional wax cells in the case of the honey bee, and the phenomenon of metamorphosis—and sometimes even a double or triple metamorphosis—such phenomena as these are meant. If indeed there is a kind of teleological 'conspiracy' involved here, that will certainly make some people look to the hypothesis of God with some favor.

Peirce claims to have three arguments for the existence of God, but these are interconnected into something of an unclear tangle. The fact that musement leads one to God is his chief argument, and he calls it the "Humble Argument." He alleges that not only is musement the most powerful argument for God, but also it is the best argument since it does not depend upon rigorous analysis nor upon long formal education. In fact the argument takes its best form in the mind of the "clodhopper"—whence its name. (6.482) Nothing is more inimical to the argument than a little education which, when
it is broad, puffs a man up, giving him the feeling he has discovered or perhaps even created all the truths he has lately learned, while he does nothing but accept uncritically every new wind of doctrine, and, when it is narrow, making him feel that his competence in his specialty gives importance to whatever other opinions he may happen to hold.

This musement, then, is the humble argument. The "neglected" argument "consists in showing that the humble argument is the natural fruit of free meditation, since every heart will be ravished by the beauty and adorability of the Idea, when it is so pursued" (6,487) And the third argument, the one most relevant to our over-all purpose, is the study of "logical methodective" (6.488) which justifies the other two arguments philosophically. Peirce even goes so far as to say, in a later discussion of this third argument, that if his theory concerning the nature of human thinking is proved, then so is God's reality, so closely does that hypothesis follow from the epistemological foundation. (6.491) This is an amazing claim!

It is surely clear that Peirce's 'proofs' of God's reality are only probable in nature, as is the case for any proposition concerning matters of fact: he speaks of this "strictly hypothetical God." (6.467) For Peirce, as we understand, any matter of existence, including the self and the outside world, is an hypothesis. So although God is strictly hypothetical, he is known on the same ground as everything
else: by abduction. Whether one agrees with Peirce or not on the question of theism, it appears to me that Peirce is absolutely right in pointing to the notion that God is an hypothesis as much as any other matter of fact, an hypothesis arrived at by the same process as any other and to be judged by the same criteria: aesthetic or intuitive appeal, explanatory power, and agreement with other facts in so far as they are known.

This approach seems to me to be in conformity with the judgment of common sense. The ordinary man is not usually of the opinion that God's existence can be proved in the mathematical sense (what would be the room for faith?), nor does he ordinarily think that the idea of God is not even a legitimate speculation, as the positivists would have it. Thus Peirce justifies yet again his description of his philosophy as "critical common-sensism." In fact a good argument could be made that all of the main results of supposing all human knowledge to be inferential in nature are in conformity with common sense--perhaps with a minimum of explanation. This, if true, would have been important to Peirce, since he was persuaded that most of our 'everyday' notions are practically indubitable and it is useless to try to persuade ourselves otherwise on philosophical or rational grounds. Hume, of course, admitted as much.

If believers in the deductive perfection of the ontological argument ever have moments when they doubt God's ex-
istence, that shows they really don't believe the argument fully. Full belief acts like full belief all the time: i.e., never doubts. Likewise, if positivists ever, in the privacy of their chambers, suspect God's existence, it shows they really do not believe fully that he is not a real hypothesis. They make him a real hypothesis when they wonder, or, rather, they make the possibility of positivism's falsehood a real hypothesis. Perhaps one of the earliest statements of the pragmatic doctrine of belief was given in the Book of James: "Belief without works is dead." Critical common-sensism allows both believers and non-believers to doubt--without betraying their intellectual principles. For Peirce, nothing, under the right circumstances, is theoretically immune from doubt (a corollary of fallibilism), but many things are practically immune.

In the following quotation Peirce elaborates on the nature of a 'simple,' 'natural,' and 'facile' theory, all in the context of the Neglected Argument. His last sentence is very revealing.

Modern science has been built up after the model of Galileo, who founded it, on il lume naturale. That truly inspired prophet had said that, of two hypotheses, the simpler is to be preferred; but I was formerly one of those who, in our dull self-conceit fancying ourselves more sly than he, twisted the maxim to mean the logically simpler, the one that adds the least to what has been observed, in spite of three obvious objections: first, that so there was no support for any hypothesis; secondly, that by the same token we ought to content ourselves with simply formulating the special observations actually made; and thirdly, that every advance of science that further opens the
truth to our view discloses a world of unexpected complications. It was not until long experience forced me to realize that subsequent discoveries were every time showing I had been wrong, while those who understood the maxim as Galileo had done, early unlocked the secret, that the scales fell from my eyes and my mind awoke to the broad and flaming daylight that it is the simpler Hypothesis in the sense of the more facile and natural, the one that instinct suggests, that must be preferred; for the reason that, unless man have a natural bent in accordance with nature's, he has no chance of understanding nature at all. Many tests of this principal and positive fact, relating as well to my own studies as to the researches of others, have confirmed me in this opinion; and when I shall come to set them forth in a book, their array will convince everybody. Oh, no! I am forgetting that armour, impenetrable by accurate thought, in which the rank and file of minds are clad! They may, for example, get the notion that my proposition involves a denial of the rigidity of the laws of association: it would be quite on a par with much that is current. I do not mean that logical simplicity is a consideration of no value at all, but only that its value is badly secondary to that of simplicity in the other sense.

If, however, the maxim is correct in Galileo's sense, whence it follows that man has, in some degree, a divinatory power, primary or derived, like that of a wasp or a bird, then instances swarm to show that a certain altogether peculiar confidence in a hypothesis, not to be confounded with rash cocksureness, has a very appreciable value as a sign of the truth of the hypothesis. I regret I cannot give an account of certain interesting and almost convincing cases. The N. A. excites this peculiar confidence in the very highest degree. (6.477)

It might be possible to agree with Peirce's theory that all knowledge is abductive in nature, and that all creative leaps are abductive, while at the same time holding that there is a vast difference between the inference, say, that other personalities exist, and the theory that God exists. Just to take one consideration, one might allege that the
evidence of the senses is almost conclusive on the first point, but at best doubtful on the second. This might be an important consideration if the question were merely whether there are other human bodies in the world, but the point is not applicable to the question, are there other feeling centers or personalities (or 'souls' if you prefer) in the world. On this question all the sensory evidence is so far quite indirect and the leap of inference is based—on what? Partly on the evidence of the heart, if Peirce's lead may be followed. Peirce says:

We can know nothing except what we directly experience. So all that we can anyway know relates to experience. All the creations of our mind are but patchworks from experience. So that all our ideas are but ideas of real or transposed experiences. A word can mean nothing except the idea it calls up. So that we cannot even talk about anything but a knowable object. The unknowable about which Hamilton and the agnostics talk can be nothing but an Unknowable Knowable. The absolutely unknowable is a nonexistent existence. The Unknowable is a nominalistic heresy. (6.492)

Where would such an idea, say as that of God, come from, if not from direct experience? Would you make it a result of some kind of reasoning, good or bad? Why, reasoning can supply the mind with nothing in the world except an estimate of the value of a statistical ratio, that is, how often certain kinds of things are found in certain combinations in the ordinary course of experience. And scepticism in the sense of doubt of the validity of elementary ideas—which is really a proposal to turn the idea out of court and permit no inquiry into its applicability—is doubly condemned first as obstructing inquiry, and condemned second because it is treating some other than a statistical ratio as a thing to be argued about. No: as to God, open your eyes—and your heart, which is also a perceptive organ—and you see him. But you may ask, Don't you admit there are any delusions?
Yes: I may think a thing is black, and on close examination it may turn out to be bottle-green. But I cannot think a thing is black if there is no such thing to be seen as black. Neither can I think that a certain action is self-sacrificing, if no such thing as self-sacrifice exists, although it may be very rare. It is the nominalists, and the nominalists alone, who indulge in such scepticism, which the scientific method utterly condemns. (6.493)

Peirce here opens up another gold mine of suggestion. Can one deny that the 'heart' is a sensitive organ? What does this mean, anyway? That a man's whole being—rational, emotional, instinctive,—may feel a tug toward—toward what? ideas? people? both? more besides? Surely it is at least a minimal part of Peirce's meaning here that one must 'open one's heart' to the idea of God, perhaps in much the same way that one may consciously 'open one's heart' to a beggar or to someone in distress (these comparisons may not be fortunate). One must let the idea come under favorable scrutiny, one must nurture it and let it grow if it will, play with it and see how it would affect one's life and thought. This is a test of a hypothesis! This is nothing more than the nominalist does with his idea or anyone does with an idea he has come upon more or less originally. Peirce believes that the absolute sterility of nominalism as a way of looking at the world will not permit it to withstand 'open-hearted' comparison with realism, and, as a corollary, theism, for much longer than an hour or two.

But there is another passage which bears upon these points that is so rich in suggestion that it cannot be passed
If a pragmaticist is asked what he means by the word "God," he can only say that just as long acquaintance with a man of great character may deeply influence one's whole manner of conduct, so that a glance at his portrait may make a difference, just as almost living with Dr. Johnson enabled poor Boswell to write an immortal book and a really sublime book, just as long study of the works of Aristotle may make him an acquaintance, so if contemplation and study of the physico-psychical universe can imbue a man with principles of conduct analogous to the influence of a great man's works or conversation, then that analogue of a mind—for it is impossible to say that any human attribute is literally applicable—is what he means by "God." Of course, various great theologians explain that one cannot attribute reason to God, nor perception (which always involves an element of surprise and of learning what one did not know), and, in short, that his "mind" is necessarily so unlike ours, that some—though wrongly—high in the church say that it is only negatively, as being entirely different from everything else, that we can attach any meaning to the Name. This is not so; because the discoveries of science, their enabling us to predict what will be the course of nature, is proof conclusive that, though we cannot think any thought of God's, we can catch a fragment of His Thought, as it were.

Now such being the pragmaticist's answer to the question what he means by the word "God," the question whether there really is such a being is the question whether all physical science is merely the figment—the arbitrary figment—of the students of nature, and further whether the one lesson of the Gautama Boodha, Confucius, Socrates, and all who from any point of view have had their ways of conduct determined by meditation upon the physico-psychical universe, be only their arbitrary notion or be the Truth behind the appearances which the frivolous man does not think of; and whether the super-human courage which such contemplation has conferred upon priests who go to pass their lives with lepers and refuse all offers of rescue is mere silly fanaticism, the passion of a baby, or whether it is strength derived from the power of the truth. Now the only guide to the answer to this question lies in the power of the passion of love which more or less overmasters every agnostic scientist and everybody who seriously and deeply considers the universe. But whatever there may be of
argument in all this is as nothing, the merest nothing, in comparison to its force as an appeal to one's own instinct, which is to argument what substance is to shadow, what bedrock is to the built foundations of a cathedral. (6.502-3.)

We have already examined briefly the opening thought concerning the pragmatic meaning of the word "God." The point is well-taken, if in need of more examination. One would want to consider an analogous treatment of words which positivists would put in a similar category, words like: Satan, angel, soul, ghost, fairy. Do these words become meaningful too? If so, is there any word which can be discarded by the pragmatic criterion, or is it a tool for explication only?

But what can be said concerning the suggestion that to believe in a God, logically; or, as he puts it, that the man who rejects God must suppose science to be the "arbitrary figment" of the student of nature? Perhaps Peirce meant to suggest that if one accepts realism in principle, as the working scientist must, then realism will have theism as its final and reasonable conclusion, just as the man who accepts nominalism is impelled toward an ever deeper scepticism.

And the next point, the 'power of the truth' which has led men to acts of greatness and self-sacrifice, and which leads the rest of us to admire and applaud them--it is hardly possible to name any school-book philosophy which has shown this power to anything like the same degree nor have any of those systems had any great effect for good upon men of all classes and conditions, even when they have affected for good
some in the intelligentsia. Is this the power of "Truth" or of illusion? That illusion can be powerful, no one can deny, but is it powerful for good and is its power constructive? To affirm this in any strong sense is perhaps the final degree of scepticism—though of course the sceptic could only affirm it in a manner of speaking, since he knows not what is good or constructive. The whole point must be examined in the light of James' Varieties of Religious Experience—a book which opens the way to inquiry to a wonderful degree, and that not necessarily from James' remarks alone, but from the facts themselves which are presented.

Peirce acknowledges that his whole approach toward the question of God's existence depends upon the assumption that other minds will react to the hypothesis just as his does. He says that "... a latent tendency toward belief in God is a fundamental ingredient of the soul, and that, far from being a vicious or superstitious ingredient, it is simply the natural precipitate of meditation upon the origin of the Three Universes," and he adds that he believes this to be a fact characteristic of "universal human nature." (6.487) And again, he comments, "I have not pretended to have any other ground for my belief ... than my assumption, which each one of us makes, that my own intellectual disposition is normal. I am forced to confess that no pessimist will agree with me. I do not admit that pessimists are, at the same time, thoroughly sane, and in addition are endowed in normal measure with intellectual
vigor. . . " (6.484)

Actually, the assumption that human minds are essentially similar is less a matter of 'optimism' and 'pessimism' than it is another case of realism versus the sceptical approach to the world, which is, I take it, what Peirce was really saying. To argue from analogy that human minds are probably about as similar as human hands can have no effect upon one who refuses to draw analogies or generalizations on principle. In the case of God's existence, if its popular acceptability as a theory is granted, the nominalist can always point to this as the best illustration of the phenomenon of the Big Lie. It all depends on how one looks at the world.

In summary, Peirce believed that the hypothesis of God arises in precisely the same way as any scientific hypothesis arises, only differing from the ordinary hypothesis in that its "Plausibility . . . reaches an almost unparalleled height among deliberately formed hypotheses." (6.489)

What, then, are some conceivable consequences that can be deduced from this idea? How is it connected with reality? Peirce openly admits that in this case the hypothesis is so vague that only in "exceptional cases" can one deduce a definite consequence. Conscious, no doubt, that this is not a very satisfactory answer, Peirce now plays his trump card, and this trump card is nothing but his wide formulation of the pragmatic maxim. The hypothesis of God, Peirce points out, has a "commanding influence over the whole conduct of
life of its believers. According to that logical doctrine which
the present writer first formulated in 1873 and named Pragma-
tism, the true meaning of any product of the intellect lies
in whatever unitary determination it would impart to practi-
cal conduct under any and every conceivable circumstance,
supposing such conduct to be guided by reflexion carried to
an ultimate limit." (6.490) Thus, Peirce never abandoned
his pragmatic maxim, nor did he ever find it necessary to re-
word it or even reinterpret it: all he ever had to do was to
draw attention to its specific wording. The meaning of a no-
tion consists in all its conceivable consequences, in "any
and every" conceivable consequence. These consequences are
limited to a laboratory, but extend to all human conduct as
well, including, and especially including, mental conduct.

Needless to say, positivistically inclined commentators
are sadly distressed by the way Peirce gets himself out of
this bind. Thompson says, "It is not easy to see how this
circumstance [that the hypothesis has a "commanding influence
over the whole conduct of life of its believers" (6.490)7, if
granted, can afford a scientific test of the hypothesis and
counteract its being unverifiable in the ordinary sense.36
But he later admits that there is some point to this way of

36 Manley Thompson, The Pragmatic Philosophy of C. S.
143. Are we really clear on what the "ordinary sense" of
verifiability is?
viewing the matter. 37 And Buchler tries to make a rather sharp distinction between Peirce's formulation of the maxim where he uses words like 'sensible,' 'operation,' and 'verification,' and the places where he uses words like 'conduct,' 'self-control,' 'habit,' and 'purpose.' 38 The answer to this is that if one accepts a wide interpretation of the pragmatic maxim, "from this original form every truth that follows from any of the other forms of the maxim can be deduced, while some errors can be avoided into which other pragmatists have fallen," as Peirce says. (5.415)

That it was always Peirce's intention in the maxim to point one to the widest possible set of 'conceivable consequences,' is shown in case after case. Consider this statement:

I do not see why prayer may not be efficacious, or if not the prayer exactly, the state of mind of which the prayer is nothing more than the expression, namely the soul's consciousness of its relation to God, which is nothing more than precisely the pragmatic meaning of the name of God; so that, in that sense, prayer is simply calling upon the name of the Lord. (6.516)

I believe that Peirce knew very well what he was saying when he formulated his maxim, and, taken altogether, there is very little to commend Thompson's analysis of the problem we have been considering:

37 Ibid.
38 Buchler, op. cit., p. 153.
When Peirce's constant injunctions to test truth experimentally are taken in a literal sense, they of course preclude any attempt to give a true account of man's ultimate end except as that course of action which human nature is biologically and socially compelled to follow. Peirce himself wavered as to how literally he should take his own injunction. . . .

The pragmatic maxim itself is an excellent case in point. Literally, this maxim appears to render any proposition scientifically meaningless that implies no specific practical effects which would constitute its experimental verification. Peirce's suspicion that his maxim was stoic and nominalistic is in this respect justified, but he was also correct in pointing out that the realism he had advocated at the same time was inconsistent with this interpretation of the maxim. 39

Peirce had carefully warned his readers that his maxim "allows any flight of imagination, provided this imagination ultimately alights upon a possible practical effect; and thus many hypotheses may seem at first glance to be excluded by the pragmatically maxim that are not really so excluded." (5.196) In the eyes of some critics, Peirce's religious views may have been "flights of imagination" on Peirce's part, but Peirce had made careful provision for these beliefs, and to say that they have only a "rather tenuous" connection with his system 40 is once again to permit oneself to lop off whole sections of Peirce's thought without sufficient justification. Wennerberg very accurately observes that much hinges on what

39 Thompson, op. cit., p. 261.
40 Hartshorne and Weiss, op. cit., 6.4. 108.
one means when one speaks of "possible" practical effects.  

The point at issue here is, of course, that the situation in which someone with a given belief would be surprised must be possible in some sense of this word. Peirce has not explicitly declared what kind of possibility—logical, empirical, etc.—he has in mind in this context. And one can of course give different interpretations of the pragmatic maxim depending upon how one interprets the concept of possibility in this context.  

For myself, I cannot help but believe that Paul Weiss has correctly caught the spirit of Peirce when he observes that, though a good hypothesis ought to be readily refutable, ought not to contain unnecessary or redundant features and ought, in some sense, to be open to experimental verification, yet "it need not avoid the assumption of unobserved, unobservable, and even incredible elements, for without them there would be no history and no subatomic physics."  

And again, one can point to the passage where Peirce says that he does not mean by a 'practical consequence' a difference, for example, in the way one might answer a metaphysical question or a question about history: "Pragmatism is completely volitalized if you admit that sort of practicality." (5.33) It can not be a "species of practicality that consists in one's conduct about words and modes of

41 Wennerberg, op. cit., p. 139.

42 Ibid., Almost everything is possible in a logical sense. Unfortunately, Wennerberg does not go on to examine the implications of this observation of his.

43 Paul Weiss, "The Logic of the Creative Process," in Wiener and Young, op. cit., p. 178. Compare on this point 1.120; 2.511n.; 2.642.
expression." (Ibid.) But this would have to be compared to another passage, equally interesting and suggestive, where he says that our thinking about an hypothesis "really consists in making experiments upon it." (1,322) This latter is in accord with his insistence, explained above in the section on "Faculties," that no ideas are caught whole, but must be surveyed and examined in the brain—as when one thinks about the statement that the shortest distance between two points is a straight line. Very well, then; a mere difference in words is not a practical difference; but what about a real difference in conception discovered by the experiment of thinking on an idea—an idea unable to be tested in the real world? (Not that the mind is not part of the 'real world.') The question of absolute vs. relative motion is a good case in point. Again, perhaps the key to all this is that only conceivable practical consequences and differences must be available. Also it is quite possible that we will have to admit that if one takes the pragmatic maxim in the wide sense which Peirce usually gives it, it seems to lose most of its value in determining the admissibility of hypotheses—though it undoubtedly has value there—but rather has its main value in its use as a tool to teach us the real meaning of concepts—its value in clarifying notions and making us see what is really involved, in rescuing us from the hypnotic effect of philosophical jargon and long chains of reasoning involving highly abstruse conceptions. It is a means of bringing us
back to earth and making us talk sense and explain ourselves in terms that have "cash value," or at least a "conceivable" cash value! No one, certainly, can deny that Peirce repeatedly asserted that an hypothesis must have testable consequences in order to be fit to be entertained. Again, no one denies that it is immensely helpful to have directly testable consequences. But the problem is very grave, because almost everything seems to have consequences of some kind that are very indirectly testable. How, for example, can one test this proposed moral truth: "All men should love their neighbors as themselves."? As an hypothesis, it pre-eminently fits Peirce's suggestion that an hypothesis be 'idealistic' rather than 'materialistic'—a suggestion prompted by his conviction that 'idealistic' hypotheses will in fact be more rich in testable consequences. But just how one would go about testing this hypothesis is hard to say. Compare it with all other proposed maxims—see if they can't be subsumed under it? This would be a form of 'observation' as real as any other, for Peirce. It is very interesting, and relevant to our problem, this suggestion that the best hypotheses are the 'idealistic' ones rather than the 'materialistic' ones. Compare on this point the contempt Peirce expresses for 'mystical' theories, "by which," he says, "I mean all those which have no possibility of being mechanically explained." (6.125, in an essay of 1878. My emph.)

Or again consider Peirce's own theory of synechism.
This is a highly metaphysical idea involving the notion that ideas spread, that all things evolve and grow, including 'laws' themselves, that all things are in a continuum, and the idea of the importance of the phenomena basic to protoplasm and all other things as well, that of habit-taking.

Peirce says of this theory,

Such is our guess of the secret of the sphynx. To raise it from the rank of philosophical speculation to that of a scientific hypothesis, we must show that consequences can be deduced from it with more or less probability which can be compared with observation. We must show that there is some method of deducing the characters of the law which could result in this way by the action of habit-taking on purely fortuitous occurrences, and a method of ascertaining whether such characters belong to the actual laws of nature. (1.410)

But the discussion which follows, to no one's surprise, yields no suggestion of a test which one might in any sense call "mechanical" or indeed any kind of test at all. But this is true of almost all of Peirce's 'metaphysical' discussions and is his usual way of proceeding. One must suppose that his idea of testing a metaphysical hypothesis was broad and generous indeed.

In any case, one can't hold Peirce to too strict (or perhaps one should say, too materialistic) an interpretation of his testability criterion--not, at least if one has any inclination to save Peirce from the most blatant kind of contradiction--for no one can deny that he seriously proposed metaphysical hypotheses which cannot be tested in the way one tests chemical theories. It is probably best to look upon
this suggestion of Peirce's as "only a step" in his wider system and approach—as he himself said in a late essay—a point of view ultimately valid, perhaps always helpful, but not always easy to apply to abstruse theories. In this essay of 1902 Peirce bears out these points. He says of his pragmatic maxim, that,

The doctrine appears to assume that the end of man is action—a stoical axiom which, to the present writer at the age of sixty, does not recommend itself so forcibly as it did at thirty. If it be admitted, on the contrary, that action wants an end, and that that end must be something of a general description, then the spirit of the maxim itself, which is that we must look to the upshot of our concepts in order rightly to apprehend them, would direct us towards something different from practical facts, namely, to general ideas, as the true interpreters of our thought. Nevertheless, the maxim has approved itself to the writer, after many years of trial, as of great utility in leading to a relatively high grade of clearness of thought. He would venture to suggest that it should always be put into practice with conscientious thoroughness, but that, when that has been done, and not before, a still higher grade of clearness of thought can be attained by remembering that the only ultimate good which the practical facts to which it directs attention can subserve is to further the development of concrete reasonableness; so that the meaning of the concept does not lie in any individual reactions at all, but in the manner in which those reactions contribute that development. (5.3, my emph.)

These remarks ought to be given conclusive weight both because they reflect his own consistent application of the maxim, and because they show his mature evaluation of it. And if these remarks are given conclusive weight, we cease looking for "practical facts" as the final and ultimate interpreters of our thought, and rather look to "general ideas."
All the maxim is really trying to say, its real "spirit," as Peirce puts it, is merely that we look to the "upshot of our concept in order rightly to apprehend them . . . ." I cannot but believe that this not only was Peirce's definitive view of the matter, but also that it is in harmony with the spirit and literal wording of the maxim ("conceivable practical consequences"), and moreover it is his only salvation from the positivism he claimed to disavow and certainly never practiced. It is useful to point out that even Buchler admits that Peirce's intention in the pragmatic maxim ought to be judged from Peirce's own application of it. He says,

Undoubtedly, Peirce's own writings on matters metaphysical ought not to be judged in place of his programmatic pronouncements where the latter are not adequate enough for us to estimate the relations between pragmatism and metaphysics. But it is worthwhile venturing the opinion that a metaphysics consistent with pragmatism will not intentionally be filled with statements like "Active law is efficient reasonableness, or in other words is truly reasonable reasonableness. Reasonable reasonableness is Thirdness as Thirdness" (5.121).

Moreover, I am confident that what I have just said is amply borne out by the following note appended to his essay "How to Make Our Ideas Clear," and written in 1906. After stating the maxim, and using various forms of the word 'conceive' several times, he adds this note:

This employment five times over of derivates of conceipere must then have had a purpose. In point of fact it had two. One was to show that I was speaking

44 Buchler, op. cit., pp. 152 f.
of meaning in no other sense than that of intellectual purport. The other was to avoid all danger of being understood as attempting to explain a concept by percepts, images, schemata, or by anything but concepts. I did not, therefore, mean to say that acts, which are more strictly singular than anything, could constitute the purport, or adequate proper interpretation, of any symbol. I compared action to the finale of the symphony of thought, belief being a demicadence. Nobody conceives that the few bars at the end of a musical movement are the purpose of the movement. They may be called its upshot. But the figure obviously would not bear detailed application. I only mention it to show that the suspicion I myself expressed . . . after a too hasty rereading of the forgotten magazine paper, that it expressed a stoic, that is, a nominalistic, materialistic, and utterly philistine state of thought, was quite mistaken. (5.402n.3)

Thus in the end he defends his maxim against even his own narrow interpretation of it, or misinterpretation, by calling attention to its specific wording, and renouncing his own suspicion that it tended toward nominalism. He explains most clearly the sense in which 'practical' is to be taken. Concepts are to be explained by concepts!

B. Peirce and James

In the back of the critic's minds there may be the haunting fear that the mere admission of a metaphysical hypothesis, or the assertion that as a notion it may have practical effects, may bring Peirce dangerously close to the position of William James. But with Peirce and his maxim there is nothing said about the truth of an hypothesis. An hypothesis may be a genuine hypothesis with some reason for its support, and in a certain sense it may even 'work' without it being 'true.' Any hypothesis, no matter how well confirmed, may
be false. It was James and not Peirce who said, you can say of an idea "... either that 'it is useful because it is true' or that 'it is true because it is useful.' Both these phrases mean exactly the same thing.\textsuperscript{45} This is a most up-Peirceian notion. As far as I know, there is only one place where Peirce even suggests such a view. In one place (1.538) he says that the only justification for a judgment is that "it subsequently turns out to be useful." But, as Feibleman observes, "usefulness, in Peirce's meaning... usually proves to mean some step which aids in the discovery of truth. Indeed it would not be misleading to regard pragmatism as nothing more than the method that complements the correspondence theory of truth.\textsuperscript{46} Feibleman's last point is well taken. Peirce always insisted on the objectivity of truth: "That truth consists in a conformity of something independent of his thinking it to be so, or of any man's opinion on that subject." (5.211) And he immediately adds that the pragmatic translation of this is that truth is the ultimate result of inquiry. Whatever one says about this, it is not James's doctrine that what works is true, nor does it justify the fear that an hypothesis, just because it is a


legitimate one or even because it has a high degree of confirmation, must forthwith be taken as true. "Doing" was never the "Be-all and End-all" for Peirce's version of pragmatism.

Arthur O. Lovejoy, in an essay, "What Is the Pragmaticist Theory of Meaning?" betrays an almost total failure to understand Peirce, when he attributes to him this Jamesian position that thought exists solely for the sake of action. Peirce would, in fact, agree with Lovejoy's own criticism of this doctrine, when Lovejoy says,

It is, in short, no more evident--if one is to employ such expressions--that thought exists in man "for the sake of" action than that action exists for the sake of thought; and it is (I suggest) more probable that neither exists solely for the sake of the other. But the acceptance of the assumption by Peirce becomes somewhat intelligible if one recalls the intellectual climate of the 1870's . . . .

On this point a compromise seems to be possible between James and Peirce. Instead of making the radical statement that what works is true, it would be better to say (what James did say, though the more radical statement is more often quoted) that whatever works is so far true. "Any idea on which we can ride, so to speak; any idea that will carry us prosperously from any one part of our experience to any other part, linking things satisfactorily, working securely, simplifying, saving labor; is true for just so much, true in so far forth, true instrumentally." This is to say that a

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doctrine or theory that works has caught some of the spectrum of truth. Newtonian physics, for example, is false ultimately, but is true for a certain range of phenomena within a certain range of accuracy. It catches a good deal of truth in a few formulae. This surely is the reason it works within a certain range of reality. In any case it is apparent that James's statement cannot be thrown out as obvious nonsense, and that for this very good reason: If one believes that what is true works—and this is surely not so controversial—then it is certainly true that whatever works over the long run shares in the truth, approaches the truth to some minimal extent, or at least has a fighting chance of being true. The history of the world does not support the theory that falsehood and error work for very long. Error, it is commonly believed, has within it the seeds of failure and destruction, though these effects may not be immediate. Whoever believes this must surely seriously consider the corollary: that whatever does not fail over a period of time partakes in the truth—and even error while it succeeds, has, in a manner of speaking, that much truth to it, or again, at least that whatever does not fail over a period of time has a fighting chance of being true.49

In summary, Peirce conceived of his pragmatic maxim in

49 There is a splendid discussion of the relation between Peirce and James with regard to the pragmatic maxim in Buchler's book, *op. cit.*, pp. 166-174.
a wide sense. He had no intention of dismissing as meaningless all of man's most interesting problems. The primary purpose of his maxim was to clear up abstract notions by looking to their "upshot." Secondarily, the maxim served to show the meaninglessness of an hypothesis with no conceivable consequences. The only real problem in connection with this latter doctrine is in trying to find an example of an hypothesis with no conceivable consequences.

F. Peirce and Kant

A comparison of Kant and Peirce enables us to discern some interesting parallels. In a certain sense, Peirce's notion of abduction may be seen as taking place of Kant's notions of "understanding" and "reason." The role of these two faculties in Kant's scheme was to synthesize or unify a manifold, and the difference between them was only a difference in the kind of manifold they worked on. We have seen that for Peirce too the essence of the abductive process is its unifying character.

For Kant the synthesis yielded by the understanding is called "knowledge" because the understanding is in contact with the data of sense, and, in effect, confers objectivity upon them. The ideas of reason (God, the world, the soul), on the other hand, do not yield knowledge of these concepts, but only the idea of them as postulates. This inferiority in status is caused by the fact that reason works
only upon the manifold presented to it by the understanding, and is thus one step removed from the manifold of sense, and therefore cannot constitute reality in the way the understanding does. Still, the mind is drawn to the ideas of reason with a power bordering on compulsion, and is free to use the ideas as regulators of thought, provided it does not succumb to the "uncritical" and "dogmatic" temptation of regarding them as real and proved. This limitation of knowledge parallels the positivistic streak in Peirce, where he wishes to exclude abductions which have no conceivable practical consequences, i.e., which are out of touch with possible sensory experience. I am not claiming that this "positivistic streak" is fundamental to Peirce, or was his considered view, but I do not deny he flirted with it at times, and I do call attention to the rough way it parallels Kant's distinction between the claims derived from the understanding and from reason.

It is interesting to see how close Peirce's mature view--his wide interpretation of his pragmatic maxim--is to what Kant's view would have been if he could have seen his way clear to acknowledge that reason has as much right to 'constitutive' of the manifold of the understanding as the understanding has to be constitutive of the manifold of sense. Whether he ought, from his own principles, to have admitted that, I offer no opinion. I only draw attention to what the outcome would be in such a case.

A clue to this hypothetical outcome could be derived
from an examination of the chapter on the regulative employment of the ideas of pure reason—a chapter which in many ways is the heart of the Critique of Pure Reason. This is the chapter which gives that "critique," and it can be abstracted as follows:

Kant says plainly that reason has to do with the understanding just as the understanding has to do with the manifold of the object. The understanding applies the categories to the manifold of experience and thus yields a unity. In the same way, reason takes the concepts of understanding and "orders" them, and "gives them that unity which they can have only if they be employed in their widest possible application, that is, with a view to obtaining totality in the various series.50 Reason "unifies the manifold of concepts by means of ideas, positing a certain collective unity as the goal of the activities of the understanding."51

Reason, having no immediate relation to an object, therefore has no constitutive employment. Transcendental ideas of pure reason when regarded as constitutive are "dialectical" and "pseudo-rational." What reason does have is a regulative employment, namely, "that of directing the understanding towards a certain goal upon which the routes marked


51 Ibid., p. 533.
out by all its rules converge, as upon their point of intersection. This point is indeed a mere idea, a focus imaginarius, from which, since it lies quite outside the bounds of possible experience, the concepts of the understanding do not in reality proceed; none the less it serves to give to these concepts the greatest possible unity combined with the greatest possible extension." 52 Reason tends to be deluded into thinking that these converging lines actually do converge into a real point, lying just outside the field of empirically possible knowledge. This is an illusion, but it is a necessary one, for how else can the understanding extend its knowledge and application beyond the mere separate data it knows? Reason wishes to systematize and subsume under as few principles as possible the knowledge obtained for us by the understanding. In fact reason wishes to subsume everything under one principle. The principles of unity are not derived from nature; on the contrary, we interrogate nature in accordance with these ideas, and consider our knowledge as defective so long as it is not adequate to them. 53 In fact, Kant says, "the influence of reason on the classifications of the natural scientist is still easily detected." 54

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52 Ibid. Compare all of this with abduction!
53 Ibid., p. 534.
54 Ibid.,
Reason is used apodeictically when it searches for particular cases of what it already certainly knows as a universal. One has only to judge whether the particular is a case of the generalization. On the other hand, reason is employed hypothetically when it knows certain particular cases with certainty, but the universal of these cases is problematic, a "mere idea." If all particular cases point to the universal rule, we are inclined to argue for it. This hypothetical use of reason is not constitutive—that is, it does not strictly prove the rule. "The hypothetical employment of reason is regulative only; its sole aim is, so far as may be possible, to bring unity into the body of our detailed knowledge, and thereby to approximate the rule to universality."⁵⁵ Kant says further that this systematic unity "is the criterion of the truth of its rules."⁵⁶ This unity is not given, but only "projected," and it aids us in the special modes of employment of the understanding, and directs "its attention to cases which are not given, and thus rendering it more coherent."⁵⁷

Reason not only wishes to put detailed phenomena under various principles, but also wishes to put the principles all

⁵⁵ Ibid., p. 535.
⁵⁶ Ibid.,
⁵⁷ Ibid.
under one principle. But from all of this nothing can be inferred about the world: one is not even permitted to "in a certain measure postulate this unity a priori." 58

The way this doctrine works can be clearly seen in Kant's treatment of the self and of God. Here are two unities which bring under one idea a great diversity of phenomena. One does not say that these unities are necessarily to be met with, but merely that we must seek them "in the interests of reason." 59

All of this takes on a new significance from a Peircean standpoint. Peirce has no use for the distinction between reason and understanding. He suggests that the hypotheses of perception are no different from the hypotheses of conception, that hypotheses of physics and hypotheses of metaphysics are of the same general kind and are to be judged by the same standards and treated in the same way. In short, we are invited back into the realm of "dogmatism"—but with a difference: instead of making physics and metaphysics alike "dogmatic," Peirce treats them both as inhabitants of the realm of abduction, in which the doctrine of fallibilism is never to be left out of sight.

58 Ibid., p. 536. How one would do this sort of thing by "measures" is a hard question.

59 Ibid., p. 537.
CHAPTER III

FALLIBILISM: SELF-CORRECTIVE FEATURE OF THOUGHT

Peirce is a strange amalgam of the English temperament with the Continental temperament, but the English is predominant. One can see how easy it would have been for Peirce to become another Kant, especially in style, but also to a degree in substance. Indeed there are traces of this everywhere in Peirce's work, especially in those passages where he lapses into deep obscurity and begins to make up new and terrible expressions at a furious rate, where his sense of humor fails and his humanity disappears. Nor are these always his best passages. But they are the exceptions. The bulk of Peirce's work is English in spirit—lively, witty, clear, insouciant, impudent, full of love of style and hatred of nonsense.

This is not a mere matter of literary style, but it is true of philosophical style. It would be difficult if not impossible to imagine Hume reading Kant's philosophy with profit. Needless to say, Hume would not have liked the man—so dry, humorless, pedantic, arrogant, expounding a system so incredible in a style so barbaric. On the other hand, whether Hume could have read Peirce with profit is purely a matter of conjecture, but at least it is not impossible to imagine. As seen from the viewpoint of one who genuinely
enjoys the temperament and style of both men it is hard not to believe that they would have liked and respected one another, and it does not seem to one with this viewpoint that Hume could have dismissed Peirce's line of argument with contempt, but rather might very well have been impressed by it. Pure conjecture, indeed, but possible; and possibly true not only for Hume, but also for the other Englishmen—Berkeley, Locke, Reid, Mill, Bentham. But can one believe it of Hegel?! It is not possible.

Peirce's deep interest in and respect for science and logic immediately put him upon the English side of the philosophical fence.

I am saturated, through and through, with the spirit of the physical sciences. I have been a great student of logic, having read everything of any importance on the subject, devoting a great deal of time to medieval thought, without neglecting the works of the Greeks, the English, the Germans, the French, etc., and have produced systems of my own both in deductive and in inductive logic. (1.3)

Peirce's hard-headedness, his dislike of mysticism, his tendency to treat small issues and to support a large generalization upon many small considerations rather than upon one grand logical step—all of these things make him English. At bottom it is a matter of style and approach more than anything else that makes him English, especially since, in his conclusions, he almost never agrees with them, except for Reid, and here only to a degree. But he does not agree with the Continentals in conclusions either—he is closer to the
mediavals perhaps than any modern group, especially on the
overriding issue of realism vs. nominalism. He is an empir-
icist more than a rationalist, but he abhors the common-law
marriage of empiricism to nominalism. Nominalists have al-
ways tended toward empiricism, but from Peirce's point of
view the marriage is tragically sterile, for, although the
nominalists go to experience, they have made up their minds
beforehand to learn nothing from it. At one point Peirce
deplores "the superficial perspicuity of [nominalistic] meta-
physics [which] rendered [Mill's] logic extremely popular
with those who think, but do not think profoundly; who know
something of science, but more from the outside than the in-
side, and who for one reason or another delight in the sim-
plest theories even if they fail to cover the facts." (1.70)

Again, after relating how diligently he had studied
Kant, he says,

The effect of these studies was that I came to
hold the classical German philosophy to be, upon
its argumentative side, of little weight; although
I esteem it, perhaps am too partial to it, as a
rich mine of philosophical suggestions. The English
philosophy, meagre and crude, as it is, in its con-
ceptions, proceeds by surer methods and more accurate
logic. The doctrine of the association of ideas is,
to my thinking, the finest piece of philosophical
work of the pre-scientific ages. Yet I can but pro-
nounce English sensationalism to be entirely desti-
tute of any solid bottom. (1.5)

But perhaps the passage which best expresses Peirce's ambi-
valent feelings toward the sceptical, "tough-minded" thinkers
is the following:
There is a strong tendency in us all to be sceptical about there being any real meaning or law in things. This scepticism is strongest in the most masculine thinkers. I applaud scepticism with all my heart, provided it have four qualities: first, that it be sincere and real doubt; second, that it be aggressive; third, that it push inquiry; and fourth, that it stand ready to acknowledge what it now doubts, as soon as the doubted element comes clearly to light. To be angry with sceptics, who, whether they are aware of it or not, are the best friends of spiritual truth, is a manifest sign that the angry person is himself infected with scepticism—not, however, of the innocent and wholesome kind that tries to bring truth to light, but of the mendacious, clandestine, disguised, and conservative variety that is afraid of truth, although truth merely means the way to attain one's purposes. If the sceptics think that any account can be given of the phenomena of the universe while they leave Meaning out of account, by all means let them go ahead and try to do it. It is a most laudable and wholesome enterprise. But when they go so far as to say that there is no such idea in our minds, irreducible to anything else, I say to them, "Gentlemen, your strongest sentiment, to which I subscribe with all my heart, is that a man worth of that name will not allow petty intellectual predilections to blind him to truth, which consists in the conformity of his thought to his purposes. But you know there is such a thing as a defect of candor of which one is not oneself aware. You perceive, no doubt, that if there be an element of thought irreducible to any other, it would be hard, on your principles, to account for man's having it, unless he derived it from environing Nature. But if, because of that, you were to turn your gaze away from an idea that shines out clearly in your mind, you would be violating your principles in a very much more radical way." (1,344)

There is a sense, indeed, in which the English have been preeminently the "most masculine" thinkers, the tough-minded philosophers, but there is another sense in which most of philosophy in the 17th-19th centuries has been tough-minded. The English have got this reputation by the fact that so often they come to conclusions which seem to have so little
in them to comfort man--whatever comfort they give is mostly of the kind that comes from knowing the worst. But the sense in which most of the classical philosophers deserve this title is in this regard: that they long for certain conclusions, for an unshakable foundation on which to build a world-view. This of course is a natural desire--man has always hated doubt and uncertainty--but it was a natural desire made more intense by the development of science and mathematics with their apparent success in winning a consensus and, if not at present in full possession of all the truth, at least on the right track with every reason to hope for eventual success. This was much more than could be said about philosophy, and every philosopher looked upon himself as the very man to put an end to the scandal by setting metaphysics in order once and for all.

But it was this passionate desire to follow the mathematical model, to have a system with indubitable foundations and a logically air-tight development--it was this misguided effort which led to the most pernicious results. Chief among these results was the recurring tendency toward solipsism, subjectivity, or scepticism. Most of these philosophers thought of themselves as being "scientific" men, and in their minds the methods of the physical scientist and the mathematician were vaguely conceived to be similar (as indeed they are in a vague way). But from the hindsight Peirce affords, it is clear that a basic misunderstanding of methods was
involved here. The process of deduction is infallible in principle (only in principle), but is applicable mainly in the self-contained world of the mathematician and logician. But the process of induction, and even more particularly of abduction, is, by its very nature, fallible.

A. **Induction is a self-corrective process.**

The process of abduction suggests hypotheses to the mind, but we have already seen that it is by the process of induction that these suggestions are tested, refined, and a probably value assigned to them. Abduction is the key to all human knowledge in that it is the only creative act, but induction affords the method of keeping theories in touch with reality, of bounding the imagination and eliminating wild guesses. Thus the role which induction plays is hardly less important than the role of abduction—and in real investigative situations they are usually intertwined with each other and with deduction too. (Cf. 2.640, quoted above)

Since induction plays such an integral part in the knowing process, some of the chief features of the knowing process are identical with the characteristics of induction. In this section we shall examine some of Peirce's general remarks on the implications which the theory of induction have for the theory of knowledge itself.

The essay titled by Peirce "The First Rule of Logic" (5.574ff.) must surely be classed among the most brilliant
and provocative which Peirce wrote. The essay touches issues the most elemental. In it Peirce attempts to explicate the nature of inductive reasoning, and in the process he tries, as so many men have done before him, to lay the ax to the root of scepticism, and any original effort in this direction can only be of great interest to serious thinkers.

The main point of this profound essay can be put so simply that it sounds like a cliche or worse, and in fact it is a point that is in perfect accord with common sense—which is to say it is not in accord with much of what has passed for philosophy. But like all basic truths, if indeed it be a truth, it has enormous implications, particularly in that almost all of modern philosophy has been accomplished upon the opposite assumption, implicitly if not explicitly.

The main point is this: the more one reasons, the nearer to the truth one is likely to come. How indeed can this platitude have a claim to greatness? Because sceptical philosophers and philosophers who pattern their work after the mathematical model, which, to a large degree, includes any number of modern systems, do not work from that assumption at all, or, if they work from it, do so at the expense of ignoring many of their most fundamental themes which, if taken seriously, would preclude the use of that assumption.

Hume, more clearly than anyone, denied the maxim. In his masterpiece, A Treatise of Human Nature,60 he argues...

essentially that all knowledge is merely probable. But then the knowing process by which we judge that a thing is probable is itself a process subject to error. Thus the judgment that a thing is probable is itself merely probable.

Then one may pass judgment upon the cumulative weight of these two probabilities, and even then judge that the whole complex is still very highly probable. But what about this last judgment? It too is merely probable. Thus one is led into an infinite regress "till at last there remain nothing of the original probability, however great we may suppose it to have been, and however small the diminution by every new uncertainty."\(^6^1\) As Peirce puts it:

> You might as well say at once that reasoning is to be avoided because it has led to so much error; quite in the same philistine line of thought would that be; and so well in accord with the spirit of nominalism that I wonder some one does not put it forward. (1.383)

Hume's view of this matter is hidden in many ancient and respectable philosophers. Aquinas says, "A small mistake in the beginning is a great one in the end, according to the Philosopher in the first book of the De Caelo et Mundo.\(^6^2\)

It is a small step from believing this to believing that one ought not reason at all. In fact, to understand in a word the point Peirce makes in this essay one has merely to deny this sentiment of Aquinas and Aristotle. Bertrand

\(^{6^1}\) Ibid., p. 182.

\(^{6^2}\) Thomas Aquinas, On Being and Essence, Armand Maurer, trans. (Toronto, the Pontifical Institute of Mediaeval Studies, 1949), p. 25.
Russell puts the same point in a whimsical way, but though he means to be whimsical, he has stated Hume's literal view, and one can only wonder if Russell knows what he is saying—that is, does he really have a bona fide reply to this argument:

Logic was, formerly, the art of drawing inferences; it has now become the art of abstaining from inferences, since it has appeared that the inferences we naturally feel inclined to make are hardly ever valid. I conclude, therefore, that logic ought to be taught in schools with a view to teaching people not to reason. For, if they reason, they will almost certainly reason wrongly.63

This way of looking at the matter is fostered by the model of mathematics and Euclidian geometry, and it is an approach that has pervaded philosophy since the times of Euclid himself, if not before. In any kind of deductive scheme, error in the premises can only lead to more and more errors, and any error introduced into the chain of reasoning will likewise ruin the conclusion or conclusions, and the ruin will become more disastrous the further the chain of reasoning is carried.

Clearly, on the other hand, induction is a self-corrective process. The more samples one takes, the nearer to the truth one comes, and, where one can take samples indefinitely, one can approach the truth as nearly as one wants. But it is at the root of Peirce's system that all synthetic

thinking whatever partakes to some degree of the characteristics of induction, and, thus, **all** thinking has this virtue of being self-corrective. This, if true, would be a wonderful discovery, showing at once the futility of the sceptical method in philosophy as well as the ratio-deductive method, and confirming the inductive, so-called "scientific method."

But how can one say that **all** thought partakes of some of the characteristics of induction, when deduction seems to be, on the surface at least, a form of reasoning entirely unrelated to induction? Peirce gives a diagrammatically simple case. Imagine a column of figures to be added. No one adding them together, unless he is very accustomed to doing sums, will be absolutely sure that the result is accurate, and, if accuracy is very important, he will want to add it up a couple more times or use one of the systems designed to check the addition. But what in the world is this but taking a vote, a sample? It is a form of induction. The same thing applies to any deductive chain. In a geometrical proof one equally feels the compulsion to go back and check the reasoning. To be sure, a deduction is **theoretically** infallible, but it is never anything more than a **theoretical** infallibility. In practice error may creep into even the most simple deduction—in fact errors are every so often found in mathematical proofs of the most rigorous kind which had been thought accurate for generations. (cf. 1.248)

Is it possible that two plus two does not equal four?
Certainly it is possible, says Peirce. (2.192) It is possible that two plus two is not equal to four, but we do not doubt it for a moment. Mathematical reasoning is beyond all doubt, but is fallible. (Cf. 7.108f.; 2.192) Similarly we may be quite confident that most of our common sense beliefs are true, but we can not be sure which ones. (4.63; 5.311)

This whole line of reasoning is strongly reinforced by all of the arguments Peirce used in the "Faculties" essays to show that all reasoning of whatever kind must be fallible because of the fact that thinking is a process in time.

But what of Peirce's contention that the ratiocinative process, the more it is pursued, tends not only to correct its conclusions, but also even the premises from which it starts? On this point, Peirce observes:

The theory of Aristotle is that a necessary conclusion is just equally as certain as its premises, while a probable conclusion is somewhat less so. Hence, he was driven to his strange distinction between what is better known to Nature and what is better known to us. But were every probable inference less certain than its premises, science, which piles inference upon inference, often quite deeply, would soon be in a bad way. Every astronomer, however, is familiar with the fact that the catalogue place of a fundamental star, which is the result of elaborate reasoning, is far more accurate than any of the observations from which it was deduced. (5.575)

And of even more moment is Peirce's assertion that imperfect reason can perfect itself! (2.195)

Peirce even gives an example of a mathematical process, into which random errors may be introduced, but which
tends to correct itself the longer it is pursued. But he admits that the process of correcting premises is not "so sure, or at least so swift," in a deductive chain as in an inductive argument. But he still maintains that even deduction is self-corrective:

Deductive inquiry, then, has its errors; and it corrects them too. But it is by no means so sure, or at least so swift to do this as is Inductive science. A celebrated error in the Mechanique Celeste concerning the amount of theoretical acceleration of the moon's mean motion deceived the whole world of astronomy for more than half a century. Errors of reasoning in the first book of Euclid's Elements, the logic of which book was for two thousand years subjected to more careful criticism than any other piece of reasoning without exception ever was or probably ever will be, only became known after the non-Euclidean geometry had been developed. The certainty of mathematical reasoning, however, lies in this, that once an error is suspected, the whole world is speedily in accord about it. (5.577) my emph.

Peirce does not mean that there is a "logical" possibility for error in deductive reasoning; only that the one doing the reasoning, whether man or machine, may introduce an error. But however the error may get there, it is still an error at the end and the whole process is fallible. A chain is also as weak as its weakest link. There is a temptation to say that there is something very Hegelian about Peirce's view of the process of coming to the truth. Peirce says,

This calls to mind one of the most wonderful features of reasoning and one of the most important philosophes in the doctrine of science, of which, however, you will search in vain for any mention in any book I can think of; namely, that reasoning tends to correct itself, and the more so, the more wisely its plan is
laid. Nay, it not only corrects its conclusions, it even corrects its premises. (5.575)

And a bit later he adds,

So it appears that this marvelous self-correcting property of Reason, which Hegel made so much of, belongs to every sort of science, although it appears as essential, intrinsic, and inevitable only in the highest type of reasoning, which is induction. (5.579)

There appears to be a bit of trouble here as to whether Peirce has ever read about this principle before or whether Hegel enunciated it, at least in some sense, but the point is clear anyway. The idea seems to be that wherever one commences to reason, no matter if on an entirely false premise, the process of continuing to think long enough will slowly begin to eliminate errors as a self-consistent picture begins to emerge. Peirce's quarrel with Hegel is that Hegel merely follows his own inclinations in his chain of reasoning, which, in his case at least, is very often most fanciful, and ignores the facts of nature, history, and science. The scientific method of course has as one of its axioms that one continually checks one's reasoning against experience, and not dictate to the world on the assumption that man's reasoning power is so strong that it can go unhindered from truth to truth. And yet, with this exception duly noted, there is much in common between Hegel's and Peirce's view of the growth of knowledge: Reality as a seamless, growing whole, which the mind

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64 This has been disputed by some Hegel scholars, e.g., John Niemayer Findlay, Hegel, A Re-examination (London: Allen and Unwin, 1958).
knows by a process of widening the circumference of knowledge --rather than by deducing bits of information in a line leading down from first principles (though Hegel must be thought of as using a pseudo-deductive method--it has little in common with mathematical or logical deduction). The image of a circle is here very helpful--a circle which grows by gradually and often imperceptibly filling in gaps of ignorance by creative leaps of inference, in much the same way a jig-saw puzzle is gradually put together, except there are no outer bounds--but neither is there a foundation piece: any place will do to start. One could easily argue, if one wished, that it is impossible in principle to put a jig-saw puzzle together since there is an infinite number of possible ways one might unsuccessfully attempt to piece together any two pieces, (there are an infinite number of points on the circumference of each of the two pieces.) On this point Whitehead gave William James the credit for discovering "intuitively the great truth with which modern logic is now wrestling"--"that every finite set of premises must indicate notions which are excluded from its direct purview."65 This remark seems to be pointing to the problem of trying to see any part of our knowledge as a self-contained whole, when in fact every "part" is radically intertwined with the whole in

a web-like or organic fashion. 66

It is impossible to overestimate the importance of this whole point in Peirce's thinking. And of course either Peirce is wrong through and through on this topic, orsomething very like this is the case, and, if so, how much of modern philosophy is undermined—and how many of its puzzles and enigmas vanish! I say "Modern," not meaning by that any particular reference to some of the extraordinary sects in modern philosophy, nor meaning particularly to exclude ancient philosophy, since it is clear that what has been said is applicable to much ancient thought, but rather meaning to emphasize the "classical" philosophers generally from Descartes down, and including most of the moderns.

If Peirce's view is correct, no one need fear to tackle any problem for fear of not knowing how to start or for fear of starting from the wrong assumptions. If reasoning tends to grow and correct itself as it goes along, the thing to do is to start. Peirce says that the phenomenon of self-correction "is a property so deeply saturating (inquiry's) inmost nature that it may truly be said that there is but one thing needful for learning the truth, and that is a hearty and active desire to learn what is true." (5.582) This is not to say that a lot of effort might not be wasted in starting off from totally erroneous assumptions, or that shrewd

66Whitehead gave lavish praise to James for this and other discoveries, not realizing how much James was in debt to Peirce. So says Max H. Fisch in op. cit., p. 4.
and careful planning of approach is not very valuable, but merely to say that in the last analysis it is dispensable. The "first rule of logic," the "life of science," however, is this: that one love the truth! (cf. 1.135, and 1.235) From this all else follows.

None of this should be taken to imply that the truth is easy to come by—far from it—but what it does imply is very significant, namely, that effort toward finding it is sure to be rewarded to a degree and at last. Even in a science, or, if one prefers, a discipline, as abstruse and as wracked by internal wars as philosophy, there has been some slight progress through the years if it consists in nothing more than the elimination of some of the more incredible alternatives. And every man's labor has contributed to this progress, perhaps not least of all those who have elaborated to their most unbelievable conclusions those systems now universally rejected.

B. Fallibilism and the Way out of Philosophical Scepticism.

Nature cannot be cheated. If induction has this wonderful property of being self-corrective, it has also a corresponding drawback, and that is that it is not an infallible reasoning process. Errors may creep in. And this truth is as basic to epistemology and all philosophy as the first truth is, with as many far-reaching implications. The first of these is this:
Demonstrative proof is not to be thought of. The demonstrations of the metaphysicians are all moonshine. (1.7)

And again,

Religious infallibilism, caught in the current of the times shows symptoms of declaring itself to be only practically speaking infallible; and when it has thus once confessed itself subject to gradations, there will remain over no relic of the good old tenth-century infallibilism, except that of the infallible scientists . . . . (1.8)

Though infallibility in scientific matters seems to me irresistibly comical, I should be in a sad way if I could not retain a high respect for those who lay claim to it, for they comprise the greater part of the people who have any conversation at all. When I say they lay claim to it, I mean they assume the functions of it quite naturally and unconsciously. The full meaning of the adage Humanum est errare, they have never waked up to. In those sciences of measurement which are the least subject to error--metrology, geodesy, and metrical astronomy--no man of self-respect ever now states his results, without affixing to it its probable error; and if this practice is not followed in other sciences it is because in those the probable errors are too vast to be estimated. (1.9)

As a result of this small principle of fallibilism one is freed of the necessity to go ever inward in the futile search for indubitable truths--one can then in all good conscience look outward toward the real world and the world of common sense without the fear that a list of conceivable objections has to be taken with morbid seriousness. Fallibilism is a "revolutionary" doctrine, says Buchler!67 "All my philosophy," says Peirce, "has grown from fallibilism!" (1.14)

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67 Buchler, op. cit., p. 177.
Clearly we are on very important ground.

How the notion of fallibilism applies to Descartes has already been seen. But for the purpose of making crystal-clear how vast a significance the doctrine of fallibilism has, as well as for the purpose of raising some other interesting points, consider now how the doctrine applies to Hume and Kant.

Concerning Hume, it is quite easy to see how a desire for perfect certainty can make one a sceptic, just as a too overweening desire for all the money in the world would likely render a man a pauper before his adventures were over. Hume has given a very good definition of what constitutes scepticism which is particularly interesting when viewed from Peircian principles:

But that all Berkeley's arguments, though otherwise intended, are in reality, merely sceptical, appears from this, that they admit of no answer and produce no conviction. Their only effect is to cause that momentary amazement and irresolution and confusion, which is the result of scepticism.  

The interesting question to raise here is this: was Hume a sceptic? If the sceptical arguments "do not produce conviction"—as indeed it is easy to agree they do not—does one then believe them? It is a contradiction in terms. The fact that Hume could only 'believe' his doctrines when isolated from the world in his study, the fact that 'nature overcomes all doubts' ought, perhaps, have given Hume reason to

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68 Hume, Enquiry, p. 682.
believe in the possibility of his having somewhere made a serious error in his approach. It is interesting, this admission that sceptical arguments produce no conviction, for ordinarily one says of other such arguments that they are no good. But Hume would have been insulted if anyone else had said that of his efforts.

But now consider some of his specific points:

Hume employs three arguments against reason, and this desire for certainty is at the root of the two of them that have already been mentioned: first, the argument that if reason is doubted initially, there is no way to justify it except by a reasoning process which is suspect according to the original doubt. The remedy for this, as already pointed out, must, it appears, be to refrain from making the original doubt, which in any case can hardly be more than a paper doubt, but rather to jump in medias res, to radically break into this vicious circle with a bold, if, for the moment, ungrounded, hypothesis. Second is Hume's argument that reason leads to contradictions. But this argument, at least as developed by Hume, is unsuccessful, because Hume thought the notion of infinity was contradictory, which is not necessarily the case. The argument is not a good one even on Hume's principles, for if reason is so weak and unreliable as Hume argues, we may fairly assume that any contradictions

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69Hume, Enquiry, pp. 683f.
into which we are led are the result of errors on the part of the reasoner and not reason itself. But the third argument is the one important for our discussion here, and that is that if, in any given case of reasoning, the possibility of error is acknowledged, one is only dealing with a probability, and the conclusion that it is a probability is itself another such probable conclusion and so on indefinitely. Here, more clearly than anywhere, it is apparent that this desire for certainty, this feeling that a merely probable conclusion is positively worthless, is the root of the trouble. Whenever Hume speaks of knowledge, he always means absolute and certain knowledge. To him there is all the difference in the world between an overwhelmingly high probability and knowledge. "But knowledge and probability are of such contrary and disagreeing natures, that they cannot well run insensibly into each other . . . ."\(^7\) Paradoxically, here is where Hume and Peirce come to an agreement (and it is not the only place, as we will see on the question of instinct). Hume and Peirce in fact agree that no 'knowledge' in Hume's sense exists, i.e., nothing is infallibly certain. All that exists is high probability: but in common language

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as well as in pragmatic language, high probability—so high that the human mind is incapable of entertaining a real, living doubt—is called knowledge!

Part of the trouble lies in this, that Hume does not seem to have a feel for the place of hypothesis in human knowledge. Modern science, perhaps under the influence of Hume, has come to feel that knowledge consists more in those things that cannot be disproved than those things, if any, that can. Consider the casual theory of perception. Few notions enjoy more universal assent among ordinary people. But yet it is a theory that stands in need of proof. There is here something to be accounted for, namely, the appearance of phenomena before the mind. Supposing the existence of a so-called noumenal world, are the phenomena then consistently explained thereby? Yes. Is there any known way to disprove the possibility of the existence of the noumenal world? No. Very well, then, shall we let this theory become knowledge? Granted that this is not the kind of knowledge Hume wanted, and that indeed and in principle it is very greatly inferior to certain knowledge. But grant too that one must have a word to describe the condition of a theory that is in perfect harmony with all of the known facts, that satisfies our sense of relevance, and that cannot be disproved.

But in this case at least there are alternative theories which account for phenomena and enjoy the same status, that is, they are not subject to disproof: there is Descartes' theory that a demon puts all these notions in our head—
similar in fact to Berkeley's theory, and there is also the possibility that the mind imposes all images upon itself as in dreams and madness it shows itself capable of imposing some images upon itself. Both these theories are equally as simple and coherent as the external world theory, and perhaps more so. By what conceivable criterion does one pick between the theories?

Hume answers over and over again with what amounts to Peirce's reply, as mentioned above, that one's choice in matters such as this is determined by a "blind and powerful instinct of nature." 71

This is an amazing outcome. It does not mean that one ignores empirical or rational considerations. To rely solely upon instinct would certainly be a radical repudiation of both the five senses and the mind. Rather one uses reason as far as one can go, provided one does not let it lead one to a conclusion that is impossible to be believed in a living sense. But if one comes at last to alternative theories all acceptable to reason and none of which can be finally disproved with some kind of crucial experiment, then "the sensitive part of our nature" can legitimately be called in for decision. This sounds far more radical than it really is. It becomes more acceptable when it is realized how fundamental a role instinct plays in the very process of inventing alternative theories. If the mind must depend upon some "occult" or "creative" power for the invention of theories,
it is hardly in any position to object with too much vio-
ence if that same faculty must be called in for a final de-
cision--after the theories have been tested and purified in
so far as possible by empirical and rational tests. The mat-
ter is perfectly illustrated by the problem of the existence
of the external world. No theory could be more logically
air-tight than solipsism. Berkeley's theory and the theory
of the external world are at best equal in simplicity and
coherence to solipsism. (I say "at best" because if one
takes the maxim that entities are not to be multiplied be-
yond necessity, solipsism has the best claim to our atten-
tion.) But the community settles upon the theory of the ex-
ternal world as, in some sense, the most satisfying and be-
lievable. If we can believe for any reason, with Peirce,
that our "sensitive nature" is in tune with the universe,
(and Peirce gives us many reasons for believing so), we can
rest content, counting the theory as literally demonstrated--
i.e., supported by considerations which satisfy thoroughly.

And finally, on this subject of the demonstrative ap-
proach to philosophy, one might examine Kant in the light of
Peirce's notions. Kant certainly wished to undermine Hume-
an scepticism, and to do this he looked for certainties, not
mere probabilities. At one point he says of our most funda-
mental notions, the categories, that they "must either be
grounded a priori in the understanding, or must be entirely
given up as a mere phantom of the brain. But Peirce viewed the results of Kant's work as merely a more elaborate form of nominalism (an "anti-metaphysical scepticism," according to Buchler. This might be a profitable line of investigation, but it would not be an easy one because of the differences in Kant interpretation. It does seem to be true, in general, however, that if one ignores the "revolution" part of Kant's philosophy, there are some rough parallels with Peirce. The ideas of the understanding and the ideas of pure reason unify experience. The mind tries to fit experience into them, in so far as possible. But this is just what Peirce believes in his doctrine of hypothesis. The mind is driven to a very good hypothesis such as that of space or time by long experience, and then, out of the force of habit, the mind seeks to make all experience fall under that hypothesis. Thus the mind, for example, is driven, just as in Kant, to the idea of God as a great harmonizing hypothesis.

To be sure, the certainty that Kant wanted, which, indeed motivated his whole search, is lost on Peirce's view. A man can always will to be a sceptic, and sceptics can't be got rid of as Kant wanted to do. But Peirce's whole philosophy can be viewed as an effort to show the sceptic the unreasonableness of his position, and how his problems can, to a very large degree, be answered.

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72 Kant, op. cit., p. 125.
The search for certainty has proved to be to the modern mind what the search for a method of transforming base metals into gold was to the middle ages—or the search for a perpetual motion machine or an elixir of youth. Fallacies all. And for reasons relatively easy to grasp from the modern vantage point. But the fallacy of the search for certainty is the most pernicious of them all. As Peirce says: "Approximation must be the fabric out of which our philosophy has to be built." (1.404, my emphasis)

Consider from the standpoint of Peirce's theories the following informal comments of Russell:

On reaching the age of eighty it is reasonable to suppose that the bulk of one's work is done, and that what remains to do will be of less importance. The serious part of my life ever since boyhood has been devoted to two different objects which for a long time remained separate and have only in recent years united into a single whole. I wanted, on the one hand, to find out whether anything could be known; and on the other hand to do whatever might be possible toward creating a happier world. Up to the age of thirty-eight I gave most of my energies to the first of these tasks. I was troubled by skepticism and unwillingly forced to the conclusion that most of what passes for knowledge is open to reasonable doubt. I wanted certainty in the kind of way in which people want religious faith. I thought that certainty is more likely to be found in mathematics than elsewhere. But I discovered that many mathematical demonstrations, which my teachers expected me to accept, were full of fallacies, and that, if certainty were indeed discoverable in mathematics, it would be in a new kind of mathematics, with more solid foundations than those that had hitherto been thought secure. But as the work proceeded, I was continually reminded of the fable about the elephant and the tortoise. Having constructed an elephant upon which the mathematical world could rest, I found the elephant tottering, and proceeded to construct a tortoise to keep the elephant
from falling. But the tortoise was no more secure than the elephant, and after some twenty years of very arduous toil, I came to the conclusion that there was nothing more that I could do in the way of making mathematical knowledge indubitable.74

And again:

Mill's law of causation is, in fact, only roughly and approximately true in an everyday and unscientific sense. Nevertheless, he thinks it is proved by an inference which elsewhere he considers very shaky; that of induction by simply enumeration. This process is not only shaky, but can be proved quite definitely to lead to false consequences more often than true ones. If you find n objects all of which possess two properties, A and B, and you then find another object possessing the property A, it can easily be proved that it is unlikely to possess the property B. This is concealed from common sense by the fact that our animal propensity toward induction is confined to the sort of cases in which induction is liable to give correct results. Take the following as an example of an induction which no one would make; all the sheep that Kant ever saw were within ten miles of Konigsberg, but he felt no inclination to induce that all sheep were within ten miles of Konigsberg.

Modern physics does not use induction in the old sense at all. It makes enormous theories without pretending that they are in any exact sense true, and uses them only hypothetically until new facts turn up which require new theories. All that the modern physicist claims for a theory is that it fits the known facts and therefore cannot at present be refuted. The problem of induction in its traditional form has by most theoretical physicists been abandoned as insoluble. I am not by any means persuaded that they are right in this, but I think it is quite definitely demonstrable that the problem is very different from what Mill supposed it to be.75

74 Bertrand Russell, Portraits from Memory and Other Essays (New York: Simon and Schuster, 1951), pp. 54f.
75 Ibid., pp. 125f.
These comments, taken more or less at random, illustrate, more than any one point, how differently one reads philosophy after seeing things from Peirce's point of view—how pregnant with meaning even the most random philosophical comments can become. In the latter quotation particularly it is interesting to see the way Russell is groping toward the notion of abduction.

C. Knowledge grows organically.

Let us return for a moment to the image of a circle which was used to represent human knowledge. The notion of circularity or of an infinite regress is one that crops up in Peirce every so often and in some way it seems to play an important role in his doctrine. At one point Peirce refers to the process of abstraction as the consideration of an operation as itself something to be operated on, as is common in mathematics. (1.83) Immediately it occurs to one that this kind of thing could be done indefinitely. In 6.428 Peirce speaks of the scientific method as itself a scientific result. This is provocative. Josiah Royce loved to point out instances of thought's "self-transcending quality," as in 'the thought of a thought,' 'the consciousness of consciousness of self,' 'loyalty to the ideal of loyalty.' 76 Smullyan, in an essay called "Implications of Critical Common-Sensism," 77 has an admirable discussion which relates


to this very point—how one can inquire into standards of inquiry:

One cannot surrender the presuppositions of inquiry and retain the perspective in inquiry. If one will not distinguish between the valid and invalid, if one will not accept the dictates of memory, if one will not generalize from the data, if one will not infer from the data of sense that there are objective realities, then, though nirvana be achieved, and the achievement be ever so important, such blessedness will be a trance in which all dreams are black.

Genuine inquiry presupposes confidence in the working logic of inquiry, which is not to say that it presupposes confidence in every highly precise logistic formulation or analysis of it. It is central to the doctrine which Peirce called Critical Common-sensism that we distinguish between logica utens and logica docens. The logica utens is our crude, natural, logical wit. It is the complex system of criteria, some of them explicitly grasped, some implicitly employed, by which we determine matters of relevance and consistency. If mathematical logic is not merely an algorithm, if it pretends to be a precise formulation of the validating logical forms, then its consistency must be judged by reference to the more obscurely formulated ideas of validity and consistency which compose the logica utens of inquiry.

The suggestion in these remarks is the same as what we have been trying to convey in the image of breaking violently into a circle—by what amounts to nothing more than an act of willing by trusting, at first, to thought without knowing exactly why, and perhaps without ever being able to know exactly why. Peirce commends the scholastics for having the good judgement to never question fundamentals! (5.264) And again he says with great emphasis: "The Criticist believes in criticizing first principles, while the Common-sensist thinks
such criticism is all nonsense." (5.505)\textsuperscript{78}

Peirce brings this subject up again in perhaps its most interesting form in the case of his discussion of fallibilism:

All positive reasoning is of the nature of judging the proportion of something in a whole collection by the proportion found in a sample. Accordingly, there are three things to which we can never hope to attain by reasoning, namely, absolute certainty, absolute exactitude, absolute universality. We cannot be absolutely certain that our conclusions are even approximately true; for the sample may be utterly unlike the unsampled part of the collection. We cannot pretend to be even probably exact; because, the sample consists of but a finite number of instances and only admits special values of the proportion sought. Finally, even if we could ascertain with absolute certainty and exactness that the ratio of sinful men to all men was 1 to 1; still among the infinite generations of men there would be room for any finite number of sinless men without violating the proportion. The case is the same with a seven-legged calf. (1.141)

Perhaps the reader has anticipated the interesting part of this, which Peirce mentions a page later:

On the whole, then, we cannot in any way reach perfect certitude nor exactitude. We never can be absolutely sure of anything, nor can we with any probability ascertain the exact value of any measure or general ratio.

This is my conclusion, after many years of study of the logic of science; and it is the conclusion which others, of very different cast of mind, have come to, likewise. I believe I may say there is no tenable opinion regarding human knowledge which does not legitimately lead to this corollary. Certainly there is

\textsuperscript{78} Cf. Santayana: "First principles can never be discovered, if discovered at all, until they have long been taken for granted, and employed in the very investigation which reveals them." Scepticism and Animal Faith (N.Y.: Chs. Scribner's Sons, 1923), p. 2.
... the doctrine is true; without claiming absolute certainty for it, it is substantially unassailable. (1.147, 1.151)

nothing new in it; and many of the greatest minds of all time have held it for true.

The problem with this last sentence is that it invites us to stand back and view human knowledge as a whole and then make some statement about it, which statement will be true of itself as a part of human knowledge. What is it to say that "we never can be absolutely sure of anything? If we can't be sure of that, then it is possible that, in some rare case, we can be absolutely sure of something. The circularity seems to be hopeless.

But again this same type of difficulty is encountered in the case of defining words. The dictionary either uses synonyms or expresses the thought in a simple sentence or sentences. It is a wonder indeed that no sceptic has applied himself to the proof that no one can possibly learn any word whatever, since words are all defined by other words. To say that one can learn words by being shown raises interesting points. In the first place, this is the point of pragmatism. Everyone realizes how easy it is to become lost in a morass of words, and it is feared that much philosophy has done that. So the remedy is to take complex words or ideas and conceive of what real differences they would make or what their "upshot" would be. In this way one certainly has the advantage of breaking out of the circle of synonyms, but it is not at all certain that one has broken out of a circle altogether. Perhaps at best one has broken out of a small
one into a larger one.

The story of Helen Keller may hold a clue for this mystery. As a little child she went for many years without having any opportunity to learn what a word was. Finally her tutor began to spell into Helen's hand the names of various objects. This was done for a long period, and met with the blankest incomprehension on Helen's part. Virtually the only contact the outside world had with Helen was through the pleasure-pain principle. In this way she was taught elementary principles of behavior, but as yet she had no conception of what a word was or of the notion that thoughts could be got across to other people's minds by other than brute means. According to the story, one day Helen's tutor spelled the word "water" into her hand while both of their hands were under the water flowing out of a pump. In a flash of insight—an abduction if ever there was one—Helen saw what all of this spelling was about. Immediately she ran about grasping objects and pounding on objects not ceasing till its name had been spelled into her hand. Her desire to learn names became insatiable, and, of course, having caught on to the principle, having broken into the circle, learning the whole language was merely a matter of time and work.

This story makes almost irresistible the suggestion that language is a closed, or nearly closed circle. One gets the point of what language is about in a flash. No one can help a person get the point of what it is all about, except
most indirectly, nor, in all probability, does one get the point gradually, even in the case of little children. Rather, if it is an abduction, it comes like a flash. The same kind of phenomenon can be seen in many other cases. For example, the point of a geometrical proof often comes home in this same kind of burst of insight—essentially the same kind of burst of insight that occurred to the inventor of the proof.

The same kind of sceptical argument which asserts that men know nothing, and even if they did they could not know that they knew it, and even if they knew it and knew that they knew it, they could not prove it to anyone else, could just as well be applied to the science of cryptology. Here are some documents in a dead language, or in a live tongue but put into a highly complex code. How will it ever be possible to translate them? Those addicted to the deductive method will insist on being given a lexicon or a key to the code, and will confidently allege that without this kind of rock-bottom foundation nothing can ever be known for certain about what the documents say, and not being known with certainty, nothing will be known at all. But codes and languages are broken.

Cryptography is a science of deduction (sic) and controlled experiment; hypotheses are formed, tested and often discarded. But the residue which passes the test grows and grows until finally there comes a point when the experimenter feels solid ground beneath his feet: his hypotheses cohere, and fragments of sense emerge from their camouflage. The code "breaks." Perhaps this is best defined as the
point when the likely leads appear faster than they can be followed up. It is like the initiation of a chain-reaction in atomic physics; once the critical threshold is passed, the reaction propagates itself. 79

The important thing to observe in these remarks is the fact that knowledge grows and grows, and begins to hold together, cohere, and finally it begins to harden and solidify and to become "solid ground" under the feet of the investigator. Every piece is dubitable; nothing serves as a sure foundation piece. But the whole, unlike the parts, becomes sure and solid and, in the psychological sense, 'certain.' The scientific method itself teaches us that a conclusion can be far more certain than any of the facts which support it. (5.237)

Surely it is clear that language does not rest on some kind of indubitable foundation, or a kind of axiomatic base. Nor does one have to learn it in any given order. 80 The important thing is that the main point be understood, and any word or words that are handy and easy will do to begin. And, true enough, once one has a toe-hold on the language, the rest can come much more easily. Also one need not worry too much about the niceties of grammar as long as


80 Boswell once asked Johnson what it was best to teach a child first. Johnson replied, "Sir, it is no matter what you teach them first, any more than what leg you shall put into your breeches first. Sir, you may stand disputing which is best to put in first, but in the mean time your breech is bare. Sir, while you are considering which of two things you should teach your child first, another boy has learnt them both."
communication is unhindered. The grammar will take care of itself after a while. Misunderstandings will tend to be corrected with usage.

Now it would be hard to say how far these facts concerning verbal, spoken language could legitimately be said to represent the truth of cognitive processes in general. There may be essential differences, but even so the suggestion of what is meant by saying human knowledge is in a circle may be roughly true. It does not have an axiomatic basis, it grows by abductive leaps, it is self-corrective, and, in all probability, efforts to transcend it—to look upon it as a whole—will be paradoxical, (but not necessarily on that account useless or false when correctly understood). This is perhaps another way of saying that we are not God, or that we can't get out of our own skins.

Also this line of thought suggests that knowledge is all interconnected and of a piece. Imagine the task of trying to define a word to someone who continually asks the meaning of each new word you use in your definition. One would soon be lead to outline the whole spectrum of human knowledge, and would indeed soon enough come to its boundaries. (Example: What is color? Color is "a sensation evoked as a response to the stimulation of the eye and its attached nervous mechanisms by radiant energy of certain wave lengths and intensities." (Webster's New Collegiate Dictionary). But what is: a sensation, a response, a stimulation, an eye,
being attached, a nerve, a mechanism, energy, radiant energy, a wave, length, intensity? How quickly we arrive at the limits of human knowledge with just one simple word! I say "the limits" because I doubt if anyone has a very clear idea of what energy is—to take one thing on the list. Or try the game on the word "theosophy," and consider all the underlined words: "Alleged knowledge of God and of the world as related to God obtained by direct mystical insight or by philosophical speculation or by a combination of both."

(Ibid.)

According to Peirce's theory, a word takes on greater depth and richness, the more one learns, and particularly as the new knowledge is closely related to the word in question. He says, "How much more the word electricity means now than it did in the days of Franklin; how much more the term planet means now than it did in the time of Hipparchus." (7.587)

And not only do individual concepts depend for their meaning and significance on all other concepts, but the method of reasoning itself can be refined and improved the more it is understood and used. Science, itself, more than anything else, may be said to be correct method. And the paradox is that this method is itself a result of science. Whitehead says that the greatest discovery of the 19th century was the discovery of the method of discovery itself.81

method one has for unearthing truths, the faster knowledge is expanded; and the more the method is used, the more refined and improved it becomes. This circle is open to sceptical objections, once again, but they all betray the false basis of scepticism. The fact that science discovers its own method, and progresses even more rapidly by the use of this method does not undermine both science and the method but to the contrary is a case again of "organism"—or mutual help through mutual support. Spinoza supplies us with another example of this same kind of phenomenon in the case of tool-making:

The matter stands on the same footing as the making of material tools, which might be argued about in a similar way. For, in order to work iron, a hammer is needed, and the hammer cannot be forth-coming unless it has been made; but, in order to make it; there was need of another hammer and other tools, and so on to infinity. We might thus vainly endeavor to prove that men have no power of working iron. But as men at first made use of the instruments supplied by nature to accomplish very easy pieces of workmanship, laboriously and imperfectly, and then, when these were finished, wrought other things more difficult with less labor and greater perfection; and so gradually mounted from the simplest operations to the making of tools, and from the making of tools to the making of more complex tools, and fresh feats of workmanship, till they arrived at making, with small expenditure of labor, the vast number of complicated mechanisms which they now possess. So, in like manner, the intellect, by its native strength, makes for itself intellectual instruments, whereby it acquires strength for performing other intellectual operations, and from these operations gets again fresh instruments, or the power of pushing its investigations further, and thus gradually proceeds till it reaches the summit of wisdom.82

Knowledge is thus a highly complex and interrelated affair. It is not stretching things to imagine that, just as every atom exerts its force throughout the whole universe, each additional bit of insight clarifies and amplifies to a degree all the related concepts, and to a lesser degree all concepts related to them and so on. It might be added that all of this applies equally to the pragmatic definition of a word. One can think of possible sensible effects, but these need to be thoroughly understood in all their completeness, and this is an endless job. Buchler puts this whole matter very well when he says that, for Peirce, thought is not a granular succession, but a web of continuously related signs. This is really the heart of fallibilism. All science, all significant inquiry is a web with indefinite frontiers.  

There might seem to be some conflict in Peirce's system between what he says about the continuous nature of sign activity and the fact of sudden abductive "insight." This, however, would be a misunderstanding easily cleared up. The flow of signs is always continuous, even during abduction. An abduction is "sudden" or comes in a "flash" only relatively speaking. While seeking for a probable hypothesis the mind somehow ranges over the possibilities until it hits upon a good hypothesis which it presents to the consciousness—but the "hitting upon" or the "flash" with which the idea

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83 Bucher, The Philosophy of Peirce, p. xii.
comes before the attention is only sudden in the psychological sense—not the metaphysical sense; in the same way a sound may be said to be "sudden," but still the perception of the sound has been a continuous affair.

Moreover, there is no reason to suppose there is a real conflict between Peirce's idea that knowledge is supported by many threads of inference and his contention that it is of the nature of an "insight." This "insight" is not a Cartesian "intuition." It is merely the mind's coming to view its data from a particularly fruitful or unifying standpoint. This "viewing" is itself continuous. The insight is justified partly by the multiplicity of the considerations that point to it.

In summary, we may say that although there is much about these matters which is not at all clear, Peirce's position, if generally correct, inclines one to believe that he was right in his attack on Descartes' view of knowledge. It inclines one to believe that rather than waiting for knowledge to be infallibly grounded, one ought to jump in medias res and start thinking in the hope and expectation that erroneous presuppositions will be found out eventually. It inclines us to trust that central fabric of our opinions which has been weaved out of years of experience, and which

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84 Cf. Santayana: "A philosopher is compelled to follow the maxim of epic poets and to plunge in medias res." op. cit., p. 1.
has become, not merely a tissue of inferences, but a strong cloth of inferences so interconnected that it is solid enough to stand on. Here such things are meant as the existence of the outside world, the existence of "psyches" in other people, the orderliness of nature and so forth. It is no mean thing in philosophy to have a credible proof for the existence of the outside world. Ever since Descartes philosophy has been trying to climb out of that solipsistic hole he dug, and with a notable lack of success, and with agreement too on the fact that Descartes' way out was fallacious. Perhaps now the problem of the existence of the outside world can be de-"bracketed."85

Every thought, therefore, every step of reasoning, unless it is a mere free play of association, implies laws or rules of good reasoning. Even thinking or examining those rules of good reasoning has to be done in the light of even more fundamental standards of reasoning. Thus every controlled thought or step of reasoning presupposes an uncriticized network of presuppositions or "premises" as Peirce calls them. One is therefore faced with either trusting this fabric of premises or rejecting it. If one pretends to reject it, he cannot pretend to do so for good reasons, because the existence of good reasons is what is being re-

85 Phenomenologists perpetrate Descartes' error of wanting to do philosophy by the geometrical method. But they can't even deal with the problem of the existence of the outside world--they can't get off the ground!
jected. It is strange that most sceptics have tried to project an image of sweet reasonableness, when, by their doctrine, they admit themselves to be unreasonable. But it is not so strange when one realizes that no one is a real sceptic in the sense that he is able to maintain a "living" doubt of reason or of any of the other fundamentals of common sense.
CHAPTER IV
CONCRETE REASONABLENESS: COOPERATION
BETWEEN REASON AND INSTINCT

Peirce was not a 'one-idea'd' philosopher. He is most famous for his development of the idea of pragmatism, but this was one idea among many for Peirce. As Peirce continues to become more widely known, the recognition grows that he had original and incisive things to say on almost all of the most interesting philosophical questions. In this chapter we will see Peirce at his best, making many creative suggestions which bear upon most difficult questions. First we will discuss the basic role which our primitive instincts play in the reasoning process, particularly as our instinct guides the abductive process. Then we will try to show where instinct should be trusted and where it should not be trusted, by way of 'balancing' the emphasis which Peirce places on instinct.

A. Abduction is inference guided by nature's hand.

The problem of this first division may be summarized in the following question: How do people ever get a correct theory? This indeed is a problem though it may not appear to be one at first sight. But it has puzzled and agonized many minds because there seemed to be no glimmer of a solution in sight—and in addition it seemed that whatever the
solution was to be, it was likely to be pregnant with implications for all fields of human knowledge. It is Peirce's merit again that not only has he suggested a highly plausible hypothesis on this matter, but that his hypothesis is rooted and grounded in his system as a whole—it is not by any means a detached suggestion, but one that relates to all the most vital parts of his system—his doctrine of evolution, synchronism, abduction and inference, and what he says about theory and practice, science and religion. It is a suggestion of the first magnitude, philosophically speaking.

To elaborate on the nature of this problem briefly, there seems to be a large, perhaps infinite, number of wrong theories which might be proposed to explain any given phenomenon. How does the mind ever guess the right one, or even a partially right one? How is the mind able, with such a sure feel for reality, to dismiss uncounted irrelevancies which might erroneously be thought to bear on any given problem? How does the atomic physicist know to ignore the fluctuations of the stock market, or the biography of a long deceased hero of history? To say that those things are relevant which have some kind of causal connection upon the phenomenon in question, is merely to put the question in another form. In what consists causal connection? Constant connection? Clearly not. Physical proximity? Even more clearly not. At least it is easy to think of cases where these two features are present without any apparent causal connection.
In fact, it is another way to express the problem to ask:
How do we know where to look for causes and where not to
look?

To say, as has been said above, that the mind looks
for a unifying, harmonizing principle, is really only to put
the problem another way, or, more likely, to conceal the
problem with high-sounding words like 'unifying' and 'har-
monizing,' for the real problem lies in the fact that phen-
omena can be 'unified' in all sorts of ways. Fluctuations
on the stock market might accidentally have a correlation
with data gathered by an atomic physicist. Picasso can
bring unity to a scene of nature—a unity as real as the
physicist's—but not relevant in the least to the 'truth'
about physical nature (cf. 1,383). Unity can be had easily.
But what is hard to come by is to see the real interconnec-
tions, the unity, not merely of our own creative fancy, but
the one employed by nature herself.

The following puzzle is, I fancy, a good illustration
of the problem under discussion. There is a series of in-
finitelength composed of English letters beginning OTTFF.
... What is the 'real' ordering principle behind the con-
struction of this series? How would a machine go about sol-
vving this problem, supposing it had all the information at
its disposal that I did when working on the problem? It ap-
ppears that it would have blindly to go through every conceiv-
able possibility. But there are an infinite number of possi-
bilities, or if not exactly infinite, then very many indeed. Here is an example of one wrong solution to the problem: "O" is the fifteenth letter in the alphabet; "T" is the twentieth; "F" is the sixth. Perhaps the series is constructed by dropping back one letter, and the next group is NSSEE, and so on indefinitely, going back to "Z" after "A". This certainly brings a unity to the problem and is a possible solution. But perhaps the rule is more complex. Here is another wrong solution: Perhaps these letters are the initial letters to the first words in the first book in the upper, right-hand corner of the bookcase in my study, and the next letters are the initial letters to the succeeding words in that book, and so on through that book and all the other books in the bookcase, and then repeat the series. Or perhaps the rule is similar to that but even more complex. Perhaps the rule has something to do with the shape of the letters. There is no end to wrong theories, and to wrong ways to impose a unity on the series.

Now, by wrong theories, I naturally mean theories other than the one that the originator of the puzzle had in mind. As stated above, the puzzle is so vague that OTTFF . . . repeated indefinitely would satisfy the conditions. A machine would give this as a possible answer, unless it could somehow sense the futility and inappropriateness of such an answer. The same is true of the other proposed answers. But what we are really looking for is the unity that
imposes, or tends to impose, _itself on us_, not we on it—
and this is in harmony with Peirce's definition of the real
—that which _forces itself on us_.

In my own case, I was unable to think of the answer
to the problem for two days or so, when it came to me in a
flash one morning as I just waked up.

There are in fact _two_ interesting problems here: first
is the problem of how the mind could seek out an appropriate
answer among all the irrelevant possible answers, and second,
how to explain the fact that once the real answer comes to
a person, he _knows_ and senses that this is the correct an-
swer—and has no real need to check up with anyone. His con-
fidence is complete. When it is understood whence this con-
fidence comes, one has a real insight into Peirce's theory
and also a confirmation of it.

The only way to express Peirce's theory is to say
that the person who solves the problem has enough insight
into human psychology to know or sense that the correct an-
swer is the kind of answer that makes the puzzle signifi-
cantly interesting to other people. The subconscious just
homes in on "interesting" solutions, and ignores the vast
quantity of possible _ad hoc_ solutions.

How a machine could answer this puzzle other than by
going blindly through every conceivable possibility—and
whether it could do it even this way in anything less than
a short eternity, I do not know. And how it could recognize
the significant answer when it found it, is the second problem.

But to say the mind can solve such a problem (and problems in science in general are included) is not to say how it does so. Peirce's answer to this problem is vague, but perhaps as good a first step as has ever been suggested. Peirce's answer would be, in the case of the puzzle, that my mind is kin to the minds of other people and therefore tends to work in the same way. Common sense certainly supports the notion that human minds are similar in essentials. But there is the old saw about how one can be sure that my perception of the color red is at all like the other person's. A little reflection shows there is no way of knowing for certain and it is easy to come to some sort of sceptical conclusion. Peirce cites the case of the blind man who had surmised from things he had heard that the color red must be something like the blare of a trumpet. Peirce thinks that this is somehow a remarkably accurate statement and that it shows the "community of feelings" that people share. Of course it proves nothing, since a man who saw red as a shade of orange might well have something of the same quality of sensation. If one insists upon a demonstration nothing would be easier than to reject this form of argument and lapse into scepticism. James says that the assumption that men's feelings are similar is the "simplest hypothesis that meets
the case," though, "as a matter of fact we never are sure of it." If one wants to be sceptical, one can ask, as Peirce pointed out (1.314ff.) whether even in the case of the same individual his perception of red is the same today as it was yesterday, or is the same this moment as it was the last. This is exactly the same question in principle as the former one, but our belief in memory is much too strong to be overcome by this sceptical approach.

So the notion that human psychology has a certain common nature, besides being believed by everyone anyway, is open to a philosophical defense. In the case, however, of the discovery of physical theories (as contrasted to man-made problems), the assertion, the proposed answer as to how we come to true theories, is more interesting—namely, that the true physical theories are sought out by the mind with some degree of accuracy because it is somehow in tune with nature and in harmony with it, just as it is in tune with other minds.

In examining the reasonings of those physicists who gave to modern science the initial propulsion which has insured its healthful life ever since, we are struck with the great, though not absolutely decisive, weight they allowed to instinctive judgments. Galileo appeals to i1 lume naturale at the most critical stages of his reasoning. Kepler, Gilbert, and Harvey—not to speak of Copernicus—substantially rely upon an inward power, not sufficient to reach the truth by itself, but yet supplying an essential factor to the influences carrying their minds to the truth. (1.80)

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When the mind faces a problem it begins to search according to rules of its own—ignoring data that have no possible relevance—looking where it knows,—How?, by sentiment, by feeling, by instinct?—a possible answer may lay. This process, of course, is so often accomplished subconsciously, as the history of great insights testifies, that it is hard to imagine how else the mind could do this, if something like Peirce's theory were not true.

... the categories suggest our looking for a synthetizing law; and this we find in the power of assimilation, incident to which is the habit-taking faculty. This is all the categories pretend to do. They suggest a way of thinking; and the possibility of science depends upon the fact that human thought necessarily partakes of whatever character is diffused through the whole universe, and that its natural modes have some tendency to be the modes of action of the universe. (1.351)

This last sentence summarizes Peirce's theory very well, especially in its suggestion that the human mind is as much a part of nature as is anything else, and therefore can be assumed to be not totally foreign to nature's ways and dependent upon purely blind or fortuitous stabs in its efforts to comprehend nature.

Concerning this theory, Bertrand Russell has made these brief remarks:

'[Peirce] holds—and I confess that an examination of scientific inference has made me feel the force of this view—that man is adapted, by his congenital constitution, to the apprehension of natural laws which cannot be proved by experience, although experience is in conformity with them. "The chicken you say pecks by instinct. But if you are going to think every poor chicken endowed with an innate
tendency towards a positive truth, why should you think that to man alone this gift is denied?" This is an important question, to which I do not know the answer.87

Buchler has pointed out that Mach, independently of Peirce, came to much the same kind of conclusion with regard to the role of instinct in the abductive process. For Mach, our instinctive feel for nature always preceds a scientific unravelment of it. Instinct is very fallible, in its suggesting of hypotheses, but it serves a crucial function in guiding the mind, putting it on the scent. Instinct is acquired in the development of the race. These are all exact parallels of Peirce's thought.88

There just does not seem to be any plausible escape from the notion that the mind does know by some "inward power" to reject some hypotheses utterly and look with favor on others.

If you ask an investigator why he does not try this or that wild theory, he will say, "It does not seem reasonable." It is curious that we seldom use this word where the strict logic of our procedure is clearly seen. We do say that a mathematical error is not reasonable. We call that opinion reasonable whose only support is instinct. . . . (5.174) (Brackets in the text.)

Now this theory, of the mind's in-tune-ment with nature, is at the basis of much of what Peirce says about metaphysics and religion, and its implications for all these

87In the "Foreword" to Feibleman, _op. cit._, p. xvi.
88Buchler, _Peirce's Empiricism_, p. 142n.1.
areas of thought are truly enormous, as one can sense almost immediately.

B. Evolution and Critical Common-sensism

Ever conscious of the profound implications of the theory of evolution, Peirce finds it quite plausible to account for the mind's kinship with nature by pointing to man's roots in nature via his evolution.

In Peirce's essay on "Evolutionary Love" (6.287ff.) he examines various theories of evolution—evolution by chance, by mechanical necessity, and, his own theory, by love. He points out against Lamarckism that "direct endeavor can achieve almost nothing." "It is as easy by taking thought to add a cubit to one's stature as it is to produce an idea acceptable to any of the Muses by merely straining for it before it is ready to come." (6.301) Rather, "the deeper workings of the spirit take place in their own slow way, without our connivance." (Ibid.)

Those parts of the mind which have mastered their tasks sink into a lethargic habit, but "a succession of surprises wonderfully brightens the ideas." (Ibid.) "Thus, the first step in the Lamarckian evolution of mind is the putting of sundry thoughts into situations in which they are free to play." (Ibid.) But the evolution of mind proceeds under the guidance of the hand of love:

The agapastic development of thought is the adoption of certain mental tendencies, not altogether
heedlessly, as in tychism, nor quite blindly by the mere force of circumstances or of logic, as in anacasm, but by an immediate attraction for the idea itself, whose nature is divined before the mind possesses it, by the power of sympathy, that is, by virtue of the continuity of mind; and this mental tendency may be of three varieties, ... (6.307)

This development may take place in the mental life of the whole community or society, or in the mental life of an individual under the strong influence of social circumstances, or, finally, "... it may affect an individual, independently of his human affections, by virtue of an attraction it exercises upon his mind, even before he has comprehended it. This is the phenomenon which has been well called the divination of genius; for it is due to the continuity between the man's mind and the Most High." (ibid.) On the other hand, Peirce adds, "I doubt if any of the great discoveries ought, properly, to be considered as altogether individual achievements; and I think many will share this doubt. Yet, if not, what an argument for the continuity of mind, and for agapasticism is here!" (6.317)

Thus, Peirce's doctrine of instinct is tied by the closest bonds to his deepest metaphysical doctrines. The continuity of signs, of all mental life, as it flows and tends to organize itself under more general heads, the evolution of physical laws, biological laws, and the life of the mind—all this tied together in a very provocative package.

The contents of this package, the general expression
of all these phenomena is the growth of "concrete reasonableness" throughout the whole cosmos. Under the head of "concrete reasonableness" there are three or four succinct expressions of Peirce's doctrine from his own pen which are worth quoting:

Almost everybody now agree that the ultimate good lies in the evolutionary process in some way. If so, it is not in individual reactions in their segregation, but in something general or continuous. Synecchism is founded on the notion that the coalescence, the becoming instinct with general ideas, are but phases of one and the same process of the growth of reasonableness. (5.4)

And in another place he ties this doctrine down to his notion of pragmaticism:

Accordingly, the pragmaticist does not make the summum bonum consist in action, but makes it consist in that process of evolution whereby the existent comes more and more to embody those generals which were just now said to be destined, which is what we strive to express in calling them reasonable. In its higher stages, evolution takes place more and more largely through self-control, and this gives the pragmaticist a sort of justification for making the rational purport to be general. (5.433)

This theory of the gradual growth of the truth as an aspect of the growth of concrete reasonableness, and instinct's place in this theory raises very difficult and interesting questions relating to the old debate concerning innate knowledge, or a priori knowledge, and the blank tablet theory. Peirce's theory is something new in that he supposes an innate tendency towards truth, quite different from Leibniz, Locke, or Kant. His theory can be made plausible-sounding at least. The mind certainly comes into the world pre-adapt-
ed to a world like ours. It is ready, with a highly sensitive and elaborate apparatus, to see, hear, feel, taste, and smell,—and that before having done any of these things.

Might it not also be ready, in a weaker sense, to learn the law of gravitation and other scientific truths? This is not a fanciful theory. How long would the human organism have had to wait to learn about light and electromagnetic phenomena in general if it had not been equipped with the complex and delicate structure which forms the eye and the related parts of the brain and nervous structure?

But as interesting and stimulating as this theory is, it leads to most difficult questions (rather this is an added virtue of the theory). Consider, for example, all the knowledge of physics, and of aero-dynamic theory in particular, which is implicit in the bird's ability to fly—and not merely to fly in a simple more or less straight path as airplanes usually do, but to execute highly complex aerial gymnastics (as when pursuing an insect). Consider, for that matter, all that the brain must already 'know' about light and color in order to make an eye (or if not the brain, then the fertilized egg). True, the information in neither case is explicit in the form of conscious knowledge, but it is not any less real information for that. Information is stored on computer tapes, but does the computer know all of that information?

But pressing the thought further, ordinary language does not hesitate to say that a bird knows how to fly, just
as a man knows how to walk or run or swim or skate. A man knows how to skate when he can move effectively on skates, and not only when he can analyze in an explicit way the dynamics of the roller skate under all sorts of complex pressures. But how far can one follow the dictates of common usage in analyzing a philosophical question? Plants certainly turn to the light, but one can hardly say that they know to. And this has nothing to do with the fact that they are not self-conscious, but only with the fact that they are not conscious at all.

Consider another provocative example: there are any number of people who know no music theory of any kind, who can play no instrument and read no notes. And yet, they can hear a tune and immediately they can whistle the melody back. To whistle different notes requires clearly an ability to make a rather fine adjustment in the many muscles that control the cheeks and lips. And to whistle a coherent tune requires the ability to go unerringly from tone to tone, sometimes, in complicated melodies, making an interval between notes that very seldom follow one another, and doing so in a complex rhythmic pattern. If the person were asked to sound the interval between, say, a re and the me in the next octave up, he would be unable to do so—at least not without figuring it out, but if such an interval occurred in the melody he just heard, he could do it easily. Now in what sense does such a person know music? The majority of people
perhaps fit into just such a description as this--knowing no theory, but able to sing or whistle a tune. In one sense, surely, their knowledge is extensive--for it requires a complex series of muscular adjustments to whistle. Also we would be amazed if an animal could repeat a melody on first hearing--or after many hearings for that matter, and we would be willing to say of such an animal that he knows such-and-such a tune and that he is amazingly intelligent. But on the other hand the person's knowledge is not 'scientific'--not explicit or systematic or related.

To get at the bottom of these questions, what is called for is an elaboration of what is meant by the word 'know.' Peirce's analysis of 'belief' is useful at this point, for the meanings of these words overlap. Everything that a man will claim he knows, he will also claim he believes. And to believe in its strong sense (as contrasted to its uncertain sense: 'I believe I saw him'--as in, 'I think I saw him') is the same as to know. Peirce has shown us that a translation of 'belief' into pragmatic terms shows it to be a word expressing readiness to act in appropriate ways under certain conditions. The man who really believes the bank is safe will, under proper circumstances, be willing to put surplus money into it. He knows the bank is safe. Similarly, one sense of the word 'know' can be analyzed into an expression of a determination to act a certain way. If you say a man knows how to skate, that means that if skates
are put on him, he will act appropriately and with success. If one says the bird knows how to fly, the same thing applies. Self-conscious knowledge, "knowing that" something is a higher kind of knowledge, apparently limited to men, and a different problem from simple "how to" knowledge. But what about questions such as, "Does a plant know how to turn to the light?", or "Does a man know how to digest food or to grow hair?", or "Does a car know how to run?" Perhaps one does not use the word 'know', even in its general sense, with reference to anything lacking a central nervous system, and that might seem to offer a clue to the problem except that one is reluctant to say of men that they know how to digest or grow hair.

But if one says of men that they know how to walk or of birds that they know how to fly--both of which actions are to a very high degree instinctive in some sense--why the reluctance to say they know how to digest? Perhaps the key to differentiating between such cases lies in the learning process. Animals are more naturally said to 'know' things that they have learned. And so while a bird must experiment a little before it is very good at flying, no such process is necessary for digesting, laying eggs, or growing feathers. In some sense, of course, a bird does know how to digest, but these are operations which--to speak vaguely--it has learned from its species rather than individually. Perhaps also in a broad sense it might be useful to charac-
terize knowledge as patterns of future behavior that can be forgotten or unlearned. It is of course true that many things once learned are almost impossible to forget, but I suppose it is quite impossible for a normal animal to forget how to do things instinctive to it (unless the instinct were some-how weakened over a period of generations)—and these things would be placed in a category, similar to perhaps, but differ-ent from, knowledge.

The problem of the meaning of 'to know' is related to Peirce's theory in many ways, no doubt, but it is interest-ing to consider the fact that the brain has so much informa-tion in it—many highly complex things that it can do—while we have no conscious knowledge of the details of the processes. The organism is adapted to the phenomena of light and color to an extent that surpasses our theoretical or explicit knowledge of that subject—and the gap is enormous. It is no wonder that philosophers have thought to gain knowledge by "searching the garrett of the skull," or have come to theo ries of innate ideas. If knowledge is understood merely in a practical sense, the brain comes into the world knowing how to digest—or if not the brain exactly, the stomach, or the organism as a whole. But if knowledge is understood to in-clude only things learned, then innate knowledge seems to be defined away rather than refuted. But in addition to the criterion of having learned things in order to be said to know them, there is also a tendency to distinguish knowledge
from instinct by the criterion of self-consciousness—but this will no doubt raise far more problems than it will solve. One knows things when the idea is explicit and when one knows that one knows them. Appropriate behavior without this self-consciousness tends toward an instinctive form of knowledge, but not invariably. One may certainly know how to whistle without knowing any music theory, but the person who both whistles and knows the theory certainly may be said to have a deeper understanding of what is going on—an understanding that may be reflected in increased capacity for successful behavior in future circumstances. This is a "higher" form of knowledge that goes beyond our immediate problem.

In any case, Peirce is an empiricist and rejects the notion of innate ideas. We have no knowledge of how to digest, grow hair, fight disease, etc. although indeed we do them with success. Peirce's theory in a way claims the best of both worlds—holding not that we have innate ideas, but innate tendencies toward certain ideas. It is not surprising for Peirce that the human brain, adapted on every hand for the real world and the real laws of physics that govern that world—the laws of chemistry having to do with smell and taste, the laws of sound having to do with air in vibration, the laws of light relating to color and optics, the laws of biology having to do with the care and functioning of the human body—that a brain so adapted and so saturated through and through with the laws of physics and biology
would, when it became ready to study the world scientifically or systematically, stumble with relative speed upon correct or nearly correct hypotheses. This is a phenomenon no less true of the esoteric parts of science than of the parts with which the mind might conceivably have more experience—it is, for example, no less true of researches in quantum mechanics than in studies in the early stages of mechanical physics. In these modern studies the investigators are led to try mathematical equations which seem somehow 'fitting' or 'likely' or 'beautiful' and in this way often come to important insights. But why some equations should seem 'likely' or 'beautiful' is just the mystery we are considering—a mystery compounded by nature's apparently finding them so too, or, if not beautiful, then useful or coherent, in a great number of cases. But if the mind is indeed 'kin to' nature or 'in tune' with nature, as Peirce claims, it is this in a very basic way indeed—so that not only are our theories about the so-called 'Newtonian' world surprisingly accurate, as indeed might be explained by the mind's acquaintance with macroscopic phenomena, but also the same holds true for the microscopic world, where the mind has no conscious opportunity for learning from ordinary experience. (Though here again, in the building up of the body a tremendous amount of information of the world of the atom and the molecule, and perhaps of sub-atomic physics too, is implicit.)

To be sure, Peirce's theory is quite vague—an objec-
tion which would have had no force with Peirce since vague-
ness is appropriate when dealing with matters on which we
have little detailed information, which we seek to know on-
ly in broad outline. For Peirce a good theory is as vague
and loose as possible, while yet explaining known phenomena,
because it is less likely to be ruined by small bits of new
information. Peirce's theory of the mind's kinship with na-
ture is a good theory indeed under this criterion.

If the theory is true, it has wide implications for
the study of aesthetics, morality, and religion--areas as
yet so little understood in a really scientific way, and per-
haps as some say, not even amenable to that approach, or on-
ly amenable to it in a highly modified form. The fact that
Peirce's theory has wide implications also makes it a good
theory, for it is all the easier to test and examine for
this reason. Like all 'idealistic' theories, it is fruit-
ful of consequences and suggestions in a way more pedestrian
or 'materialistic' hypotheses are not. (cf. 5.599f.)

Peirce's theory is relevant to so many fields because
it gives a new importance and grounding for beliefs or atti-
tudes held by large numbers of men through the ages on in-
instinct, or, if that is too technical a word or is thought to
prejudice the issue, on simple feeling. The source of aesthe-
tic pleasure, for example, is quite a mystery, but it is made
far more mysterious by the amazing unanimity men show in their
judgements of art. One of Peirce's most fundamental theses
was that human reason is so weak that no individual ought to place overweening confidence in any truth he has discovered unless he can persuade all candid minds to agree with him (a thing most easily done in mathematics and accomplished only with great difficulty in most other fields). From this viewpoint the exceedingly short life span of most scientific theories contrasts amazingly with the agreement men share on ethical and artistic questions--fields alleged to be subjective beyond all hope. Whether Beethoven or Mozart were great artists who produced beautiful works is a perfectly settled question (though there might be debate as to how to rank them). The same is true in painting and sculpture. That Greek sculpture and architecture was of very high quality is a judgment shared by virtually every living soul who has had the opportunity to know about these works. The time span is impressive--and another thousand years can be added by examining artifacts of various kinds found in Egyptian tombs--work that almost never fails to please the modern eye (and in this case the style has not been in a position to permeate civilized taste in the way that Greek works could, since many of the Egyptian works have been largely unknown or at least neglected through the intervening millenia).

Moral maxims can be shown to have displayed the same kind of perseverance of rough agreement in the most diverse
ages and places.\footnote{C. S. Lewis has collected a quite impressive list of moral maxims from diverse ages and places--impressive in that they are so similar to each other and to modern adages. See his \textit{The Abolition of Man} (New York: The Macmillan Co., 1963), pp. 51ff. This point is certainly debatable. Perhaps one could collect a list of cynical maxims from all ages with equal ease. La Rochefoucauld is a gold mine of them: he is the Devil's answer to Solomon. But then even the cynical maxims would probably be similar to each other, and that is all that is needed for the point at issue. Also it is interesting that cynical maxims are usually uttered with a semi-humorous intent, the humor depending upon our recognition that they go against our 'higher nature.'}

For Peirce it is entirely wrong to pretend that such deeprooted feelings and sentiments are merely epiphenomena upon a blind play of dead atoms. To dismiss these phenomena this way is to approach the world with nominalistic eyes--and therefore to see nothing where there is everything important to be seen.

It would be an obvious criticism to charge that Peirce is urging us or encouraging us to believe in things--whether moral, metaphysical, or physical theories--merely because we have a very strong tendency to think them true. This oversimplifies what Peirce is saying. Peirce is saying indeed that in the case of a theory that exercises this rather occult attraction over us we ought seriously to entertain it--examine it and test it, not, certainly, because it is going to come out true, but rather because it has a high chance of being true--a chance almost infinitely higher than in the case of a theory that does not pull us at all--some \textit{ad hoc} theory.
which of course might be true, but which somehow seems silly
or inappropriate to the investigator. Both what Peirce has
affirmed and what he has not affirmed are important. He has
not given a ridiculous theory that justifies whatever notion
a man may delight in, but he has shown that this very feeling
of attraction is our indispensable guide and our only hope in
the abductive process. But there is no excuse for not draw-
ing out fully the consequences of a theory and subjecting
them to a merciless series of tests, "insofar as possible."

On this point Russell agrees:

Every one who has done any kind of creative work has
experienced, in a greater or less degree, the state
of mind in which, after long labour, truth, or beauty,
appears, or seems to appear, in a sudden glory—it
may be only about some small matter, or it may be
about the universe. The experience is, at the moment,
very convincing; doubt may come later, but at the
time there is utter certainty. I think most of the
best creative work, in art, in science, in literature,
and in philosophy, has been the result of such a mo-
ment. Whether it comes to others as to me, I cannot
say. For my part, I have found that, when I wish to
write a book on some subject, I must first soak my-
self in detail, until all the separate parts of the
subject—matter are familiar; then, some day, if I
am fortunate, I perceive the whole, with all its parts
duly interrelated. After that, I only have to write
down what I have seen. The nearest analogy is first
walking all over a mountain in a mist, until every
path and ridge and valley is separately familiar, and
then, from a distance, seeing the mountain whole and
clear in bright sunshine.

This experience, I believe, is necessary to good
creative work, but it is not sufficient; indeed the
subjective certainty that it brings with it may be
fatally misleading. William James describes a man
who got the experience from laughing-gas; whenever
he was under its influence, he knew the secret of the
universe, but when he came to, he had forgotten it.
At last, with immense effort, he wrote down the secret before the vision had faded. When completely recovered, he rushed to see what he had written. It was: "A smell of petroleum prevails throughout." What seems like sudden insight may be misleading, and must be tested soberly when the divine intoxication has passed.\footnote{\textit{A History of Western Philosophy} (New York: Simon and Schuster, 1945), pp. 123f.}

So Peirce's theory does not mean, for example, that the morality of Western man is justified just because it is his and he likes it. (By 'likes it' we must mean in a theoretical sense. Most normal people entertain a moral ideal somewhat above what they usually practice and thus do not 'like' their ideal in that sense, except the saints—or rather it is probably the saints who feel their imperfections most acutely, so perhaps it should be said that people do not 'like' their ideal except in the case of those who have learned to ignore any higher call and consequently live just as they think they ought to live). Nor is Peirce suggesting that my aesthetic criteria are certain to be quite perfect because they are mine and I like them. But he is suggesting that my moral and aesthetic criteria are \textbf{likely} to be on the right track, will probably \textbf{tend} to be correct—and this the more I widen my experience in those fields and submit myself to the training and education of those who already have long experience in these fields.

And here in embryo is the answer to those who, on the one hand, point to tribes in Africa or people on isolated
South Sea islands, and point out moral or aesthetic preferences the most peculiar, in an effort to show how baseless and accidental our own are, and the answer to those, on the other hand, who want to hark back to some kind of primitive morality or aesthetic standard—perhaps taking as their ideal one of these same tribes.

The fault in going to the primitives or to isolated societies, whether for a positive or a negative purpose, lies in the very fact of their isolatedness. We are in a position to see them and judge and accept their criteria if we want, but they have not been in a position to see and accept ours. And the fact that most often primitivism is rejected by the great civilizations may just as well show that from the higher perspective and wider experience of the 'high' civilizations, they sense the inferiority of the primitives as that they are prejudiced in favor of their own. And the fact that these minority groups tend to give up what is peculiar to their own standards when they have long been exposed to some major civilization, may indeed be used to indicate that in these matters, might makes right, but may also indicate that right makes might, that they recognize the overall superiority of the "civilized" ideals, to, say, cannibalism. (I am speaking mostly in terms of general ethical theory. In practice, of course, "civilized" men who are adventurous enough to go to administer colonies may often be the moral inferiors of the natives.) But let those who admire primi-
tive art put up as much money for it as a Rembrandt would fetch, if they wish to impress us.

In the case of the Judeo-Christian ethic, with its supreme command of love of neighbor, it has grown from a small root and origin and has taken its hold on the minds of men all over the world, and I suppose the majority of moral analysts have concerned themselves rarely with improving it—the Utilitarians and others have tried with indifferent success—but rather with justifying it and grounding it. This at least is the way Peirce would incline to view these matters, and though the moral history of the world may not prove Peirce's point, it can be viewed from his perspective with as much or more ease than from others. And again it has the advantage of not leading to sceptical conclusions—conclusions which no man can live by and few want to.

An important by-product of Peirce's theory is the wonderful way it makes brothers out of the artists and scientists. Scientists have tended to look upon artists with a feeling compounded of wonder and contempt—contempt for the inexactness and utter subjectivity of the artist's work, but wonder and sometimes fear, at his ability to play almost at will upon his heart-strings. And the artist looks upon the scientist as a man (if they could bring themselves to use or abuse the word thus) who has cut himself off from all that makes life rich or interesting—from all the deeper aspects of reality—not seeing that the best scientists are them-
selves nothing but artists, but having the aim, not merely of creating interesting and beautiful theories, but of discovering the interesting and beautiful plan laid down long ages ago by nature. The artist does not see the scientist's thrill when he has come to an idea that God himself had come to ages ago. The delights are of the same kind for both professions, and though one is more free than the other, both follow a process at bottom identical in the two cases.

It is also worth noting here what will have already have suggested itself to the reader—that Peirce's theory is comformable to religion in general, and in particular has much in common with the ancient Judeo-Christian doctrines that man was created in "God's image." Genesis, besides using that phrase, also says at one point that, quoting God, "Man has become like us, knowing good from evil." From the context, which has to do with moral knowledge, it is clear that an instinctive kind of knowledge is meant, since no code or list of commands is mentioned. And for the purposes of the philosophical points it is a matter of indifference with how much orthodoxy or literalness one looks at Genesis so long as the main points are understood, since, as it happens, Peirce and Genesis say much the same thing in the end, only Peirce elaborates the point and offers a suggestion as to how it came about. There is no evidence that Peirce ever thought about the Biblical doctrine of the imago dei in connection with his theory, but he would no doubt have delighted in
finding his point already suggested in so venerable a document, particularly as it is so fundamental a point and was arrived at independently.

To object to all of this on the ground that it is a form of argument much too anthropological, would again be no objection to Peirce. That it is anthropological is, indeed, the whole point. Peirce accepts that form of argument, as being highly powerful in explanatory power and rejects competing theories on the ground that they are sterile.

I hear you say: "This smacks too much of an anthropomorphic conception." I reply that every scientific explanation of a natural phenomenon is a hypothesis that there is something in nature to which the human reason is analogous; and that it really is so all the successes of science in its applications to human convenience are witnesses. They proclaim that truth over the length and breadth of the modern world. In the light of the successes of science to my mind there is a degree of baseness in denying our birthright as children of God and in shamefacedly slinking away from anthropomorphic conceptions of the universe. (1.316)

There is a brilliantly suggestive essay written by the great French savant, Henri Poincare, in which almost all of the points made by Peirce are raised independently, except the crucial hypothesis that the mind is in tune with nature. The essay is worth studying in its entirety, but for our purposes here we may quote some of the passages which are more striking:

... this feeling, this intuition of mathematical order, that makes us divine hidden harmonies and relations ... (p. 35)

... this delicate feeling so difficult to define ... (Ibid.)
A first hypothesis now presents itself: the subliminal self is in no way inferior to the conscious self; it is not purely automatic; it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. (p. 39)

... What is the cause that, among the thousand products of our unconscious activity, some are called to pass the threshold while others remain below? Is it a simple chance which confers this privilege? Evidently not ...

It may be surprising to see emotional sensibility invoked a propos of mathematical demonstrations which, it would seem can interest only the intellect. This would be to forget the feeling of mathematical beauty, of the harmony of numbers and forms, of geometric elegance. This is a true esthetic feeling that all real mathematicians know, and surely it belongs to emotional sensibility. (p. 39f.) 91

It is clear from what Poincare says in this essay that his greatest difficulty is in understanding how the subconscious mind is able to hit upon a good or plausible combination of ideas when the number of possible ones is unlimited. He is reduced to saying that the subconscious mind must somehow be able to actually and really go through a vast, incredible number of possible combinations (the number of which "frightens the imagination," p. 41). This is not entirely probable. Nor is Poincare able to suggest any explanation for this amazing ability of the mind, even if it really does try out this countless multitude of ideas, to hit upon any

good ones from the literally infinite number of possible combinations that must exist but cannot be brought into view because of their sheer quantity. One is almost driven to the conclusion that there is some kind of 'divining' of likely combinations—even if the vast bulk of these are of no use.

Poincaré really passes over the problem of recognizing good combinations once made. He says they have an appeal of our aesthetic sensibility and thus are allowed to break through to the conscious mind. This seems plausible, but says little in a way of explanation for how the mind is able to test only reasonably plausible combinations out of the infinity at its disposal. Merely to say that useful combinations appeal to an aesthetic sensibility is to raise profound and difficult questions. Peirce's hypothesis offers a suggestion that points the way to a possible solution.

Peirce's theory of instinct and the mind's in-tune-ment with nature is a suggestion, like so many of Peirce's, in the best tradition of philosophy. It suggests a way of looking at the world, it answers, at least in a vague way, some of the persistent puzzles of modern thought, it opens the door to further thought and development. It shares these features with Descartes' cogito doctrine, with Hume's sceptical approach, with Kant's doctrine of categories of thought. Like those theories it is a great imaginative leap—and that apart from whether it is true or not.
In addition to that, the doctrine tends to close the gap between man and nature—in this sense it helps with the mind-body problem. It does not solve the problem of what is consciousness, to be sure, but it does bring the mind of man closer to nature, and allows it a certain 'feel' for the unconscious world. Actually, in Peirce's thought the world is brought closer to the mind rather than vice versa in his doctrine of panpsychism, but the effect is the same either way—men need not feel so hopelessly estranged from nature that there is no chance of knowing her secrets and her laws at least to an ever growing degree.

Finally, there is a striking confirmation of Peirce's theory in the writing of Hume—the man who perhaps more than any other embodied almost all of the opinions Peirce held to be false, a living catalogue of errors. The key passage occurs in Hume's Treatise. 92 Where he says with all possible emphasis that,

\[\ldots\] all our reasonings concerning causes and effects are deriv'd from nothing but custom; and that belief is more properly an act of the sensitive, than of the cognitative part of nature.

In the Enquiry 93 he makes the same point, saying that our common sense beliefs are determined by nothing else than a

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"blind and powerful instinct of nature." Hume certainly had more reason than anyone before him to recognize that belief in these matters was not an affair of purely rational considerations, that if one set one's mind to an effort to find logical objections to common sense there were many at hand and powerful. And it is interesting to observe how Hume's false approach to philosophy (as it would appear to Peirce) led him to much the same point that Peirce held, but without a supporting rationale. Of course, Hume thought that this necessity of relying upon our "sensitive nature" was all the more reason for being a sceptic. But how strange it is to deplore and mistrust that "blind and powerful instinct of nature" which brings us to believe so many things, when, without that instinct, we should hardly be able to know anything at all—we should hardly have to worry about learning the high truths of philosophy since we should not be in a position to know those elementary practical truths which enable us to survive to a philosophical age! And stranger yet, to know those practical truths which enable us to grow old and prosperous and then deny that those principles catch any part of the spectrum of truth. But, as Peirce pointed out, Hume was a man strong in his principles, and faithful in his idolatrous worship to the god Obstinacy!

This discussion is meant merely to give some rough indication of the direction which Peirce's theory of man's kinship with nature seems to lead us. Nature has been guiding
man's mind and heart for countless generations, and in our searchings for truth, whether in physics, ethics, aesthetics, psychics, or whatever, we ignore our deep-rooted instincts at our own peril. Rather our sentiments are nature's way of loading the dice in our favor in our search for truth. The mind is inclined toward the truth, and this is why hypothesis-making is frequently successful. Whether it is slightly inclined or greatly inclined is not so important as the fact that it is inclined at all, for whether slightly or greatly, the more we think and search the more this loading of the dice will tend to work in our favor. And in addition, this theory has the added merit—a merit according to Peirce's standards at least—of unifying the most diverse phenomena and having, if true, many varied consequences. Note again that the theory says nothing about the truth of any given insight suggested by instinct—in any given case such an insight is fallible. The other half of Peirce's interest—his empirical, "prope-positivist" side, the side dwelt upon by Buchler and others, is concerned with the vital matter of testing and purifying such theories. Peirce's contribution to this side of the subject is recognized long since and established. But he was not lacking as a metaphysician.

C. Theory and practice

Peirce's view of human reason, tied as it is to a theory of instinct, has some extremely curious consequences,
which are both interesting and profitable in themselves as well as shedding further light on the real meaning of his theory as it shows in its "practical" bearings its real significance. If indeed we are to look at the "upshot" of a concept or hypothesis to see its real meaning, we cannot neglect to do this with Peirce's theory of abduction itself, his theory of the theory-making process.

How Peirce views the connection between reason and instinct as the connection bears on human life and conduct is developed in three of the most stimulating and creative essays which Peirce wrote. The editors of the Collected Papers following hints left by Peirce, have entitled these three essays, "Theory and Practice," "Practical Concerns and the Wisdom of Sentiment," and "Vitally Important Topics."

Perhaps the point of these essays can be summarized in the following excerpt:

In regard to the greatest affairs of life, the wise man follows his heart and does not trust his head. This should be the method of every man, no matter how powerful his intellect. More so still, perhaps, if mathematics is too difficult for him, that is to say, if he is unequal to any intricate reasoning whatsoever. Would not a man physically puny be a fool not to recognize it, and to allow an insane megalomania to induce him to enter a match game of football? But the slightest of physical frames might as well attempt to force back a locomotive engine, as for the mightiest of mental giants to try to regulate his life advantageously by a purely reasoned-out theory. (1.653)

Peirce supports this thesis with several interesting considerations. The first is that philosophy, in so far as it is a science, should be pursued by the scientific method. Now,
the scientific method, in its highest form, looks, as he says, for the Truth of things, with no regard whatever to possible applications of these truths to human life and conduct. This is not, of course, to say that one should ignore practical applications as they may present themselves, nor is it to say that one cannot search for the solution to practical problems with the scientific method. But in doing these things one has departed that far from science's ideal, which is a completely disinterested pursuit of the way things are. Therefore, one ought not approach the study of philosophy with one eye always on the likely practical consequences of whatever theory may be under consideration. In the search for truth, whether in science or philosophy, it is always a very hard task to keep oneself objective, and this can hardly be done at all if one is forever nervous of the possible consequences of various points of view. "All things" are, or should be, pure theory to science. (5.589)

But it may reasonably be objected that possible practical consequences are an integral part of any theory and neither can not nor should not be ignored. Peirce's position is that they should be ignored, when the theories in question bear on "vitally important matters," such as morality and religion, love and marriage, politics, and all similar matters.

\textsuperscript{94} This use of the word "practical" corresponds to the everyday use of the word as referring to "useful" to human interests, and is not to be confused with the more technical use of the word heretofore employed where is meant not only "useful" to human goals, but relevant to any possible sensory experience.
The ultimate reason Peirce has for taking what may appear to be so strange a position is that the reason of any one man, or even of one generation, is too weak and feeble a tool for a person to risk anything very important, in a personal sense, on what it happens to say at one moment. Though reason is weak, it is strong enough to be able to recognize how weak it is:

The very theory of reasoning, were we resolutely to attack it without any dread of mathematics, would furnish us conclusive reasons for limiting the applicability of reasoning to unimportant matters; so that, unless a problem is insignificant in importance compared with the aggregate of analogous problems, reasoning itself pronounces that there is a fallacy in submitting the question to reason at all. (1.652)

Were I willing to make a single exception to the principle I thus enunciate, and to admit that there was one study which was at once scientific and yet vitally important, I should make that exception in favor of logic; for the reason that if we fall into the error of believing that vitally important questions are to be decided by reasoning, the only hope of salvation lies in formal logic, which demonstrates in the clearest manner that reasoning itself testifies to its own ultimate subordination to sentiment. It is like a Pope who should declare ex cathedra and call upon all the faithful to implicitly believe on pain of damnation by the power of the keys that he was not the supreme authority. (1.672)

And again,

Reasoning is of three kinds. The first is necessary, but it only professes to give us information concerning the matter of our own hypotheses and distinctly declare that, if we want to know anything else, we must go elsewhere. The second depends upon probabilities. The only cases in which it pretends to be of value is where we have, like an insurance company, an endless multitude of insignificant risks. Wherever a vital interest is at stake, it clearly
says, "Don't ask me." The third kind of reasoning tries what il lume naturale, which lit the footsteps of Galileo, can do. It is really an appeal to instinct. Thus reason, for all the frills it customarily wears, in vital crises, comes down upon its marrow-bones to beg the succour of instinct.

Reason is of its very essence egotistical. In many matters it acts the fly on the wheel. Do not doubt that the bee thinks it has a good reason for making the end of its cell as it does. But I should be very much surprised to learn that its reason had solved that problem of isoperimetry that its instinct has solved. Men many times fancy that they act from reason when, in point of fact, the reasons they attribute to themselves are nothing but excuses which unconscious instinct invents to satisfy the teasing "whys" of the ego. The extent of this self-delusion is such as to render philosophical rationalism a farce.

Reason, then, appeals to sentiment in the last resort. Sentiment, on its side feels itself to be the man. That is my simple apology for philosophical sentimentalism. (1.630-632)

When no two metaphysicians agree, though they have used reason most rigorously in establishing their conclusions, how can a single individual hope to hit upon the truth by using his unaided reason? Socrates said that one ought not consult the "masses" on any important question—that when one needs a mundane task done, one goes to a specialist in the field, and, therefore, much more one should consult a specialist in vitally important matters. But this overlooks the fact that in any but the most mundane considerations there is no significant agreement among the "experts." Perhaps then the metaphysics of the masses, or of common sense, to put the case a bit more attractively, comes as close to the truth or perhaps closer than that of the var-
ious doctors of the subject. Santayana, who is even more of
a common-sensist than Peirce, says, "I think that common
sense, in a rough, dogged way, is technically sounder than
the special schools of philosophy ... ."95

Does this mean that one ought to abandon the study
of the higher subjects? By no means. It only means that
one ought not to alter one's life drastically at every al-
leged new discovery of reason.

It is far better to let philosophy follow perfectly
untrammeled a scientific method, predetermined in ad-
vanee of knowing to what it will lead. If that course
be honestly and scrupulously carried out, the results
reached, even if they be not altogether true, even
if they be grossly mistaken, can not but be highly
serviceable for the ultimate discovery of truth.
Meantime, sentiment can say, "Oh well, philosophical
science has not by any means said its last word yet;
and meantime I will continue to believe so and so."
(1.644, my emph.)

The case may perhaps be illustrated by imagining a
man who sets upon the study of ethics with a view in mind
of radically reforming his life in accordance with whatever
truths he may learn. Since the use of unaided reason upon
this problem historically seems to give rise to conclusions
highly diverse, we may imagine that, like many others, this
individual comes to the clear and certain conviction that all
ethics lacks any foundation at all, and that all moral behav-
ior is folly. Now, if he undertakes to live in accordance
with this new insight, his lot is likely to be an unhappy one.

He will probably be unhappy in prison, where society will quickly and rightly place him, if not for his wickedness exactly, then for his uncommon lack of good judgment, and his unhappiness will be compounded greatly if, one day, it occurs to him that he has made an elementary mistake in the line of reasoning which brought him to his extraordinary conclusion in the first place. This man we may call unwise:

Sentimentalism implies conservatism; and it is of the essence of conservatism to refuse to push any practical principle to its extreme limits—excluding the principle of conservatism itself. We do not say that sentiment is never to be influenced by reason, nor that under no circumstances would we advocate radical reforms. We only say that the man who would allow his religious life to be wounded by any sudden acceptance of a philosophy of religion or who would precipitately change his code of morals at the dictate of a philosophy of ethics—who would, let us say, hastily practice incest—is a man whom we should consider unwise. The regnant system of sexual rules is an instinctive or sentimental induction summarizing the experience of all our race. That it is abstractly and absolutely infallible we do not pretend; but that it is practically infallible for the individual—which is the only clear sense the word "infallibility" will bear—in that he ought to obey it and not his individual reason, that we do maintain. (1.633)

Animals which we may presume know very little theory on any subject whatever, very seldom fall into vitally serious errors. By instinct they know enough of animal psychology to find a mate and raise offspring usually without engaging in maniacal and suicidal wars against animals of their own species. They know enough of applied physics and biology to keep themselves alive for a normal life span, on the average (1).
Certain qualifications and explanations must be made if this doctrine is to seem anything less than utterly irrational. First, one may point out that many men have practiced what Peirce is here preaching. Hume did not pretend to live by his theoretical discoveries, and would have thought mad anyone who did. It is not at all uncommon for great philosophers to hold moral theories which from the viewpoint of common sense can only be called monstrous, and at the same time live lives of the greatest charity and gentleness toward their fellow creatures. Nor would it strike anyone as unbelievable for a doctor of ethics who preached a very vigorous code of morality to abscond with a large sum of money. Metaphysicians with the most diverse views of time, some holding that it is an illusion, all look at their watches. So common are events like these that one hardly notices the wide gulf that separates theory and practice—and what reasons, if any, lie behind the existence of that gulf.

Secondly, Peirce says, "vitally important matters" are, of all matters, the "veriest trifles." Here we must be careful not to misunderstand him. "Vitally important matters" are for Peirce personal in an extreme degree; they do not concern the world of universal forms and truths. Too much concern with these practical matters leads to barbarism (1.674), or to the successful businessman mentality (at its worst, is meant, of course).

... suppose you embrace ... a conservative senti-
mentalism, modestly rate your own reasoning powers at the very mediocre price they would fetch if put up at auction, and then what do you come to? Why, then, the very first command that is laid upon you, your quite highest business and duty, becomes, as everybody knows, to recognize a higher business than your business, not merely an avocation after the daily task of your vocation is performed, but a generalized conception of duty which completes your personality by melting it into the neighboring parts of the universal cosmos. If this sounds unintelligible, just take for comparison the first good mother of a family that meets your eye, and ask whether she is not a sentimentalist, whether you would wish her to be otherwise, and lastly whether you can find a better formula in which to outline the universal features of her portrait than that I have just given. I dare say you can improve upon that; but you will find one element of it is correct—especially if your understanding is aided by the logic of relatives—and that is that the supreme commandment of the Buddhistic-Christian religion is, to generalize, to complete the whole system even until continuity results and the distinct individuals weld together. Thus it is, that while reasoning and the science of reasoning strenuously proclaim the subordination of reasoning to sentiment, the very supreme commandment of sentiment is that man should generalize, or what the logic of relatives shows to be the same thing, should become welded into the universal continuum, which is what true reasoning consists in. But this does not reinstate reasoning, for this generalization should come about, not merely in man's cognitions, which are but the superficial film of his being, but objectively in the deepest emotional springs of his life. In fulfilling this command, man prepares himself for transmutation into a new form of life, the joyful Nirvana in which the discontinuities of his will shall have all but disappeared. (1.673)

Rational considerations are thus said to have bearing upon our vitally important concerns, but not in a hasty or rash fashion. Instinct may be improved and taught, but only slowly and over a period of time, after long acquaintance with theory:

Instinct is capable of development and growth--
though by a movement which is slow in the proportion in which it is vital; and this development takes place upon lines which are altogether parallel to those of reasoning. . . . The soul's deeper parts can only be reached through its surface. In this way the eternal forms, that mathematics and philosophy and the other sciences make us acquainted with, will by slow percolation gradually reach the very core of one's being; and will come to influence our lives; and this they will do, not because they involve truths of merely vital importance, but because they are ideal and eternal verities. (1.648)

In this way we are to understand the point regarding the fact that animals do not fall into vital errors. If we were content to live as animals do we should give up the sciences altogether. This is not what is recommended at all. In fact, Peirce wants everyone to become imbued with the scientific spirit—to lose his individuality in the search for the most general truths. But while we are in our present state of ignorance we must understand the difference between scientific hypotheses—whether they concern chemistry or ethics—hypotheses which may have enough merit to justify long and expensive investigation, but which it would be unwise to act upon forthwith, and the instincts by which we judge on the vitally important affairs. In one's personal life, failing certain discoveries in the fields of morality, metaphysics, and religion, one must maintain a modest conservatism, and the highest possible respect for experience:

If, walking in a garden on a dark night, you were suddenly to hear the voice of your sister crying to you to rescue her from a villain, would you stop to reason out the metaphysical question of whether it were possible for one mind to cause material waves of sound and for another mind to perceive them?
If you did, the problem might probably occupy the remainder of your days. In the same way, if a man undergoes any religious experience and hears the call of his Saviour, for him to halt till he has adjusted a philosophical difficulty would seem to be an analogous sort of thing, whether you call it stupid or whether you call it disgusting. If on the other hand, a man has had no religious experience, then any religion not an affectation is as yet impossible for him; and the only worthy course is to wait quietly till such experience comes. No amount of speculation can take the place of experience. (1.655)

Peirce further says that true science can not succeed if it is oriented toward practical interests. The medical researcher, who does all his work with an eye on finding cures for human ills is ruined as a scientific man, though "he may do a great deal for human life." (1.619)

What are we to say of this? First, it is debatable whether "pure" science should have precedence over "practical" science, though the mere suggestion would be heresy to Peirce. One might be tempted to say that "pure" research might ultimately lead to even more practical results than efforts frankly practical in nature. On the other hand, it is perhaps equally plausible to argue that as many "pure theoretical" discoveries are made in the pursuit of "practical" ends as would be made in direct pursuit of them, and this is plausible because it appears that any number of the most important of all scientific discoveries have been hit upon by accident, by men working (as often as not) on some practical problem. By this I mean to suggest that many of the most important new discoveries necessarily lie in unsus-
pected directions, and consequently may be hit upon as well by accident as any other way, and meanwhile practical interests give a motive force to keep a small army of investigators at work in varied fields. Of course, science can never advance if these profoundly suggestive discoveries are not followed up by the theoreticians, if they are merely ignored and left to the side by the men concerned with some specific practical problem—but it might be a matter of doubt if there are many scientists of no matter how humble rank who will not greet with excitement any radically new phenomenon they may run into by accident. On the other hand, it is easy to defend Peirce on this point. For no matter how many important theoretical discoveries may be hit upon in the course of efforts to establish man in space, for example, it seems very probable that that much effort devoted to more basic enquiries would be more productive of basic discoveries. Consider the mysteries connected with biological processes, or the brain, or parapsychology! But there is no practical way to get men as interested in putting all that money into these fields. The money being spent on space research, if not spent there, would probably not be spent at all.

Like the music of Mozart, which has the most profound ambiguity—a tension between the highest joy and the deepest melancholy, Peirce's work weaves into a complex fabric the most diverse themes. This intricate interconnectedness is perhaps as well illustrated by the above quoted passages and
discussion as anywhere—and as well illustrated by this whole essay of Peirce's as by any of the others. This whole essay is the work of the greatest possible genius. Without passing judgment as to whether it is exactly true or not, there is no denying its suggestiveness. It is misleading perhaps to imagine that the subject of this essay is confined to "theory and practice." It could as appropriately be considered as a discussion of the relation between science and religion, or philosophy and life, or "logic and mysticism," or "reason and instinct." A detailed comparison of Peirce's thoughts on this subject with Bertrand Russell's book, Logic and Mysticism, would no doubt be rewarding in the extreme, and the same is true of Bergson's doctrine of the artificiality and misleading nature of reason as compared to instinct's sure feel for the truth. And again the same subject is discussed by Santayana in his book on the relation between reason and "animal faith," and the results of Santayana's work are similar to Peirce's. When so many men of differing approaches have such a basic point in common, we certainly have justification for taking that point with the utmost seriousness.
CHAPTER V

CONCLUSION

Peirce is a man who has concerned himself with the major traditional problems of philosophy. Peirce does not make light of the great philosophical issues, but makes an honest effort to examine them and to solve them to the best of his ability. His effort to solve some of the great classical problems always has this merit: it is honest, forthright, manly, sober and intelligent. One does not have to agree with his conclusions in any given case or in any case at all to be able to recognize the professional spirit in Peirce. He is not a poet; he is not a scoffer; he is not trifling with his readers or with the great issues with which he deals. He is not a pedant or a "scholar" of the unoriginal type who plays with footnotes and toys with subtle interpretations of obscure issues or philosophers. He is not playing games. Rather he is attacking the real problems which have concerned and bothered thoughtful people since the days of Thales.

If one were forced to pick out one philosophical problem and call that one problem the major problem of philosophy, I would want to suggest that that issue would be the one called scepticism. In some sense the major battle has not been so much between this view of reality and that view
of reality as it has been between those who believe that, whatever reality is, it can be known by men, and those who believe that it can not be. Plato, who, by anybody's reckoning, must be placed among the great giants of the history of ideas for the thoroughness with which he both raised and discussed virtually all the major issues, had at bottom an anti-sceptical motivation. Aristotle and the Christian philosophers dealt profoundly with the problems of scepticism too, but Descartes was the one who brought the problem of scepticism to the fore in a really dramatic way so that in a real and important sense he can be rightly called the father of modern philosophy. I will not elaborate further on this theme for it would be a long story to trace the role of scepticism in the thought of the classical philosophers of the Continent and of England, and in modern times the place of scepticism in existentialism and positivism (both of which schools have, in their own way, embraced the doctrine to a large degree).

One could probably view the history of philosophy from some other vantage point which would be as interesting and as valid as the one I have suggested. But if one is willing to allow some merit to the point of view I have outlined—and the only merit I am claiming for it is that it is a suggestive way of hanging the whole thing together—then one will have to allow that the central problem of philosophy is logical or epistemological: what is reasoning,
what is knowledge, and how can they be justified? Peirce is mainly noted for what he said on the subject of pragmatism, but I believe that the importance the world has attached to that phase of his thought is partly a matter of historical accident—that is, it hit upon a subject of much interest at a particular stage in the development of American thought. For myself, on the other hand, I believe Peirce's greatness lies in his attack on the virtually impregnable fortress of scepticism.

Peirce's doctrine of abduction or retroduction is to my mind as great a philosophical insight as perhaps any which has ever been made. Peirce says that the doctrine of the association of ideas was among the greatest of philosophical insights, and is it not probable that the notion of abduction is at least as great as that? In fact, it subsumes the doctrine of association under itself as a special case in the way Einstein's theories do Newton's.

Peirce never failed to be stimulative and creative, and his more purely metaphysical theories—particularly his doctrine of categories—have these considerable merits. But somehow it seems easier to be sceptical and critical of these aspects of his thought than of his discussion on the nature of reasoning and thinking. Certainly I have not made it a secret that I have no objections to metaphysics in principle and Peirce's system is perhaps as good as any that has ever been suggested. Still, it seems very speculative indeed,
and I sympathize with Buchler's coolness toward some of Peirce's more Hegelian utterances. But Peirce's long study of logic and his first-hand acquaintance with the scientific method seem to me to have paid off handsomely in his doctrine of abduction--its creative nature, its fallible nature, its self-corrective nature, its tendency toward the truth, its justification of common-sense, its relation to deduction and induction as the most basic thought-process. I do not find other students of Peirce seeing the importance, the truly revolutionary importance, of the doctrine of abduction that I see, and I would like to cause some change in emphasis in this direction. I believe I have Peirce on my side in this, as he seems to give ample hints that he viewed abduction and its consequences and implications as at the heart of what he had to offer the philosophical world.
HELIIOGRAPHY


APPENDIX A

Here are some key passages from Poincare's brilliant essay on mathematical creation in which he gives a most lucid account of the creative process and discusses some of its implications.

In fact, what is mathematical creation? It does not consist in making new combinations with mathematical entities already known. Any one could do that, but the combinations so made would be infinite in number and most of them absolutely without interest. To create consists precisely in not making useless combinations and in making those which are useful and which are only a small minority. Invention is discernment, choice. (op. cit., p. 35)

How to make this choice I have before explained; the mathematical facts worthy of being studied are those which, by their analogy with other facts, are capable of leading us to the knowledge of a mathematical law just as experimental facts lead us to the knowledge of a physical law. They are those which reveal to us unsuspected kinship between other facts, long known, but wrongly believed to be strangers to one another.

Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart. Not that I mean as sufficing for invention the bringing together of objects as disparate as possible; most combinations so formed would be entirely sterile. But certain among them, very rare, are the most fruitful of all.

To invent, I have said, is to choose; but the word is perhaps not wholly exact. It makes one think of a purchaser before whom are displayed a large number of samples, and who examines them, one after the other, to make a choice. Here the samples would be so numerous that a whole lifetime would not suffice to examine them. This is not the actual state of things. The sterile combinations do not even present themselves to the mind of the inventor. Never in the field of his consciousness do combinations appear that are not really useful, except some that he rejects but which have to some extent the characteristics of useful combinations. All goes on as if the inventor were an examiner for the second degree who would only have to question the candidates who had passed a previous examination. (ibid., p. 35f.)

... One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class
of Fuchsian functions, those which come from the hypergeometric series; I had only to write out the results, which took but a few hours. (ibid.)

The need for the second period of conscious work, after the inspiration, is still easier to understand. It is necessary to put in shape the results of this inspiration, to deduce from them the immediate consequences, to arrange them, to word the demonstrations, but above all is verification necessary. I have spoken of the feeling of absolute certitude accompanying the inspiration; in the cases cited this feeling was no deceiver, nor is it usually. But do not think this is a rule without exception; often this feeling deceives us without being any the less vivid, and we only find it out when we seek to put on foot the demonstration. I have especially noticed this fact in regard to ideas coming to me in the morning or evening in bed while in a semi-hypnagogic state.

Such are the realities; now for the thoughts they force upon us. The unconscious, or, as we say, the subliminal self plays an important role in mathematical creation; this follows from what we have said. But usually the subliminal self is considered as purely automatic. Now we have seen that mathematical work is not simply mechanical, that it could not be done by a machine, however perfect. It is not merely a question of applying rules, of making the most combinations possible according to certain fixed laws. The combinations so obtained would be exceedingly numerous, useless and cumbersome. The true work of the inventor consists in choosing among these combinations so as to eliminate the useless ones or rather to avoid the trouble of making them, and the rules which must guide this choice are extremely fine and delicate. It is almost impossible to state them precisely; they are felt rather than formulated. Under these conditions, how imagine a sieve capable of applying them mechanically?

A first hypothesis now presents itself; the subliminal self is in no way inferior to the conscious self; it is not purely automatic; it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. What do I say? It knows better how to divine than the conscious self, since it succeeds where that has failed. In a word, is not the subliminal self superior to the conscious self? You recognize the full importance of this question. (ibid., pp. 38f., my emph.)

It is certain that the combinations which present themselves to the mind in a sort of sudden illumination, after an unconscious working somewhat prolonged, are generally useful and fertile
combinations, which seem the result of a first impression. Does it follow that the subliminal self, having divined by a delicate intuition that these combinations would be useful, has formed only these, or has it rather formed many others which were lacking in interest and have remained unconscious?

In this second way of looking at it, all the combinations would be formed in consequence of the automatism of the subliminal self, but only the interesting ones would break into the domain of consciousness. And this is still very mysterious. What is the cause that, among the thousand products of our unconscious activity, some are called to pass the threshold while others remain below? Is it a simple chance which confers this privilege? Evidently not; among all the stimuli of our senses, for example, only the most intense fix our attention, unless it has been drawn to them by other causes. More generally the privileged unconscious phenomena, those susceptible of becoming conscious, are those which, directly or indirectly, affect most profoundly our emotional sensibility.

It may be surprising to see emotional sensibility invoked a propos of mathematical demonstrations which, it would seem, can interest only the intellect. This would be to forget the feeling of mathematical beauty, of the harmony of numbers and forms, of geometric elegance. This is a true esthetic feeling that all real mathematicians know, and surely it belongs to emotional sensibility.

Now, what are the mathematic entities to which we attribute this character of beauty and elegance, and which are capable of developing in us a sort of esthetic emotion? They are those whose elements are harmoniously disposed so that the mind without effort can embrace their totality while realizing the details. This harmony is at once a satisfaction of our esthetic needs and an aid to the mind, sustaining and guiding. And at the same time, in putting under our eyes a well-ordered whole, it makes us foresee a mathematical law. Now, as we have said above, the only mathematical facts worthy of fixing our attention and capable of being useful are those which can teach us a mathematical law. So that we reach the following conclusion: The useful combinations are precisely the most beautiful, I mean those best able to charm this special ’sensibility that all mathematicians know, but of which the profane are so ignorant as often to be tempted to smile at it.

What happens then? Among the great numbers of combinations blindly formed by the subliminal self, almost all are without interest and without utility; but just for that reason they are
also without effect upon the esthetic sensibility. Consciousness will never know them; only certain ones are harmonious, and, consequently, at once useful and beautiful. They will be capable of touching this special sensibility of the geometry of which I have just spoken, and which, once aroused, will call our attention to them, and thus give them occasion to become conscious.

This is only a hypothesis, and yet here is an observation which may confirm it: when a sudden illumination seizes upon the mind of the mathematician, it usually happens that it does not deceive him, but it also sometimes happens, as I have said, that it does not stand the test of verification; well, we almost always notice that this false idea, had it been true, would have gratified our natural feeling for mathematical elegance.

Thus it is this special esthetic sensibility which plays the role of the delicate sieve of which I spoke, and that sufficiently explains why the one lacking it will never be a real creator.

Yet all the difficulties have not disappeared. The conscious self is narrowly limited, and as for the subliminal self we know not its limitations, and this is why we are not too reluctant in supposing that it has been able in a short time to make more different combinations than the whole life of a conscious being could encompass. Yet these limitations exist. Is it likely that it is able to form all the possible combinations, whose number would frighten the imagination? Nevertheless that would seem necessary, because if it produces only a small part of these combinations, and if it makes them at random, there would be small chance that the good, the one we should choose, would be found among them. (ibid., pp. 39ff.)

Another observation. It never happens that the unconscious work gives us the result of a somewhat long calculation all made, where we have only to apply fixed rules. We might think the wholly automatic subliminal self particularly apt for this sort of work, which is in a way exclusively mechanical. It seems that thinking in the evening upon the factors of a multiplication we might hope to find the product ready made upon our awakening, or again that an algebraic calculation, for example a verification, would be made unconsciously. Nothing of the sort, as observation proves. All one may hope from these inspirations, fruits of unconscious work, is a point of departure for such calculations. As for the calculations themselves, they must be made in the second period of conscious work, that which follows the inspiration, that in which one
verifies the results of this inspiration and deduces their consequences. The rules of these calculations are strict and complicated. They require discipline, attention, will, and therefore consciousness. In the subliminal self, on the contrary, reigns what I should call liberty, if we might give this name to the simple absence of discipline, and to the disorder born of chance. Only, this disorder itself permits unexpected combinations. (ibid., p. 42)