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Communication, Semiotic Continuity, and the Margins of the Peircean Text

by
Mary Keeler and Christian Kloesel

Abstract

The essay briefly describes Peirce's life, the quality and scope of his work, and the nature and condition of the manuscripts that survive in several archives, primarily at Harvard. Based on this description, we call into question the concept of "text" itself and identify at least four useful senses of the term "margins" to consider how his manuscripts challenge current editorial theory and practice. Peirce's ambition was to ground and expand logic on a fundamentally new basis–a general theory of representation he called semiotic–which could account for the continuous nature of thought and communication working together in human experience to generate knowledge. He was convinced, from his work as a physical scientist, that absolute accuracy is unattainable, and his pragmatism is the method that regards truth as a *limit* successively approached by increasingly refined investigations, which depend on communication among collaborating investigators. Peirce's theory has been recognized as a new philosophical paradigm responding to (and reconciling the effects of) Cartesian dualism, materialism, and reductionism–the demand for an absolute foundation for knowledge that prevents us from explaining how communication is possible at all. His own corpus exemplifies the futility of attempting to capture the continuity of ideas in a discrete medium of expression, and records his awareness of and frustration with this limitation: in his extensive marginal comments, his marginally-printable work on graphical logic, his work to extend the margins of what we consider the theoretical scope needed to explain human experience, and his fundamental philosophical refusal to define the margins of the *known* or *knowable*. Peirce's work anticipates, in nature and content, the ingenious computer-network medium that promises to engender new appreciation for realms and modes of inquiry that our traditional media relegate to the margins of scholarship.

1. Introduction

In a discussion of whether it would be possible to build a machine capable of logical inference, Peirce describes Allan Marquand's invention of a mechanical syllogism solver and says that no logical machines yet constructed are able to perform mathematical deductions, which is only one test of a theory of reasoning. He goes on to say, "There is, however, a modern Exact Logic which, although yet in its infancy, is already far enough advanced to render it a mere question of expense to construct a machine that would grind out all the known theorems of arithmetic and advance that science still more rapidly than it is now progressing" (MS 831:3; 1900). But, he asks, would this be a reasoning machine?

> What, then, is the use of designating some formulations of opinion as rational, while other (perhaps leading to the same results) are stigmatized as blind followings of the rule of thumb or of authority, or as mere guesses? When we reason we set out from an assumed representation of the state of things. This we call our *premise*; and working upon this, we produce another representation which professes to refer to the same state of things; and this we call our *conclusion*. . . . The irrationality here consists in our following a fixed method [an algorithm], of the correctness of which the method itself affords no assurance; so that if it does not happen to be right in its application to the case in hand, we go hopelessly astray. In genuine reasoning, we are not wedded to our method. We deliberately approve it, but we stand ever ready and disposed to reexamine it and so improve upon it, and to criticise our criticism of it, without cessation. Thus the utility of the word "reasoning" lies in its helping us to discriminate between self-critical and uncritical formations of representations. If a machine works according to a fixed principle involved in the plan of it, it may be a useful aid in reasoning; but unless it is so contrived that, were there any defect in it, it would improve itself in that respect, then, although it could correctly work out evey possible conclusion from premises, the machine itself would afford no assurance that its conclusions would be correct. Such assurance could only come from our critical examination of it. Consequently, it would not be, strictly speaking, a reasoning-machine.
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> Self-criticism can never be perfectly thorough for the last act of criticism is always itself open to criticism. But as long as we remain disposed to self-criticism and to further inquiry, we have in this disposition an assurance that if the truth of any question can ever be got at, we shall eventually get at it. (MS 831: 4-5)

We grasp here the perspecitive that threads through the following essay's examination of the marginal nature of Peirce's work, in text and concept, its challenges for editorial theory, and the promise of a new medium with powers to change the conduct and understanding of creation, scholarship, and—certainly—critical editing. In the second of his 1903 Pragmatism Lectures, Peirce's opening remarks urge his audience to consider his philosophical perspective critically, as he has done, if they hope see for themselves what it means.

> I trust that if you can see what my description is meant to convey, you will not find it so hard to see that it is just. And yet I should be really sorry if you were so easily satisfied about a matter of extreme importance. Time is needed to digest these ideas and to form a definitive judgment of their truth,—*much* time. . . . Certainly, in philosophy what a man does not think out for himself he never understands at all. Nothing can be learned out of books or lectures, they have to be treated not as oracles but simply as facts to be studied like any other facts. That, at any rate is the way in which I would have you treat my lectures. Call no man master, or at any rate not me. Only bear in mind that I have been a good many years trying in singleness of heart to find out how these things really are, and always disposed to doubt and criticize my own results. (MS 300: 2-3)

Peirce captures the essence of "the editorial role" here as, fundamentally, *criticism* (careful examination and interpretation), in thought and expression (which, in its most rudimentary form, is criticism or examination of one's own habits of thought and expression).

His life's work can be seen as the struggle to gain the philosophical perspective needed to appreciate how intellectual growth is possible. Human creativity, whether by individual or collective effort, necessarily relies on (is even inherent in) our esthetic, ethical, and logical sense of responsibility based on self-critical control. This paramount and most human capability cannot be captured in our instruments, even so-called "reasoning" ones, which inevitably operate on our instruction, as our extensions. Only by developing effective relationships with these instruments can we hope to augment our constructive (editorial) ability.

2. Peirce's Life and Work

Charles Sanders Peirce lived from 1839 to 1914. His father, Benjamin Peirce, was professor of mathematics and astronomy at Harvard, was widely regarded as the leading American mathematician of his time, and served as president of the American Academy for the Advancement of Science and as Superintendent of the U.S. Coast and Geodetic Survey (the pre-eminent American scientific institution of the period). Charles was unusually intelligent, rigorously trained by his father, and grew up in a household where the leading scientific and literary figures of the day frequently gathered.

He took up the study of chemistry at age 8, and of logic at 12. At 15, he entered Harvard and graduated four years later as one of the youngest in his class (but in the bottom 15%—because he was unable, by temperament and upbringing, to conform to the Harvard regimen). From 1861 (when he began his 30-year employment with the U.S. Coast & Geodetic Survey) to 1863, he studied chemistry at Harvard's Lawrence Scientific School and graduated *summa cum laude* with a B.S. In 1865, 1866, and 1869–70, he delivered three extensive lecture series (on the logic of science and on British logicians) at Harvard and the Lowell Institute, and he was elected member of the American Academy of Arts and Sciences in 1867. Following four years (1872-75) as assistant in the Harvard Observatory—where he prepared his only published book, *Photometric Researches* (1878)—he won election to the National Academy of Science in 1877 (and to the London Mathematical Society in 1880).

From these early achievements it appeared that Peirce was destined for an illustrious career at Harvard or some other renowned institution. But he grew up and lived in a social climate (both Puritan New England and, later, the genteel milieu of Baltimore and Washington, DC) that could not tolerate the idiosyncrasies of his personality, the

consequences of his unfortunate first marriage, and the mysterious circumstances of his second marriage. He never found a permanent academic position—though he held an appointment as part-time lecturer in logic at the Johns Hopkins University from 1879 to 1884—and he retired to 'Arisbe,' a house and farm outside Milford, Pennsylvania, in 1888, three years before his resignation from the Coast Survey.

After 1891, Peirce and his wife Juliette lived in increasingly desperate poverty. He made his living primarily by writing reviews for the *Nation,* articles for the *Monist* and *Open Court,* and dictionary definitions for the *Century Dictionary* and Baldwin's *Dictionary of Philosophy and Psychology*; by giving occasional lectures at Harvard and the Lowell Institute (as in 1892, 1898, and 1903); and by benefitting from the generosity of William James and several other people who pledged annual donations to Peirce's bank account. But eventually James died, his friends forgot Peirce, and he died an impoverished, sick, frustrated, and nearly forgotten man on 19 April 1914.

Throughout his life, Peirce maintained a wide-ranging correspondence with prominent figures in a variety of intellectual fields, and was better known and more widely published than is generally realized today, especially in this country. He is certainly better known in Europe; and when an international Peirce congress was held at Harvard in 1989 (to celebrate his sesquicentennial), some four hundred scholars from every continent and nearly every major academic discipline came to discuss his influence on their work.

Peirce is now regarded as "the most original, versatile, and comprehensive philosophical mind [America] has yet produced" (Nagel, 185) or as the American Leibniz (Hartshorne, 63). He worked as physicist, chemist, mathematician, astronomer, and geodesist, and was competent and accomplished in the sciences generally. But he always regarded himself as primarily a logician, though in a far broader sense than we use the term today. He showed how to extend traditional logic to include relations, which made possible the logical analysis of probabilistic reasoning (Putnam, 258-607). He developed a system of metaphysics from his logic of relatives, which he hoped could effectively reconcile the dichotomies of modern philosophy (idealism vs. materialism; rationalism vs. empiricism). He demonstrated the connections between logic, probability, and inductive reasoning, and he sketched the first known design for an electrical switching circuit that could perform logical and arithmetical operations. He was known in his time as the greatest living logician. Ernst Schröder, the leading European logician at the turn of the century, sent the following encouragement to Peirce in 1896: "However ungrateful your countrymen and contemporaneans might prove, your fame [will] shine like that of Leibniz or Aristoteles into all the thousands of years to come." His ambition was to ground and expand logic on a fundamentally new basis—within the framework of a general theory of signs and representation called semiotic (or "semeiotic," his preferred spelling). Although he is now best

known as one of the founders of modern semiotics (perhaps as *the* founder), most of his best work on this general theory is, unfortunately, still available only in manuscript form.

Because of the quality and scope of his work, Peirce has had foundational influence in the American philosophical tradition, which has since been developed by James, Dewey, Royce, Mead, Quine, Morris, Chomsky, Rorty, and Putnam. His ideas continue to grow in relevance to topics now at the leading edge of human intellectual development: machine intelligence, cognitive science, topographical (graphical) logic, abductive logic, probability theory, the theory of representation and communication, the coordination of graphical (iconic) and verbal (symbolic) understanding, and postmodernism in the arts and in critical theory.

As scientist and computer, Peirce worked to advance the physical sciences by experiment and theory development. He was the first to state the length of the meter in terms of a wavelength of light; he designed instruments to measure the force of gravity and to define the shape of the Earth and the Milky Way; and he contributed to the effort to establish world-wide measurement standards as the basis upon which researchers could rely when comparing the results of their investigations. His scientific work convinced him that absolute accuracy is unattainable, and he conceived pragmatism (based on his semiotic) as the method of inquiry for increasingly refined investigations, with truth conceived as the logical limit, depending on communication among participants to obtain information from one another and to collaborate in order to make sense of it jointly.

The scope of Peirce's research includes psychology, statistics and probability, mathematics, astronomy, chemistry, physics, geodesy, comparative biography, criminology, cartography, economics, philology, religion, metaphysics, and ancient, medieval, and modern history and philosophy. His semiotic is logic generalized to conceive mentality and cognition as essentially communicational, so that the collaborative communication of inquirers (exemplified in science as learning by collective experience) is the most highly developed form of human behavior, which can be taken as a model for inquiry (research and learning) across the academic spectrum. But his ideas and accomplishments in these and other areas remain essentially obscure and unknown: due to the prolific volume of his writings and their frequently interrelated topical scope, and because the largest part of his work remains unpublished.

3. Peirce's Work as Text: Obstacles for Peircean Scholarship

The only large-scale and purportedly comprehensive edition of Peirce's writings is the misnamed *Collected Papers of Charles Sanders Peirce*, published in six volumes sixty years

ago (1931–35) and enlarged by two volumes in 1958. Its topical selection omits science and mathematics almost entirely, and it includes few reviews and even fewer historical, psychological, and philological writings. It contains nearly 150 selections from his unpublished manuscripts, but only one-fifth of those selections consists of complete manuscripts, and many of them are inaccurately dated; parts of some manuscripts appear in up to three of the eight volumes, and at least one series of papers is scattered throughout seven of the eight. Several smaller anthologies published during the next few decades have simply reprinted excerpts from the *CP*.

More recently, several larger editions have appeared. Peirce's *Contributions to "The Nation,"* which contains the several hundred reviews he wrote for that journal, was published in four parts between 1975 and 1987; though chronologically arranged, it is too narrowly specialized for a comprehensive study of Peirce's thought. *The New Elements of Mathematics, by Charles S. Peirce* was published in 1976; the four-volumes-in-five include a wealth of previously unpublished materials, but their arrangement is topical and many selections are undated and textually unreliable. The same is true of the two-volume *Historical Perspectives on Peirce's Logic of Science* published in 1985, of the two volumes of letters between Peirce and Victoria Lady Welby (1953 and 1977, and of Peirce's *Complete Published Works,* the 149-microfiche edition of copies or transcripts of Peirce's lifetime publications issued in 1977 (and enlarged by 12 fiches in 1986). **[[footnote**: There are two important German collections of Peircean writings—the two-volume Schriften published in 1967 amd 1971, and the three-volume Semiotische Schriften published in 1986, 1989, and 1993—of which only the latter is, though in translation, more or less reliable.**]]** The editorial/textual principle guiding these editions was, to a larger or lesser degree, no more critical or comprehensive than that stated in the first volume of the *CP*: "Whenever possible Peirce's punctuation and spelling have been retained."

The textually (and in most other ways) most reliable edition of Peirce's writings now available is the in-progress *Writings of Charles S. Peirce: Chronological Edition*—a critical selection of his work that will not reach his most mature philosophical work for several years. At the current rate of progress, the projected thirty volumes of this edition will not be completed until well into the next century, especially as Peirce's writings become more difficult: from a textual perspective, as well as from the perspectives of scholar, typesetter, and printer. And even when that edition is completed, according to current plans and policies, it will present less than a third of Peirce's entire work. Although designed to convey a representative sense of the full range of Peirce's thought and work—in logic and philosophy, in mathematics, history, philology, and psychology, and in the various hard or special sciences to which Peirce made many original contributions—it will be incomplete. Moreover,

such an edition—in its paper print format—cannot easily present Peirce's progressively more graphical and "colorful" writings: writings permeated with symbols (many invented by Peirce) and complicated graphics, and enriched (in significant and signifying ways) by the use of colors, both in pen and pencil—both in words and graphics.

Peirce published only one book during his lifetime, and edited another (the 1883 *Studies in Logic by Members of the Johns Hopkins University,* containing a preface, one long article, and two shorter notes of his own), and he saw into print nearly 10,000 additional pages in a variety of journals, magazines, newspapers, dictionaries, and different kinds of scientific publications: several hundred book reviews, several thousand dictionary definitions, numerous technical and scientific reports (and reports of scholarly meetings and conferences), scores of epistemological, metaphysical, logical, and pragmaticist articles, and several privately printed booklets and brochures. In addition, he left behind at his death enough unpublished material to fill 80 or 90 additional volumes (of 500 printed pages each), excluding his correspondence. Clearly not all of these are worthy of publication—in the sense usually applied to multi-volume print editions—but, for a serious study of Peirce's polymathic and original work, scholars need access to everything Peirce wrote: whether published article, galley or page proof, printer's copy, fair-copy manuscript, rough outline for a lecture or essay, sketchy notes toward a report or dictionary definition, or proseless calculations and computations.

The largest part of his lifetime publications is now available in his *Complete Published Works* (though it is likely that additional unsigned reviews will continue to be identified as his, especially in the *Nation* and the New York *Evening Post*), and the majority of his unpublished manuscripts can be inspected in the 38-reel "Microfilm Edition of the Charles S. Peirce Papers in the Houghton Library of Harvard University," published in 1964 (with supplemental reels in 1971). But the microfilm edition is now thirty years old, its quality and topical arrangement obstruct efficient use, and much was left out or overlooked in the filming (especially in his correspondence). Moreover, it does not include substantial holdings at the National Archives (in the records of the Coast Survey) and significant smaller collections at Columbia, Princeton, and the Johns Hopkins; the Library of Congress, the Smithsonian, and the National Ocean Service Library; the Boston and New York Public Libraries; and the library at Southern Illinois University (the repository of materials from the Open Court Publishing Company where a number of manuscript printer's copies and proofs of several important articles by Peirce have recently been discovered). In total, Peirce's unpublished writings (including his correspondence) come to well over 100,000 pages, the largest majority of which have not been available to most scholars since they were first written. The secondary literature demonstrates that only the hardiest of Peirce scholars have made use of

his manuscripts (that is, those at Harvard), and most of these have done so, by means of photocopies, in their role as contributing editors for the *Writings*.

Joseph Esposito finds that traditional Peirce scholarship marked by the limited access to his writings and based largely on the *CP*, which gives a small and misrepresentative sample of the manuscript material in the Harvard collection.

> From such perspectives Peirce looks like a philosopher who often changed his mind, who was full of brilliant flashes of argument and insight but had no commanding form to his work. This impression has partly been justified by the fact that when Peirce did change his mind he conscpicuosly announced it to his readers. It is also significant that he never published a systematic book of metaphysical philosophy, that he often published in popular journals, and that his writings appear to readers of the *Collected Papers* as episodic and fragmentary. . . . In his later years Peirce had ample opportunity to conclude that his lifetime efforts would not be long remembered. Had he known otherwise he might have been inspired to write a short book on his conception of the task of philosophy, a table of contents for future generations to follow. Instead he proposed giant works, works far beyond the scope of a single man to complete even in a lifetime. (1980, 1)

Most scholars find Peirce's philosophy to be self-contradictory as it appears in the *CP,* because his practice of revising theories and exploring new ideas cannot be followed in the topically selected manuscript fragments that appear in these volumes. The disciplinary specialist who studies Peirce's ideas must be able to follow the skeins of his thought through the entire collection, because his work in logic and experimental science influenced his philosophy (his conceptions of scientific method, language, truth, and reality) and that work in turn suggested new investigations in logic. No one of these had priority in the development of his thought, and material on any one disciplinary subject may be dispersed throughout his writings.

Scholars in diverse fields, need complete and chronological access to Peirce's multi-faceted and wide-ranging work if they are to progress beyond what Peirce himself described after reading Wincenty Lutoslawski's *The Origin and Growth of Plato's Logic* (1897), regarding the publication of Plato's dialogues.

> Unless we are content to treat the only complete collection of the works of any Greek philosopher that we possess as a mere repertory of gems of thought, as most readers are content to do; but wish to view them as they are so superlatively worthy of being viewed as the record of the entire development of thought of a great thinker, then everything depends uypon the chronology of the dialogues. (MS 434)

Though Peirce is now most widely known the father of pragmatism, the other two well-known American pragmatists (James and Dewey) enjoy a much greater reputation, with

much better and more nearly complete editions of their work. Eighty years after Peirce's death, even with immense improvements in archival collections throughout the United States, we have no effective access to the extraordinary breadth and depth of his work and can now only begin to realize that what Peirce said in one of his 1903 Pragmatism Lectures of his logical writings refers to his entire corpus.

> But I must tell you that all that you can find in print of my work in logic are simply scattered outcroppings here and there of a rich vein which remains unpublished. Most of it I suppose has been written down; but no human being could ever put together the fragments. I could not myself do so. (MS 302)

4. The Marginal Nature of Peirce's Work

Beyond the problem of current inadequate access to Peirce's surviving works by traditional scholarly means, is the futility of attempting to capture particularly his philosophical thought in any discrete medium of expression. His manuscripts even record his awareness of and frustration with the limitations of the linear paper-embodied text in such established media as the printed book or journal article. We can identify four qualities of what Peirce has left as his life's work that indicate why it remains at the margins of scholarship: (1) his extensive marginal annotations and comments, (2) his marginally received and marginally printed and printable writings, which include his extensive work in graphical logic and his use of colors, both in text and graphics, (3) his efforts to extend the margins of the theoretical scope needed to explain human experience, which requires cross-disciplinary perspective of the sciences, the humanities, and all other domains inquired into by human reason, and (4) his fundamental philosophical refusal to define (or delimit) the margins of the known or knowable in support of a philosophical perspective capable of evolving with the growth of human experience.

1. Peirce's prolific and complex marginalia, both textual and graphical, exemplify the never-finished or always-in-progress nature of his work and expand the limitations of the written and printed page. Considered without regard to the other marginal aspects of his work, they appear to be like the corrections, annotations, notes, and comments in the writings of other prodigious authors like him, which have always challenged the limitations of paper print media.

2. Because Peirce published an enormous amount of material during his lifetime, and in many different places and print-media, it remains at the margins of scholars' awareness and comprehension. The situation is worse with the much larger part of his work—his unpublished manuscripts—and it will continue to be so despite the several editions that have already appeared. The largest and most promising of all print editions, the *Writings* has been an exemplary critical edition, in its first five volumes, but given the growing complexity of Peirce's later and more voluminous writings, those standards will be increasingly tested and, especially because of the publishing demands of the crucial graphical component, may eventually fail to yield the useful resource that authentic Peircean scholarship requires. In short, even upon completion of the thirty projected volumes, many of Peirce's important work would remain marginally accessible.

3. Peirce's writings challenge the margins of traditional scholarly publishing by content as well as by their condition. Reading and editing Peirce is an extremely difficult task, because he was a polymath (whose work no one single person can possibly fully comprehend or critically edit). His writings, no matter what their nominal topic, are so deeply perfused with discussions of topics from other disciplines, so that mathematics might loom significantly in an epistemological paper, or chemistry in a pragmatic one, or logic in a mathematical one, or geodesy in a metaphysical one. Beyond the limitations of access (his unpublished manuscripts are deposited in many different places, remain in a deplorable state of order and arrangement, and are nearly unmanageable in size and volume), the task of representing the course he followed in developing his philosophical view (explained below) within the confines of the printed page and bound book is seemingly impossible.

4. Peirce's philosophical view, itself, fundamentally refuses to define (or delimit) the margins of the known or knowable. In this regard, his conceptions of communication and continuity lose their vital essence in the very notion of a (selected) critical or definitive edition. His (semiotic) examination and explanation of how human experience grows through communication calls on us to accept the "editorial role," each in our own way, to extend our own margins of thought—and to progress collectively through self-controlled expression. In one of his letters to Victoria Lady Welby, with whom he corresponded until her death in 1912, Peirce wrote:

> Know that from the day when at the age of 12 or 13 I took up, in my elder brother's room, a copy of Whately's *Logic*, and asked him what Logic was, and getting some simple answer, flung myself on the floor and buried mayself in it, it has never been in my power to study anything—mathematics, ethics, meatphysics, graviation, thermodynamics, otpics, chemistry, comparative anatomy, psychology, phonetics, economic, the history of science, whist, men and women, wine, metrology, except as a study of semeiotic. (SS, 85-86)

In a postscript written five days later, but not mailed, Peirce says (apologizing for his long letter):

> Well, dear Lady Welby, you deserve this infliction, for having spoken of my having "always been kindly (!!!) interested in the work [on semiotic, which she termed significs] to which my life is devoted," when I have myself been entirely absorbed in the very same subject since 1863, without meeting, before I made your acquaintance, a single mind to whom it did not seem very like bosh. (L463: 145; *CP* 8.376)

In the postscript, Peirce expresses his difficulty in finding anyone to appreciate that it is one thing to see mathematics, chemistry, or any other subject through semiotic spectacles, and quite another to construct or to inquire into the construction of such a set of spectacles—to extend the margins of philosophical perspective.

5. The Communicational Imperative of Peirce's Philosophy

Christopher Hookway, who has worked with Peirce's manuscripts extensively, comments on the limited progress of Peircean scholarship, as it appeared (in 1985) when he set himself the task of writing the book that he looked for when he began to study Peirce's philosophy.

> Many people share the opinion that Charles S. Peirce is a philosophical giant, perhaps the most important philosopher to have emerged in the United States. Most philosophers think of him as the founder of 'pragmatism' and are aware of doctrines—about truth and meaning, for example—which they describe as 'Peircean'. But, curiously, few have read more than two or three of his best-known papers, and these somewhat unrepresentative ones. On reading further, one finds a rich and impressive corpus of writings, containing imaginative and original discussions of a wide range of issues in most areas of philosophy: he appears to have anticipated many important philosophical discoveries of the last eighty years. However, the interest of Peirce's work does not consist simply in these detailed examinations of philosophical problems, for he was, above all, a systematic philosopher. Inspired by Kant, he devoted his life to providing foundations for knowledge and, in the course of doing so, he brought together a number of different philosophical doctrines: the new logic of relations and quantifiers invented independently by Frege in Germany and Peirce in the United States; sophisticated insights into the structure of science and the logic of probability; a systematic theory of meaning and interpretation; a developed philosophy of mathematics; a general theory of value; and a metaphysics incorporating an ambitious evolutionary cosmology. It is not wholly surprising that he is

> not read more widely. . . . He never produced a unified coherent presentation of the system. We have to work from a mass of papers, sets of lectures notes, reviews, and manuscripts, and on that basis—helped by his many programmatic statements—reconstruct the structure and development of his system. (1985: ix)

Because of the complexity of its conceptual nature (and the difficulties of access to its holograph expressions), Peirce's philosophy has been interpreted piecemeal by most scholars, who have been able to construe his ideas as supporting any particular philosophical tradition they want to promote.

Ernest Nagel, for example, judiciously explains that Peirce's ambition was "to construct a system of philosophy so comprehensive that for a long time to come achievements in all departments of research, in mathematics, in the natural sciences, in history, in sociology, would appear simply as details filling out its outline" (Buchler, 1939: xiii). He finds a unique pair of fundamental insights in Peirce's thought—"the recognition of the role played by symbols or language in human behavior and knowledge; and the recognition that human knowledge is an achievement of biological organisms functioning in social contexts"—and he concludes that Peirce conceived his semiotic as a theory that would assimilate the findings of both the formal (logical) and the empirical (biologico-social) approaches of inquiry. "He was the first, or among the first," Nagel continues, "to work out an empiricism which could combine recognition of the indispensable function in inquiry of strict logic and other regulative principles, with a recognition of the equally indispensable role of sensory observation." (in Buchler, 1939: xvi)

However, more careful study of Peirce shows that what Nagel calls "an empiricism," Peirce called "pragmatism": the method he prescribed to avoid the puzzles of traditional philosophy and logical theory, which (as Nagel recognized) "derive almost entirely from isolating knowledge from the procedures leading up to it, so that it becomes logically impossible to attain." Hookway explains that Peirce does not remove the problems of traditional philosophy by exposing their errors, but his pragmatism makes their dichotomous oppositions "tractable." Esposito has also worked extensively with Peirce's manuscripts and has explicated his work as a comprehensive metaphyics (which Peirce called "the science of unclear thinking" (see Searle 559) responding to the limitations of modern philosophy.

Peirce himself realized that many of his contemporaries, such as his friend William James and his student John Dewey, misunderstood his work. Here is his account of what he saw happening to his conception of pragmatism.

> Four different doctrines indeed that would be so describable [as pragmatism] occur to me as possible to be broached by *somebody*. It will be more the purpose to glance at them

> each, than to inquire of Professor James which one, if any, he embraces; . . . . In the first place, then, it is not incredible that somebody should opine that all human thoughts are so indefinite as to render it a pure question of convenience what we should regard as anybody's meaning in any utterance; although to hold that vagueness of thought could, of itself, have such a result would involve a confusion of *vagueness* with *generality in depth*. Yet certainly whosoever should himself have ideas so confused as to think *all* human ideas to be of that more than miraculous vagueness might well be expected to fall into the confusion in question. In the second place, it is conceivable that a person should hold "man to be the measure of things" in so extreme a sense as to make practical convenience his sole criterion of truth; and he, might then easily be let to consider this opinion to be what pragmatism consists in. In the third place, a person of positivistic opinions might admit (or even insist, as Comte himself did,) that the meanings of some concepts involve elements other than conceivable practical consequences; while yet, in view of our total ignorance as to what subjects those further elements are true of, and what they are false of, he might think it expedient altogether to ignore those further elements, and might entitle this policy "pragmatism;" and being, like most positivists, a bad logician and a vague thinker, he might be under the delusion that, in doing so, he was basing pragmatism on a "practical preference." In the fourth place, since Professor James's definition of pragmatism in Baldwin's *Dictionary of Psychology and Philosophy* (Vol. II, p.321 b.) says that it is "the doctrine that the whole 'meaning' of a conception *expresses* itself in practical consequences," [the Italics are mine. C.S.S.P] upon which follows a division of the genus 'practical consequences' into two species, it is easily imaginable that he holds that some, if not all, concepts are capable of expressing themselves or getting expressed in several ways (MS 300:4; 1908).

Peirce's solution to this illegitimate proliferation of meaning was to change the name of his conception.

> [I]t has probably never happened that any philosopher has attempted to give a general name to his own doctrine without that name's soon acquiring in common philosophical usage, a signification much broader than was originally intended. . . . [M]y word "pragmatism" . . . begins to be met with occasionally in the literary journals, where it gets abused in the merciless way that words have to expect when they fall into literary clutches. . . . So, then, the writer, finds his bantling "pragmatism" so promoted, feels that it is time to kiss his child good-by and relinquish it to its higher destiny; while to serve the precise purpose of expressing the original definition, he begs to announce the birth of the word "pragmaticism," which is ugly enough to be safe from kidnappers (*CP* 5.143-4).

Pragmaticism, for Peirce, was the method of inquiry implied by his semiotic, as properly understood. Pragmaticism tells us how the conditions of mediation, semiotically defined, *effect* learning in our experience. Semiotic, the theory, explains the need for pragmatism (a procedure for learning) and offers a conceptual framework with which to identify and examine what are the necessary conditions for meaning to occur in experience. Pragmatism, the method implied by semiotic, describes the practice or procedure for creating

those conditions: "Nobody will expect of a theory that it should furnish skill or render practice needless" (*CP* 2.213).

Peirce developed his theory as a means to understand the nature of inquiry (or learning) as the process by which we can examine the beliefs, interpretations, and assumptions in the course of our experience, for which he considered traditional logic to be inadequate because it provided no comprehensive account of language and meaning—of communication. He considered science to be the most reliable process of conducting inquiry, and his work on pragmatism is an effort to capture its essential methodological nature in philosophically useful terms. "The single purpose of my whole life has been to do what in me lay toward rendering Philosophy scientific" (MS 296:37). What Peirce means by "scientific" must be appreciated in terms of his semiotic (theory of experience) and pragmatic method (procedure for continuing to develop experience effectively).

> [Philosophical theories] have the same sort of basis as scientific results have. That is to say, they rest on experience—on the total everyday experience of many generations . . . . Such experience is worthless for distinctively scientific purposes . . . although all science . . . would have to shut up shop if she should manage to escape accepting them.(5.522).

> The kind of philosophy which interests me and must, I think, interest everybody is that philosophy which uses the most rational methods it can devise, for finding out the little that can as yet be found out about the universe of mind and matter from those observations which every person can make in every hour of this waking life . . . laboratory-philosophy . . . (*CP* 1.126, 129).

Logic as the science of reasoning, in terms of semiotic, has three branches: deduction, induction, and abduction. Aduction tries to account for the creative effort to formulate hypotheses (guesses) that represent how conditions in the world must be in terms of facts (relations among objects) to render any body of data (observations) explicable. The primary challenge of any science is to resolve the many different observations (views or experiences of some phenomenon) that are possible, by continuing to formulate and test hypotheses (representations of these views), with some hope that the many views can be brought together in one final explanation. Effective inquiry proceeds only through cooperation of individuals working to represent and express their views (experience), thereby creating a community that can give each member a broader perspective (collective experience) but which can only remain vital through continued individual contributions. Trying to overcome the solipsism or individualism that characterizes both rationalism and empiricism, Peirce (based on his own experience as a working scientist) developed his semiotic and pragmaticism to account philosophically for *a community of inquirers* as what makes knowing possible.

> The real is that which, sooner or later, information and reasoning would finally result in, and which is therefore independent of the vagaries of me and you. Thus, the very origin of the conception of reality shows that this conception essentially involves the notion of a *community*, without definite limits, and capable of a definite increase of knowledge. (5.311)

As a practising scientist, Peirce used his extraordinary achievements in the humanities to examine the nature of science from a humanist's perspective. As a philosopher, he concluded that the essence of successful inquiry of any sort is due not primarily to the sophistication of its instruments or its investigational techniques but rather to the soundness of its collaborative communicational arrangements and understandings: careful observation and ingenious conceptualization generate knowledge only insofar as they are collaboratively validated and accepted.

6. The Continuity of Peirce's Text

As he developed his philosophical perspective, Peirce found it increasingly difficult to constrain his thought within the limitations of the formats of expression available to him, which are the same as those which still generally prevail: the book and the journal article, or linear paper-embodied text. Moreover, those aspects of his thought that he regarded as most significant, and are often the subject of the greatest contemporary interest, are typically those that the editors of his own time would not publish because they could not imagine a readership for them. This limitation, taken together with his compositional methods, resulted in a rich corpus of material in respect to which the usual distinction between draft versions of a paper and the final version (if there is one) is all but useless. In fact, there is no useful distinction to be drawn in general between that part of the manuscript material which should be available to any serious scholar and that part which can be neglected either because of redundancy or because it is distinctly inferior in intellectual quality. A description of his method of writing will indicate why.

Typically, if Peirce was aiming at establishing an idea, he would proceed from a certain starting point along a certain line of thought until he became aware that if he pursued the matter further in the way he was headed, he would not get to where he wanted to go, or at least not within the limits set by possible publication. He would then double back a few sentences, a page, two pages, ten pages, or fifty pages, until he found a suitable logical forking point, and move toward his goal in an alternative way from that point until the same

sort of thing happened again; whereupon he would again double back to a forking point and move toward his goal anew. Sometimes a path from a fork would itself have a fork, which is to say that in going back he would go past a fork taken earlier and find one still farther back in the direction from which he had come. Sometimes a fork on a fork would itself have a fork, and so on. Sometimes he would go back to the beginning and blaze another trail from there, still heading toward his original goal, but in a quite different way. Sometimes he would abandon that starting point and try another approach. Sometimes he would actually make it to his original goal but, then, his understanding of it would have changed (grown) in the course of his trying to reach it, forcing him to redefine his objective. What is most valuable to the contemporary reader is Peirce's learning process itself, not witnessing the result (especially what he completed for publication) but joining him along the trails and side-trails he pursued.

Peirce referred to himself as a pioneering thinker. Many of his unpublished manuscripts—some of which are several hundred pages long—are indeed like trails made through a hitherto uncharted conceptual forest, not records of random strolls here and there but rather the sort of trails left by a careful explorer. A major reason for the growing contemporary interest in Peirce's work is that the territory he explored is frequently what is only now being investigated by others and staked out for temporary settlement by one discipline or another. But if Peirce's exploratory method of composition makes these writings exciting to read, it also makes them unpublishable in print and bound form. We could, of course, bind up transcriptions of such intellectual explorations as books, but no publisher would regard the material presented in that form to be acceptable as a product of their press, and, in any case, the very binding of the pages would make the printed transcription less useful than the material in its original state. This material must be manipulated, rearranged, set first in one order and then in another, so that even the awkwardness of the unbound paper page is preferable to the diminishment of intellectual value that would result from presenting it in conventional book format.

Certainly, search and retrieval of the material in its present form is a nightmare, made endurable only by the quality of the content with which one is working. Peirce's method of writing, particularly in his later years, was such that almost any topic might be introduced and discussed in almost any given manuscript, regardless of its nominal topic, which makes it often necessary to search through the manuscripts (in photocopy or microfilm) page by page, hoping the right guess has been made about where to search, since the manuscript labels are not usually helpful, and it is impossible to work through the entire 100,000 pages time and time again. Days can be spent in search of a dimly remembered but crucially important passage, sometimes to no avail. Much the same can be said of the *CP* which, though in the process of being superseded, is still the only overall presentation of his writings available to

most readers; but its indices and principles of arrangement are far from adequate for scholarly purposes.

We have already mentioned that edition's topical arrangement, which brings about the disruption of actual series of papers, both published and unpublished—so that the six papers published in *the Popular Science Monthly* between November 1877 and August 1878 under the main title "Illustrations of the Logic of Science" are scattered in 3 of the 8 volumes of the *CP*. Of the twenty or so manuscripts making up the 1898 Cambridge Conferences on "Detached Ideas on Vitally Important Topics," parts of nine are scattered in 5 of the 8 volumes, and only one is published in its entirety. His 1903 Lowell Lectures "On Some Topics of Logic" appear separately in 7 of the 8 volumes. Moreover, most of Peirce's manuscripts appear in excerpts only (and we are rarely told what and how much has been left out), and (to reflect the volumes' respective topics) different parts of the same manuscript appear in different volumes; many of the selections are either not dated at all or dated inaccurately and, worst of all, in a number of instances, parts of different manuscripts are seemingly grafted together (without mention), and some of these grafted manuscripts consist of writings composed more than three decades apart. This state of affairs (and others mentioned in this essay) leaves us with a scholarly tool that is unreliable, obscurantist, and often entirely frustrating.

A brief glance at a bibliography of Peirce's published writings (which began in 1857 and ended in 1909) and at various guides to his unpublished writings (which, by his own account, began when he was 11, at which time he wrote a "History of Chemistry," and ended, by his second wife's account, when he was lying on his death-bed in April 1914) will indicate the continuity of his work, as well as the fact that he was not finished (writing) when he died. His many productions and numerous observations make clear that he would not have called a single one of his writings "finished," "definitive," or "final." Although he intended to get into print considerably more than he did—including several full-length books, which he either did not finish, was unwilling to tailor to his (potential) publisher's demands, or simply failed to have accepted by a publisher (primarily because they were too advanced or difficult to become money-makers)—it is fair to say that the largest part of his writings represents "unfinished" work or, better, "work-in-progress." **[[footnote**: Peirce gives additional reasons for not having published more when he says that "it is not part of the purpose of my writings to give readers pleasure" (8.379) or "I mostly write stuff of no interest" (SS 4). Also, in a letter to Victoria Lady Welby, he clearly marks the difference between publishing material and merely getting it into print:

> Much of my work never will be published. If I can, before I die, get so much made accessible as others may have a difficulty in discovering, I shall feel that I can be excused from more. My aversion to publishing anything has not been due to want of interest in others but to the thought that after all a philosophy can only be passed from mouth to mouth, where there is opportunity to object & cross-question & that printing is not publishing unless the matter be pretty frivolous. (SS 44)

But most importantly, perhaps, and again in the Carnegie Institution application, he says:

> What has chiefly prevented my publishing much has been, first, that my desire to teach has not ben so strong as my desire to learn, and secondly, that so far from there being any demand for papers by me, I have found considerable difficulty in getting them printed as a favor to myself. (E 3) **]]**

Moreover, sometime during his final twenty years (especially after the rejection of his 1902 grant application to the Carnegie Institution) he despaired of publishing comprehensive books outlining his philosophical system, but instead became concerned merely with having enough time and energy left to work out and write down that system: so that, someday somehow, others might benefit from his efforts. As he says in one of his 1903 Pragmatism Lectures, he wrote because he wanted "to make a difference in man's future intellectual development . . . [and] to give men the benefit of what I have done" (MS 302).

The fact that Peirce considered even his published work as "unfinished" or as "work-in-progress" can be seen in comments he made in a number of places, as well as in his habit of marking at least one offprint of his published articles "Working Copy" (upon receiving it)—and then making corrections, annotations, and comments in it, sometimes many years later. **[[footnote**: There is at least one essay (P 167, or item 19 in W4), the important "On the Algebra of Logic" published in 1880 in the *American Journal of Mathematics*, of which there are three (differently) marked offprints: (1) "Working Copy" (PEPMS 367), (2) "Corrections not final" (PEPMS 366), and (3) "Lecture Copy" (PEPMS 369), which he used in at least one of his logic classes at the Johns Hopkins University.**]]** Now, many of us correct obvious errors before we send offprints to friends and colleagues, but do we annotate and comment upon them twenty years later? Peirce tells us in one of the 1903 Lowell Lectures that he has always been skeptical "with everything I have printed" (MS 465) and, in the 15 May lecture on "Multitude and Continuity" given before the mathematics faculty at Harvard, he says that "No sooner is a paper of mine worked up to a finish and printed than I immediately begin to take a critical attitude toward it and go to work to raise all the objections to it big and little that I can." He continues, in an alternate version, "And the result has always been that I have found that there were other men who were far better satisfied with them than I myself have been."

He concludes by saying, "The truth is that I am far too well acquainted with the depths of my own stupidity to know what it is to be satisfied with any product of my mind" (MS 316a). Or as he wrote a year earlier, in a manuscript entitled "Reason's Rules," about his work preceding actual publication:

> I have always been so ardently bent upon correcting and improving my own opinions and conceptions that before I would reach the later chapters of a long book, those that I had written earliest would appear to me poor, and the whole plan of the work, which, of course, had been laid out first of all, to be unenlightened. (MS 694)

It is this very self-criticism that kept Peirce from publishing more than he did and that explains the "unfinished" and "in-progress" nature of his work. He says repeatedly that he struggled for decades with the veracity of his semiotic; for nearly thirty years with the truth of pragmatism; and for over twenty years with his system of graphical logic that, in January 1897, he came to call Existential Graphs (though he had had it in mind for a dozen years). He tells us, in another of the 1903 Pragmatism Lectures, referring to his realization that his graphical logic would provide a proof of pragmatism:

> When I first got the general algebra of logic into smooth running order [in 1884], by a method that has lain nearly twenty years in manuscript and which I have lately concluded is so impossible to get it printed that it had better be burned,—when I first found myself in possession of this machinery I promised myself that I should see the whole working of the mathematical reason unveiled directly. (MS 303)

Peirce saw into print somewhat less than he intended not because he had nothing more to say, or nothing more to contribute to the world, but because he regarded none of his work as ever really finished, as continually in need of modification and further development. He even describes a "method of discussing with [him]self a philosophical question" or his "processes of forming philosophical opinions." These methods and processes exhibit not only the growth and continuity of his thought but the fact that closure, certainty, and final intentions are (according to his pragmatic maxim) possible only *in the long run*. The best expression of his attitude in forming philosophical opinions appears in a lengthy but highly important paragraph in one of his 1903 Pragmatism Lectures:

> In the first place, I endeavor, as far as possible, to avoid attacking questions which seem possibly to depend upon questions which I have not already thoroughly considered at least once. I then set down my question in writing as accurately as I can, which is in itself, sometimes, a matter of difficulty and doubt. That done I write down in the briefest, but most complete and exact terms, every argument I have read heard or can imagine to be maintained, first on one side and then on the other of the question. Some of these arguments admit of brief and decisive refutations which I also set down. I then reflect

upon the matter and, without entering into the merits of the case, state what the general nature of the considerations appears to me to be upon which the decision should be made to turn, with the reasons. I add the indication, or sometimes a full statement of other ways of considering the question which I know to have been employed or which might naturally be employed, and show as clearly as I can what degree of weight ought to be attributed to each and why. There usually appears to me to be but one way in which the question can be decisively discussed, and I proceed to set down the points of that discussion, together with all the doubts that may arise. If I find the question depends upon some other which I have not fully considered, I put the whole thing aside, until that other question shall have ben considered. Frequently the original question will take a new and broader form, so that I amend what I have written or begin over again. Or it may be that while a broader question is suggested and noted, the discussion is completed on the original lines. Sometimes I come upon indications that there is some other way of considering the matter without my being able to formulate that other way. In that case, I shall have a mass of tentative notes which may prove useful when I shall come [to] understand the subject better. I ultimately amend again and again reviewing every part of the argument as critically as I can. It then very often happens that besides this preferred mode of treatment some others merit some attention, especially if it turns out that they tend to modify the conclusion. I set down whatever seems worth noting respecting each. I now go back to my two lists of arguments first set down, which will by this time probably have been augmented and briefly note, in regard to each one, what seems to dispose of it in the way of acceptance or rejection. Arrived at this point, I put away my notes and pass to something else. But in process of time I shall recur to the original question, probably in a somewhat different form, and from a different point of view; and I am always disposed to be sceptical about the value of my former discussion. Indeed, what brings me back to the question will commonly be some new light in which I see, or suspect, that there is some consideration whose importance I had not appreciated, and I find myself disposed and encourage the disposition to regard my former discussion as wooden and unintelligent. I now do the whole thing over again without consulting my former notes of which I do not retain any precise recollection. Having completed this second examination, I get out my former notes, and critically compare them. Even where they agree there will sometimes be a slight difference which upon careful consideration suggests some doubt. Now it is precisely doubts that I am at this stage endeavoring to develope. Combining the two discussions, I do the best justice I can to the problem and again lay it aside. After a time, usually a long time, the matter comes up for a third time, and I now invariably find that my ideas have, as it were, become shaken down into a more compacted, connected, and generalized mass. I go over my notes once more, work out to the end any doubts that that I am able to resolve, and get a thorough grasp of my own opinions. What is not now indelibly impressed upon my mind I would rather it were disencumbered from. For now is to begin a long course of cultivation of the conceptions I have thus far gained. This process I continue to perform, for the most part, pen in hand. I draw up my statement afresh, omitting what seems to be of too little worth for preservation. I criticize it in every philosophical aspect which seems to me just. I endeavor to enlarge it and especially to make it join homogeneously with other results. In that way statements which I may print and which to readers who take them for momentary inspirations may seem decidely

> brilliant are to me who remember what dozens of times they have gone through my mill, are well-known for the monuments of my stupidity that they really are. (MS 311)

If we take at face-value Peirce's description of his thinking and writing methods and if we take seriously his remarks about representing "the entire development of thought of a great thinker," we must conclude that every publication and every manuscript page—with deletions, additions, and other revisions; with references and allusions to all other published and unpublished materials; with citations of letters and private notebooks; and with directions toward memos, notes, and scraps—is required to represent the continuity and full development of his thought.

7. The Semiotic Perspective

Peirce was clearly satisfied that he had achieved one objective in his life's work: "Logic, in its general sense, is, as I believe I have shown, only another name for *semiotic*" (2.227). Leroy Searle, in his article on Peirce for the *Johns Hopkins Literary Guide to Theory and Criticism*, says he "described himself as an experimentalist and 'logician,' a term that expanded in scope from his earliest papers to encompass virtually the whole enterprise of organized thought and inquiry" (558). Searle warns readers of Peirce: "Perhaps the greatest difficulty, aside from the probability that they are born and bred nominalists, is that most will bring to Peirce's writing assumptions about 'logic,' 'metaphysics,' and 'semiotics' or about the idea of the 'sign' that may be fundamentally incompatible with the position Peirce elaborates" (559).

Peirce's semiotic has ancient origins in a theory of "semiosis," an originally Greek conception of how our ability to represent the objects of experience makes it possible for us to generalize (symbolize, categorize, measure): to establish relations that make possible the continuous growth or spreading of ideas. By the end of his life, he had developed a comprehensive theory to account for all traditional realms of philosophical investigation. *Ontology* can be viewed as examining one dimension of semiotic; its field of investigation is the structure of the world (elements and relations of existence). *Epistemology* examines a second dimension of semiotic; its field of investigation is the meaning of the world (our relations to the world by means of knowledge through representation). *Semiotic* examines the third dimension to incorporate the first two in a field of investigation into the occurrence of meaning in the world (our experiential reliance on representations of the relations in the world to gain knowledge of it). According to Esposito, Peirce's aim was "to discover a unified theory of logic, psychology, and metaphysics, and to present it in some sort of logical form" (1980: 147).

Searle describes the prevailing attitude and condition of modern philosophy, which Peirce's metaphysics challenges—and its effect on science.

> While Philosophical commentators may wish to "ignore the metaphysical side of Peirce's thought" (Nauta 121), it was crucial for Peirce, whose persistent complaint about metaphysics since Rene Descartes was that it was unclear, self-contradictory, or confused—not that one could get rid of it or otherwise deconstruct it. His turn to Duns Scotus, the subtlest medieval defender of realism, combined with his study of Kant, led to a version of critical realism in which he rejects the nominalism he finds in virtually all modern philosophers since Descartes (*CP* 1.18-19).
>
> In general, Peirce took the view that "nominalism" involves a metaphysical reduction of modes of reality to the existence of individual entities (1. 21), thereby hopelessly obscuring the dependence of thought and inquiry on diverse forms of representation and so ensuring in all intellectual pursuits, but especially in experimental science, a chronic state of crisis or confusion over the status of truth claims, as well as the proliferation of destructive and not merely critical forms of skepticism. (559)

In this century, modern science has begun to recognize the need for such a comprehensive theoretical view. In *Order Out of Chaos,* Ilya Prigogine observes that, "Peirce's metaphysics was considered as one more example of a philosophy alienated from reality. But . . ., in fact, today Peirce's work appears to be a pioneering step toward the understanding of the pluralism involved in physical laws" (1984: 303). He goes on to explain the radical change in the outlook of modern science away from the conception of a purely objective reality, which implied that "novelty and diversity had to be denied in the name of immutable universal laws . . . with a rationality taken as closed and knowledge seen as nearly achieved," toward a conception that is "now open to the unexpected" and that scientists "no longer define as the result of imperfect knowledge or insufficient control" (Ibid., 306). He describes the new situation as a coming together of our insights about the world around us and the world inside—in metaphysical terms.

> It is hard to avoid the impression that the distinction between what exists in time, what is irreversible, and, on the other hand, what is outside of time, what is eternal, is at the origin of human symbolic activity. Indeed, one aspect of the transformation of a natural object, a stone, to an object of art is closely related to our impact on matter. Artistic activity breaks the temporal symmetry of the object. It leaves a mark that translates our temporal dissymmetry into the temporal dissymmetry of the object. Out of the reversible, nearly cyclic noise level in which we live arises music that is both stochastic and time-oriented. (Ibid., 311)

Modern physics now recognizes many of the problems that Peirce developed his semiotic to explain, nearly a century ago, and the irreversibility (disymmetry) of time, which he conceived as continuity, was of primary importance in his work to construct a theory of communication. On this point, Prigogine mentions that

> [o]ne of the most surprising results of Einstein's special theory of relativity, published in 1905, was the introduction of a local time associated with each observer. However, this local

> time remained reversible time. Einstein's problem both in the special and the general theories of relativity was mainly that of the "communication" between observers, the way they could compare time intervals. (Ibid., 17-18)

We can account for the past (in memories and records of all kinds)—even any awareness of the present (to the extent that we turn our attention to it) becomes consciousness of the immediate past—but we cannot so account for the future. Peirce's philosophical *observation* of this "asymmetry of experience," based on the irreversibility of time, indicated to him a fundamental "directionality in experience": we are bound in our conscious experience to "go from the past toward the future."**[REF MS 304?]** This metaphysical observation was fundamental to his semiotic as a theory of the continuity of experience (the *growth* of meaning, rather than its haphazard expansion). Uncertainty about the future tends to draw us out of the certainty of the past. Notions of probability and chance (tendencies) have no meaning (are of no use to us) without our awareness of time. With this awareness, we have the rational roots of the sense of *purpose*; and the semiotic problem, then, was to explain how this continuity of experience operates through thought and communication.

Peirce observed that something mysterious happens when humans communicate, something that cannot be understood in our traditional scientific approach relying on logical determinism. Take the immediate example: as you read this sentence, structured from words as observed marks on paper, you easily ignore their physical qualities and engage in thought about what (in your experience) the strings of marks might be used to refer. We do not react to the physical qualities of a medium of communication the way we react to the physical qualities of purely sensible objects; the conditions are not simply objective and accountable in terms of cause and effect. Peirce knew that the Greeks had noticed the mystery and had tried to develop effective conceptual investigation into the conditions necessary for its occurrence. He also knew that modern Western philosophy, in its symbolic logic tradition and preoccupation with linguistic *structure*, had not fully appreciated what *functional* conditions the Greeks had tried to explain and understand. St. Augustine described the mystery in terms of the concept of sign: "A sign is a thing which causes us to think of something beyond the impression the thing itself makes upon the senses" (Robertson 1958: 2.1.1, 34). We might say, in modern terms, that when we use a medium of communication, it can mysteriously become "transparent" for us, and so reveal to our thoughts the thing to which it refers.

A medium of expression does not simply "convey meaning," but becomes a part of (modifies) our human experience to affect, in some way that cannot be objectively predicted, those engaged in its use. Models of this approach come from medieval scholars who further developed Greek theories, conceived thought *as* communication (all thought is dialogic in form;

see MSS 634 and 637), and investigated the necessary conditions for any form of such *mediation* to occur. In our modern technological conception of communication, we readily consider the process as no more than the transmission of information, taking no comprehensive account of the conditions that must be part of the occurrence of meaning in anyone's experience. According to Peirce, ideas cannot be accounted for in these terms.

> We are accustomed to speak of ideas as reproduced, as passed from mind to mind, as similar or dissimilar to one another, and, in short, as if they were substantial things; nor can any reasonable objection be raised to such expressions. But taking the word "idea" in the sense of an event in an individual consciousness, it is clear that an idea onces past is gone forever, and any supposed recurrence of it is another idea. These two ideas are not present in the same state of consciousness, and therefore cannot possibly be compared. ("Law of Mind," *EP*, 313)

A chemist by training, Peirce employed the Greeks' conception of sign to help explain the mediation underlying the objective conditions for mediation (structure of the medium and behavior of participants), the way a chemist employs the concept of molecule as the basis for explaining molecular activity underlying the observable behavior of materials in reaction. Mediation is not merely reaction; we cannot discover "the rules of sign-mediated behavior" simply by external observation and statistical summary. Peirce's perspective indicates that we miss something essential when we treat meaning as no more than the interaction of entities:

> I hold a different theory; namely that in the first place every composition of concepts is built up by the application of relatives, . . ., and in the second place that this composition takes place, as in chemistry, by units of valency, so that each correlate of a relative term is a single individual, and for example the relation of being a loving servant is not correctly a mere compound of the relations of loving and of serving. (MS 300:18)

Signs *are* mediation, or the mediating experience. Signs, as mediation (*in experience)*, cannot be examined as objects (*of experience),* by means of the empirical approach, but must be conceived in terms of semiosis (as continuous phenomena). We must speak of "signs" as though they were entities, because language, our conventional medium of inquiry, is designed to treat *objects* of inquiry. (And so, says Bertrand Russell, we know much more about physics than about anything else.) Because of this limitation of language, when we use the word "sign" as a theoretical concept in semiotic, we must always think "the ongoing process of semiosis." Symbolic expressions are the periodic products of semiosis, but their empirically identifiable features alone do not determine what meaning will be made of them as signs (in semiosis): "In the first place, a sign is not a real thing. It is of such a nature to exist in replicas. Look down a

printed page, and every *the* you see is the same word, every *e* the same letter. A real thing does not so exist in replica. The being of a sign is merely *being represented*" (MS 517:10; 1904).

An expression has *virtual*, not factual, meaning—meaning that thought and communication continually generate in the process of mediation. What makes an expression more than its objective properties is the not-strictly-causal (only vaguely determinable) relation to what *someone's* thought *might* take it to mean. From any (necessarily limited) human point of view, the meaning of any expression cannot be simply a matter of *probability* (some established conventional response) but must include *possibility* (an individual's unique experience in which the interpretation of meaning occurs) that cannot help but generate new meaning—growing experience. Only by means of a simplistic theory that construes a "sender" as omniscient and a "receiver" as robotic, could we ever attribute any effect (response of receiver) to a particular cause (intention of sender) through a medium of communication. A theory of "coded behavior" will never explain the creative productivity that particularly characterizes human thought and communication. The essential continuity of experience, in which meaning is always a possibility in the future, is theoretically fundamental to Peirce's method, or pragmatism—a point ignored by his contemporary, as well as by the modern, "pragmatists."

> I do not think that the import of any word (except perhaps a pronoun) is limited to what is in the utterer's mind actualiter, so that when I mention the Greek language my meaning should be limited to such Greek words as I happen to be thinking of at the moment. It is, on the contrary, according to me, what is in the mind, perhaps not even habitualiter, but only virtualiter which constitutes the import.* To say that I hold that the import, or adequate ultimate interpretation, of a concept is contained, not in any deed or deeds that will ever be done, but in a habit of conduct, or general moral determination of whatever proceedure there may come to be, is no more than to say that I am a pragmaticist.
>
> [this fotenote was added by taping an extension on the original MS page]
> *This was said in 1868, before declaring for pragmaticism, thus: "No present actual thought (which is mere feeling) has any meaning, any intellectual value; for this lies, not in what is actually thought, but in what this thought may be connected with in representation by subsequent thoughts; so that the meaning of a thought is altogether something virtual." (J. Spec. Phil, p 149) This paper in fact expresses a kind of pragmatism not unlike that of Prof. James. (MS 291:9; 1906)

Peirce introduced his sign theory in 1867 as the basis for his philosophy of science and the method he later called pragmatism. For the rest of his life, he worked to develop it as an "observational science," dependent on observations and experience of everyday life, and applicable to any sign-activity whatever (CP 3.427). His pragmatism explains how particular conditions of mediation, as semiotically defined and analyzable, make it possible for learning (experience through time) to occur. His semiotic examines the general conditions that make it

possible for phenomenal object to become a sign in mediation—that is, how *signs* can refer to *something* for *someone*.

Peirce's semiotic conceives mediation in a fundamentally *tri-relative* conceptual structure that captures its generative or continuously growing nature. He arrived at this conception by beginning with the concepts of subject and object, because experience cannot be conceived in less than these two terms. But we need more than two concepts, because the theory must enable us to account for the *relationship* between the two separate terms when we speak of a subject *experiencing* an object. The necessary third term (focusing attention on the *relation of experience* between subject and object as a phenomenal element in its own right—to define, analyze, and explain) makes the minimum adequate conceptual structure a tri-relative one.

On this basis, Peirce, along with Augustus DeMorgan and George Boole, began to develop "the logic of relations", which prescribes an essential ordering (time dimension) of conceptual terms, a construct that makes it possible for Peirce to account for the generative or creative aspect of experience in terms of tri-relative sign-activity. Traditional dichotomous theories (such as Saussure's of signifier/signified and those of the logical positivists), without this relation of generation, cannot explain the productivity of thought and communication in creating new signs. Because the conditions conceptualized in these theories are, therefore, timeless (language coded to thought as accomplished fact), they cannot explain the uniqueness of someone's meaning in a particular time and place or how it can come to be understood by others. Rather than a theory of language, Peirce's semiotic is a theory of how meaning is produced in experience. Without the tri-relation that constitutes experience theoretically accounted for, communication must be considered irrelevant and even impossible.

On this point, Searle remarks:

> While Peirce's "semiotics" may appear intriguingly similar to Saussure's proposed discipline of "semiology", it should not be over looked that the first of many fundamental differences is that Peirce's [semiotic] is not based on the *word* as "sign" but on the proposition as that which unifies consciousness and creates intelligibility or comprehension. In this sense, Peirce's [semiotic] is not a theory of language but a theory of the production of meaning. (560)

Materialism and idealism are merged (as Objective Idealism) in his semiotically explained metaphysics: the substance of anything we experience is never in question, only our ability to make it intelligible, by which we understand it in some measure. Searle says that, in this conclusion, Peirce shows

> that our ability to discriminate (and therefore to compare), like our ability to abstract, or prescind (1:549n), and dissociate, is not at all symmetrical. Only in those cases where a conception actually does reduce the manifold sensations to unity can we abstract or prescind,

> and by this test Peirce is able to eliminate entirely the need for a Kantian transcendental analysis or the pursuit of a hierarchical Hegelian dialectic. (561)

Beyond accounting for thought and communication as time-based and productively evolving, the generality of Peirce's theory gave him a comprehensive perspective on the many modes of expression in human mediation, and it exposed the misconception of basing logic (any explanation of reasoning) on language alone. In the first place, he said,

> Logic, for me, is the study of the essential conditions to which signs must conform in order to function as such. How the constitution of the human mind may compel men to think is not the question; and the appeal to language appears to me no better than an unsatisfactory ascertaining of psychological facts that are of no relevancy to logic. But if such appeal is to be made, (and logicians generally do make it; in particular their doctrine of the copula appears to rest solely upon this,) it would seem that they ought to survey human languages generally and not confine themselves to the small and extremely peculiar group of Aryan speech. (MS 291:15)

Peirce argued that the purely symbolic character of traditional logic fundamentally prevented it from usefully serving us as an observational science, in capturing the essential continuity of experience. He created a form of graphical notation, his Existential Graphs, with which to investigate the formal relations of linguistic symbols with respect to their meaning in any particular context of experience (which, he maintained, is generated from *iconic* and *indexical* relations *in that context*). At the same time, he cautioned against the notion that any mode of reference performs complete representation.

> The system of Existential Graphs may be characterized with great truth as presenting before our eyes a moving picture of thought. Provided this characterization be taken not as a flatly literal statement, but as a simile, it will, I venture to predict, surprise you to find what a strain of detailed comparison it will bear without snapping. A picture is visual representation of the relations between the parts of its object; a vivid and highly informative representation, rewarding somewhat close examination. Yet from the nature of things it must fall short of perfection, just as a representation of any kind must. It cannot directly exhibit all the dimensions of its object, be this physical of psychic. It shows this object only under certain light, and from a single point of view. There is a hind side, too, that it does not show at all. Moreover, it will not bear examination under a high-power microscope; since, so compared with its object, it will be formed to represent parts as simple and homogeneous that really are highly complex. It is curious how entirely true each of these statements is of the representations of thought in graphs. On the other hand, whatsoever object is shown in a correct picture as composite, really is composite, and is really composed of such parts as the picture shows; only these are, in reality, only *proximate*, and not *ultimate*, parts. **(MS 291:?)**

No thing is *actually* a sign (not a diagram or image or even a string of text), in semiotic terms but *any* thing is *potentially* a sign; what makes some *thing* function as a sign (in semiosis)

is someone *using* it to refer to something. Certainly, marks in alphabetic shapes forming words and sentences on paper are *more likely* to be used (by someone who is literate in that language) in mediation, because they have become conventional media—have become habitual or automated in their function *(for that someone)*. Individual points-of-view are accounted for in terms of Peirce's tri-relation which, at the same time, indicates just what constitutes the *potential* advantage of a conventional medium (of symbols), such as language: "It appears to me that the essential function of a sign is to render inefficient relations efficient,—not to set them into action, but to establish a habit or general rule whereby they will act on occasion. . . . a sign is something by knowing which we know something more" (SS:31-32).

The last part of this quotation is crucial in understanding what Peirce means by "efficient relations." Just as mediation in a language (when conventionally used by all participants) allows us to treat the medium transparently in order to express ideas, this very transparency can prevent us from examining the generalizing character of that medium's established structure and habituated function. One part of the tri-relation (the relation of idea to sign) may be perfectly automatic but, if the sign's relation to its object is not well-established (based on the sign-user's experience of that object), then the tri-relation as a whole will not be efficient (efficiency entails effectiveness) in its role of referring to *something* for someone. As the units of language (words, sentences, paragraphs, documents, etc.) grow, their combinatorial power increases, while their referential power decreases (symbols can take on a life of their own). We are easily misled by signs, as any rhetorician knows. Our ability to create and use them is certainly our greatest virtue but, at the same time, it can be our greatest liability in reasoning—if we do not use the pragmatic (experimental) method to investigate their trustworthiness.

Both "directions" of the tri-relation—idea to sign and sign to what it refers—capture the subjective and objective nature of semiotic phenomena: conventionality and essential representability. The purpose of the pragmatic method is to create truly efficient sign relations by maintaining the unifying function of conventionality while developing the diversifying function of representability through any media that can be used to connect ideas (as concepts and expressions).

In his last years of theoretical work, Peirce was able to generalize his semiotic to the point of approaching his life-long goal of a truly comprehensive metaphyics that could account for how the mind (ideas) relates to matter (the material world) in terms of the time-limited individual in continuity with time-eternal reality. In his controversial *Monist* series on metaphysics, published in the early 1890s, he incorporates (German Idealism) "Schelling-fashioned idealism" (6.102) to comprehend the scope of his semiotic metaphysics:

> I am bound to maintain that an idea can only be affected by an idea in continuous connection with it. By anything but an idea, it cannot be affected at all. This obliges me to say, as I do say, on other grounds, that what we call matter is not completely dead, but is merely mind hide-bound with habits. It still retains the element of diversification; and in that diversification there is life. When an idea is conveyed from one mind to another, it is by forms of combination of the diverse elements of nature, say by some curious symmetry, or by some union of tender color with refined odor. To such forms the law of mechanical energy has no application. If they are eternal, it is in the spirit they embody; and their origin cannot be accounted for by an mechanical necessity ("The Law of Mind" EP:331-32).

Clearly, Peirce knew that he had not finished developing the metaphysical implications of his semiotic as a general theory of signs and that such a goal was not within even his own (individual) grasp:

> Of course, having only studied signs during one brief life-time, I cannot know very much about them. (MS 292:41; 1906)

8. Semiotic Continuity in Peirce's Theory Development

Peirce spent the last fifty years of his life developing his semiotic to explain the nature of mediation: how our feelings (intuitions) can become effectively related to what (without this mediation capability) would be the brute-force objects in a world of simple reaction, by means of our power to contemplate and converse, which makes it possible for us to "know" (to gain some control of what happens in our experience). In the end, he incorporated his semiotic, his pragmaticism, and his existential graphs as a major metaphysical project toward resolving at least one traditional problem in philosophy that he had identified in the beginning: "if materialism without idealism is blind, idealism without materialism is void" (MS 1638; published in the *Cambridge Chronicle*, 21 November 1863).

He began with the hypothesis that the tendency or urge to generalize across the multitude of distinctions our senses are capable of discriminating for us, is the basis of rational thought. We make sense of what would otherwise be "noise" or sheer confusion by means of our ability to create some apparent order in thought (communication with ourselves) and through communication with others who are capable of creating mutually recognized order. The sensory tendency to detect differences—to particularize experience—must be complemented by the cognitive (communicational) capability to relate the distinguished particulars on some basis—to generalize experience. To be effective (in gaining control), this capability must be exercised in some sort of community (by collective cognition), no matter how vague or limited the conditions for relations among its members are.

His semiotic explains, in these terms, how experience can occur and progress. His pragmaticism can be appreciated as the methodological reminder that generalizing is not an end in itself: the unifying cognitive capability, in turn, must serve the discriminating sensory capability, in a continuing cycle of conceiving and testing ideas against reality. In this continuous effort—to formulate ideas, to test them against sensory experience, to modify them in response, and to test them again—we rely, in semiotic terms, on mediation relations so minute and complex (think of the synapse communication in brain cells) that we could never be aware of or account for them all. While they are all *theoretically* explicable, we need only investigate their unnoticed operation (or transparency) in relational detail when a particular purpose arises. Peirce hoped that his existential graphs would be an adequate symbolization of thinking in general, for use in a procedural manner that might, at least, make us aware of the transparency problems of conventional languages:

> [I]n one respect at any rate Existential Graphs is essentially different from language. Namely, instead of being merely protracted in time, its expressions are diagrams upon a surface, and indeed must be regarded only as a projection upon that surface of a sign extended in three dimensions. Three dimensions are necessary and sufficient for the expression of all assertions. (MS 654:6-7)

On the other hand, if most mediation relations did not occur for us automatically, without our conscious thought, none of our remarkable human capabilities would be possible. Contemporary scientific study of the occurrence of automatic response in biological systems (including the human brain) was an important influence on Peirce's theory development, and he came to regard *habits* as a more evolved case of the same phenomenon, in the realm of intellect. To the extent that we can establish cognitive relations that are trustworthy, as a result of experience, we can establish habits of thought and behavior (by training and learning)—which operate uncritically unless disturbed by new experience in which they are recognized as dysfunctional. By means of such complex mediation, we establish (more or less successful) mediated relations with the world around us. To the extent that these relations are habitual, we tend not to notice them and examine their effectiveness. We learn languages but do not readily examine their "fitness" in representing our experience. We establish habitual relations through tools and technological devices of all kinds that release us from routine, on which we may build to create new pursuits. The human-computer relation may epitomize our capability to establish habitual relations and increasingly build them into the machine itself, once we can define a habit in terms of an algorithm, or routine of interpretation for executing some operation.

The human semiotic capability to generalize—to relate objects (sensed or imagined) through mediation in experience, learn habits of thought, and automate productive behavior—requires human consciousness, or self-awareness, or the ability to "take perspective": to use the

objective self to view the subjective self. Peirce clearly enunciated his dialogical concept of cognition in "What Pragmatism Is" (1905): "A person is not absolutely an individual. His thoughts are what 'he is saying to himself', that is, is saying to that other self that is just coming into life in the flow of time" (5.421) Five years later, he expressed the point as follows:

> In reasoning, one is obliged to *think to oneself*. In order to recognize what is needful for doing this it is necessary to recognize, first of all, what "oneself" is. One is not twice in precisely the same mental state. One is virtually (i.e. for pertinent purposes, the same as if one were) a somewhat different person, to whom one's present thought has to be communicated. (7.103)

We can examine our habits and consciously develop new ones (just as we design and build automation into a machine), based upon what we can imagine to be possible as the consequence, linking the past to the future through ideas. But only through a *procedure* can our concepts (designs) be generalized (automated), to build reliable habits of thought (machines)—or what we call "knowledge." Procedure in building machines includes testing them in operation; procedure in building knowledge, effective knowledge, has the same requirement.

The history of science demonstrates the many hazards of mistaking elaborate conceptual generalizations for what they are supposed to refer, rather than using them as devices to be continually modified as more is learned. "The Bed-Rock Beneath Pragmaticism," written in 1908, Peirce makes clear that generality is a form of vagueness, that "An absolutely and completely determinate sign is an impossibility" (5.506). In the semiotic explanation of the tri-relative condition, a sign refers to something else for someone: the sign can never *be* the thing referred to (it would have no use in generalizing) and we never know for sure what someone might take it to mean. "Perfect accuracy of thought is unattainable,—theoretically unattainable. And undo striving for it is worse than time wasted" (SS, 11).

In semiosis, we experience something beyond moment-to-moment brute reaction to objects; our mediating experience progresses through time relating events and conditions—building concepts that might more or less vaguely indicate regularities in the future. To the extent that our expectations are fulfilled, we continue operating on the basis of those conceptions (as if they were true) in our habits. In a 1907 unpublished letter to the editor of *The Nation*, Peirce describes the "kernel of pragmaticism" in these conditional terms: "The *whole* meaning of an intellectual predicate is that certain *kinds* of events would happen, once in so often, in the course of experience, under certain kinds of existential conditions" (5.468; our italics).

Building anything for some purpose, whether actual or conceptual, involves a feedback process in a procedure of experimentation that involves testing and measuring its fittness or validity in general practice, which requires self-control in conduct:

> The pragmaticist does not make the *summon bonum* to consist in action [as his contemporary pragmatists had construed his concept], but makes it to 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)

In his 1903 Lowell Lectures, Peirce began to formulate his pragmatism in terms of metaphysical semiotic continuity:

> Pragmatism is the doctrine that what any word or thought means *consists in* what it can contribute to an expectation about future experience, and nothing more. (MS 462)

And in his *Monist* articles two years later, he finally states the pragmatic maxim in semiotic language.

> The entire intellectual purport of any symbol consists in the total of all general modes of rational conduct which, conditionally upon all the possible different circumstances and desires, would ensue upon the acceptance of the symbol. (5.438)

As Searle explains,

> While this maxim appears to leave meaning indefinitely deferred, it would be more accurate to say that it accepts meaning (as it does thought and reality itself) as a continuous process, in which we determine, with arbitrary precision (depending on "different circumstances and desires"), in communities of inquiry. Finally, Peirce's pragmaticism, with its debt to Duns Scotus, reflects Peirce's sense that thinking is normative and in it deepest reaches ethical and aesthetic; it must be these if it is be scientific (5.36, 8.242). According to the title phrase of one of his most widely read essays, it is by inquiry and experiment that we seek the "fixation of belief" (5.358 ff.), while the ethics of the process is profoundly summarized in the slogan that Peirce would have on "every wall of the city of philosophy: Do not block the way of inquiry" (1.135)— which is to say, no belief is ever ultimate, and no one gets the last word. (562)

Peirce considered what twentieth century physicists and philosophers call the problem of indeterminacy, in terms of semiotic, to be a circumstance of respresentational multiplicity, to which his pragmatism responds. Any particular expression or interpretation might well lead to a definite response, which then can be evaluated for its usefulness in that context; but no particular representation can possibly be the end of inquiry or claim to be absolute. Determining meaning, for any particular circumstance, and testing it in further experience is the procedure for maintaining a potential indefinite determinability, in which every proposition (sign) would be part of an endless continuum that never reaches, but approaches the limit of, perfect representation.

The effective conduct of science provides the best evidence that regularity (procedure) and inexactitude (vagueness of meaning) are not only compatible but productive, in the long run. Consequently, if its regular procedures are to remain vital, science must not lose contact with its wellspring in the semiotic vagueness of human experience; as Peirce says,

> Over the chasm that yawns between the ultimate goal of science and such ideas of Man's environment as, coming over him during his primal wanderings in the forest, while yet his very notion of error was the vaguest, he managed to communicate to some fellow, we are building a cantilever bridge of induction, held together by scientific struts and ties. Yet every plank of its advance is first laid by [hypothesis] alone, that is to say, by the spontaneous conjectures of instinctive reason; and neither Deduction nor Induction contribute a single new concept to the structure. (6.475)

In this regard, Peirce was concerned about the dominance of deterministic materialism in the science of his time and, in his 1893 "Reply to the Necessitarians" in *The Monist*, he posed four phenomena that cannot be explained by the established mechanistic laws: growth, diversity, generalization, and feeling. His purpose was not to refute the established laws of physics but to demonstrate that they are not abolute and complete, especially in their ability to account for living matter.

> Some of us are evolutionists; that is, we are so impressed with the pervasiveness of growth, whose course seems only here and there to be interrupted, that it seems to us that the universe as a whole, so far as anything can possibly be conceived or logically opined of the whole, should be conceived as growing. (6.613)

Peirce's earliest writings indicate his conclusion (mentioned in the preceding section) that mind and matter differ only with respect to point-of-view (MS 923s in 1860-62 and "Analysis of Creation," W1:85-90, in 1861). The theory of semiotic continuity (developed over his last thirty years) first attempts to explain how, in a world of chance, matter could turn into mind through evolution. By the early 1890s, he gained a biperspective view from which to proceed.

> Viewing a thing from the outside, considering its relations of action and reaction with other things, it appears as matter. Viewing it from the inside, looking at its immediate character as feeling, it appears as consciousness. These two views are combined when we remember that mechanical laws are nothing but acquired habits, like all the regularities of mind, including the tendency to take habit, itself; and that this action of habit is nothing but generalization, and generalization is nothing but the spreading of feeling. (6.268; "Man's Glassy Essence," *EP*: 349)

He then proceeds to address the problem of how mind and matter may continuously act on one another. (See Esposito, 1980: 173-74.) The established mechanistic view, with conservative principles, cannot even provide the basis of an *opportunity* for the growth (irreversible tendency) of feelings and consciousness:

> Mechanical causation, if absolute, leaves nothing for consciousness to do in the world of matter; and if the world of mind is merely a transcript of that of matter, there is nothing for consciousness to do even in the mental realm. (6.613)

Examining the explanatory basis of physical laws, Peirce argues even further that the law of conservation of energy (the randomizing factor of thermodynamics) and the possibility of life rely on the same notion of chance:

> I do no more, then, than follow the usual pattern of the physicists, in calling in chance to explain the apparent violation of the law of energy which is presented by the phenomena of growth. . . .
>
> Remark, reader, at this point, that chance . . . is not the mere creature of our ignorance. It is that diversity and variety of things and events which law does not prevent. Such is that real chance upon which the kinetical theory of gases, and the doctrines of political economy, depend. . . . Chance itself pours in at every avenue of sense: it is of all things the most obstrusive. That it is absolute is the most manifest of all intellectual perceptions. That it is a being, living and conscious, is what all the dullness that belongs to ratiocination's self can scarce muster hardihood to deny. . . .
>
> Must I once again repeat that the tendency to take habits, being itself a habit, has *eo ipso* a tendency to grow; so that only a slightest germ is needed? A realist, such as I am, can find no difficulty in the production of that first infinitesimal germ of habit-taking by chance, provided he thinks chance could act at all. This seems, at first blush, to be explaining something as a chance-result. But exact analysis will show it is not so. (6.612)

Peirce says that growth, rather than simply defying the conservation law of physics, must be accounted for in a new law of "an intimate connection between growth and habit" that builds on what the conservative laws describe as an advancement:

> Now this law of habit seems to be quite radically different in it general form from mechanical law, inasmuch as it would at once cease to operate if it were rigidly obeyed: since in that case all habits would at once become so fixed as to give room for no further formation of habits. In this point of view, then, growth seems to indicate a positive violation of law. (6.613)

Peirce concludes that all living organisms require the ordering negentropic (habit-taking) tendency along with the entropic (habit-breaking) tendency in order to conduct themselves successfully in the mechanistic world of chance (where regularities have some probability of

occurring): "I make use of chance chiefly to make room for a principle of generalization or tendency to form habits, which I hold has produced all regularities" (6.63, 606). As Esposito explains (1980: 169-70), habit-breaking requires the concept of chance to give habit-taking activities the opportunity to become increasingly subject to habit.

Peirce's notion of continuity was conceived to characterize the negentropic tendency itself (see 4.121). The possibility of systematicity, or regularity, responds to the conditions of chance, or irregularity:

> Supposing matter to be but mind under the slavery of inveterate habit, the law of mind still applies to it. According to that law, consciousness subsides as habit becomes established, and is excited again at the breaking up of habit. But the highest quality of mind involves a great readiness to take habits, and a great readiness to lose them. (6.613)

In the end, Esposito concludes, Peirce may have failed in his attempt to produce a complete account of philosophical problems, but "his efforts in that direction have left us a legacy of a truly interdisciplinary metaphysics upon which to build" (1980:231) Searle credits him with expanding logic "to cover the whole range of intelligent inquiry or associative thought for any 'intelligence capable of learning by experience' (CP 2:227), without losing the precision that made Peirce one of the fathers of modern formal logic," so that his metaphysics "does not issue in a simple ontology, nor does it lead to radical skepticism because the crucial (and subtle) question hinges on the character and function of representability, not being or existence" (559-60).

Peirce, himself, described the results of his efforts, in 1907:

> I am, as far as I know, a pioneer, or rather a backwoodsman, in the work of clearing and opening up what I call *semiotic,* that is, the doctrine of the essential nature and fundamental varieties of possible semiosis; and I find the field too vast, the labor too great, for a first-comer. (MS 318:96; 5.448)

9. The Difficulty of Editing and Publishing Peirce's Work

As a prodigious author (and publisher and, to a lesser degree, editor), Peirce was aware of all matters connected with writing, editing, and publishing. In 1891 (five years before the appearance of the relevant fascicle in the *Oxford English Dictionary*) he provided a more sophisticated definition of "emendation" than any that had appeared in print; it is "an attempt to restore the true reading of a passage upon historical grounds, external or internal, by means of conjecture or circumstantial evidence" (MS 1167). In 1900, he wrote "The Editor's Manual" (MS 1181), a 92-page manuscript primarily about spelling. And between

1864 and 1908 he published several hundred book reviews, in which he had much to say about writing, publishing, and editing. In an 1893 review of a new edition of Beckford's *Vathek*, he provided the recipe for an immortal book; intimating the novel's actual history, he said: "Write it at one sitting in 3 days and 2 nights; devote 3 1/2 years to improving it, and then publish it as near as possible as it originally was" (P 539). In 1890, he agreed with A. C. Fraser's plea for a new edition of Locke's works, and said that "this great man, whose utterances still have their lessons for the world, with wholesome influences for all plastic minds, should be studied in a complete, correct, and critical edition" (P 396), and in a review of Fraser's 1901 edition of *The Works of Berkeley*, he clearly distinguished between what are now called "substantives" and "accidentals": "Whether for an ordinary reader of philosophy, this edition or that in Bohn's 'Philosophical Library' is to be preferred is a delicate question. The text of either is excellent, although neither, we are sorry to say, respects Berkeley's punctuation, which is a part of his style" (P 791).

What about editing and publishing Peirce's own work? An edition of Peirce will be different from many other contemporary editions, especially those that issue previously published book-length works by novelists, psychologists, and philosophers which, even during their lifetime, went through a number of separate printings, and that must, therefore, focus on the collation of all authoritative (and sometimes, un-authoritative) versions of particular documents and on the eradication of editorial and compositorial corruptions. An edition of Peirce will be different, because few of his publications were printed more than once and because there are few holograph manuscript versions, printer's copies, corrected page- or galley-proofs, or offprints corrected by Peirce shortly after publication. It will also be different because, in his unpublished manuscripts (the largest part of his œuvre), there are few authoritative, and collatable, alternate versions. As indicated earlier, rather than writing a series of (collatable) drafts that are subsumed in a final version, Peirce would generally proceed along a path of thought, return to a crossroads, and then blaze new trails—with the roads not taken becoming at times important stretches of a subsequent exploration. As a consequence, nearly all of his manuscripts have their own textual authority, and there are few difficulties, either here or in his publications, in establishing copy-text. It might thus fairly be concluded that editing—and (re-)publishing—Peirce's writings, whether published or unpublished, is a relatively simple task.

It would be easier if Peirce's writings were deposited in one place and properly assembled, dated and complete, textual in the purely linguistic (or ASCII-character) sense, and fewer in number and smaller in bulk. None, unfortunately, is the case: and that is why editing and publishing them is—at least in the traditional medium of the printed and bound (paper) book—enormously difficult. Many of his writings present serious obstacles for

traditional publication methods, for his work is highly graphical in nature. There is text enclosed in graphical figures, graphics embedded in text, text contoured around graphics, and entire pages of graphics with no text at all. Moreover, Peirce used color in his text and figures to make important distinctions and to key text elements to related graphical elements, and he invented many symbols and the so-called Existential Graphs, which are permeated with colors and tinctures. What publisher can possibly recover the exorbitant costs of typesetting such material, and who will be able to print the many lists and tables, as well as mathematical and scientific formulas, in Peirce's writings, not to mention his work in Arabic, Cuneiform, and Egyptian hieroglyphics?

Editing and publishing Peirce's writings would be easier if they consisted of his lifetime publications only. But these, as mentioned, represent only about one-fifth (perhaps one-sixth) of his entire work. Only partly because of their bulk, editing and publishing his manuscripts may be impossible at worst, difficult at best. He indicates in his unsuccessful 1902 grant application to the Carnegie Institution (to enable him to write 36 memoirs detailing his system of logic) that he has accumulated "a large store of unpublished results" and that "Those things I have published have been slight and fragmentary, and have dealt little with the more important of my results" (L75: E 33 and 37–38). As quoted earlier, his published works are only "scattered outcroppings of a rich vein" of unpublished fragments, which "no human being could ever put together" (MS 302).

The two most serious difficulties in editing and publishing Peirce's work lie in the reassembling and reorganization, as well as in the dating, of his unpublished manuscripts, both those at Harvard and those scattered in several smaller collections elsewhere (to which one might add the difficulties of trying to deal with the work of a polymath, which no one single person can understand fully or edit confidently). Peirce himself dated only about one-third of his manuscripts, and yet their dates of composition are sometimes of great importance: for as he made fundamental discoveries in topology, in geodesy, and in several theorems and methods of formal logic, a number of his manuscripts involve questions of priority. Many of Peirce's manuscripts have, in fact, now been dated, primarily by editors in the Peirce Edition Project in Indianapolis. Using information derived from publications and internal evidence, reports and correspondence, and watermarks and Peirce's handwriting, they have been able to assign definitive dates to several hundred manuscripts (especially those in the time periods covered in the first six volumes of the *Writings*) and preliminary dates to nearly all. But given the several thousand fragmentary pages that remain unplaced—and that will so remain until each page has been carefully compared and scrutinized in preparation for each of the successive remaining volumes in that edition—it is fair to assume that the

chronological fine-tuning of manuscripts (and separate manuscript pages) will not be completed until shortly before the completion of the final volume in the edition.

The same will be true of the reassembling and reorganization of Peirce's manuscripts, which have been in a chaotic state of disarray since their arrival at Harvard in 1915. (What follows will focus on these papers, for the much smaller collections elsewhere are considerably less problematical. Although the several thousand pages of Peircean scientific materials that have been discovered in Record Group 23 in the National Archives are scattered through hundreds of linear feet of the records of the Coast Survey, they have been photocopied and are now available, and chronologically assembled, in the collections of the Peirce Edition Project.) There are literally thousands of loose, incomplete, and fragmentary pages that are collected in so-called fragment folders. Although many of these pages have over the years been moved into their appropriate places in particular manuscripts (in the photocopy collections of the Peirce Edition Project, to a lesser extent, in the similar collections at the Texas Tech University Institute for Studies in Pragmaticism), many thousand more remain scattered and fragmentary for the time being. Moreover, certain gaps in these papers will always remain, for pages and papers have been lost or stolen over the years and, especially during paper shortages (in World War II), some papers were actually given away.

Today the collection is sorted into folders according to a variety of organizational schemes (and fragments in one folder are often found to belong to manuscripts in another). Richard Robin's *Annotated Catalogue of the Papers of Charles S. Peirce* provides the most valuable and comprehensive view of the disordered manuscripts (and their incomplete representation in the microfilm edition). But unfortunately, it gives a greater sense of order than there actually is and, even here, the topical arrangement has proven counterproductive. MS 1043, for example, a five-page untitled note on chemical valency, appears in the "Chemistry" section and is said to belong with MSS 1041 and 1042, both entitled "Valency." As it turns out, the note completes a now reassembled excellent twenty-five page version of the 1906 essay on "The Basis of Pragmaticism," consisting of one loose title page from MS 280 (in the "Pragmatism" section), nineteen pages from MS 908 (in the "Metaphysics" section), and the note from MS 1043 (whose first page has Peirce's inscription, in red ink, "Note to be printed in small type at the end of the article"). There are numerous other such instances of disarray (and misappellations), for we find manuscripts under "Mathematics" (or "Pragmatism" or "Metaphysics") that could just as well belong under "Logic"—and visa versa—others under "Astronomy" that could belong under "Physics," still others under "Physics" that equally concern "Psychology," and so on. Moreover, many a manuscript (or parts thereof) actually belongs into letters—and parts of letters into manuscripts.

A related question on the difficulty of editing and publishing Peirce's work is how will the reader ever have ready access to Peirce's letters? Only a minimal number have been published (among them the extensive collection between Peirce and Victoria Lady Welby, and the much smaller between Peirce and William Torrey Harris, founding editor of the *Journal of Speculative Philosophy*), only a minimal number is included in the *Writings* and in earlier editions, and the microfilm edition lacks hundreds of them. And what, it might be asked, is to be done (in editing and publishing Peirce's work) with other such private documents as diaries and personal notebooks. Although these are writings never intended for publication, or the eyes of anyone but Peirce himself, a few are among some of his most important manuscripts.

Foremost among these is the so-called Logic Notebook, his journal of logical analyses, inscribed in nineteen of the years between 12 November 1865 and 1 November 1909. It can fairly be said that this is the single most fruitful and important of all of Peirce's extant manuscripts, but large parts of it are illegible in the microfilm edition (primarily because of bleed-through in its near-onion-skin paper) and only parts of it have been and will be reproduced in the *Writings*. And yet Peirce himself divined its importance to his work, when he wrote on 23 March 1867: "I cannot explain the deep emotion with which I open this book again. Here I write but never after read what I have written for what I write is done in the process of forming a conception." The remainder of the notebook is devoted to important discussions and representations of formal logic, categoriology, graphical logic, semiotic, mathematics, and metaphysics—and due to its private and very graphical nature, it presents typesetting and printing difficulties.

There are other truly profound and seemingly insuperable difficulties in (editing and) publishing Peirce's work in the traditional paper-embodied medium of the printed page and bound book. What, for example, is the editor of a selected critical edition to do with a manuscript that has six (more or less) complete (or incomplete) versions, as in the case of Peirce's Carnegie application? **[FN]** Although the compositional order of the six versions can be established relatively easily and although the 76-page version actually sent to the Executive Committee (and later returned to Peirce, with a "corrected" typescript prepared at the Carnegie Institution) is clearly marked, it is equally clear that only the six versions together (some 500 pages in all) can come close to representing the full extent of Peirce's intentions for his memoirs. The "final" and actually sent version is neither the best nor the one that best represents Peirce's final intention; for several of the 36 memoirs are here not described at all (beyond their titles) or described and outlined much less clearly and fully than they are in other versions. Peirce's intention, in short, is represented in all six versions.

What is the editor of a selected critical edition to do with the four chapters that make up the 1901–1902 "Minute Logic" (MSS 425–434), an incomplete logic book whose completed and continuous text (in the central and "final" versions of the four chapters) amounts to about 1,000 pages? But there are as many pages again, representing the sort of trail-blazing passages and sections mentioned earlier, which a contributing editor in the Peirce Edition Project worked for over a year to map (in several carefully constructed stemmata) to reveal complex and organic convolutions that are no less important to the development (and understanding) of Peirce's argument than are the continuous central versions of the main trunk. Even if a paper edition could publish all 2,300 pages of this book (in the main body as well as in the editorial and textual apparatus), the printed page and would keep the reader from seeing, at once (or in real time), the full extent of its many evolutions.

There are several other groups and series of manuscripts like those of the "Minute Logic." Two of Peirce's most important lecture series—both given in 1903, one at Harvard (MSS 301–316a) and the other at the Lowell Institute (MSS 447–478), and both consisting of eight lectures—come, respectively, to about 700 and 1,500 pages. Although many of these were obviously not read (or covered) in the lectures, they are no less important than those actually presented. And what is the editor to do with MSS 601–679, written between late 1907 and late 1910 and comprising some 1,700 pages? These pages represent various overlapping and interrelated chapters for at least three (interrelated and overlapping) book projects, variously entitled "The Rationale of Reasoning," "Logic Regarded as a Study of Signs," and "Essays on Meaning." Even if a paper edition could somehow represent all three book projects, and print all 1,700 pages, the usefulness of that representation would be severely limited.

What, finally (though many other examples might be cited), is the editor of a selected critical edition to do with two of the best known and most frequently cited of Peirce's papers "The Fixation of Belief" and "How to Make Our Ideas Clear," published in 1877 and 1878, respectively? As foundational expressions of his pragmatism, Peirce intended to use them—each time with extensive revisions, including deletions and additions of sometimes lengthy passages—as chapters in several later book projects. There is no "final" version of either essay—except as it might be tailored for each particular book project—and there is no paper edition that, within the limited framework of 30 volumes, could afford to publish the two papers four or five times.

The difficulty, of editing and publishing the marginalia in Peirce's work is less serious. These marginalia are like those in any prodigious author's work, in that they correct errors and make other revisions (which sometimes extend into preceding or following versos, and are problematical only when Peirce fails either to complete his revision or to insert carets

and directional lines); provide references and footnotes, and give instructions to typists, typesetters, printers, and editors (the last including Peirce himself, regarding his own writings, whether the present one or others); contain comments upon his own writing or that of others and, in lectures, indicate the number of minutes so far taken; or are mere doodles or pen and ink trials.

One last and somewhat more serious difficulty in editing and publishing Peirce's text (and its margins and marginalia) lies in the fact that several early editors (and cataloguers) of his unpublished manuscripts saw fit to use the margins—and the text itself—for a variety of purposes, by writing in corrections, notes, and other annotations (both in pencil and in pen): and, in some cases, only the most experienced and astute reader of the manuscripts is able to differentiate—whether in the original manuscripts, in photocopies, or in the microfilm—Peirce's hand from that of others. These marginalia serve the following purposes. (1) To indicate, by numerical notations, the inclusion of certain passages in the *CP* (as "1.349" or "1.611–615 precedes this"). (2) To identify a given passage or paper ("Lowell Lectures/Lecture I/Vol 2" or "Fragment # 104"; the latter is written in ink, but crossed out in lead pencil), to cross-reference it with other papers ("cf Lowell" or "More in Box 18"), or to provide it with a (missing) title or even to modify Peirce's own title. (3) To summarize, by a word or phrase, the contents of a particular passage, paragraph, or section (as "categories" or "thirdness"), or even a whole paper (as in one of the 1903 Pragmatism Lectures: "Almost nothing on/Pragmatism"). (4) To "correct" what was deemed incorrect or to add (seemingly) missing words. (5) To give instructions to typists (as "begin," "omit from here," "Begin [on fresh page]," "go to p 60," "Type 26 1/2 pp," or "Typist Stop"—and many of these pages have in addition beginning and closing brackets, as well as passages and whole pages crossed out by the editors) and instructions to typesetters: for a number of Peirce's handwritten manuscripts (and a few of his typescripts) seem to have been used as printer's copy for the *CP*; it is, moreover, reasonable to assume that some of these manuscripts (and typescripts) have not found their way back into the Peirce Papers collection (such as the two-paragraph opening section of the 1887–88 "A Guess at the Riddle" that is included in the *CP* but can no longer be found in the Papers). And (6)—most astoundingly—to evaluate passages, sections, or whole papers by providing them with letter grades (as "A," "B+," or "C"—or following the "Almost nothing on Pragmatism" remark with: "But B–A quality") or adding other comments (as "dup[licate]" or "5 pp too diffuse"): all these intended, it appears, to help the editors in selecting what to include in their edited volumes.

The traditional medium of the printed page and bound book makes the idea of producing an authoritative text that embodies an author's "final intention" seem reasonable. Because of its rigid nature and the cost of producing such texts, the role of an editor is infused

with the notion of establishing at least textual intention as an artifact, almost as an end in itself. In this hide-bound mode of existence, representations function to stabilize (pragmatically) the procedure of scholarship but, at the same time, to abbreviate the critical process that is fundamental to the vitality of the collective scholarly mind. Peirce's semiotic gives us the perspective from which to appreciate the editorial role in the procedure of collective inquiry, where habit-taking is as crucial as habit-breaking. But if we hope to establish Peirce's "intention" in a medium of expression, we must invent a new one for the purpose.

10. Peirce's "Intention" Never to Finish Developing His Ideas

Traditional editing theory would give us the objective, in editing Peirce's manuscripts, of establishing *a text* that represents *his intentions,* which would be dubious from the semiotic perspective. First of all, the notion of "a text" as the data of our experience from which we interpret Peirce's intentions would be impossible to establish with any credibility (as we have seen above). Even if we restrict our objective to determining "what he intended to publish," we know from his own testimony that this would be merely expedient and not serve Peircean scholarship. Selecting a sample to publish, as must be done in producing a critical print edition, implies some basis for judgment—as well as enormous reliance on a manageable number of editors to carry out the work judiciously and accurately. But even if the whole archive of Peirce's work could at least be arranged in some accurate, chronologically-ordered form, the original manuscripts would be the data of experience from which the editors work to infer Peirce's intention at any point of rendering it in textual form. Semiotic tells us that "[t]he data from which inference sets out and upon which all reasoning depends are the *perceptual facts*, which are the intellect's <u>fallible</u> record of the *percepts*, or "evidence of the senses" (2.143; our underline).

Beyond this most obvious issue of perceptual fallibilty lie more subtle difficulties. Which intentions, at which instant in time, could be established? Even if the notion of continuously changing intentions were consistent with current editorial theory, how could this be represented in the print medium, with its already overburdened footnotes and textual apparatus? More difficult yet would be explaining and justifying—and keeping track of—the editorial judgments, which result from the editors' interpretation. As Peirce describes semiotic evolution, "[E]very symbol is a living thing, . . . its meaning inevitably grows, incorporates new elements and throws off old ones" (2.222). And even beyond this unimaginable burden (the pragmatic result of the feeble concept of "author's intention") would

be the complication that symbolic meaning has continued to grow since Peirce's writing: "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. These words have acquired information "(7.587). Editors would need to be thoroughly steeped, if that is possible, in what a nineteenth century mind might "intend" the meaning of the symbols to be in order to "determine" what their meaning *might* have been for Peirce. And what does semiotic tell us about the indeterminacy (multiplicity) of meaning? Worse yet, Peirce's pragmatism claims that meaning is always in the future; the editors would be trying to defy his fundamental principle of communication in their nineteenth-century version! The perils, as explained above, have always plagued the editing of Peirce's work.

This very problem of accurate interpretation, considering the complexity of continuously growing meaning, led Peirce to his most challenging work in logic.

> No communication of one person to another can be entirely definite, i.e. non-vague. We may reasonably hope that physiologists will some day find some means of comparing the qualities of one person's feelings with those of another, so that it would not be fair to insist upon their present incomparability as an inevitable source of misunderstanding. Besides, it does not affect the intellectual purport of communications. But whenever degree or any other possibility of continuous variation subsists, absolute precision is impossible. Much else must be vague, because no man's interpretation of words is based on exactly the same experience as any other man's. Even in our most intellectual conceptions, the more we strive to be precise, this more unattainable precision seems. it should never be forgotten that our own thinking is carried on as a dialogue, and though mostly in lesser degree, is subject to almost every imperfection of language. I have worked out the logic of vagueness with something like completeness but need not inflict more of it upon you, at present. (MS291:14; 1906)

His work in semiotic convinced him that objective idealism (what makes it possible for us to suppose that there is a basis for common meaning between individuals and even across cultures), in order to be effective, must be complemented by logical realism (what makes it possible for our ideas to tend toward reliable reference in the world of our experience):

> To satisfy our doubts, . . . it is necessary that a method should be found by which our belief may be determined by nothing human, but by some external permanency—by something upon which our thinking has no effect. . . . It must be something which affects, or might affect, every man. . . . [T]he method must be such that the ultimate conclusion of every man shall be the same. Such is the method of science. (5.384)

Self-controlled collective reasoning was, for Peirce, the scientific method. Science was not a body of certified truths or systematized knowledge for Peirce and he even suggests

that knowledge is not the point of science at all (see 6.428). As Hookway explains: "it is not sufficient because 'knowledge, though it be systematized, may be dead memory; while by science we all habitually mean a living and growing body of truth'; it is not necessary because we can take the activities of, for example Ptolemy to be genuinely scientific even though most of the propositions he defended were substantially false'" (see 7.605). The scientific inquirer is a member of a community of those who disinterestedly pursue the truth. Their pursuit advances, essentially, through dialogue and conversation and is sucessful to the extent that it can produce testable representations of reality. "Knowing" is entirely a collective achievement, based on our ability to establish the truth of our representations of it collectively (see Hookway, 119).

From the semiotic perspective, Peirce's "intention" was to *communicate his ideas*, which *necessarily* involves three factors that constitute mediation or semiosis (the medium of expression, the object of the expression, and the idea generated by someone who interprets what might be expressed in the medium about the object). Whether the "someone" was Peirce himself (by means of his own expressions in a manuscript, considering the objects of his own thought) or someone else (scholar, editor, or student attempting to interpret his manuscripts as to what he might be trying to express), the very act brings a new experiential point-of-view into the continuing growth of ideas. For Peirce, communicating with himself in text and drawings generated more conceptual depth and breadth (or helped him "snapshot" his ideas as they progressed to keep track of where they might be headed or where else they might go). For the someone following Peirce, communicating by means of the manuscript with him generates ideas in their particular experiences of the world, which may establish some continuity of thought with Peirce, as meaning continues to develop.

Peirce's concept of pragmatism serves as example by which to show what happens to concepts in communication—and their author's "intentions." From its early formulation, even those who greatly respected Peirce's intellect began to interpret his concept in ways that served their own (more limited) purposes. Today, by dictionary definition and philosophical tradition, the concept is hardly recognizable as what Peirce's manuscripts indicate it meant to him. Because the theory is so comprehensive, pragmatism's commonly accepted meaning is not contrary to Peirce's use of the term, but it falls far short of living up to what it might mean to us if we had fuller understanding of the continuity in his development of its meaning. On the other hand, its current meaning may well have served some essential evolutionary purpose and can always be re-examined for its usefulness, once we appreciate the continuous nature of Peirce's "intention."

The essential nature and purpose—and virtue—of communication is *not* simply to transmit messages accurately (what information theory was conceived to do), but to modify or

add to them in the process (to generate new ideas about the objects of our thoughts—no matter how abstract, or general, they may be). In communication, we keep ideas growing and responding to our collective experience of the conditions that confront us —whether they are presented by natural phenomena or by our creative expressions, which together constitute our experience, and whether or not they refer to anything of pragmatic value. That always remains to be discovered in the future.

11. The New Medium

If not absolutely necessary, it is entirely fitting that Peirce's work has had to wait for publication until the advent of a medium capable of capturing its nature and purpose. The virtues as well as limitations of the book have determined the conduct and character of inquiry for over 500 years, and we have no idea just how much "the medium is the message." The new computer-network medium, soon fully capable of bringing together all previous media, shows promise of a new semiotic era for collective inquiry. Countless methods and procedures that have been established over the centuries to develop the current publisher-library-academy circumstances are already changing through technological innovation.

Until now, the limitations of the paper delivery medium have determined what intellectual resources we could create. With digital media—integrated modes of representation under user control (interactive multimedia of sound, text, and image)—we gain new freedom of expression; digital storage allows us to keep track of expressions and their authors, and digital networks give us access to, and the capability to select, what serves specific communication purposes as they arise. Now that each of us has the potential to be a publisher or broadcaster, we will all need to understand better the purpose of the"editorial role," pragmatically, to support semiotic continuity (overcome chaos and yet not "block the road to inquiry").

Our traditionally established structures of organization and control have supported the misconception that knowledge can be located somewhere. The prospect of a world-wide, high-speed, high-capacity, computer-linking network transmission medium, by which we can learn and research as a "collective mind," forces us (even without Peirce's philosophical perspective) to question our belief in knowledge as an established, immutable structure. Along with the development of such a pervasive capability will come the need to create unprecedented new facilities for communication, collaboration, and critical control.

Great amounts of money continue to be spent on the production of artistically, historically, and philosophically significant work in the form of large print editions. The

required critical editorial work, using traditional methods and tools, is painfully slow. Not only does this work need the efficiency to be gained from the new medium, but scholarly work has begun to *require* the electronic enhancement of the products, in the form of computer-based resources and tools. At a minimum, these tools will automate (make more efficient to use) such features as tables of contents, indices, and bibliographies that are essential to an edition's effective critical purpose. Such means of finding and keeping track of content will be even more crucial to research conducted in computer-network media; and the work of those who develop these means (editors and their staffs) will continue to become more valuable—though their methods (habits and procedures) will need to change in response to the new potential. Unfortunately, just as printers tried to automate the process of manuscript production in the transition from handwritten pages to printed books, we are now trying to automate the book and have not yet begun to understand how the electronic form makes both technological and behavioral change necessary, and in concert.

According to Brian Gaines, we have entered a new era of digital technology innovation and development that will focus "as much on the content and intentions of computer-based activities as on the underlying technologies of hardware, software, communications, and human-computer interfaces" (Gaines, 39). The innovation must not only involve new technologies, such as those for knowledge representation and acquisition (hypermedia and intelligent agents), but also our judicious application of them, as they become our primary means of academic discourse on a world-wide communication network. We must become more closely engaged in determining what we want automation technology to do for us.

Computer-network technology has the potential to increase dramatically our powers of observation, exploration, application, and interpretation, by giving us common access to far more material than we can "track through" or "track down" by any other means. In addition, it gives us the means to establish virtual communities built on the components of reliable archives, efficient access, and effective communication. With sufficient design and coordination among network systems managers, publishers, librarians, researchers, and students, network communities could develop and maintain intellectual resources virtually, analogous to the way geographically based communities develop and maintain their physical resources. Network community activities would include:

> Libraries and publishers collaborating to archive works of established scholars and provide useful (tailored application) access for students in particular fields of investigation to explore that body of work;

Researchers collaborating to conduct joint investigation into the origins and implications of recorded events; and

Editors, teachers, students, and researchers collaborating to prepare a selected portion of material from a database collection tailored according to some pedagogical need or research requirement.

Resource materials would be more efficiently available to more individuals, and individuals' contributions to building resources would be more efficiently available for consideration in the virtual community of inquiry. In semiotic terms, what are now inefficient relations (in the realms of publishing, library, teaching, and research) could be made much more efficient.

In the transition, as we lose the printed page (and with it the book, the bookshelf, and the floors of indexed storage), we will need what Patricia Battin calls a "new set of life lines." The operations of searching, sorting, selecting, and keeping track of where related ideas seem to be going and where they came from will be essential in the on-line environment of communication and collaboration. These functions are already essential in the scholarship of an individual investigator; they will take on dramatically new "overhead dimensions" in the on-line community, where communication will be nearly as convenient as thinking.

12. The Promise of the New Medium for Electronic Editions

Many of the technological requirements for what are now called "electronic editions" or "hypereditions" already exist; but many critical functions still need to be carefully specified and responded to in digital systems development, if we are to use these resources effectively in scholarship and continue their development in virtual communities of inquiry. Without addressing the matter of editions, George Landow summarizes the coming impact of the new medium: "Electronic text processing marks the next major shift in information technology after the development of the printed book. It promises (or threatens) to produce effects on our culture, particularly on our literature, education, criticism, and scholarship, just as radical as those produced by Gutenberg's movable type" (*Hypertext*, p. 19). Our conscious behavioral changes will be at least as significant and necessary as those provided by technological advancements.

Several other scholars, each more or less closely involved with specific editing projects, have examined the influences of the new technology on editing to identify advantages and problematic effects. Charles Faulhaber discusses (among others) the TLG (Thesaurus Linguae Graecae), ARTFL (American and French Research on the Treasury of the

French Language), and ADMYTE (Archivo Digital de Manuscritos y Textos Españoles), and concludes that "The decisive change between the current practice of textual criticism and that of the 21st century will be the use of the computer to produce machine-readable critical editions." Reese Jenkins, editor of the Edison Papers, recognizes advances beyond machine-readable text into the realm of hypermedia, and summarizes by saying that "As we are nearing the end of the century during which images, objects and sound have increasingly come to dominate our culture, we as historians and documentary editors need to broaden our verbal conception of a document, learn the diverse languages expressed in forms rather than words, and find ways of incorporating and integrating into our monographs and editions, words, images, artifacts and sound" ("Words, Images, Artifacts and Sound: Documents for the History of Technology," *British Journal for the Histisy of Science* 20:1 [Jan 1987], 56). Jerome McGann, originator of the Rossetti Hypermedia Archive, assures us (in a World Wide Web document with the allusive title "The Rationale of HyperText") that network hypermedia "is no more a sign of the Last Days than was moveable type five centuries ago." And Peter Robinson, a participant both in the Voltaire and Canterbury Tales electronic edition projects at Oxford (and the author of two important reports on the digitization and the transcription of primary textual sources), concludes that "There are no longer any technical obstacles in the way of creating electronic editions and distributing these at reasonable cost. The obstacles are political, financial, and ideological."

Although none of these scholars details the possibilities and advantages of on-line editorial and scholarly communities on the World Wide Web (which may, however, be implied in McGann's reminder that "the word 'text' derives from a word that means 'weaving'" and which is exemplified at least in the network-collaborative transcription process of the Canterbury Tales Project), clearly they are aware of it. The most forward-looking conception of on-line electronic editions was presented several years ago in at editing conference at the University of Toronto:

> One of the most interesting possibilities that the electronic edition opens up . . . is that of maintaining a fluid, on-line copy, to which corrections and additions by the editors, or suggested to them by other . . . scholars, could continually be appended, with their source and date indicated. The application would seem to entail a partially new conception of the function of critical editions. . . . An on-line version . . . holds out the prospect of an edition that will form a centre of a much more useful kind: a central copy, available to all scholars, that is continually updated. The on-line copy could thus become a continuing focus and clearing-house for scholarship. (George M. Logan, David T. Barnard, and Robert G. Crawford. "Computer-Based Publication of Critical Editions: Some General Considerations and a Prototype." (Conference pre-print in) *Computers and the Humanities: Today's Research, Tomorrow's Teaching*. (University of Toronto, March 1986). P. 325.

Electronic editions continue to lag behind the new technology, primarily because they seem unable to free themselves from "the tyranny of the printed page and the bound volume" (Robinson). McGann points out that "the book or codex form has been one of our most powerful tools for developing, storing, and disseminating information" and that "[c]ritical and other scholarly editions of our cultural inheritance are among the most distinguished achievements of our profession," but he adds that "[i]n an age of print publication, manuscripts of writers tend to stand in *medias res*, for they anticipate a final translation into that 'better world' conceived as the printed word" and that "history has slowly revealed the formal limits of all hardcopy's informational and critical powers." Faulhaber identifies the goal of most current electronic editions as "still the printed text itself, the material object to be placed in the hands of the linguist and the literary critic" and that "[t]o date most computerized textual criticism has conceived of the computer primarily as a tool to facilitate the production of printed texts."

The bulk of the secondary literature on the use of computer technology in editorial projects is on wordprocessing and entering, filing, and storing text; on the creation of databases and the preparation of catalogues, chronologies, bibliographies, indexes, concordances, and lists of words and variants (and the means of sorting and searching them); on stylistic, stylometric, and statistical analysis; on formatting, page-making, and typesetting (and proper encoding therefor); on collating and proofreading; and on scanning and optical character readers (and their inefficiency with handwritten materials). But what good is an electronic edition, Peter Shillingsburg asks, if it "simply does what a book does, even if it does it better?" (Shillingsburg to Finneran). According to Robinson, computer technology will enable editors "to present all the instances of a text in as many different forms as they wish, together with all the additional material they can find or imagine."

An electronic edition that takes full advantage of the new technology will "provide all of the information currently provided in print editions—but in a form both easier to use and more powerful" (Faulhaber, 128), and it will include bibliographic information and tools, retrieval and analysis programs, and digitized images of all transcribed texts, whether handwritten or printed. As a consequence, individual volumes will become cheaper and more quickly disseminated and, with more efficient relatability among their "texts," immensely more useful (so that what was once studied syntagmatically can then be studied paradigmatically). They will be more widely useful if, instead of being available in such proprietary systems as that used by the TLG, they are made accessible across platforms by being encoded in SGML (the Standard Generalized Markup Language that specifies how

languages describing texts might be constructed) and its dialect for describing scholarly texts developed by the Text Encoding Initiative.

The three basic aspects of electronic editions or hypereditions are, according to Faulhaber, content, creation, and use. In content, "The top layer is the critical text itself, but underlying that . . . are the paleographical transcriptions of all witnesses, in turn underlain by the digitized facsimiles of the MSS themselves"; if the edition moves toward a hypermedia system that allows for "the incorporation of graphics, video, sound, and animation," we transcend "the traditional conception of a critical text." In fact, McGann argues that what is needed is a "critical archive" rather than a "critical edition"—or "a resource bank," according to Robinson, "an accumulation of materials without the privileging of any one text at all"—that stores "data in the most complete forms possible (both as logically marked-up etext and as high-resolution digitized images)" and that "must be able to accommodate the collation of pictures and the parts of pictures with each other as well as with all kinds of purely textual materials." He goes on to say that "'hyper'editions need not organize their texts in relation to a central document, or some ideal reconstruction generated from different documents. An edition is 'hyper' exactly because its structure is such that it seeks to preserve the authority of all the units that comprise its documentary arrays. . . [and it] resembles that fabulous circle whose center is everywhere and whose circumference is nowhere"—or, we might say, whose circumference has no permanent margins.

In the creation of the hyperedition, "The goal . . . is *not* to produce a critical text through mechanistic means but rather to present the editor with as much usable evidence as possible, allowing human judgment to operate as efficiently as possible." Regarding its use, finally, the hyperedition "must provide facilities to allow users to annotate the text by attaching commentaries to it, commentaries which might form the basis for an article or a class discussion, or merely contain a query concerning a puzzling feature of the text. In turn it must be possible to filter out these commentaries on the basis of the author, their date of composition, or their subject matter."

Both Faulhaber and McGann conclude with important comparisons between print and electronic editions. According to McGann, "The exigencies of the book form forced editorial scholars to develop fixed points of relation—the 'definitive text', 'copy text', 'ideal text', 'Ur text', 'standard text', and so forth—in order to conduct a book-bound navigation (by coded forms) through large bodies of documentary materials. Such fixed points no longer have to govern the ordering of the documents. As with the nodes on the Internet, every documentary moment in the hypertext is absolute with respect to the archive as a whole, or with respect to any subarchive that may have been (arbitrarily) defined within the archive." And Faulhaber stresses that hypereditions "must rely more than ever on cooperation with their peers and with

specialists from other disciplines, particularly computing and information science" and that "[f]ar more than in the traditional print environment, advances in electronic scholarship will depend on enlightened collaboration among specialists in widely separated fields."

13. The Promise Exemplified in an On-line Peircean Community of Inquiry

There have been no serious attempts yet to create an on-line research community in the humanities—a network-computer-enableds collaborating group comparable to those of the Nematode Worm Community, the Human Genome, or the Sequoia 2000 global change projects in science. Unlike science researchers, humanities scholars have little experience in collaborative work beyond joint authorship and are not prepared to appreciate the potential of a communication medium to support continuous inquiry among members of communities of common interest. Breaking this habit of solitary operation, the TLG demonstrates that (even with rudimentary network support for database access and dissemination) a humanities discipline can be transformed in scope and quality of research, with students contributing what could not be dreamed of by scholars not long ago.

There may be no better subject than the work of sPeirce on which to build, demonstrate, and develop a model for the new digital communication medium. His life's work brought the many domains of inquiry together in a philosophy of human experience, where communication occurs continuously in the growth and spread of ideas; pragmatism directs intellectual pursuit in semiotically responsible growth; and his existential graphs can lead us beyond the transparency of what has become established as "text," toward more effective implementation of multimedia. This system of graphical logic has become the basis for a world-wide group of computer science researchers (collaborating by network communication), to develop effective methods of knowledge representation, called Conceptual Graphs, for use in building automated systems in many fields of application. **[FN]** Such "intelligent" digital systems (with multimedia-based data manipulation, pattern recognition search and retrieval, intelligent database management, and user-defined interface access) will be needed to coordinate the work of academic communities in efficiently developing and maintaining their collective intellectual resources in digital form.

Many academics have already experienced the rudimentary improvement of semiotic efficiency in access to resource materials and communication with colleagues; better semiotic examination would guide further development to serve the needs of collaborative inquiry. In these advancements, we might even hope to reverse the trend of technology-driven digital systems development and begin to create a medium to serve the new editorial role that

computer-network technology not only makes possible but requires if we are to make effective use of it.

Building an on-line community based on Peirce's work as a digital resource would begin with what we could consider the primary data: his manuscripts. Each page of Peirce's manuscripts would be digitized (as raster image, as character-based transcript, and as index record) and could be retrieved and viewed or linked to any other page, for the purpose of searching and sorting the collection into compositional order and for selecting manuscripts pages to order in other ways (such as reading order or topical order) for specific purposes, as they arise. Network access and communication then make it possible to increase the contributions of scholars to the editorial process which, in semiotic terms, will require a regularizing procedure to bring their many views together on some (tentative) basis. An authoritative version would be established (tentatively) by essentially the same process we currently rely on to prepare works for publication, although new automated instruments will be required to keep its progress collectively intelligible.

In any work prepared for publication, an author explains to colleagues how to reach a certain conclusion about the subject in question, calling for others to test by replicating the procedure to see if they reach the same results. This form of communication can be logically treated as an argument, with premises (assumptions about the evidence), conclusions (results of interpreting the assumed evidence), and an account of the interpretational procedure by which the result is reached from the evidence. The procedure may include complex measurements and experiments, but it may simply be based on symbolic operations. In any case, the argument form of the communication represents the author's experience of something (in this case, pages of manuscript) and prepares it for validation in a particular field of study. If validation occurs (which constitutes tentative acceptance), this conclusion can function as a premise in the continuing inquiry of those who are participating. The effectiveness of any collaboration depends on such a validation process through communication, even when the contributors are not consciously in collaboration. Semiotically, any particular observation becomes significant only as it becomes accepted in the general context of a realm of investigation. Ideas in a particular field or group will continue to develop, depending on how well the communication procedure for validating individual interpretive contributions works.

Here, Peirce's pragmatism cautions: in any realm of inquiry, where the validation of individual interpretations occurs by explicit procedure, judgment should proceed heuristically—not algorithmically (maintained by permanent authority or habit of mind). The basis for judgment established by any group of inquirers may, at any time, be mistaken. With inquiry conceived as an ongoing, sophisticated communicational challenge, we know that

individual interpretations will be expressed more or less effectively for consideration by the group in a validation process that works more or less effectively to establish the validity of the individual contributions. The collective editorial role in this procedure is to stabilize collective inquiry by tracking the possible directions it might be going—to constuct a meta-representation (a sort of map of collective self-reflection) of all individual contributions—without determining its results. Semiotically, we might say, to keep the *matter* of inquiry ("texts," or mediational products) from becoming the hide-bound substitute for the continuity (growth) of mind. (Modern complexity theorists might say that the editorial role is to maintain the complexity between order and chaos, stagnation and confusion.) To the extent that we can explicate, examine, and improve this procedure, we can identify how digital technology might truly augment the process, without expecting ever to build an algorithm for its execution.

Technological progress during this century has given us the opportunity to create a new medium of communication for effective research and learning, across the academic spectrum. Now, at the end of the century, we can begin to see that science without effective humanist perspective is aimless and fool-hearty, and that humanism without effective scientific procedure is blind and canon-bound. If we are to realize the evolving power of the new medium—in forms that support the efficient expression, exchange, and growth of ideas—we must be able to examine traditional *editorial* processes and products, better specify their purposes, experiment with enhancements and alternatives, and transform the entire enterprise of inquiry. In the next century, the new (editorial) medium and a new (evolutionary) metaphysical perspective may give us the chance to establish semiotic continuity among intellectual disciplines while we, pragmatically, indefinitely extend their margins.