Charles S. Peirce

The Logic of Interdisciplinarity

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CHARLES SANDERS PEIRCE: INTERDISCIPLINARY SCIENTIST

I. A Man of Science

James McKeen Cattell (1860–1944)[1] was the first American psychologist admitted to the United States National Academy of Sciences (1901). In 1880 he had travelled to Germany for graduate work in philosophy at Göttingen and Leipzig. There he became interested in the emerging science of experimental psychology. He travelled to the Johns Hopkins University in 1882 to work in its new experimental psychology laboratory. But in 1883 he returned to Germany for further study with Wilhelm Wundt, becoming in 1886 the first American to earn a Ph.D. in experimental psychology at Leipzig. Eventually he was appointed Professor and Head of Psychology at Columbia University in New York City. He developed a method for ranking professionals by merit, and based upon these new methods in 1906 he published *American Men of Science*.[2]

The directory includes slightly more than 4000 entries. Of these, about 1000 have an asterisk by the name of the person's principal field of scientific research. Asteriskholders were considered by their peers, according to Cattell's introduction, to be the top men of science in the United States. On page 248, one finds the entry for "Peirce, C(harles) S(antiago Sanders)," which includes mention of his principal field of science as *Logic, a study that Peirce had described in 1872 as "the doctrine of truth, its nature, and the manner in which it is to be discovered."[3]

Peirce provided further details of his understanding of logic in 1911.[4]

> "I have now sketched my doctrine of Logical Critic, skipping a good deal. I recognize two other parts of Logic. One which may be called *Analytic* examines the nature of thought, not psychologically but simply to define what it is to doubt, to believe, to learn, etc., and then to base critic on these definitions is my real method, though in this latter I have taken the third branch of logic *Methodeutic*, which shows how to conduct an inquiry. This is what the greatest part of my life has been devoted to, though I base it on Critic.
>
> Of course, in order to study methodeutic it is necessary to make researches in as great a variety of sciences as possible,—not the two penny half penny "research work" that students of colleges do."

Why should Peirce look to science to find a basis for methodeutic? Because, as he said, "Men, the principal occupation of whose lives is finding out the truth, are called *scien-*

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1 See Michael M. Sokal, "*Science* and James McKeen Cattell, 1894–1945," *Science*, Volume 209 80), 3–52; and http://www.muskingum.edu/~psych/psycweb/history/cattell.htm.

2 J.M. Cattell and D.R. Brimhall (Lancaster, PA, 1906).

3 *MS* 364. ~~END NOTE~~

4 MS L231, Peirce to J.H. Kehler, 22 June 1911.

tific men, and their occupation is called Science ..."[5] Thus, science is the activity (method) that in general finds truth; so, in order to describe accurately such methods (the activities of scientific men, or of *scientific intelligences*) – such a description being the goal of methodeutic – Peirce became a scientific intelligence of the first rank in his day, and was so recognized by his contemporaries.

II. Philosophy is Merely Another Science

It is tempting to employ contemporary understandings of the concept *philosophy* as a guide for comprehending the work of predecessors who have employed that concept in their self descriptions. One suspects that this procedure is an example of the historian's anachronistic fallacy; and that in place of it, we should study a predecessor's conceptions insofar as we can reach them and stand within them before beginning a critique. In the case of Charles Peirce, this problem is intensified because his understanding of the nature of philosophy is radically uncommon today. He declared his sense of the term in 1897.[6]

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

That remark is a clear indication that he was first a scientist, second a physicist, then a physicist interested in philosophy, which he conceived as an endeavor itself a science closely related to other sciences – his sense of philosophy being science in its generalizing interdisciplinary aspect.

A few years earlier, in a comment to the editor of *The Monist*, Paul Carus, Peirce wrote:[7]

> "I was brought up in an atmosphere of scientific inquiry, and have all my life lived chiefly among scientific men. Since 1863 the study which has constantly been before my mind has been upon the nature, strengths, and history of methods of scientific thought."

These two remarks, and similar self-descriptions, have, on the whole, not been taken seriously by readers of Peirce's work; themes used by commentators to eliminate them by rationalizing include: (1) Peirce's science is superseded and irrelevant now – besides

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[5] Carolyn Eisele, editor, *The New Elements of Mathematics by Charles S. Peirce* (Den Haag, 1976), Volume 4: 188, 1904.

[6] *MS* 867, circa 1897.

[7] *Collected Papers* 6.604, 1893.

it is his philosophy that is of interest to us; (2) He was really a philosopher who only worked superficially in the sciences as a way to make a living, just as Spinoza ground lenses; (3) Since philosophy and science are radically different projects, if we are students of philosophy (or of science) we can ignore his science (or ignore his philosophy) and still understand him correctly; (4) There is nothing in Peirce's scientific work of contemporary interest, being merely matters relevant to the strange tastes of antiquarians or hero worshipers; (5) Peirce was a hermit, so on his own claim that science is a community, he couldn't have had anything but low status within science. For now, let us start by understanding his conceptions, but afterwards review these rationalizations.

In 1905, Peirce prepared for a series of lectures which he hoped to give at the Adirondack Summer School.[8] There we find him giving important additional aspects of his conclusions about science.

> "But what I mean by a 'science' ... in general, is the life devoted to the pursuit of truth according to the best known methods on the part of a group of men who understand one another's ideas and works as no outsider can. It is not what they have already found out which makes their business a science; it is that they are pursuing a branch of truth according, I will not say, to the best methods that are known at the time. I do not call the solitary studies of a single man a science. It is only when a group of men, more or less in intercommunication, are aiding and stimulating one another by their understanding of a particular group of studies as outsiders cannot understand them, that I call their life a science.
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> ... And two of them meeting together shall be thoroughly conversant with each other's ideas and the language he talks and should feel each other to be brethren."

Later in the same discussion, he expanded upon this notion of a band of brothers.

> "All human lives separate themselves and segregate themselves into three grand groups ... The first group consists of the devotees of enjoyment ... The second group despise such a life and cannot fully understand it. Their notion of life is to accomplish results. They build up great concerns ... The men of the third group who are comparatively few cannot conceive at all a life for enjoyment and look down upon a life of action. Their purpose is to worship God in the development of ideas and of truth. These are the men of science."

The reference to God here, by the way, does not involve some specific creed or orthodoxy; it calls up earlier forms of language in which disinterested scientific study of nature was understood as a proper approach to God. Such a conception of divinity could be called hypothetical as opposed to dogmatic.

In reviewing these remarks, one might begin to suspect that perhaps Peirce was referring to an actual group of persons, an actual scientific brotherhood, into which he may have received something like an initiation when he was a young man. Had there been such a social group in Peirce's youth, who educated him, and whose group behavior inspired his conception of science?

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[8] *MS* 1334.

The answer is "yes," and the story is important for someone seeking to avoid anachronistic rationalizations by making an effort to understand Peirce in his own terms, someone wishing to escape forcing upon Peirce's works an understanding or conception we happen to take for granted today.

There was such a brotherhood.[9] Among themselves they were first known as *The Florentine Academy*, or later more publicly as *The Lazzaroni*; here they are referenced as "the Florentines." To their enemies, and they had several, they were know as Bache and Company, or The Mutual Admiration Society.

Their program included first the notion that advancement within science should be based upon merit, not upon family or social or economic status. They encouraged international scientific cooperation. They were strong advocates for government support of science. They urged that the United States should have a national university, by which they meant a university where research, and education toward doing research, would be the principal activity. They felt this was needed to replace the standard practice of the day among young scientists: go to Europe to complete a final education as a scientific researcher. They also disliked rote "education," a discredited practice which is unfortunately still common today.

The brotherhood had vague beginnings, but its germ coalesced by 1838 with the friendship of Alexander Dallas Bache and Joseph Henry. Their first triumph was the appointment in 1843 of Bache as Superintendent of the U.S. Coast Survey. The third man into the group was Benjamin Peirce Jr., the father of Charles Peirce. On the principle of merit, Benjamin supported Bache in gaining that appointment, and the two became henceforward fast and intimate friends. The core of the movement was fully formed when in 1846 Louis Agassiz was recruited away from Europe and into Harvard. These four men then became an informal executive committee within the Florentines, while attracting several other persons who became loyal supporters and participants, or junior partners. Charles Peirce was one such junior member who worked closely with many Florentines during his graduate education and early professional years. One can especially cite Bache, Agassiz, Admiral Charles H. Davis, Josiah Parsons Cooke, and his father, as persons who molded his outlook on science and inspired the selection of his own research programs. And what was Peirce's research program, stated in its most general form? It was: What is the Logic of Science (considered generally, and without regard for disciplinary barriers)? As he began to focus upon this topic, he saw that the subject, as he had found it, was full of gaps. But he perceived that it could be developed into a form that can be fruitfully deployed into any region or subject of study that is objective – meaning that each person involved in such study must have the will to learn.

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[9] The account here is drawn principally from R.V. Bruce, *The Launching of Modern American Science* (New York, 1987) and *His Glassy Essence*.

Thus, in a brief form, one could describe Peirce as a scientist whose scientific research program was the particular science known as the Logic of Science-in-general.

One can find several clear cases of impact by members of the Florentine Academy upon Peirce's unique conception of science.

First, from them all he gained a model for his social understanding of the nature of science. Such a societal condition naturally also requires sound communication among persons of good character. This means that what we now call *scientists*, but in Peirce's time were universally designated *men of science*, have essential character traits such as fairness, clarity of expression, and lack of interest in specific research outcomes. Switching to a negative mode, the last factor can be equally described as a person's capacity to avoid preconceived results for questions under study so that the outcome can be guided by reality instead of human egos. Many such scientific character traits were captured in Peirce's one-sentence description of a scientific intelligence as a person with the will to learn. The Will to Learn is a property of individual human beings, and Science is the reasonable society of such persons. By the way, one encounters persons nowadays incorrectly claiming that Peirce proposed a "Consensus Theory of Truth." At this point, it can be clearly perceived that he did not find consensus to be the mark of truth; his conclusion was that truth is the outcome for a given question a community of scientific intelligences will converge upon if their study is controlled by reality instead of controlled by egos (which are the controlling factor in a mere consensus – the "views" of egos become the same, or they vote alike). Schools of thought, movements, creeds, viewpoints, are contemporary notions typically associated with the present-day understanding of philosophy, but in Peirce's terms each of these items could be identified as a mere consensus of egos.

From his father, the most distinguished mathematician in the United States in those days, Peirce acquired notions of the nature of mathematics and of its being even more fundamental a science than philosophy or logic. He also gained a strong spiritual sense from Benjamin, the surprising conclusion of which was that he saw there was really no conflict between religion and science when both activities are rightly understood.

From Louis Agassiz he gained an insight into the nature and logic of scientific classification methods and the concomitant importance of a fixed and secure scientific terminology as an essential aid in communication. Agassiz was the leading figure in biological classification at that time, and he lived across from the Peirces on Quincy Street in Cambridge. Agassiz's work in classification directly impacted Peirce's famous Category Theory, and the focus on classification culminated in Peirce's doctrine of the Ethics of Terminology.[10]

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[10] See "Peirce's Ethics of Terminology," *Transactions of the Charles S. Peirce Society*, Volume 17 (1981): 327–347.

In graduate school Peirce studied physical chemistry with Josiah Parsons Cooke, from whom he also received insights about the importance of terminology in science, as well as insights on the possibility of congenial relations between science and religion.[11]

From Bache, known among the Florentines as The Chief, he learned about the importance of science being an *international* cooperative community of scientific intelligences, and from him gained a sense of the importance of the role of avoiding preconceptions about results in scientific procedures.

Charley Peirce marinated in this laboratory environment and eventually began to stake out his research project on The Logic of Science within the shelter of that group. During the first months of 1865, he gave a series of lectures at Harvard on that topic. The content was somewhat premature in conception, and the lectures did not go over too well, but well enough that he was asked to repeat the attempt the next year as Lowell Lectures.

Meanwhile, in the intervening summer, he had an epiphany. All the various threads from the scientific influences upon him, as well as several other threads from the history of ideas, joined in an original new synthesis which was the germ of his new approach.[12] He rewrote the lectures. From their start his new synthesis was surprisingly well worked out – a knowledgeable person who read his lectures of 1866 can see there the distinctive themes of his later work. These themes are generalized science, focusing on and arising from his life as a laboratory worker.

Charles decided to make his career as a professional scientist. He worked in the Harvard Observatory for several years while continuing to live in Cambridge. In this capacity he eventually published (*P* 118)) a pioneering survey of our galaxy, the Milky Way. During his leisure hours he continued avidly to develop his concept of the logic of science, producing an important series of publications in that project by 1867.[13]

Bache died in that year; fundamentally he had worked himself to death on projects associated with aiding the federal government to win the U.S. Civil War. Benjamin Peirce succeeded Bache as Superintendent of the U.S. Coast and Geodetic Survey, and in effect, Ben became the new Chief of the Florentines and informally the leading scientist in the federal government. As Hilary Putnam once remarked, "Benjamin Peirce would have been the Science Advisor to the President, had such a formal office existed at that time." Charles was soon appointed to a high-level position in the Survey as Assistant to the Superintendent in charge of gravimetric survey. Traditionally, appointment to that high rank of government science carried the title "Professor," so it is quite correct to refer to him as Professor Peirce. On his project he traveled through the country and the world, engaged in what he jovially referred to as "pendulum swinging."

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11 See J.P. Cooke, *Principles of Chemical Philosophy* (Boston, 1874); *Religion and Chemistry* (New York, 1880); *Scientific Culture* (London, 1882).

12 The important details of this event may be surveyed at *His Glassy Essence*, pp. 298–307.

13 *P* 30–34.

The purpose of this effort, which was coordinated with a world-wide scientific organization, was to find the relative value of gravity at a sufficient number of sites so that a more accurate calculation of the shape of the globe could be made, hence leading to more accurate maps. In this capacity, Charles achieved world-class status as a geophysicist. A contemporary geophysicist, Professor Victor Lenzen of the University of California at Berkeley, characterized Peirce's gravity work as the best of the nineteenth century. In the course of his duties with the Survey, Charles met and collaborated with many of the leading physicists of his day. This experience enriched his later discussions of the logic of science when he separated from the Coast Survey in 1891 to devote full time to writing up his grand logic of science.

In the middle of the Civil War, in 1863, the Florentines achieved one of their greatest victories by encouraging the Congress and President Lincoln to create the National Academy of Sciences. The founders were Lincoln, Bache, Henry, Ben Peirce, Agassiz, Benjamin Gould (a Florentine junior partner), and Admiral Davis (Ben Peirce's brother-in-law, civil war naval hero, also a Florentine). Charles was elected to membership in the Academy in 1877 on the basis of his work in the logic of science.

Bache died in 1867, Ben Peirce in 1880, and the other Florentines soon after. Their finest achievement was nothing more than the founding of organized and professionalized science in the United States. While accomplishing that goal, naturally they acquired a number of powerful enemies and rivals. One of the archenemies of the Florentine Academy was Charles Eliot, the man who for forty years (starting in 1869) served as the autocratic President of Harvard University. The Florentines had blocked Eliot's prior attempts at achieving higher office at Harvard, but his last effort succeeded. And he was a vengeful man, as all hands on board knew. Indeed, that was one of the factors presented to block his earlier candidacies. Soon Eliot gained control of Florentine interests at Harvard, and as part of his doing so, he succeeded in banning Charles from the campus. Posterity should not be ashamed of this status, however, because it put Peirce among an Olympian group of fellow bannees. For instance, Ralph Waldo Emerson was banned after delivering his famous Divinity School Address in which he argued forcefully for an open-minded, scientific, form of non-creedal religion and religious studies. (Emerson was a close acquaintance of Benjamin Peirce.)

While not quite an enemy of the Florentines, another well-known figure in the history of American Science, Simon Newcomb, yearned to inherit their power and influence. Newcomb hoped in effect to succeed Ben Peirce as the new Chief of the brotherhood. But the brotherhood did not survive beyond the first generation. It had been sublimated into the National Academy of Sciences, its catalytic functions no longer required. It faded away just as it had faded into existence. Newcomb therefore made other arrangements to achieve his aims, and he became perhaps *the* politically dominant figure in American science by the turn of the century. Meanwhile he fought a constant and sub rosa rearguard action against Charles Peirce in the fear that Charley just might be able to reorganize and lead the surviving old guard and its friends. Peirce had no such incli-

nations, but Newcomb seems never to have fully believed that. One reason Newcomb might have continued to be wary was Peirce's continuing defense of Florentine policy positions almost until his dying day, especially the Florentine doctrines on education which featured opposition to the growing factory model of schooling. But this was intellectual work, not political work, on Charley's part. However, Newcomb didn't know that, or at least decided to assume the worst, so he continued blithely to smash Charles every time there was an opportunity. Charles was politically naive, so there were many opportunities.[14]

As Peirce's own career unfolded, what he originally called the Logic of Science became the Semeiotic of Science; and in his late career he discovered that Semeiotic, or the Theory of Signs, and Logic in the broad sense he had conceived it, are equivalent endeavors. Peirce's Semeiotic has received a lot of attention in recent years, which is as it should be. The present exercise, though, has shown something of the origins of Semeiotic through Peirce's close association in his formative years with Bache and Company. This connection should, in turn, help us to appreciate the full truth about the nature of Peirce's Semeiotic of Science, which is a generalized scientific logic applicable to any scientific activity.

Thus, we have reviewed evidence that Peirce was not a dilettante in science, but a master scientist. What can be said (briefly) about the other four paths – mentioned above – often used to rationalize ignoring his scientific work?

Concerning (1) and (4) we can easily show that Peirce's relevance has returned in current physics – a number of workers are using Peirce's mathematical physics as a new way to solve some old problems. Some contemporary publications display this state of affairs.[15] If – as item (1) mentioned – one thinks that it is Peirce's philosophy that is interesting for us, the answer now seems to be that he did not engage in the kind of thing philosophy nowadays is often thought to be. Thus the latter aspect of (1) also must be rejected.

Rationalization (3) claims that philosophy and science are radically different projects. However, that is not true within Peirce's work. In the context of contemporary philosophy understood as the consensus of egos, the correct statement is that Peirce was only a scientist in philosophy, physics, psychology, history, chemistry, geodesics, and so on through all the various research sciences.

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14 Persons so inclined might enjoy a search through internet data bases using keywords *Simon Newcomb Professor Moriarity*.

15 See R.G. Beil and K.L. Ketner, "Peirce, Clifford, and Quantum Theory," *International Journal of Theoretical Physics*, Volume 42 (2003, note other physics sources in the bibliography of this essay); R.G. Beil, "Peirce, Clifford and Dirac," *International Journal of Theoretical Physics*, Volume 43 (2004); R.G. Beil and K.L. Ketner, *Quantum Switches and Circuits* (Washington, DC, 2004), U.S. Trademark and Patent Office, US Patent 6,819,474.

Item (5) invokes the popular image of Peirce as a hermit. But, he was an active member of the U.S. National Academy of Sciences, who participated in national meetings of the Academy until about ten years before his death in 1914. So this image of his life must be rejected as well; he was not a hermit, but a man who endorsed that fine Bavarian sentiment – "*I mag mei Ruah!*"[16]

III. Overview of the Logic/Semeiotic of Science

A reader of remarks to this point might plausibly comment: "The hypothesis interests me; I should like to have your thorough overview of Peirce's Logic/Semeiotic of Science – have you prepared one?"

No, but I am working on the project. However, indeed, there are a number of important self-descriptions by Peirce himself that provide such a guide in his own hand. One in particular will be the most convenient for present purposes. In 1904, Peirce received the following letter:[17]

> "Adelbert College
> Western Reserve University Department of Philosophy
> Cleveland, O., October 26th, 1904
> Dr. C.S. Pierce [*sic.*] Cambridge, Massa.
> My dear Dr. Pierce:
> I have read your articles in *Mind*, the *Popular Science Monthly*, and the *Monist*, but feel that I should apply to you directly for a brief of your logical doctrine and philosophical views. I wish to notice them in the tenth edition of Uberweg-Heinze *Geschichte der Philosophie*, for which I am now rewriting the sketch of Philosophy in North America. Please be kind enough to indicate the various articles which you have written bearing on the subject.
> Sincerely yours, Mattoon M. Curtis"

Peirce began drafting a self-description. Probably his draft was not sent – no original smooth copy has been found. Furthermore, this draft was probably not approved by Peirce as a final one, for it contains a few repetitions. What we have here is probably complete in the sense that it seems not to be a fragment of any other piece. It stands well on its own, and provides a reliable, if brief, guide to Peirce's scientific career, showing its overall structure and how Semeiotic fits within it. Finally, it is relatively late, being written during a particularly fruitful period of Peirce's mature career.

Peirce spelled the name of his science of sign relations usually as "semeiotic", sometimes as "semiotic", but almost never as "semiotics". Probably the pronunciation would be: "seem-eye-OH-tick." In accordance with the principles of the Ethics of Termino-

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[16] See Peirce's reporting on the National Academy meetings in *The Nation*, volume 3; also NAS member W.V. Quine's National Academy of Sciences Biography of Peirce in *Peirce Studies* number 6, pages 15–24, or in the recent posthumous collection of his essays, *Quine in Dialogue* (Cambridge, 2008).

[17] *MS* L 107.

logy, we should refer to Peirce's own well-worked-out (but not *perfect*) theory of sign relations using the terminology he developed or adopted, and ***Semeiotic*** was Peirce's preferred usage.[18] Contemporary semiotics is not Peirce's Semeiotic: that is not an expression of a personal idiosyncrasy, it is simply a historical fact. To identify Peirce's work as "semiotics" would be to invite the same kind of confusion that occurred with "pragmatism," an illness that Peirce cured by prescribing "pragmaticism."

In reviewing the classification of science given in Peirce's draft, which is typical of his late classifications, several matters relevant to developing a correct interpretation of semeiotic can be discerned. Again, note that the general category for Peirce is science, not philosophy as a non-science branch of the humanities as understood today. Because he perceived science principally in terms of its methods, the basic point of departure for understanding Peirce's thought is method. The alternatives to science are non-scientific (or egocentric, or arbitrary, or charismatic) methods as sketched in "The Fixation of Belief" (*P* 107) and similar expositions (for example, *P* 41 or *MSS* 360–396). The most fundamental science is mathematics, which proceeds by means of observation of, and experimentation upon, diagrams. The next is phaneroscopy, followed by the normative sciences of esthetics, ethics, and *Semeiotic* (substituting 'semeiotic' for 'logic', since the two are equivalent). Semeiotic is then composed of Speculative Grammar (sometimes called Analytic), Critic, and Methodeutic (sometimes called Speculative Rhetoric). Thus, in order to understand semeiotic in its three branches, we must understand what it presupposes, among which are:

(1) that a semeiotician is a person of science (let us reserve 'man of science' for historical reference only), not a person of charisma, or of persuasion, or power, or manipulative fame;
(2) mathematics – not in the sense of mastering its subject matter, but more in the sense of having an adequate understanding of its methods and status as a science, plus an ability to use those methods;
(3) phaneroscopy, or the doctrine of the categories and the study of experiences and beliefs common to all humankind;
(4) esthetics and ethics, the study of the phenomena of control and controlling toward some purpose; and
(5) in semeiotic (logic), we must recall that it is a science controlled by the ideals of science, the search for objective truth.

Peirce's semeiotic was not some small isolated part of his system – for he does indeed present a system of scientific thought – having to do with classifying signs. Peirce's system is a profound analysis of the nature and genesis of scientific method (scientific modes of thought), coupled with a vigorous attempt to carry the results of that analysis into every corner of human endeavor – even including what we now refer to as The

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[18] See Max Fisch, *Peirce, Semeiotic, and Pragmatism* (Bloomington, 1986).

Humanities and Arts.[19] Concerning the results of his analysis, look again at the classification. We can see that once semeiotic (logic) is off the ground, it is then used to undertake research in metaphysics as well as all the special sciences, which latter division comprises most of what we today, in a too limited fashion, call science. This means that semeiotic as well as mathematics, phaneroscopy, and metaphysics, are going to be of very wide use, if this classification is correct.

It is a consequence of this account (if it is true) that we have a lot to study if we want to learn semeiotic. Contrary to the claim that Peirce's semeiotical writings are fragmentary and scattered and unsystematic, they are voluminous, painfully detailed, and as systematic as any model one might care to mention from the history of the earth. Whether it is right or wrong, true or false, a boon or bane for mankind, must be left for the flow of science to reveal. But, it is important to see *what* Peirce's hypotheses actually *were* – to give a truthful account of them. We will not be able to go beyond him until we have such an account (presently a desideratum), and lacking that, we can only go around him, which would be an unfortunate non-economy of research, not to mention also constituting an unnecessary delay. If it takes careful and patient scholarship to achieve such an account – "scriptural exegesis," as one charming boulevardier called it – then (to borrow a biblical phrase), so mote it be.

Here, then is Peirce's draft (from *MSS* L 107 and 914) of a self-description (with added bracketed citations of his works keyed to the *Comprehensive Bibliography* of his publications).

Charles Santiago Sanders Peirce

(b. 1839), son of the mathematician Benjamin P., brought up in a circle of physicists and naturalists, and specially educated as a chemist, derived his first introduction to philosophy from the K.d.r.V. and other celebrated German works, and only later made acquaintance with English, Greek, and Scholastic philosophy. Accepting unreservedly Kant's opinion that the metaphysical conceptions are merely the logical conceptions differently applied, he inferred that logic ought to be studied in the spirit of the exact sciences, and regarded Kant's table of Functions of Judgment as culpably superficial. He also thought that Kant's reply to the question how are synthetical judgments *a posteriori* possible was altogether insufficient, and that an exact inquiry into it would probably throw some light upon judgments *a priori*. Appointed in 1864 Lecturer on Logic [*P* 16] in Harvard University, he divided all reasoning into, 1st, the deductive, including all necessary inference together with all probable inference to which the calculus of probabilities is properly applicable (rejecting inverse probabilities not founded on positive information), 2nd, the inductive, including all experimental testing of hypo-

[19] See Frances Williams Scott, *C.S. Peirce's System of Science: Life as a Laboratory* (Lubbock, *Peirce Studies* 7, 2006).

theses (for he considers a physical experiment to be in a general sense of the same nature as a geometrical reasoning, which is performed by internal experimentation) but excluding, 3rd, the "abductive," or the process of forming and accepting on probation, a hypothesis by which to explain surprising facts. He put forth a "critic," or mathematical deduction of the validity of these modes of reasoning, founded upon the principle that nothing is subject to logical (any more than to ethical) criticism except so far as it is subject to self-control. What one does not in the least doubt one should not pretend to doubt; but a man should train himself to doubt. His account of validity of induction is that its premisses do not lend the slightest probability to its conclusion, but that we are justified in provisionally accepting the conclusion by the postulate that any error in that conclusion will ultimately be corrected by the further application of the same method. This postulate will only be true if the inductive conclusion be understood to be limited to a "possible experience" (a Kantian conception modified) of future similar experiments. But he already held it to be impossible to conceive anything otherwise than as an object of possible experience, and that of the kind that "experiment," or purposive arrangement of conditions, may bring; and in 1877, in two articles in the *Revue philosophique* [*P* 129, 162], he put forth the doctrine he called *Pragmatism*, namely, that every concept (as distinguished from a generalized sensation, such as 'red') is equivalent to a conditional purpose, should one have certain desires and certain types of experience, to act in a certain general way. In 1867, he published in the *Proceedings of the American Academy of Arts and Sciences* of Boston, five papers [*P* 30–34] in which he professed to limit himself to incontrovertible assertions. In one of these, "On the Classification of Arguments" [*P* 31] (partly repeating a paper he had distributed [*P* 18] the year before) he undertook to reduce all inference to *substitution* (an idea adopted afterwards by Taine and Jevons) without, however, maintaining that substitution was an elementary Operation; and indeed he subsequently showed that the substitution of B for A is never logically justified unless it be justifiable first to insert B and unless it be subsequently justifiable to omit A. This paper also studied the relation between particular judgments and negative judgments. Another of the papers of 1867 proposed a new list of categories [*P* 32], which will be given below.

In 1868 he contributed three papers [*P*26, 27, 41] to W.T. Harris's *Journal of Speculative Philosophy* in which he endeavored to prove and to trace the consequences of certain propositions in epistemology tending toward the recognition of the reality of continuity and of generality and going to show the absurdity of individualism and of egoism. In 1870, he published, in the *Memoirs of the American Academy of Arts and Sciences*, an extension of the Boolian algebra of logic [*P*52] to render it applicable to the logic of relations, and developed this branch of logic somewhat further than De Morgan had done. Especially he demonstrated that all relations between four or more correlates are reducible to compounds of triadic relations, while triadic relations can never be defined in terms of dyadic relations exclusively. In the *North American*

Review for October 1871, in a review of Frazer's edition of Berkeley's Works [*P* 60], he argued in favor of Scotistic realism.

In 1877–8 he published a series of articles in the *Popular Science Monthly* [*P* 107, 119–123] (two of them appeared also in the *Revue Philosophique* [*P* 129, 162]) in which he enounced the principle he called *pragmatism*, that is, that every concept (in contrast to qualities of feeling, images, experiences, etc.) is definable in terms of a possible purpose of conduct under hypothetical general conditions, and that from this can be deduced the best rule for rendering ideas clear, namely, "Consider what effects that *might conceivably* have practical bearings we conceive the object of our conception to have: then, our concept of those effects *is* the *whole* concept in question." But since P not only admits the difference between a commensurable and an incommensurable length, but has specially insisted upon abnumerable (*abzählbar*) multitudes (this had better be translated *Menge* though incorrectly, because students of philosophy would not know the correct term *Mächtigkeit*) it is evident that he understands "conceivably practical bearings" in a peculiarly wide sense. In the same articles he discussed the "uniformity of nature" [*P* 122] and undertook to demonstrate that while it afforded opportunities for inductive reasonings, it does not constitute the general ground of validity of such reasonings. He also argued that as a fact there appears to be as little orderliness in the universe [*P* 122] as we can conceive that a universe should have, and further that the degrees of orderliness of the universe is relative to the mind that contemplates it, consisting merely in the breadth (*Umfang*) of that mind's interests. In 1880–3, while lecturing on logic in the Johns Hopkins University, he developed in several papers in the *American Journal of Mathematics*, a theory of necessary reasoning [*P* 167], a paper on the logic of number [*P* 187] in which he distinguished between finite and infinite collections in substantially the same way that Dedekind did six years later, and by means of the conception of correspondence, which is Gauss's conception of the *Abbild* (employed also by P in his Quincuncial Projection of the Spheroid [*P* 135, also 183] of 1879), he deduced the validity of the Fermatian inference [also *P* 187] (sometimes unsuitably termed mathematical induction). He also produced a general algebra of logic [*P* 296] in which subscript letters are attached to letters on the line signifying relations, these subscripts indicating individual correlates, while the letters $\sum$ and $\prod$ with the same subscripts show whether the individuals are to be selected universally or existentially, that is, by the interpreter of the proposition or by the utterer of it. He further produced an algebra of dyadic relations [*P* 268] to which the third volume of Schröder's *Algebra der Logik* [*0* 435 (I), *0* 468 (II), *0* 610 (III)] is devoted; but P is not so entirely satisfied with that method as Schröder was. He also distributed a brochure entitled "A Brief Description of the Algebra of Relatives" [*P* 220].

Closely connected with this is his edition of his father's book called *Linear Associative Algebra*. To a volume of papers by his students entitled *Studies in Logic* [*P* 268] (Boston, 1883), some of them contributions of prime importance, he contributed a note on the algebra of dyadic relations, and a discussion of the validity and rules of scientific

induction. He rests this wholly on the principles of the calculus of probabilities, yet denies that the inductive argument lends the slightest probability to the conclusion, and refutes the principle of inverse probabilities as applied by Laplace without statistical information. He makes the justification of induction to consist in the fact that if the conclusion is erroneous, the same method, persisted in further, will bring a correction of it. In 1884, he presented to the United States National Academy of Sciences, a memoir [*P* 303] in collaboration with his student, J. Jastrow, describing experiments which show that there is no *Differenz-Schwelle* in sensation, or that if there be it is almost incredibly small. The philosophical interest of this consists in part in its bearing upon *Synechism*, or the principle of universal continuity, which does not mean that there is no discontinuity, which is involved in all existence. It was also shown by these experiments that a perception might be so slight *(petite*, Leibniz), that the greatest effort of attention under the most exceptionally favorable circumstances would fail to make the subject aware of it, so that he could answer the question which of two alternative characters it had, and yet if the subject was required to answer at random, in 60 percent of the cases his answer agreed with the objective fact. Upon this phenomenon, P, in 1887, in a communication [*P* 352] to the American Society for Psychical Research, based an attack upon the book called *Phantasms of the Living*, and was drawn into a considerable controversy with Mr. E.W. Gurney, which is printed in the *Proceedings* of that Society [*0* 353, *P* 354, *0* 381, also *P* 640]. The same year he contributed a paper [*P* 347–8] on the evidences of immortality to the volume *Science and Immortality*, Edited by S.J. Barrows, Boston: 1887, in which he expressed the opinion that current views of cosmology, especially those of Spencer, were unsound in being too thoroughly mechanical. But he thought there was no extant evidence for immortality unless the catholic miracles be admitted to be such. In 1891–3, in *The Monist* [*P* 439, 474, 477, 480, 521, 525], he outlined a hypothesis capable of being subjected to inductive tests, which hypothesis, called *tychism*, was that the laws of nature, although real, are results of a process of evolution, and as such are not yet and never will be exactly fulfilled by the facts, which depart from the laws in the same way, although vastly less than, observations do. He had intended to complete this series of papers by one or more concerning *Synechism*, but was not encouraged to do so. In 1896 in two articles [*P* 620, 637] in *The Monist* reviewing Schroeder's *Algebra der Logik*, he described a logical method called *entitative graphs*, using diagrams instead of algebraic symbols. He also considered the foundations of the logico-mathematical doctrine of multitude, the so-called "cardinal numbers" of G. Cantor, and proved that every multitude is exceeded by another multitude and that the infinite multitudes form a single simple *wohl-geordnet* series, or as he would say in English, a simple Cantorian series. Beyond that series the individual members of collections lose their separate identities in consequence of becoming essentially indefinite, and the multitude passes into continuity. In 1901 in a review [*P* 802] of the first three chapters of Pearson's *Grammar of Science*, in the *Popular Science Monthly*, P argued for the reality of natural law and against the doctrine that we reason from "first

impressions of sense." In 1903, in connection with a course of lectures [*P* 1005] on Logic before the Lowell Institute in Boston, he wrote a *Syllabus of Logic*; but it was only in part printed owing to the small fund for the purpose. In the same year he gave a course of lectures [*P* 10041 in Harvard University on *Pragmatism*.[20] In 1905 he expects to publish one article (and hopes that more may be accepted) in *The Monist* on Pragmatism. P wrote all the philosophical definitions in the *Century Dictionary* [*P* 373], and some of these relating to logic in Baldwin's *Dictionary* [*P* 761–78, 806–970].

Although Peirce is much given to raising doubts about his own philosophy, yet the alterations it has undergone since 1866, except for the introduction of the problematical tychism and a few minor corrections (of which the most important relate to the precise nature, definitions, and grounds of validity of induction and abduction), and an increasing insistence an the exclusion of psychological premisses from logic, consist in the extension of his inquiries to new problems and the greater fullness of his positions. In order to understand his doctrine, which has little in common with those of modern schools, it is necessary to know, first of all, how he classifies the sciences. He divides all science into Science of Research, Science of Review (comprising such works as those of Comte and Spencer, and the doctrine of the classification of the sciences itself), and Practical Science. That of the third branch, though elaborately worked out, need not detain us; and that of the second has not engaged his attention. The classification of Science of Research is shown in outline in the following scheme.

MATHEMATICS
PHILOSOPHY
- [Phaneroscopy], or Ideoscopy
- Normative Science
  - Esthetics
  - Ethics
  - Logic
    - Speculative Grammar
    - Critic
    - Methodeutic
  - Metaphysics

IDIOSCOPY (Bentham), or SPECIAL SCIENCE
- Physics
  - Nomological Physics, i.e. Physical Geometry, Dynamics, General Physics, etc.
  - Classificatory Physics, Chemistry, Crystallography, Biology,

[20] See Patricia Turrisi's edition of these lectures, *Pragmatism as a Method and Principle of Right Thinking* (Albany, 1997).

etc.
Descriptive Physics, Geognosy, Astronomy, etc.
Psychics
Nomological Psychics, i.e. General Psychology, Psychical Chrononomy, etc.
Classificatory Psychics, Special Psychology, Linguistics, Ethnology, etc.
Descriptive Psychics, History, Criticism, etc.

This classification (which has been worked out in minute detail) is to be regarded as simply Comte's classification, corrected. That is to say, the endeavor has been so to arrange the scheme that each science ought to make appeal, for its *general principles*, exclusively to the sciences placed above it, while for instances and special facts, it will find the sciences below it more serviceable. Mathematics merely traces out the consequences of hypotheses without caring whether they correspond to anything real or not. It is purely deductive, and all necessary inference is mathematics, pure or applied. Its hypotheses are suggested by any of the other sciences, but its assumption of them is not a scientific act. Philosophy merely analyzes the experience common to all men. The truth of this experience is not an object of any science because it cannot really be doubted. All so-called 'logical' analysis, which is the method of philosophy, ought to be regarded as philosophy, pure or applied. Idioscopy is occupied with the discovery and examination of phenomena, aided by mathematics and philosophy. It is extremely doubtful which of its two wings should be placed first. The three main branches of philosophy are distinguished as follows. [Phaneroscopy] considers the phenomenon in general, whatever comes before the mind in any way, and without caring whether it be fact or fiction, discovers and describes the elements which will invariably be present in it, that is, the categories. Normative science considers the phenomenon only so far as it can be controlled, compares purpose with performance, and ascertains the general principles of the relation between them. Metaphysics is still more special, only considering the phenomenon in so far as it is a sign of what is real. [The first of] the three branches of normative science, or the science of the phenomenon in so far as it is controllable, philosophical esthetics (which becomes something very different from the study which the noun usually designates)[,] studies the characters which will belong to the phenomenon so far as it is controllable, that is, the characters of what is aimed at. Thus, the question, What is the *summum bonum*, is regarded as an esthetical question. If pleasure be defined as that quality of feeling which is common and peculiar to all experiences that we desire, P is inclined to deny that there is any such thing as pleasure, and to think that that which is common and peculiar to such experiences is an intellectual character, the realization of the ideal, or reasonableness. Ethics studies in the controllable phenomenon the act and process of controlling it. This study is the very heart of normative science, and emphasizes more strongly than the others that dichotomy which is the

constitutive characteristic of normative science. For it is the study of the controlled and the uncontrolled as they appear in effort and resistance. This abstract ethics which can derive no principle from metaphysics or from psychology can plainly have little in common with ordinary ethics. Logic is of a much more special kind
L107:21 for it studies the relation of the phenomenon to the essential character of the phenomenon as controllable, that is, its reasonableness, or embodying an idea. That which embodies an idea is a sign, and it is best to make logic the science of the general properties of signs. Since P maintains that every thought, percept, image, feeling, etc. is a sign[,]ordinary logic, so far as it can be separated from metaphysics and psychology will be included in the abstract logic. Finally, under the head of metaphysics will be included, not merely ontology, but also whatever philosophy can determine respecting causation, the freedom of the will, the connection of mind and matter, optimism or pessimism, immortality, theology, time and space, etc.

Peirce's studies of philosophy have mostly been concerned with [phaneroscopy], logic, and some parts of metaphysics. In [phaneroscopy], he is of opinion that there are two sets of categories, a long list and a short one; and he admits that there may possibly be still others. Though he devoted two years to the study of the long list, he attained no satisfactory results. The shorter list is called by [the] easily remembered designation of the *cenopythagorean categories*. These are *Firstness*, *Secondness*, and *Thirdness*. *Firstness* is the mode or element of being by which any subject is such as it is, *positively* and regardless of everything else; or rather, the category is not bound down to this particular conception but is the element which is characteristic and peculiar in this definition and is a prominent ingredient in the ideas of quality, qualitativeness, absoluteness, originality, variety, chance, possibility, form, essence, feeling, etc. *Secondness* is that mode or element of being by which any subject is such as it is in a second subject regardless of any third; or rather, the category is the leading and characteristic element in this definition, which is prominent in the ideas of dyadic relativity or relation, action, effort, existence, individuality, opposition, negation, dependence, blind force. Secondness has two grades, the *genuine* and the *degenerate* (just as a pair of rays is called a 'degenerate' conic) and this is true in several ways. Every genuine secondness has two correlative aspects, of which one is more active or first, the other more passive or second: and these two together make a total secondness between two correlative subjects. There is a long chapter of these dichotomic distinctions of secondness. *Thirdness* is that mode or element of being whereby a subject is such as it is to a second and for a third; or rather, it is the characteristic ingredient of this definition, which is prominent in the ideas of instrument, organon, method, means, mediation, betweenness, representation, communication, community, composition, generality, regularity, continuity, totality, system, understanding, cognition, abstraction, etc. That the three categories are independent of one another is proved as follows. Secondness involves Firstness, but it is discriminated from it by the circumstance that we may consider non-relative characters of subjects neglecting their dyadic relations. But a dyadic relation cannot be a result of

non-relative characters, since if it were so there would be, besides the possession of non-relative characters of two objects, some connection between these facts; and this would be itself a dyadic relation. So Thirdness involves Secondness and thereby involves Firstness too; but it can be discriminated from Secondness by the circumstance that Secondness may occur either with or without Thirdness. Thirdness cannot be reduced to Secondness and Firstness, since if this were possible every triadic relation could be expressed in terms of dyadic relations and of non-relative attributions. Now no triadic relation can be so expressed, for it would appear in such expression as a composite relation formed of dyadic relations. Now composition is itself a triadic relation. On the other hand, there is no independent Fourthness or more complex mode or element of being; since it is easily demonstrable that every tetradic relation consists in a compound of triadic relations. Thirdness is subject to two grades of degeneracy. All genuine thirdness has a mental character.

Logic is by P. made synonymous with semeiotic, the pure theory of signs, in general. Its first part, speculative grammar, corresponding to stecheology (*Elementarlehre*), classifies and describes signs. A sign is anything, A, in a relation, *r*, to something, B, its *object*, this relation, *r*, consisting in fitness to determine something so as to produce something, C, the *interpretant* of the sign, which shall be in the relation *r* to B, or at least in some analogous relation. Thus, the sign involves the idea of a possible endless series of interpretations. In what relation this entire series, taken as a whole, stands to the object, B, depends upon circumstances.
[End of *MS* L 107 main draft]

[Variant draft A]
PEIRCE, Charles Santiago Sanders, b. Cambridge. Mass. 1839 Sep. 10, son of Benjamin P. the leading American mathematician of his day, and his wife Sarah Hunt Mills P. dau. of U.S. Senator Mills (the predecessor of Webster) who died early in Northampton, Mass. where he had established a noted law school. C.S.P. took the degrees of A.B. (1859), A.M., and S.B. in chemistry in Harvard. From Boyhood he has been devoted to Logic, considered as the theory of reasoning, especially in science, and of logical analysis. Moved chiefly by his desire to obtain an intimate knowledge of scientific reasoning, he made original investigations in the history of the pronounciation of English (*N.A. Rev.* 1864) [*P* 13], Multiple Algebra (*Proc. A.A.A.S.* 1875–7 and *Am. J. of Math.* 1882), Colors (*Am. J. Sci. and A.* 1877) [*P 100*], the Doctrine of Chances (*N.A. Rev.* [*P* 21], and *Pop. Sci. Monthly*, 1878), Certain Phenomena of diffraction Spectra [*P* 134] (*Am. J. Math.*), and as an officer of the U.S. Geod. Survey of gravity.

[Variant draft B]
Charles Santiago Sanders Peirce (b. 1839) son of the mathematician Benjamin P., reared in circle of physicists and naturalists, and specially educated as a chemist, laid the foundation of his philosophical conceptions in a study of the K.d.r.V. Accepting

unreservedly Kant's opinion that metaphysical conceptions can only be the conceptions of formal logic in different application, he was struck with the want of thoroughness of Kant's study of formal logic, and undertook a reexamination of the subject. In 1864, he was appointed lecturer on logic in Harvard University, and devoted his lectures to the criticism of the reasoning of physicists, as he did a course in 1866 before the Lowell Institute in Boston. In 1867 he published a classification of reasonings (in which he reduced all reasoning to substitution, an idea afterward followed out by Taine), a New List of Categories (Firstness, Secondness, Thirdness), an improvement of Boole's algebra of logic, etc. He had, by his studies of physical reasoning, already been led to question the rejection by modern philosophers of any mode of real being other than individual existence and actual happening; and studies of Aquinas, Scotus, Ockham, etc. led him to a rejection of nominalism expressed in three papers in the *Journal of Speculative Philosophy* (Vol. II) and in the *North American Review* for October 1871 (Review of Frazer's Berkeley). In 1870, he produced a memoir on the application of Boole's principles to the logic of relations; and the study of this branch of logic profoundly modified his conceptions of logic. In 1877 he put forth in two articles in the *Revue Philosophique* the principle which he called pragmatism, namely that an intellectual concept is nothing but a concept of a purpose that might be entertained under conceivable circumstances. Having been appointed Lecturer on Logic in the Johns Hopkins University, he gave in 1882, his account of the validity of induction in an essay contained in the volume *Studies in Logic* by members of the Johns Hopkins University, where he maintained that the inductive conclusion derives no probability from its premisses, and that the warrant for [manuscript break]

[manuscript resumed] In 1868 he contributed three papers to W.T. Harris's *Journal of Speculative Philosophy* in which he insisted that while it is necessary to be deliberate, circumspect, and critical in adopting any opinion, and to be upon the alert for symptoms of error in our belief yet that which we do not genuinely doubt cannot possibly be subjected to any real criticism, and that which we never have doubted neither has nor needs any logical support. For instance, to say that a mathematical demonstration rests upon or appeals to a logical principle is meaningless except in the sense that a certain similarity or affinity of form may be traced between the demonstration and the principle. For the demonstration being evident, it can no more be supported by a principle of logic than the principles of logic can be supported by the demonstration. Hence, philosophy can have no other starting point than the total of beliefs which we bring to it. Moreover, it cannot [ever] be good logic to suppose any principle to be first or ultimate. For that is to suppose it inexplicable, while no hypothesis is acceptable for any other reason than that it explains the known facts. Resting on these principles, he offered various proofs of the following propositions; 1st, that we have no power of immediate introspection. That every experience has a double aspect is a datum of perception; and this double aspect is well explained in all its features by the theory that we are conscious. But that we are

conscious is an inference, not a datum of perception. 2nd, there is no cognition which is logically first, but every cognition is logically determined by previous cognitions. 3rd, all cognition is of the nature of a sign, and must be interpreted in a subsequent cognition to be a cognition at all. In this absolutely present instant there is no cognitive consciousness. 4th, of the absolutely incognizable there is no conception of any description. Upon these four propositions he based a doctrine of *Synechism*, or principle of the universality of the law of continuity, carrying with it a return to scholastic realism. From the same propositions he deduced the different modes of validity of the different kinds of logical inference. In 1870, in the *Memoirs of the American Academy of Arts and Sciences*, he first enlarged the Boolian algebra of logic so as to render it applicable to the logic of relations; and he developed this branch of logic further than De Morgan had done. In October 1871 in a review of Frazer's Edition of Berkeley in the *North American Review*, he argued further against nominalism. In 1877 and 1878 in a series of articles in the *Popular Science Monthly* (of which two also appeared in the *Revue Philosophique*) he first put forth the doctrine of *Pragmatism*, as he called it, according to which every concept proper (as distinguished from a feeling, image, or percept) is fully interpretable in terms of conceivable conduct; that is to say, the difference between asserting or denying the applicability of the concept of a given subject, amounts precisely to saying that it consists solely in the fact that the reasoning proceeds according to a method which, persisted in, must correct any error of that conclusion in the speediest manner. At the same time he developed in the same volume and in the *American Journal of Mathematics*, a universal algebra of logic and an algebra of dyadic relations, the latter of which forms the subject of the third volume of Schröder's *Algebra der Logik*. He also published a paper on the Logic of Number in which he distinguished between finite and infinite collections substantially as Dedekind did six years later, and deduced the Fermatian method of reasoning about integers from the conception of *correspondence*, or substantially Gauss's *Abbild*. (His earlier Quincuncial projection [showed] his familiarity with this conception.) His father had in 1870 distributed a work called *Linear Associative Algebra*. In 1882, the son edited a new edition of that work [P 188] in which he showed its connection with the logic of relations. C.S. Peirce regards universal science, or Cenoscopy (Bentham's word), as consisting of Mathematics, which merely studies hypotheses without any concern for their truth, and Philosophy, which studies whatever can be inferred from ordinary experience. He makes Philosophy to consist of, 1st, [Phaneroscopy] or Ideoscopy, which analyzes ideas without inquiring into their truth, 2nd, Normative Science, and 3rd, Metaphysics. Of the normative sciences, Ethics depends upon Esthetics, and Logic upon Ethics; but he insists that logic must make no use of the conclusions of metaphysics and still less of those of psychology. He regards logic as the science of signs in general. Every sign is in a triadic relation to an object and to an interpretant, which is brought by the sign into a relation to the object similar to the sign's relation to the same object. But it is necessary to distinguish between the object as it is represented by the sign, and the object as it is in itself. It is also necessary to distinguish

between 1st, the interpretant as it is intended to be determined by the sign, 2nd, the interpretant as it is related to the object, and 3rd, the interpretant as it is irrespective of the peculiarities of the sign and the object. Signs are divided by trichotomy in six partially independent ways; in one way, according to their own mode of being, in two ways according to their relation to their objects, and in three ways according to their relation to their interpretants. It may be mentioned that Peirce regards a proposition, by which he means the substance of a judgment considered as abstracted from the assent to it or dissent from it, a symbol which has a part by which it separately *indicates* its object while it also *signifies* this object in another way. The genus is the *dicisign*.
[break in manuscript]

[manuscript continues]
[phaneroscopy] and logic, and in a lesser degree with some parts of metaphysics. As to [phaneroscopy], he is of opinion that there are at least two sets of categories. After devoting two years to the study of one of these, which corresponds with Hegel's categories, he became discouraged by the difficulty of attaining any satisfactory approach to certainty, and abandoned the subject. On the other hand, he has found another set, corresponding to Hegel's three stages, more easy to investigate and extremely useful. He calls these the *cenopythagorean categories*. They are three in number, *Firstness*, *Secondness*, and *Thirdness*.

Firstness, or the mode of being of that which is such as [it is] regardless of anything else, as exemplified by simple Qualities of [continues at *MS* 914] feeling; *Secondness*, or the mode of being of that which is such as it is relatively to a second object but regardless of any third; and *Thirdness*, or that which is such as it is in bringing a second into relation to a third. That thirdness cannot be reduced to any combination of secondnesses follows at once from the fact that combination is itself a triadic relation; so that a combination of secondnesses would itself involve an irreducible thirdness. On the other hand, [there] can be no irreducible Fourthness or mode of being defined by a relation between more than three correlates, since it is easily shown that every such relation is definable as a triadic relation among triadic relations. The most characteristic form of thirdness is that of a *sign*; and it is shown that every cognition is of the nature of a sign. Every sign has an object, which may be regarded either as it is immediately represented in the sign to be and as it is in its own firstness. It is equally essential to the function of a sign that it should determine an *Interpretant*, or a second correlate related to the object of the sign as the sign is itself related to that object; and this interpretant may be regarded as the sign represents it to be, as it is in its pure secondness to the object, and as it is in its own firstness. Upon these considerations are founded six trichotomic divisions of signs (of which only two were recognized in 1867). For in the first place a sign may, in its own firstness, either be a mere idea or quality of feeling, or it may be a *sinsign*; that is, an individual existent (and P holds, with Hegel, that existence consists in the blind reaction of the existent with the rest of the universe in which it exists), or it

may (like a word) be a general type (*legisign*) to which existents may conform. In the second place a sign may, in its secondness to its object as represented (according to the statement of 1867, which may have indirectly influenced Stout's[21] psychological division of signs) either, as an *Icon*, be related to that object by virtue of a character which belongs to the sign in its own Firstness, and which equally would belong to it though the object did not exist, or, as an *Index*, may be related to its object by a real secondness, such as a physical connection, to it, or it may, as a *Symbol*, be related to its object only because it will be represented in its interpretant as so related, as is the case with any word or other conventional sign, or any general type of image regarded as a schema of a concept. In the third place, a sign may, in its secondness to its object as the latter is in its own firstness, be a sign of an idea or quality, or of an individual existent (including an event), or of a general type. In the fourth place, a sign may, in its thirdness to its object for its interpretant as the latter is "meant" to be by the sign, either determine that interpretant

[end of *MS* 914; end of variant drafts]

IV. Are the Humanities and Arts also Sciences?

If philosophy, on Peirce's hypothesis, is really a part of science, what (on his hypothesis) could be said of those other fields today considered as Arts and Humanities (considered today as the other non-sciences)? Thus, the logic of our discussion brings us face-to-face with a series of lively research questions, the resolution of which will be facilitated by Elize Bisanz's study-edition of Peirce's writings for *The Monist*. This group of essays is a significant component of a larger body of Peirce's important late writings beginning with *Reasoning and the Logic of Things* (Cambridge, 1992), *Pragmatism as a Principle and Method of Right Thinking* (Albany, 1997), and his Lowell Lectures of 1903 (in preparation, Peirce Edition Project – see *P* 1005 for a listing of the relevant manuscripts) entitled "Some Topics of Logic Bearing on Questions now Vexed."

I suspect that it would be a mistake to proceed on the popular current supposition that science and art/humanities/theology should operate along radically different methodical lines. Peirce's repeated comment that he was early removed from nominalism to find a better home for scientific method in scholastic realism is a comment bearing upon this problem. What clothing would today cover the skeleton of Nominalism were Peirce around to describe it? Using his principles within an act of imagination, perhaps he would notice that in some areas of social science, scholars speak of reality being

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[21] G.F. Stout, English psychologist, editor of *Mind*, author of *Analytic Psychology* (1896) and *A Manual of Psychology* (1899).

constructed by society, of a continuing chain of interpretation entirely free of control by reality, or he might notice that in regard to the Arts and Humanities it is widely assumed in our culture that the only feasible or even cognizable way to discuss beauty – or the good, or justice, or spiritual matters – is by way of an extreme relativity of opinion or from within the frame of an almost-solipsist ego prison.

Peirce thought that his interdisciplinary, objective, realist, methodology of Semeiotic might have a chance to bridge these wide gulleys, not in a way that is reductionistic in the fashion of Scientism,[22] but in a spirit and process of convergence toward truth (under the guidance of reality) through activities of cooperating scientific intelligences.

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[22] See K.L. Ketner, "Rescuing Science from Scientism: The Achievement of Walker Percy," *The Intercollegiate Review*, Volume 35 (1999): pp. 22–27.