

Science as a Form of Life According to Peirce

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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". (MS 1334: 12–13, 1905).

This beautiful quotation from Charles S. Peirce comes from his "Lecture I to the Adirondack Summer School 1905" and was catalogued as MS 1334 (Robin 1967). In 1986 Kenneth L. Ketner chose fifteen pages (7–22) of the *Notebook I* of these lectures to represent Peirce's conception of science in his volume *Classical American Philosophy* (Stuhr 1987: 46–48). "The Nature of Science" was the appropriate title assigned to that selection, which up to then had been almost unknown to the majority of Peirce scholars. Sara Barrena translated the piece into Spanish in 1996 (Barrena 1996: 1435–1440) and we chose the quotation above as the motto for our then incipient group of Peirce scholars in the Spanish-speaking world because it so finely expressed the aim of our undertaking. Against the traditional image of the philosopher as a solitary thinker near the stove, we wanted, following Peirce, to encourage cooperation and communication between our researchers not only as something useful, but as something essential for the real development of science.

For this reason, I am deeply honored to have been invited to participate in this congress, which also provides me with the opportunity to visit the beautiful city of Istanbul—a city that Charles S. Peirce greatly admired during his stay here at the end of August 1870. I am especially grateful to Dr. Nazli for both the kind invitation and for suggesting the topic of my keynote address, "Science as a Form of Life According to Peirce," a subject to which I have paid attention during years.

My presentation today will be structured in five sections and I will try to provide several texts from Peirce that illustrate well his conception of a scientific life: 1) Peirce a true scientist philosopher; 2) What science really is for Peirce; 3) The brotherhood of science; 4) Progress and communication in science; 5) Science as a mode of life.

1. Peirce a true scientist philosopher

First of all, it should be stated clearly that, although Peirce was a philosopher and a logician, he was first and foremost a real practitioner of science. Not only was he trained as a chemist at Harvard, but for thirty years (1861-91) he worked regularly and strenuously for the U. S. Coast Survey as a metrologist and as an observer in astronomy and geodesy. His reports to the Coast Survey are an outstanding testimony to his personal experience in the hard work of measuring and obtaining empirical evidence. As you

know, with Sara Barrena we have been working during fifteen years on Peirce's European journeys between 1870 and 1883, paying particular attention to his correspondence and his scientific reports. We have verified that Peirce was a serious professional scientist, working particularly in astronomy, geodesy and gravity determinations with pendulums. Throughout Peirce's correspondence it becomes clear what an opportunity the European sojourns were for him to expand his contacts, exchange views, and learn from experts. Perhaps for the first time Peirce experienced what it was like to feel part of a living community of inquiry, and was aware of how much his work could benefit from it.

A glance at his *Photometric Researches* produced in the years 1872-75 confirms this impression of a man involved in solid scientific work (*W* 3, 382-493). I agree with Victor Lenzen —whose serious studies about Peirce's scientific work are nowadays almost completely forgotten— that "Peirce's scientific work is relevant to his philosophy, for his philosophical doctrines indicate the influence of his reflective thought upon the methods of science" (Lenzen 1964, 33), and with Ketner's judgment, "Peirce was not a dilettante in science, but a master scientist" (Ketner 2009, 42). To summarize this in Fisch's words, "Peirce was not merely a philosopher or a logician who had read up on science. He was a full-fledged professional scientist, who carried into all his work the concerns of the philosopher and logician" (Fisch 1993, *W* 3, xxviii-xxix). More recently Tom Short has written a full book on Peirce and modern science. Short writes in the first chapter "Peirce's Life in Science: 1859-1891", summarizing his study: «I report nothing not already known; this chapter's purpose is to establish the depth of Peirce's immersion in modern science, so as to ground the fundamental thesis of this book, that his philosophical *modus operandi* was that of a scientist" (Short 2022, 1).

Peirce's personal participation in the scientific community of his time buttresses whatever he has to say about science from a philosophical point of view. Having done research in astronomy, mathematics, logic and philosophy and in the history of all these sciences, Peirce tried all his life to disclose the logic of scientific inquiry. In addition to his personal experience of scientific practice, his sound knowledge of the history of science and of the history of philosophy helped him to establish a general cartography of scientific methodology. In this sense, following Hookway to some extent (1992: 1-3), I think that the most accurate understanding of Peirce's philosophy is to see him as a traditional and systematic philosopher, but one dealing with the modern problems of science, truth and knowledge on the basis of a very valuable personal experience as a logician and as an experimental researcher in the bosom of an international community of scientists and thinkers.

2. What science really is

Science is for Peirce "a living historic entity" (*CP* 1.44, c.1896), "a living and growing body of truth" (*CP* 6.428, 1893). Beginning in his early years, in "Some Consequences of Four Incapacities" (1868), Peirce identified the community of inquirers as essential to scientific rationality (*CP* 5.311, 1868). The flourishing of scientific reason can only take place in the context of research communities: the pursuit of truth is a corporate task and not an individual search for foundations.

Throughout all his life, but especially in his later years, Peirce insisted that the popular image of science as something finished and complete is totally opposed to what

science really is, at least in its original practical intent. That which constitutes science "is not so much correct conclusions, as it is a correct method. But the method of science is itself a scientific result. It did not spring out of the brain of a beginner: it was a historic attainment and a scientific achievement" (*CP* 6.428, 1893).

Scientific growth is not only the accumulation of data, of registrations, measurements or experiences, but also requires creativity. To learn the truth requires not only collecting data, but also abduction, the adoption of a hypothesis to explain surprising facts, and the deduction of probable consequences which are expected to verify the hypotheses (*CP* 7.202, 1901). Abduction consists —Peirce writes to Mario Calderoni— in "examining a mass of facts and in allowing these facts to suggest a theory" (*CP* 8.209, 1905). Though the scientist is invariably a person who has become deeply impressed with the efficacy of minute and thorough observations, he or she knows that observing is never enough: "Science, then, may be defined as the business whose ultimate aim is to educe the truth by means of close observation" (*HP* 1123, 1898).

Here are two beautiful texts by the mature Peirce which define what a science is. The first one is from a 1902 manuscript on the classification of the sciences (*MS* 1343, 6-7, 1902):

Science is to mean for us a mode of life whose single animating purpose is to find out the real truth, which pursues this purpose by a well-considered method, founded on thorough acquaintance with such scientific results already ascertained by others as may be available, and which seeks cooperation in the hope that the truth may be found, if not by any of the actual inquirers, yet ultimately by those who come after them and who shall make use of their results (also in *CP* 7.55, 1902).

The second text comes from the manuscript of the Adirondack Summer School Lectures quoted at the beginning of my talk (Ketner 2009, 37):

But what I mean by a "science" (...) 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, but according 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. It is not necessary that they should all be at work upon the same problem, or that all should be fully acquainted with all that it is needful for another of them to know; but their studies must be so closely allied that any one of them could take up the problem of any other after some months of special preparation and that each should understand pretty minutely what it is that each one of the other's work consists in; so that any 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 (*MS* 1334, pp. 11-14, 1905).

Probably there is nothing more alien to the present competitive style of science than this Peircean notion of scientists working together like brethren. It seems to me that is the task of philosophers to try to teach this *mode of life* through the defense of cross-disciplinarity and of the advantages of affective relations between colleagues in a Peircean spirit of agapastic reasonableness (Nubiola 2005).

3. The brotherhood of science

Eleven years ago, in the Charles S. Peirce International Centennial Congress, held in Lowell, MA, in July 2014, I presented a paper titled "Scientific Community and Cooperation in Peirce's European Letters" during a thought-provoking panel alongside Sara Barrena and Nathan Houser. In my presentation, I drew on Peirce's writings to advocate for a "brotherhood of science," emphasizing collaborative unity within the scientific community. Following my talk, Professor Susan Haack offered a succinct observation: "Thanks for your talk, but brothers quarrel!" In response, I argued that sibling disputes, while common, occur within an affective and emotional framework that contextualizes their conflicts, fostering a deeper unity despite differences. Moreover, I championed cooperation over competition, highlighting the concept of "emulation." According to Webster's Dictionary, emulation is defined as "ambition or endeavor to equal or excel others (as in achievement)." In contrast to competition, which can often prove unproductive, healthy emulation, in my view, drives scientific progress by inspiring cooperation, mutual growth, and collective achievement (Nubiola 2014).

Let us pay attention to this notion of «brotherhood of science». The origin of that expression seems to come back to the medieval brotherhood of scholars. It is very likely that it was a common expression in the second part of the 19th century as a way to refer to the universality of scientific activity overcoming the national borders and political enmities. I have not found —until now— that literal expression in Peirce's texts, but in our exploration of Peirce's European correspondence we found a letter from Benjamin Peirce to the British mathematician and logician Augustus de Morgan (1806-1871) presenting his son Charles and precisely invoking the «unseen brotherhood of science»:

I presume upon the unseen¹ brotherhood of science to introduce to you my son Charles S. Peirce Esq. who is a devoted student of Logic and I think that he has original thoughts which you may regard as deserving your consideration.²

Charles S. Peirce frequently emphasized the notion of scientists as *brethren*, describing them as "my scientific brethren" (CP 6.295, 1891) and advocating for a cooperative ethos that transcends national and cultural boundaries. This concept of scientific brotherhood appears in multiple instances throughout Peirce's writings. Here, I highlight at least two notable examples:

Men who spend their lives in finding out similar kinds of truth about similar things understand what one another are about better than outsiders do. They are all familiar with words which others do not know the exact meaning of, they appreciate each other's difficulties and consult one another about them. They love the same sort of things. They consort together and consider one another as *brethren*. They are said to pursue the same branch of science (HP 804-5, 1904).

¹ Grattan-Guinness read "universal". "Peirce between Logic and Mathematics", *Studies in the Logic of Charles Sanders Peirce*, N. Houser, D. D. Roberts y J. van Evra eds., Bloomington, IN, Indiana University Press, 1997, p. 42

² "Letter of Benjamin Peirce to Augustus De Morgan, Washington, 17.06.1870", MS 913I/107/1/1870, De Morgan Papers, Senate House Library, University of London.

Science and philosophy seem to have been changed in their cradles. For it is not knowing, but the love of learning, that characterizes the scientific man; while the "philosopher" is a man with a system which he thinks embodies all that is best worth knowing. If a man burns to learn and sets himself to comparing his ideas with experimental results in order that he may correct those ideas, every scientific man will recognize him as a brother, no matter how small his knowledge may be. (CP 1.44, c.1896)

In sum, Peirce's correspondence offers substantial evidence of the rigor of his scientific work, his deep engagement with the observation and measurement of reality, and his steadfast commitment to the "brotherhood of science."

4) Progress and communication in science

As previously mentioned, Peirce characterized science as a diligent pursuit of truth for its own sake, conducted by a community of inquirers skilled in using specialized instruments and trained in distinct modes of perception or thought. For Peirce, sciences are research traditions that evolve across time and space. He argued that "science does not advance by revolutions, warfare, and cataclysms, but by cooperation, by each researcher's taking advantage of his predecessors' achievements, and by his joining his own work in one continuous piece to that already done" (CP 2.157, c.1902). Thus, Peirce viewed science as a way of life—a craft transmitted from masters to apprentices.

Each community of scientists grows up around certain methods of investigation, around specific modes of perception cultivated communally in space and time. In particular, the members of a research community are united by their common skill in the handling of certain instruments and their common ability to carry out certain types of work (MS 1334, 1905). Each science thus corresponds to a special class of observations which renders peculiar the modes of thought of the students of each special branch (CP 1.100, c.1896). Those who study very distant branches of knowledge are not only totally alien to their respective objects of study, but even their own way of thinking is very different (HP 805).

For Peirce, the key to the advancement of knowledge and to the development of sciences is not revolution, but communication. Communication between the members of a science community is essential for scrutinizing the evidence and the results achieved in research. There is no algorithm —no routine or unfailing method— for discovering the truth or knowing for sure when you have it. Thus, truth and knowledge —at least in the hard sciences— are located at the level of the scientific community rather than the individual inquirer (Ransdell 1998). More specifically, Peirce clearly asserts that the scientific community, far from being an assembly or a parliament whose members fight each other with fierce arguments, should be more like a family. "A given science with a special name, a special journal, a special society, studying one group of facts, whose students understand one another in a general way and naturally associate together, forms what I call a *family*" (CP 1.238, c.1902). A scientific community is always —or at least should be, according to Peirce— an affective community.

A second point of interest is the encouragement of cross-disciplinarity between sciences: "One of the most salient phenomena of the life of science is that of a student of one subject getting aid from students of other subjects" (HP 805, 1904). It is not only that

"the higher places in science in the coming years are for those who succeed in adapting the methods of one science to the investigation of another. That is what the greatest progress of the passing generation has consisted in" (CP 7.66, 1882), but that new knowledge is generated wherever communication between different branches of science is enhanced.

5) Science as a mode of life

As probably you know Peirce invested some attention for years in researching the greatness of the historical figures measuring the impact that the reading of their biography had in the mind or the heart of his students. [W4: lxi-lxii; 5: 26-106] This was a sort of a surprising *experimental study*. On January 12, 1901 Peirce wrote for the New York *Evening Post* an article with the title "The Century's Great Men in Science", that was an offspring of that earlier study. It was reprinted in the annual report of the Smithsonian Institution. I want to copy the description of his method to determine the greatness of the scientists and his conclusion of that article because both texts provide a beautiful image of science as a way of life, and also a clear understanding of Peirce as a scientific researcher. Peirce explains his method thus:

My opinion will, I fear, be set down by some intellectual men as foolishness, though it has not been lightly formed, nor without long years of experimentation—that the way to judge of whether a man was great or not is to put aside all analysis, to contemplate attentively his life and works, and then to look into one's heart and estimate the impression one finds to have been made. This is the way in which one would decide whether a mountain were sublime or not. The great man is the impressive personality, and the question whether he is great is a question of impression.

And after nominating and describing the main achievements of the greatest scientists of the past century in the different fields, Peirce concluded:

When we compare all the men I have glanced at, with a view to eliciting a common trait somewhat distinctive of the nineteenth century, we can not but see that science has been animated by a new spirit, till the very word has become a misnomer. It is the man of science eager to have his every opinion regenerated, his every idea rationalized, by drinking at the fountain of fact, and devoting all the energies of his life to the cult of truth, not as he understands it, but as he does not yet understand it, that ought properly to be called a philosopher. To an earlier age knowledge was power, merely that and nothing more; to us it is life and the *summum bonum*. Emancipation from the bonds of self, of one's own prepossessions, importunately sought at the hands of that rational power before which all must ultimately bow—this is the characteristic that distinguishes all the great figures of the nineteenth-century science from those of former periods.

Here the mode of the life of the *scientist* is clearly described. A scientist is someone passionate about constantly renewing his beliefs and rationalizing his ideas, drawing from the wellspring of facts. The scientists dedicate all their energy to the pursuit of truth—not the truth they already think they know, but the truth they have yet to understand. That's who truly deserve to be called a *philosopher*.

I want finally to add that the mature Peirce considered scientific inquiry as a kind of religious work. For Peirce the *heuretics* or *heurospudists* [from *eurisko*, to discover, and *spoudaio*, diligent] are the scientists who endeavor to discover, and who "look upon

discovery as making acquaintance with God and as the very purpose for which the human race was created". The text deserves a longer quotation:

purpose for which the human race was created. Indeed as the very purpose of God in creating the world at all. [...] when I say that *God is*, I mean that the conception of a God is the highest flight toward an understanding of the original of the whole physico-psychical universe that we can make. It has the advantage over the agnostics and other views of offering to our apprehension an object to be loved. Now the *heurospudist* has an imperative need of finding in nature an object to love. His science cannot subsist without it. For science to him must be worship in order not to fall down before the feet of some idol of human workmanship. Remember that the human race is but an ephemeral thing. In a little while it will be altogether done with and cast aside. Even now is merely dominant on one small planet of one insignificant star, while all that our sight embraces on a starry night is to the universe far less than a single cell of the brain is to the whole man. (*MS 1334*, 20, 1905).

This text is profoundly impressive, in particular when one considers the countless hours Peirce devoted to long nights patiently observing the stars and meticulously recording his measurements.

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I must conclude, and I wish to do so by once again expressing my gratitude to Dr. Nazli for inviting me to Peirce's Constantinople. You have turned a cherished dream of mine into reality.

Bibliographic References

Cited Works of Charles S. Peirce:

CP *The Collected Papers of Charles S. Peirce*, vols. 1–8, C. Hartshorne, P. Weiss and A. W. Burks (eds.), Cambridge, MA: Harvard University Press, 1931–1958. Cited by volume and paragraph number, followed by year.

HP *Historical Perspectives on Peirce's Logic of Science: A History of Science*, vols. 1–2, C. Eisele (ed.), Berlin, New York, Amsterdam: Mouton, 1985.

MS *The Charles S. Peirce Papers*, Am 1632, Houghton Library, Harvard University. The manuscript numbers follow R. Robin, *Annotated Catalogue of the Papers of Charles S. Peirce*, Amherst, MA: University of Massachusetts Press, 1967. In the case of letters the number is preceded by *L* ("Letter").

W *Writings of Charles S. Peirce: A Chronological Edition*, vols. 1–6 and 8, M. H. Fisch et al. (eds.), Bloomington and Indianapolis, IN: Indiana University Press, 1982–.

—— "The Century's Great Men in Science", *Annual Report of the Board of Regents of the Smithsonian Institution for the Year Ending, June 30, 1900*, Washington: Government Printing Office, 1901, 693-699.

Barrena, Sara: *Charles S. Peirce: Un argumento olvidado a favor de la realidad de Dios. Introducción, traducción y notas*, Pamplona, Cuadernos de Anuario Filosófico 34, 1996.

Fisch, Max H.: "Introduction", in *W* 3, 1993, xxi-xxxvii.

Grattan-Guinness, Ivor: "Peirce between Logic and Mathematics", *Studies in the Logic of Charles Sanders Peirce*, N. Houser, D. D. Roberts and J. van Evra (eds.), Bloomington, IN, Indiana University Press, 1997, 23-42.

Hookway, Christopher (1992), *Peirce*, Routledge: London.

Ketner, K. L.: "Charles Sanders Peirce: Interdisciplinary Scientist", in C. S. Peirce, *The Logic of Interdisciplinarity. The Monist-Series*, E. Bisanz (ed.), Berlin, Akademie, 2009, 35-57

Lenzen, Victor F.: "Charles S. Peirce as Astronomer", in *Studies in the Philosophy of Charles Sanders Peirce*, Second Series, E. C. Moore and R. Robin (eds.), Amherst, MA, University of Massachusetts Press, 1964, 33-50.

Nubiola, Jaime: "The Classification of the Sciences and Cross-disciplinarity", *Transactions of the Charles S. Peirce Society* XLI/2, 2005, 271-282.

Nubiola, Jaime: "[Scientific Community and Cooperation in Peirce's European Letters](#)", *Transactions of the Charles S. Peirce Society*, 50 (2014), 443-452.

Ransdell, Joseph: "Sciences as Communicational Communities", Arisbe: The Peirce Gateway, 1998.

Short, T. L.: *Charles Peirce and Modern Science*, Cambridge University Press, 2022.
[<https://doi-org.ezproxy.unav.es/10.1017/9781009223508>]

Stuhr, John (ed): *Classical American Philosophy*, Oxford, Oxford University Press, 1987.