

The Cosmopolitan Peirce: The Impact of his European Experience

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Introduction to the panel [Jaime Nubiola]

The common image of Charles Sanders Peirce as an isolated thinker writing in Arisbe without any contact with the world is not only historically inaccurate, but also it makes difficult to understand some key elements of his philosophy. Charles S. Peirce traveled to Europe on five different occasions. The five trips occurred between the years 1870 and 1883, all of them in the service of the Coast and Geodetic Survey, at that time the chief scientific agency of the United States. Those trips—which covered a total of thirty-eight months—were a rich mixture of scientific research and tourism, of communication with other scientists and also of enjoying with the artistic treasures of Europe. The impact of this extensive travelling was so relevant in Peirce's life and thought that it makes perfect sense to identify this space of time as his “cosmopolitan period”—to use Max Fisch's expression (1986: 227).

Peirce's experiences of his European trips are lively reflected in his wide correspondence (professional and family letters), which until now has been unduly neglected by the scholarship, due in part to the difficult access to it and in part to the general lack of interest from analytic tradition in the biographical aspects of philosophy. We are convinced that the feelings that Peirce experienced in Europe were seeds which bore fruit in later years. A close study of Peirce's letters and other documents of those years will help to avoid some misunderstandings about his thought and its evolution, highlighting his active participation in the first line of several fields of cooperative scientific research (astronomy, geodesy, etc.).

In the panel there will be three speakers, Nathan Houser, Sara Barrena and myself, covering each one twenty minutes, and leaving thirty minutes for final discussion. All the presentations will use a good number of images from Peirce's manuscripts and from other evidences of Peirce's European trips.

1. Peirce's Cosmopolitan Thought [Nathan Houser]

Abstract:

It is well-known that in 1837 Ralph Waldo Emerson gave a famous talk to the Phi Beta Kappa Society of Cambridge, Massachusetts, in which he urged Americans to extend their independence from Europe beyond the political realm to the sphere of thought and culture: “We have listened too long to the courtly muses of Europe . . .” It was time, Emerson urged, to “speak our own minds” and to forge a distinctly American cultural identity. Although

Peirce, as much as anyone, heeded Emerson's call, he, like his friend William James, and of course like Emerson himself, was a cosmopolitan man deeply informed by the breadth of his reading and by his European contacts and travels. Given his leading role in the birth and development of pragmatism, the most luminous American contribution to philosophy, it is not surprising that Peirce has typically been acclaimed as a distinctly American philosopher. While this attribution may be just, it fails to represent the complete Peirce unless it takes into account how deeply his thought was enmeshed with classical and contemporary European thought. Now that Peirce has so clearly become a philosopher for the ages, and widely studied in classrooms across Europe and around the world, there is a growing interest in the range and extent of his contacts with European thinkers and in exploring the impact of his European experience on the development of his thought. This contribution will survey the cosmopolitan underpinnings and context of Peirce's thought focusing especially on how his "American philosophy" was as much a response to his European experience as it was to the unique factors arising from his place in America.

Special consideration will be given to the period of Peirce's development described by Max H. Fisch as "Peirce's Cosmopolitan Period," the years running from 1870 to 1883 during which Peirce traveled five times to Europe and, overall, spent nearly three full years abroad. Although it can be argued that because of the stature of Peirce's family and their life in Cambridge, Massachusetts, he grew up in a cosmopolitan atmosphere, it is evident from Peirce's letters home from Europe that his time there made a significant impact on the course of his thought. It might even be said, perhaps somewhat surprisingly, that the importance of actual experience in Peirce's pragmatic doctrine of meaning became profoundly evident to him during his first European sojourn, which ended only a few months before he and William James founded the Cambridge Metaphysical Club. As he wrote from Italy in 1870 in to his wife, Zina, "[i]t is difficult to give a notion of the character of a country so unlike what you have seen." Peirce had honed his powers of perception for his astronomical work at the Harvard Observatory but it may not be stretching the truth too far to say that his aesthetic sensibilities prior to his European travels were grounded more in intellectual considerations than in wide-ranging aesthetic experiences. Peirce's struggle in his letters home from Europe to put his intense new feelings and the character of his new experiences into words provided an important lesson in the qualitative and non-conceptual nature of firstness and the need for linking firstness with secondness in order to give definitive conceptual meaning to aesthetic experience.

So we may suppose that in this, and in other ways, Peirce's European experiences influenced the development of his thought and helped shape his philosophy. But probably more decidedly his thought was influenced by his contact with European scientists and philosophers. The problems that occupied Peirce, not only while he was visiting Europe, but throughout most of his life, were problems that also occupied European thinkers (both past and present), whose work was known and used by Peirce. These were shared problems. In many cases, especially in his scientific work and in logic, Peirce's only influential colleagues were Europeans. The American thinkers who greatly influenced Peirce in other areas, William James for example, were themselves deeply involved in European thought. So to understand Peirce as an American philosopher it is necessary to grasp that he was profoundly influenced by European thought and culture and to inquire how his American and European experiences worked together to form his ideas and shape him into the world philosopher he became. This contribution will be a contribution to that inquiry.

2. Charles S. Peirce in Europe: The "*Aesthetic Letters*" [Sara Barrena]

In this talk I will focus on the aesthetic dimensions of Peirce's cosmopolitan period. As Prof. Houser has already noted, Peirce's European experiences influenced the later development of his thought, and this is also the case with his ideas concerning aesthetics. His contact with a new world and with numerous artworks could not fail to impress a person of Peirce's sensibility and intelligence; on the contrary, it prompted him to develop distinct impressions and conceptions that years later would acquire great importance in his definition of the normative sciences and of pragmatism itself.

In the first place, I will study Peirce's connection with art, and I will highlight certain significant examples taken from his European letters. In the second place, I will briefly explore the conception of aesthetics and the theory of art that are present in Peirce's mature thought, and which, in my opinion, are deeply rooted in his European experiences. My conclusion will highlight the reach of his theory of aesthetics, which goes beyond a mere theory of art: as the European letters show, it is related to something indescribable that we try to express; and it puts us on track towards that which deserves to be sought for itself, towards Beauty, Goodness and Truth.

1. The artistic experiences of Peirce: the European voyages

It might appear that Peirce's interests, all throughout his life, stayed far from aesthetics and art. Nevertheless, this was not the case. Peirce was always interested in art, and several intimations can be found in his work about the role beauty should play in our life. He himself wrote on one occasion that he had an extreme sensibility (*MS* 847, 905) and, although he recognized in 1903 that he was largely ignorant of art, he nevertheless felt that he had "a fair share of capacity for esthetic enjoyment" (*CP* 5.113) which his European voyages certainly contributed to developing.

Peirce's personal connection with art can be seen in the letters he wrote during his five visits to Europe between June 1870 and September 1883, especially in the letters from his first and second trips. That correspondence, along with his youthful readings of Friedrich Schiller, can be considered the most important source for tracing the origin of Peirce's aesthetic ideas. From this point of view, the importance of these letters far exceeds their anecdotal content. They show us how the trips through Europe and the contemplation of so many works of art and historic places made deep and lasting impressions on Peirce.

Peirce liked London, for example, where he was impressed by the immensity of the city, by its multitude of vehicles, its life and its hustle and bustle, but he did not like Berlin, whose foul odors he complained about in several letters. Pest seemed "a rather pleasant place to stay" (letter of 25 August 1870) and Constantinople was "by all odds the most beautiful & fascinating place I have been in yet" (letter of 2 September 1870). Greece fascinated him because it was different, but apparently he did not like it terribly much: "On the whole I don't think Thessaly is very nice" (letter of 15 September 1870).

Peirce also related other impressions and experiences, such as those produced by the worship service he attended in the cathedral of Chester, which he said was "beautifully intoned & spiritually refreshing" (letter of 14 April 1875). He stated that everything English seemed to him to be well-made, complete and properly taken care of, excepting the smoke that poured from factories, forges and coal pits, and which he said darkened the English light,

although he also was impressed by the hellish aspect that it gave to the “black country” in Wales (letter of 18 April 1875).

Throughout his life, Peirce gave great importance to the ability to be impressed, to the sensations that things produce in us, something which his scientific methodology would combine with the imaginative and rational elaboration of these sensations. Over the years Peirce developed a theory of observation and of errors. For Peirce, art also has to derive from experience, just as with any other kind of knowledge, and aesthetics, as with any other science, must be derived from observation. The importance of aesthetic experience is something that Peirce recognized in Europe. His European voyages certainly formed at least a part of the process that Peirce described in 1903:

I have gone through a systematic course of training in recognizing my feelings. I have worked with intensity for so many hours a day every day for long years to train myself to this; and it is a training which I would recommend to all of you. The artist has such a training (*CP* 5.112).

But, what sensations did Peirce have in Europe? Which “aesthetic experiences”? Certain paintings, sculptures and buildings powerfully drew his attention over the course of these voyages. Thus, he felt great admiration for the Tiergarten in Berlin, which he describes as “enchanted,” for Potsdam and Sans Souci, for the mosque of Suleiman in Constantinople, and for the basilica of Santa Maria Maggiore in Rome, which he mentions in a letter of 14 October, addressed to his mother and where he writes that he “was greatly struck by this church.” He was also impressed by the peculiar houses of Chester (letter of 14 April 1875). He was also impacted by the splendor of Eaton Hall, the palace of the Duke of Westminster and the church tower of Wresham, an elaborate tower belonging to the perpendicular Gothic style. He paid attention to details such as marquetry and chimney inlays.

Years later, he would affirm that art consists precisely in capturing certain sensations, in being able to express them and in producing an effect on the one who contemplates the artwork. On various occasions during his voyages around Europe Peirce had already remarked on the expressive dimension of the artistic phenomenon, and indeed the expressive capacity of a work became for him a criterion of its artistic quality. Thus, for instance, on contemplating a marble bust of Shakespeare in Stratford, he writes that it is executed in the monumental style and is therefore “somewhat devoid of expression; its effect is too beefy, too phlegmatic”. The bust appeared to be lacking life, although Shakespeare, on the other hand, was excessively lively. He must have been brimming over with apt conversation, harmonizing with perfect accuracy with his interlocutor’s mood but leading him to his own. Still to a dull person he may have seemed dull, Peirce concludes, since expressive capacity depends on the qualities of the artist (letter of 18 April 1875). This incapacity for expression, which served for him as a criterion for distinguishing good artworks from those of lesser quality, also underlies the comment that he made concerning Islamic art as a style of architecture that is rather poor in ideas (4 September 1870).

In a letter written from Berlin on 30 July 1870, he also remarks that the sculptures and architecture of the city fail to produce any real effect on the visitor:

The architecture and sculpture have a very artificial and made up look, generally imitations of classic style and fail altogether of any real effect even when you must acknowledge them to be fine. The finest thing is the Victory over the Brandenburg Thor [*sic*] and that has the effect of a small bronze. The artist has taken no advantage at the large size to produce any particular effect of greatness or sublimity.

Similarly, when he refers to St. Peter’s cathedral in Rome, he remarks that “there is an absence of true belief about St. Peter’s. It’s got up. (...) It is the enormous size & perfect proportions of St. Peter’s that impresses one. Beyond that there is nothing great about it”

(letter of 14 October). Oddly enough, Peirce was totally smitten by the expressive force of Antonio Canova's sculptures, as he confesses in his letter from Rome of 16 October 1870.

One month later, on 16 November, in a letter written in Chambéry and addressed to his mother, Peirce complains of the absence of motivation and convictions that characterizes his era. By this he means that there is nothing modern artists want to express to their public. He bemoans the formalism of contemporary artists:

Canova's statues & some few pieces of modern art make one feel that all this age needs in order quite to eclipse all others in art is the Motive—but that you see is totally wanting. Art is a mere plaything or luxury now. What are our artists! Are they the representative men of our age at all or do they even at all comprehend it? The difficulty is our age has no belief; it doesn't half believe in itself even. As long as that is so it yet asks for critics & scientific men & not artists.

This capacity to first capture something and then express it is precisely what, as he makes clear in his letters, Peirce had felt unable to do when in the presence of many of the artworks that he saw on his European trips. He was surprised by a multitude of sentiments, sensations and impressions that he did not want to lose. As a traveler interested in what he saw, and under the desire to write everything down, he stated on 28 August 1870: "I thought today I would rest & write letters. I have seen so much that unless I go over it in my mind it will escape me. I feel I have now forgotten ever so many things which interested me greatly". Peirce's letters sometimes seem to be more a diary than letters properly speaking.

He felt a desire to write down the strong impressions that his voyage was causing in him. Nevertheless, he is at the same time conscious of what it cost him to give form to these impressions, these "firstnesses" which were sometimes so difficult for him to put into words. In his letter of 22 September, addressed to his wife, he writes that "[i]t is difficult to give a notion of the character of a country so unlike what you have seen", and then goes on to describe the sunrise as seen from the Greek theater of Taormina; but then he gives up and writes:

But how can I give you any sort of notion of the enchanting, *enchanting* view? I was standing in a very lofty promontory in the pure undeceptive light of morning looking down upon the sea. Just below me, 50 feet or so, was this ancient theatre. (...) I could see many villages both in the valleys & on the hills—nearest of course the curious little town of Taormina & much verdure. Across the sea on one side the shores of Calabria were very prominent & in the opposite direction over the land rose Etna majestic & awful. It is to see such things as this that it is worthwhile to come abroad, things which no art can reproduce.

Peirce shows his surprise in his letters at being unable to explain or reproduce what he saw. For instance, in a letter of 28 August, he writes that he is seeing things which his imagination is incapable of drawing and his memory is unable to remember. For instance, he tried to reproduce the bust of the empress Faustina that he had enjoyed so much in Catania, but he did not succeed in doing so: "Here was another thing not to be reproduced. Memory itself cannot do justice to this beautiful work" (letter of 22 September). Writing from London, he affirms that giving one's impressions of the city is a particularly futile undertaking, since "ideas succeed one another here with such rapidity that there is hardly time to seize them & to register them would be quite out of the question" (letter of 24 April 1875).

This European experience could therefore be at the origin of his later idea that the artist is the one who is able to rationalize the inexpressible, to calm that desire, to express the admiration that something provokes in us. He himself would later attempt to do so after writing a story, "Topographical Sketches in Thessaly, with Fictional Embroideries" (*MS*

1561), which is the only fictional work that we have of Peirce, and which seeks to bring together the impressions and sentiments that he had experienced in his trip through Greece.

The European voyages of Peirce were without a doubt tremendously important for his formation as a person, as a scientist and as a philosopher. They also involved an intense contact with art and with a cultural world that provided a fertile field for his later developments in these areas. Peirce the traveler is revealed as someone who is human, alive and subject to the force of his experiences and the impressions that his voyages provoked in him. The sensations he received in Europe would last, and with time would bear fruit in new ways of viewing both science as well as his views of art and beauty. As Nathan Houser has noted, his European letters shows that much of what Peirce saw overwhelmed him, and without a doubt they had a long-lasting impact on his sense and appreciation of beauty. Prior to his voyages, his opinions on aesthetics were based more on intellectual considerations than aesthetic experiences. Europe changed this, and gave the force of lived experience to his opinions. Peirce's thought is thus interwoven with his life.

2. The aesthetic ideas of the mature Peirce

The specific experiences to which he refers in his letters, his comments on the works of art that he saw in Europe, and his personal way of observing give us a glimpse of the mature Peircean conception of art. Around 1902, Peirce affirmed that logic must pay its *devoirs* to Ethics and Esthetics (CP 2.200). In fact, beginning at the turn of the 19th century Peirce considered aesthetics to be the first and most necessary of the normative sciences, and as the foundation of the other two. In some later texts, Peirce clearly expresses himself in favor of its both normative and functional character:

It is evident that it is in esthetics that we ought to seek for the deepest characteristics of normative science, since esthetics, in dealing with the very ideal itself whose mere materialization engrosses the attention of practice and of logic, must contain the heart, soul, and spirit of normative science (CP 5.551, 1906).

Ethics and logic depend on the question of the final end, and thus the three normative sciences are united in aesthetics, which points out that which is admirable in itself, the *summum bonum*, that which all of us should aspire to in our sentiments, thoughts and actions. Aesthetics and art have to do with the sentiments, which constitute their own particular realm, but also with reason, which unifies them and orients them towards their ultimate end.

Peirce's European experience may well have been an important source for his later view of aesthetics, and of the artist as a person who is able to give form to what cannot be commonly expressed, making qualities *reasonable* that by their very nature are isolated and hidden. Thus, metaphorically, art may be said to colonize and to tame feelings. Beauty, for Peirce, is the only thing that we admire in itself and not in respect of something else. Beauty arises when harmony and equilibrium come into the picture, when a perfect adjustment is achieved between the feelings expressed and the form in which they are expressed, so that a "reasonable embodiment" occurs. In this way, in order for a work of art to be beautiful, it should move us or it should provoke in us some type of emotion, of feeling, and at the same time move us to some reflection.

The capacity of artists to listen to what surrounds them and to have new sensations, of being impressed by the world around them, to be impacted by impressions that they later seek to express, is something essential to the artistic phenomenon, as Peirce already made clear in his letters from Europe. Those who are unable to perceive the qualities of things are not artists, since they will have nothing to express. Neither are those persons artists who are not

impressionable and observant to an above average degree. Rather, those people are artists who are able to capture the uncapturable and to make it understandable, to trap and express that which otherwise would remain hidden, unrealized, as a mere potentiality. The effort of the artist is directed to reproduce, in one way or another, that which he or she sees, hears, perceives or feels; in every art this is a very complicated trade (*CP* 5.112, 1903).

The artist will seek what is admirable in itself, and will give this ideal flesh and make it grow via his or her art, just as the scientist seeks the truth of things via reasonings. The artistic phenomenon appears as a way of seeking that which alone is admirable in itself, the growth of reasonableness in the universe, and through this very quest beauty comes to be. Peirce holds beauty to be the product of aesthetics, as opposed to its proper object (*CP* 2.199, c.1902).

Conclusion

Peircean aesthetics is more than a simple theory of art. While I cannot analyze Peirce's aesthetic notions further here, it can nonetheless be affirmed that they are not minor issues in Peirce's thought. In his mature thought, when he comes to understand the aesthetic foundation of the other normative sciences, these issues will have an impact on the very core of his system, being part of his explanation of pragmatism. The meaning of concepts will be determined by the *possible* actions to which they can give rise, and so by the capacity of self-control and of pursuing an end or ideal, which will correspond to what aesthetics defines.

There is a fullness in the Peircean conception of aesthetics that does not derive only from sensory satisfaction, but rather from a particular equilibrium, able in different ways to capture and express the reality that surrounds us and revealing something more. In the sensible itself we have indicators of something that transcends it and which in some way has come to be embodied in it. The mind is not constrained by subjective sensations, but rather is open to certain ideals. For Peirce, aesthetics has to do with the sentiments and the ability to make them reasonable, that is, to order them towards ends via habits. And it is in this capacity that the possibility resides for aesthetics to better the lives of persons.

All of this makes aesthetics into something that puts us into contact with the transcendental. Peirce seeks that which is admirable in itself, beauty, and not merely the possibility of capturing it. The Peircean notion of aesthetics has classical resonances and, using the expression of Dostoyevsky, we can conclude that for Peirce beauty will save the world.

3. Scientific Community and Cooperation in Peirce's European Letters [Jaime Nubiola]

1. Introduction: Charles S. Peirce, a scientist philosopher

My contribution aspires to describe —with some documental support from Peirce's correspondence of his first and second European trips— Peirce's conception of science as a collective and co-operative activity of all those whose lives are animated by the desire to find out the truth, whose lives are animated by "an impulse to penetrate into the reason of things" (*CP* 1.44, c.1896; *MS* 615, p. 14, 1908).

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. A glance at his *Photometric Researches* produced in the years 1872-75 immediately 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).

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. 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. What 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). Science is for Peirce "a living historic entity" (CP 1.44, c.1896), "a living and growing body of truth" (CP 6.428, 1893), and above all a *communicative mode of life*:

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).

Probably there is nothing more alien to the present competitive style of science than the Peircean conception of scientists working together like *brethren*, but it seems to me that we can learn a lot from him on this issue. I will deal with that in two sections, first, on Peirce as an inventor and builder of research instruments around which scientific communities are built, and, second, on Peirce's experience of cooperation in science.

2. Charles S. Peirce, a builder of instruments of observation

According to Peirce each community of scientists grows up around specific ways of perceiving, certain special methods of research, around particular instruments of observation. Each science corresponds to a special kind of observation, which distinguishes the mode of thought of the students of each special branch (CP 1.100, c.1896). The scientists are

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).

The main branches of research in which Peirce was deeply involved for years were astronomy, geodesy and metrology. I am not going to summarize now his accomplishments in those fields, since they are faithfully referred by Victor Lenzen in his papers and by Max Fisch in his superb: "Peirce as a Scientist, Mathematician, Historian, Logician, and Philosopher", and Carolin Eysen's: "Charles S. Peirce Nineteenth Century Man of Science", available all of them in the same page in our web [<http://www.unav.es/gep/DescripcionSegundoViaje.html>]. What I want to stress is Peirce's personal involvement in the making and improvement of instruments of measurement. This is particularly evident in the attention that is paid to the instrument builders in his European letters. In London [Browning, Casella], Hamburg [Repsold], and Paris [Brunner, Breguet, Gautier] were the best instrument makers of the time. In this sense, the interesting MS 1560a in which Peirce is suggesting the route through Europe for some colleague of the U. S. Coast Survey, besides hotels and food, places to visit and so, adds for instance, in relation to Switzerland:

Basel: Instrument makers here

Berne: Instruments makers here. Hipp

In his letter to Patterson on March 2, 1876 he writes about Paris:

I have been greatly impressed with the instrument-making establishments here of every kind, and of the immense advantage Paris has over every other place on that account for the prosecution of all physical researches.

Peirce was put in charge of determinations of gravity for the Coast Survey on November 30, 1872. After conducting observations of relative gravity in 1873 at Hoosac mountains with an *invariable* pendulum, he ordered from the firm A. Repsold und Sohne of Hamburg an apparatus with a Bessel *reversible* pendulum (copy of that of the Prussian Geodetical Institute) for determining absolute values of gravity. The main goal of his second European trip was to receive this new pendulum in order to compare the European determinations with the American ones. In his report of May 31, 1875, after his first stay in Kew Observatory, near London, Peirce describes to Patterson with great detail the pendulums that were used there. I will only quote the conclusion: "Decidedly, I must invent some way of making experiments on the friction of knife-edges, as the subject is very obscure." In fact, on the 27th of May Peirce arrived in Hamburg and went at once to Repsold's where they had his instrument all set up ready for his inspection: "I occupied three days in the examination of all its parts and today —Peirce writes in his report of May 31st— I went and accepted it and paid for it. [...] There are a number of features of it, I confess, which my judgment cannot altogether approve."

In the next monthly report Peirce writes:

On the 1st day of June I left Hamburg and came to Berlin. I at once went to see His Excellency Herr General-Lieutenant Dr. Baeyer, the director of the Prussian Geodetical Institute. I found him a very courteous and interesting old gentleman with opinions of his own upon pendulums. He has come to the conclusion that he will not use the reversible pendulum and will endeavor to persuade his colleagues of the council of the European Gradmessung to give it up. He thinks invariable pendulums swung in vacuo are the thing; if one could only invent a vacuum apparatus.

The dissatisfaction of General Baeyer with the results obtained with the Prussian pendulum put in a difficult situation his whole project. The story follows with a turn since soon Peirce started to think that the flexure of the stand of the pendulum was affecting for the value of the determinations. This will be a central issue of Peirce's scientific career that he recalls in a lot of different places (*W3*, 217, *W4*, 83 and 516-17, *HP*, 608-09, *CP* 7.6-10, 1881; *W6*, 26-27). Although it is a bit long, it seems to me that it is worthwhile to quote Peirce's description of that event in the draft of the letter to J. H. Kehler of June 22, 1911 (L 231, NEM3: 207-09):

I got leave to go abroad to study European methods of investigating gravity. While I was in Paris, there happened to be a conference of all the European Surveys. It was held in the *Palais des affaires étrangères*; and I received an invitation to attend the meetings. At the first I attended, the subject of gravity was discussed; and I was taken completely by surprise when the president, Gen. Ibañez, called upon me for my opinion of the work they had been doing. Of course, I was obliged to express my real opinion. They thought they were measuring gravity with error not exceeding 1 or at most 2 millionths of itself. But the pendulum was swung from a brass tripod and I expressed the opinion very decidedly from an examination I had made of that tripod in Geneva that it swayed under the pendulum to an extent which though not directly observable, I had been able to get a notion of the amount of, by measuring how much the part where the pendulum rested would be moored by a horizontal pull of 1 kilo's weight. Whence I concluded that all the values of gravity which they had been publishing during the past ten years were too small by about 1/10000 of themselves, or a hundred times the error they thought they were excluding.

Peirce's view was initially accepted by the International Association of Geodesy in Paris, but later in a meeting in Brussels that Peirce was not able to attend, it was rejected. The issue was finally settled in the Stuttgart assembly of 1877. I copy from Peirce's remembrance more than thirty years later:

I was landed at Plymouth and travelled right through night and day to Stuttgart where was the meeting. I got to the hotel in the evening during dinner. I knew there were 2 men who believed in me, —or rather 1 1/3—. The one was Gen. Baeyer the leader of European geodesy. The 1/3 was a fraction of Mr. Emile Plantamour, who had seen me at work in Geneva. I met Genl. Baeyer and his daughter in the corridor of the hotel as I was being shown to my room and the old General who had been fighting for me all day but really did not *know* much about the subject was so delighted to see me that he threw both arms round me and kissed me on both cheeks! The next morning I went into the meeting which was a particularly distinguished gathering, (...) I began with the mathematical theory (...) Then I described the instrument by which I had automatically registered the instants of the passage of the pendulum over the vertical, while it was swinging on the brass tripod and when it was on a properly stiff support. I had the chronograph sheets with me, and the whole demonstration was complete, and when I sat down each of my three antagonists at Brussels [Oppolzer, Plantamour and Cellérier] got up one after another and very handsomely admitted that I was entirely right. And from that time I was acknowledged as the head of that small branch or twig of science.

We may summarize this section showing the images of the pendulums and the stand built by Peirce during the eighties.

3. European Journeys: the community of science

The main goal of Peirce's first trip to Europe (June 1870 - March 1871) was to identify possible locations suitable for establishing observatories in order to study the total solar eclipse that was to take place at noon on December 22nd, 1870 over the Mediterranean Sea. Moreover, his father Benjamin Peirce wanted to introduce his son to several prominent European scientists (De Morgan, Jevons, Clifford, Lockyer, etc.). Peirce pointed out locations in Greece, Italy, and Spain, and contributed to the success of the scientific expedition under the command of his father. Eventually, he observed the eclipse, together with one of the American teams, from Catania, in Sicily. As Joseph Brent wrote, "this expedition was Charles's first experience of large-scale international scientific cooperation, and it illustrated for him the importance of the community of science in reevaluating and validating its hypotheses" (Brent 1993: 80; *W* 2: xxxiv).

I want to bring your attention to a text of his, almost forty years after the event, that we have chosen as a motto for the project we are developing right now on Peirce's European correspondence:

Philosophy is a study which needs a very protracted concentrated study before one [...] begins to be at all expert in the handling of it, if one is to be precise, systematic, and scientific. I gave ten years to it before I ventured to offer half a dozen brief contributions of my own. Three years later [1870], when I had produced something more elaborated, I went abroad and in England, Germany, Italy, Spain, learned from their own mouths what certain students at once of science and of philosophy were turning in their minds. (C. S. Peirce, Letter to *The Sun*, *MS* 325, p. 4, c.1907).

Let's now turn to Peirce's second assignment to Europe (April 1875 - August 1876) — in which we have been working during the last three years— related with his extensive work with pendulums for gravimetric determinations in what were called the initial stations (Geneve, Paris, Berlin and London) to be compared with the determinations of the gravity in Hoboken, New York. I will pick up several instances of the correspondence that may illustrate well Peirce's sense of scientific activity as a cooperative work, as a communal mode of life.

In England, Peirce was able to meet in the Cavendish Laboratory in Cambridge with the great James Clerk Maxwell to discuss his projected experiments (letters of April 24 and 30, 1875). I copy two paragraphs of his letter of April, 30, 1875 to the Superintendent Carlile P. Patterson:

I have had an interesting interview with Professor James Clark Maxwell who is a pendulum-swinging and a writer upon the mathematical theory of the resistance of the atmosphere and upon other subjects connected with Attraction. (...) I have still to see several distinguished gentlemen connected with pendulums, especially Professor Stokes who has investigated the resistance of the Atmosphere and who was largely consulted in regard to the methods of making pendulum experiments now used in the British work, General Sir Edward Sabine whom you know as a great swinger of pendulums, and Sir George Airy who swung at the top & bottom of a mine. (...)

I feel the immense advantage of talking with all these people. For example, in all I ever saw in relation to the effect of the resistance of the atmosphere on pendulums it has been assumed that the resistance was proportional to the density of the air while the temperature has been left out of account altogether, but from considering the matter in the light of the mechanical theory of heat I was led to believe that the largest term of the resistance was independent of the

density and also of the surface of resistance and was proportional to the absolute temperature. I was happy to find that Professor Maxwell who is one of the greatest authorities on the viscosity of air, and the best experimenter upon it, entirely agreed with me in this view.

In London Peirce was able to meet other respected scientists. He had a very good relation with John Lockyer and William K. Clifford, who had been both with Peirce in the observation of the eclipse in Sicily in 1870; Herbert Spencer, who introduced him in the Athenaeum; William Spottiswoode, of the Royal Society; the mathematician James Joseph Sylvester (letter of April 2 and 4, 1875); the physicist George Gabriel Stokes, expert on the problem of the friction caused in the pendulums by the viscosity of the air (letter of May 31, 1875). Peirce's attitude was one of learning from everybody with experience on the subject of his research, crediting each one of them with the intellectual or technical debts, without a particular leaning towards priority or originality.

In Berlin he had a close and friendly relation, as we have seen from the kisses, with General Baeyer. Peirce writes in his Report of 1878 that there he "enjoyed the inestimable advantage of the counsel of the Nestor of geodesy, General Baeyer, and also of the great interest in the experiments and the attention to everything which could affect the success of them on the part of Professor Förster" (W4: 83), the head of the Berlin *Sternwarte*.

In Geneve the cooperation with Emile Plantamour —"whose advice in regard to the conduct of the experiments was invaluable" Peirce writes in the same Report of 1878 (W4: 82)— was essential to develop the experiments that detected the until then unnoticed flexure of the stand that General Baeyer had suspected. In Paris it was not easy the relation with Le Verrier, but Peirce got along very well with Yvon Villarceau and Charles Wolf, "astronomer at the observatory, to whose politeness throughout the occupation of the station the writer is much indebted" (W4: 82). Back in London, "the director of the observatory [Kew], Mr. Whipple, thoroughly understands the art of oscillating the pendulum, and was most obliging in furthering the investigation in many ways" (W4: 83).

The references to scientists and quotations could be multiplied. My main point is that the study of Peirce's correspondence —in particular his monthly reports to Superintendent Patterson— of his second and longest trip provides ample evidence of the high quality of Peirce's scientific work, his personal involvement in the improvement of the instruments of observation and also of his convinced defense of the "brotherhood of Science". As he writes years later (*MS 1343*, pp. 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 (*CP 7.55*, 1902).

The study of Peirce's European correspondence is a wonderful testimony that his image as an isolated researcher is at least historically inaccurate. In his work there was a permanent cooperation with the scientists of his branch and a constant attitude of learning from his colleagues.

4. Conclusion

As I said before, probably there is nothing more alien to the present competitive individualistic style of science than Peircean conception of scientists working together like *brethren*, but it seems to me that in order to invigorate philosophy for the 21st century is our task to try to teach this *mode of life* through the defense of communication and cooperation between scientists in a Peircean spirit of agapastic reasonableness.

Thanks a lot for your attention.

Bibliographic references

References to Peirce's texts are given with the following abbreviations followed by the volume number, the paragraph number and the year of the text:

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HP Eisele, Carolyn (ed.). *Historical Perspectives on Peirce's Logic of Science: A History of Science*, vols. 1-2. Berlin: Mouton 1985.

MS *The Charles S. Peirce Papers* 32 microfilm reels of the manuscripts kept in the Houghton Library. Cambridge: Harvard University Library, Photographic Service 1966.

W Peirce, Charles S. *Writings of Charles S. Peirce: A Chronological Edition*, vols. 1-8. Eds. M. H. Fisch et al. Bloomington: Indiana University Press 1982-.

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