What a scientific metaphysics really is according to C. S. Peirce

O que é realmente a metafísica científica segundo C.S. Peirce

Jaime Nubiola
Universidad de Navarra – España
jnubiola@unav.es

Abstract: A real surprising fact is the absence of the phrase "Scientific Metaphysics" in Charles S. Peirce writings in spite of the presence of that expression on the spine of volume 6 of Peirce's *Collected Papers*. In order to explain the circumstances of that fact and to get a clearer view of this expression, the paper is arranged into five sections: 1) a brief presentation of Peirce, focusing on his work as a professional scientist; 2) an exposition of Peirce's conception of science; 3) a sketch of the notion of metaphysics in the mature Peirce; 4) an attempt to answer the question of what a scientific metaphysics is; and finally, 5) a brief conclusion.

Keywords: Charles S. Peirce. Scientific metaphysics. Science. Metaphysics. Paul Weiss. Charles Hartshorne.

Resumo: *Um fato realmente surpreendente é a ausência da expressão "Metafísica Científica" nas obras de Charles S. Peirce, apesar da presença desta expressão na lombada do volume 6 dos* Collected Papers *de Peirce. A fim de explicar as circunstâncias desse fato, e obter uma visão mais clara dessa expressão, este trabalho está organizado em cinco seções: 1) breve apresentação de Peirce, focando seu trabalho como cientista profissional; 2) uma exposição da concepção Peirciana de ciência: 3) um esboço da noção de metafísica em Peirce na sua maturidade; 4) uma tentativa de responder a pergunta sobre o que seja uma metafísica científica; e finalmente, 5) uma breve conclusão.*

Palavras-chave: *Charles S. Peirce. Metafísica científica. Ciência. Metafísica. Paul Weiss. Charles Hartshorne.*

Introduction

The origin of this paper[1] is to be found in my surprise when I was not able to find the phrase "Scientific Metaphysics" in Charles S. Peirce writings in spite of the clear presence of that expression on the spine of volume 6 of Peirce's *Collected Papers*.[2]

1 An oral version of this paper was presented in the *First European Pragmatism Conference*, Università Roma Tre in September 2012. A few paragraphs of sections 1 and 2 come from my paper Nubiola (2005b). I am grateful to André de Tienne, Cornelius de Waal, and an anonymous reviewer of *Cognitio* for their comments, to Erik Norvelle for polishing my English and to the support of the Spanish Ministry of Science and Research (FFI2011-24340).

2 To my knowledge this has not been noticed until now, even in the special issue under the title "The Scientific Metaphysics of Charles S. Peirce," B. Sørensen and T. Thellefsen (eds.) *Cybernetics & Human Knowing*, 19, 1-2 (2012).

In order to explain the circumstances of that fact and to get a clearer view of that expression, this paper is arranged into five sections: 1) a brief presentation of Peirce, focusing on his work as a professional scientist; 2) an exposition of Peirce's conception of science; 3) a sketch of the notion of metaphysics in the mature Peirce; 4) an attempt to answer the question of what a scientific metaphysics is; and finally, 5) a brief conclusion.

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.

> "The metaphysics of our best contemporaries lacks but little of the rank of a science."
> (Charles S. Peirce, CP 2.9, c. 1902).

1 Charles S. Peirce, a true scientist-philosopher

First of all, I should state 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 (1861-1891) 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 (PEIRCE, 1982). I agree with Victor Lenzen 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, p. 33), and with Ketner's judgment, "Peirce was not a dilettante in science, but a master scientist" (KETNER, 2009, p. 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).

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, p. 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 a science 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). Already 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) The flourishing of scientific reason can only take place in the context of research communities (JACOBS, 2012): 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). 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. (CP 7.55, 1902).

The second text comes from the manuscript of the Adirondack Summer School Lectures and deserves to be quoted a length: (KETNER, 2009).

> 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: 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 2005a and NUBIOLA; BARRENA, 2014).

3 What metaphysics is

Charles S. Peirce's work in the *Century Dictionary* is almost unknown even to Peirce scholars.[3] Peirce was responsible for definitions in the fields of logic, metaphysics, mathematics, mechanics, astronomy, weights and measures, color terms, and many common words of philosophical import (KETNER, 1986). Between 1883 and 1909 Peirce devoted a significant effort to the preparation of thousands of entries, perhaps around 15,000. François Latraverse in Quebec is currently finishing volume 7 of the *Chronological Edition* dedicated to Peirce's work on the *Dictionary*. For our present concerns, it is relevant to learn that the entry "metaphysics" on p. 3734 of the *Dictionary* is attributed to Peirce. There are three different usages of the term "metaphysics" according to Peirce's entry:[4]

> 1. The science of the inward and essential nature of things: a) As the subject of the books of Aristotle so called, first philosophy; ontology; the analysis of the nature of being in general; the doctrine of the first principles. b) Supernatural science; the doctrine of that which transcends all human experience. c) The science of the mind treated by means of introspection and analysis, and not by experiment and scientific observation; rational psychology. d) Any doctrine based upon presumption and not upon inductive reasoning and observation. e) An

3 The *Century Dictionary and Cyclopedia*. W. D. Whitney (ed.). New York: The Century Company, 1889-1891, v. 1, p. 32. Accessible *on-line* in http://www.global-language.com/CENTURY/

4 His very illuminating examples are omitted. It should be noted that Peirce's responsibility for his *Century Dictionary* definitions was to express received uses of the words defined so it cannot be assumed that because he approved of definitions for the Dictionary that he accepted them himself.

> abstract and abstruse body of doctrine supposed to be virtually taken for granted in some science.
>
> 2. Philosophy in general; especially, the philosophical study of mind; psychology: so used from the time of Descartes, and especially by the Scotch school.
>
> 3. In the Kantian terminology, the science of God, freedom, and immortality.

The first section of the volume 6 of *Collected Papers* is entitled, using C. S. Peirce's phrase, "The Backward State of Metaphysics." Metaphysics is "one highly abstract science which is in a deplorably backward condition" (CP 6.1-5, 1898). Peirce considers that the "common opinion that metaphysics is backward because is intrinsically beyond the reach of human cognition" is a complete mistake. On the contrary, "metaphysics, even bad metaphysics, really rests on observations," rests upon "kinds of phenomena with every man's experience is so saturated that he usually pays no particular attention to them." (CP 6.2, 1898). For Peirce, the chief cause of its backward condition is that its leading professors have been theologians lacking the real scientific spirit, since they have been "trying to confirm themselves in early beliefs," while the "struggle of the scientific man is to try to see the errors of his beliefs." The passage continues:

> We should expect to find metaphysics, judging from its position in the scheme of the sciences, to be somewhat more difficult than logic, but still on the whole one of the simplest of sciences, as it is one whose main principles must be settled before very much progress can be gained either in psychics or in physics.
>
> Historically we are astonished to find that it has been a mere arena of ceaseless and trivial disputation. But we also find that it has been pursued in a spirit the very contrary of that of wishing to learn the truth, which is the most essential requirement of the logic of science; and it is worth trying whether by proceeding modestly, recognizing in metaphysics an observational science, and applying to it the universal methods of such science, without caring one straw what kind of conclusions we reach or what their tendencies may be, but just honestly applying induction and hypothesis, we cannot gain some ground for hoping that the disputes and obscurities of the subject may at last disappear. (CP 6.4-5, 1898).

To conclude this sketchy presentation of metaphysics according to Peirce it might be useful to remember its place in the classification of sciences as a branch of Philosophy, below Phenomenology and Normative Science (CP 1.186, 1903) and its three branches:

> Metaphysics may be divided into, i, General Metaphysics, or Ontology; ii, Psychical, or Religious, Metaphysics, concerned chiefly with the questions of 1, God, 2, Freedom, 3, Immortality; and iii, Physical Metaphysics, which discusses the real nature of time, space, laws of nature, matter, etc. (CP 1.192, 1903).

As seems obvious at first sight, this triadic branching of metaphysics is roughly related to the three usages of the term "metaphysics" identified in the *Century Dictionary* and just quoted above: the only new thing is the replacement of the philosophical study of mind coming from Descartes and the Scotch school—now transferred to the Nomological Psychics or Psychology, CP 1.189—by *cosmology* under the label of "Physical Metaphysics."

4 What is a scientific metaphysics?

For years I had been impressed by the title SCIENTIFIC METAPHYSICS on the spine of volume 6 of Peirce's *Collected Papers*. I did not pay too much attention to this title until vey recently, when I discovered with great surprise that this supposed—at least by me—Peircean expression occurs only once (CP 8, p. 284, c.1893) throughout the eight thick volumes of Peirce's *Collected Papers*. Besides the occurrence in the title, it was used only twice by the editors, who put the term *scientific* into quotation marks. It appears in a footnote in volume 2: "See Preface to vol. 6 for Peirce's views regarding 'scientific' metaphysics" (CP 2.9); and in the "Editorial Note," of *CP* 6, p. v:

> With the present volume Peirce's philosophical system reaches its culmination in a "scientific" metaphysics, the study of "thirdness as thirdness" or "efficient reasonableness." (CP 5.121).

Two things are intriguing, first the quotation marks and second the real source of the expression. In relation to the first it seems clear that the use of quotation marks suggests that to talk about *a scientific metaphysics* was understood or felt by the editors to be a *contradictio in terminis*, or as an oxymoron, that is to say, they considered that nothing could be more strange or alien to science than Peirce's metaphysics. In fact, in the editorial note, after presenting a brief summary about the papers on ontology and cosmology collected in the first book of the volume, they say the following about the second part entitled "Religion:"

> The second book of the volume, devoted to religion or "psychical metaphysics," has rather tenuous connections with the rest of the system, offering, apart from scattered flashes of insight, views which have a sociological or biographical, rather than a fundamental systematic interest. (CP 6, p. v).

But, secondly, Scientific Metaphysics—without any quotation marks—is the general title of the volume which culminated the work done by "nearly all the members of the Department" [of Philosophy at Harvard] during fifteen years (CP 1, 1931) and in recent years by Charles Hartshorne and Paul Weiss. In the general introduction it is said that "the sixth [volume] is concerned with metaphysics" (CP 1, p. vi, 1931), without any adjective. By now, my suggestion is that it was Hartshorne who coined the title "Scientific Metaphysics" for the volume and Weiss who put the quotation marks on the adjective 'scientific' in the editorial notes. An exploration of the correspondence of the Department of Philosophy kept in the Harvard Archives [UAV 687.10] provide at least two clues in favor of my claim. On one hand, there is an early letter of Hartshorne to Woods (18th December 1927) in which he

mentions the collection of volumes that Peirce had planned under the general title of *Principles of Philosophy*. On the other hand, in these Archives there are two drafts of "Editorial Note" for volume VI, one prepared by Paul Weiss (including the quotation marks in *'scientific' metaphysics*) and one by Charles Hartshorne, which was finally discarded. As Paul Weiss writes to Perry on April 11th, 1935, "I reject Charles Hartshorne's [Editorial Note], since I feel quite sure that Peirce did not write with an eye on Hartshorne's publications."

In support of my guess I want to bring two contrasting quotations from both editors: Peirce—Hartshorne said in 1965—"was the most scientifically trained philosopher I've ever read; in some ways much closer to concrete experimental science than Whitehead, for instance" (HARTSHORNE, 1970, p. 157-158). And Weiss remembering his work as editor said also in 1965: "I found the material for Volume VI rather obscure and difficult. At that time I had little sympathy with it" (WEISS, 1970, p. 174).

Perhaps Hartshorne found his inspiration for this illuminating title in the printed prospectus of a "planned and partly executed work of twelve volumes" by Charles S. Peirce under the general title *The Principles of Philosophy: or, Logic, Physics, and Psychics, considered as a unity, in the Light of the Nineteenth Century,* dated around 1893 and which was to be included by Burks twenty years later in *CP* 8, pp. 284-5. The prospectus is amongst Peirce's papers and is—at least up to now—the only known occurrence of that expression coming directly from Peirce:

> Vol V. ***Scientific Metaphysics***. Begins with the theory of cognition. The nature of reality discussed as in the author's papers in the *Popular Science Monthly;* but the position taken is now set forth more clearly, fully, and in psychological detail. The reality of the external world. Primary and secondary qualities. The evidence of the real existence of continuity. The question of nominalism and realism from the point of view of continuity. Continuity and evolution. Necessitarianism refuted. Further corollaries from the principle of continuity. (Houghton AC85.P3535.881p and L 432).

I will not go into the study in detail of that projected book and the distribution of its parts. Peirce himself says in a final comment:

> Mr. Peirce does not hold himself pledged to follow precisely the above syllabus, which, on the contrary, he expects to modify as the work progresses. He will only promise that he will not depart from this programme except to improve upon it. The work is to be published by subscription at $2.50 per volume. Address: Mr. C. S. Peirce, 'Arisbe,' Milford, Pa. (CP 8, pp. 285).

What I want to explore finally is some of what other scholars have said about this label "scientific metaphysics." Andrew Reynolds, who has written a book on *Peirce's Scientific Metaphysics*, identified scientific metaphysics with *cosmology*, (REYNOLDS, 2002) with "the Philosophy of Chance, Law and Evolution" as his subtitle explains. Others, like Joseph Esposito, considered that "although Peirce was the first to conceive

the task of creating a genuine *scientific* metaphysics in modern form, he was far from fully realizing it" and suggested the need for comprehensive philosophies of quantum mechanics, of thermodynamics and so on. (ESPOSITO, 1980, p. 5-7).

Most of the authors simply do not use the expression "scientific metaphysics" or use it without paying particular attention to the label. (MURPHEY, 1993; HOOKWAY, 1992 and 2009). Kelly Parker emphasizes that "Peirce insisted in two things. First, metaphysics must be admitted as a legitimate subject of inquiry. Second, metaphysics must be treated as a science among other sciences". (PARKER, 1998, p. 190). De Waal rightly suggests, "Peirce rejected the idea that science and metaphysics are radically opposed. Instead, he argued for a 'scientific metaphysics,'" that is, a metaphysics developed through the scientific method and with the scientific attitude, paying attention to "the most general features of reality and real objects" (CP 6.6, c.1903), as an observational science upon everyday experience. (DE WAAL, 2001).

In this sense it might be said that in a Peircean spirit *good* metaphysics is that pursued with a scientific method and attitude, while *bad* metaphysics is just the unscientific one. I would like to summarize this position by quoting Susan Haack's luminous words:

> The [pragmatic] maxim is not intended to rule out metaphysics altogether, but rather to discriminate the illegitimate, the pragmatically meaningless, from 'scientific' metaphysics, which uses the method of science, observation and reasoning, and which is undertaken with the scientific attitude, that is, from the desire to find out how things really are—and not, as happens when philosophy is in the hands of theologians, from the desire to make a case for some doctrine which is already immovably believed. Scientific philosophy, as Peirce conceives it, is an observational science, differing from the other sciences not in its method but in its reliance on aspects of experience so familiar, so ubiquitous, that the difficulty is to become distinctly aware of them. (HAACK, 2003, p. 776).

Haack adds—and I firmly agree with her—that it would be a misunderstanding to think of Peirce's aspiration to make philosophy scientific in a *scientistic* or reductionist way: "Peirce expressly denies that philosophical issues could be resolved within, and certainly never suggests that philosophy ought to be replaced by, the natural sciences." (HAACK, 2003, p. 776). As Peirce himself described in the printed prospectus of *Principles of Philosophy*:

The principles supported by Mr. Peirce bear a close affinity with those of Hegel; perhaps are what Hegel's might have been had he been educated in a physical laboratory instead of in a theological seminary. Thus, Mr. Peirce acknowledges an objective logic (though its movement differs from the Hegelian dialectic), and like Hegel endeavors to assimilate truth got from many a looted system. (CP 8, pp. 284-5).

Conclusion

It is not easy to find out the real source of the title *Scientific Metaphysics* on the spine of volume 6 of Peirce's *Collected Papers*. It is a good title for his metaphysics provided that

science is not understood in the dominant reductionist approach. It reflects well Peirce's aspiration of developing metaphysics within the scientific spirit, covering ontology, cosmology and traditional religious issues like God, freedom and immortality.

The label *Scientific Metaphysics* reminds us today not only that metaphysics cannot be replaced by science, but also that research in all these branches of metaphysics should be pursued with the openness of the scientific spirit. As Claudine Tiercelin wisely suggested in her inaugural address in the Collège de France, most of this task is still pending for the twenty-first century, and the Peircean framework of a scientific metaphysics paves the way for "re-starting to breathe (TIERCELIN, 2011).

Bibliographical references to Peirce's texts

CP PEIRCE, Charles S. *Collected papers of Charles Sanders Peirce*. Vols. 1-8. HARTSHORNE, C., WEISS, P.; BURKS, A. W (eds.). Cambridge, MA: Harvard University Press 1931-1958.

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. M. H. FISCH *et al* (eds.). Bloomington: Indiana University Press 1982-.

References

DE WAAL, C. *On Peirce*. Belmont, CA: Wadsworth-Thomson, 2001.

ESPOSITO, J. *Evolutionary metaphysics*. Athens, OH: Ohio University Press, 1980.

FISCH, M. H. Introduction, In: FISCH, M. H. *et al* (eds.). *Writings of Charles S. Peirce*: a chronological edition. v. 3. Bloomington: Indiana University Press, 1993, p. xxi-xxxvii.

HAACK, S. Pragmatism. In: BUNNIN, N.; TSUI-JAMES, E. P. (eds.). *The Blackwell Companion to Philosophy*. Malden, MA: Blackwell, 2003, p. 774-789.

HARTSHORNE, C. An Interview by Irwin C. Lieb. Charles Hartshorne's recollections of editing the Peirce papers. *Transactions of the Charles S. Peirce Society*, nº 6, 1970, p. 149-159.

HOOKWAY, C. *Peirce*. London: Routledge, 1992.

_____. Peirce, Charles Sanders. In: KIM, J. (ed.). *A companion to metaphysics*. Malden, MA: Wiley-Blackwell, 2009,p. 471-473.

JACOBS, S. Models of scientific community: Charles Sanders Peirce to Thomas Kuhn. *Interdisciplinary Science Reviews*. Leeds, UK: Maney Publishing, n. 31, p. 163-173, 2006.

KETNER, K. L. Charles Sanders Peirce: Interdisciplinary scientist. In: BISANZ, E. (ed.). *C. S. Peirce. The Logic of interdisciplinarity*. The Monist-Series. Berlin: Akademie, 2009, p. 35-57.

_____. *Peirce*: a comprehensive bibliography. Bowling Green, OH: Philosophy Documentation Center, 1986.

LENZEN, V. F. Charles S. Peirce as astronomer. In: MOORE, E. C.; R. ROBIN (eds.). *Studies in the philosophy of Charles Sanders Peirce*. Second series. Amherst, MA: The University of Massachusetts Press, 1964, p. 33-50.

MURPHEY, M. G. *The development of Peirce's philosophy*. Indianapolis, IN: Hackett, 1993.

NUBIOLA, J. (2005b). Abduction, or the logic of surprise. In: *Semiotica*. Berlin: Mouton de Gruyter, n. 153 vol. 1/4, p. 117-130, 2005.

_____. (2005a). The Classification of the sciences and cross-disciplinarity. *Transactions of the Charles S. Peirce Society*, v. 2, n. XLI, p. 271-282, 2005.

NUBIOLA, J., and BARRENA S. Science as a communicative mode of life. In: THELLEFSEN, T. (ed.). *The Peirce quote book*: Charles Sanders Peirce in his own words. Berlin: Mouton de Gruyter, 2014, p. 437-442.

PARKER, K. A. *The continuity of Peirce's thought*. Nashville, TN: Vanderbilt University Press, 1998.

REYNOLDS, A. *Peirce's scientific metaphysics*. Nashville, TN: Vanderbilt University Press, 2002.

ROSS, D., *et al. Scientific metaphysics*. Oxford: Oxford University Press, 2013.

SØRENSEN, B.; THELLEFSEN, T. (eds.). The scientific metaphysics of Charles S. Peirce, *Cybernetics & Human Knowing*, 19, 1-2, 2012. Available online at <http://www.chkjournal. org/administrator/components/com_webjournal/assets/forewords/idPublication_508.pdf>. Access: 1st September 2012.

TIERCELIN, C. *La connaisance métaphysique*. Paris: Collège de France-Fayard, 2011.

WEISS, P. An interview by Richard Bernstein. Paul Weiss's recollections of editing the Peirce papers. *Transactions of the Charles S. Peirce Society,* v. 6, n. 3 / 4, p. 161-188, 1970.

WHITNEY, W. D. (ed.). *Century Dictionary and Cyclopedia*. New York: The Century Company, 1889-1891. Available *on-line* at http://www.global-language.com/CENTURY/. Access: 1st September 2012.

Endereço/ Address

Jaime Nubiola
Dept. Filosofía
Universidad de Navarra
31009 Pamplona, Spain

Data de envio: 06-08-14
Data de aprovação: 29-10-14