PHILOSOPHICAL PROBLEM OF RELATIONS ACCORDING TO PEIRCE: ALLIANCES TOWARDS AN ONTOLOGY OF RELATIONS REGARDING TWO ASPECTS OF SYNECHISM

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Abstract: *This paper aims to present Peirce's philosophy as an alternative to the philosophy of being. Peirce's ontology could not be ranked as a discourse about the reality of being (Aristotle); nor could it be understood as a scientific metaphysics ruled by transcendental conditions (Kant). Peirce evades from both traditions, as long as he builds his ontology from a semiotics-based reality whose mode of being is defined in terms of relations (monadic, dyadic and triadic relations). So I assume through my argument that Peirce's ontology forges an essential alliance to the so-called ontology of relations (BAINS, 2006). I summarize the allies and principles of such ontology, and consequently I argue for Peirce's part on it taking into account two elements of his Synechism: the primacy of relations over individuals in continuous multiplicities and the mode of being of relations according to triadic relations in the category of Thirdness.*

Key-words: *Ontology. Synechism. Relation.*

PROBLEMA FILOSÓFICO DA RELAÇÃO DE ACORDO COM PEIRCE: ALIANÇAS EM DIREÇÃO A UMA ONTOLOGIA DAS RELAÇÕES TENDO EM VISTA DOIS ASPECTOS DO SINEQUISMO

Resumo: Este artigo tem como finalidade apresentar a filosofia de Peirce como uma alternativa para a filosofia do ser. A ontologia de Peirce não poderia ser classificada como um discurso sobre a realidade do ser (e.g. Aristóteles); nem poderia ser entendida como uma metafísica científica regrada por condições transcendentais (e.g. Kant). Peirce se esquiva de ambas as tradições, na medida em que constrói sua ontologia em uma realidade baseada na semiótica, cujo modo de ser é definido em termos de relações (monádicas, diádicas e triádicas). Então, eu sustento o argumento de que a ontologia de Peirce perfaz uma aliança essencial para a assim chamada ontologia das relações (BAINS, 2006). Eu resumo os aliados e princípios de tal ontologia, e defendo que a contribuição de Peirce para a mesma pode ser observada em pelo menos dois elementos de seu Sinequismo: a primazia das relações sobre os indivíduos em multiplicidades contínuas e o modo de ser das relações de acordo com relações triádicas na categoria de Terceiridade.

Palavras-chave: Ontologia. Sinequismo. Relação.

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1. The idea of an ontology of relations

As Philosophy students, we are always brought back to the issue of being. We must therefore focus the philosophical question of being through a pupil's perspective, even though a long time has passed since we left the school desks. The History of Philosophy usually drops the exclusive alternative regarding the issue of being: either we are on ontology's side or we are on the transcendental's side. Either we argue for the principles of a philosophy of substantial being or we otherwise defend a philosophy that establishes from the very beginning the transcendental conditions of possibility pertaining to all possible experience. Instead of establishing a discourse regarding the nature of being, we are supposed to observe rules that condition the experience of reality. But, in relation to the student's rough vision, we are also able to assume the hypothesis that it would be possible to formulate a way of thinking not rooted on the verb to be, neither is it aligned to the Kantian transcendental philosophy. Peirce's thought as a whole occupies an *in-between* choice with respect to these traditional ontological alternatives, since his metaphysics overflows the usual boundaries and eludes the established labels. In fact, Peirce rejects both the "*ontological alternatives offered by a tradition of substance metaphysics*" and the "*spectator philosophy of knowledge*" (ROSENTHAL 1994, 99 and 108).

We shall give some examples to illustrate the dramatic alternative the History of Philosophy has transmitted to us in order to begin with an overview that will emphasize by contrast Peirce's position. The illustrations to be provided on this topic are well known philosophical characters, as long as they account for the main concept in use at any philosophy of being, that is, the concept of substance. In the case of the classical thought, Aristotle presents himself as the touchstone of ontology. According to him the object of ontology is the substance, because:

> […] while some things are not substances, as many as are substances are formed in accordance with a nature of their own and by a process of nature, their substance would seem to be this kind of 'nature', which is not an element but a principle (for this is the primary cause of its being. (ARISTOTLE 2004, VII, 17, 1041 b 27).

Kant does not come so fast like Aristotle to declare the definition of substance as the object of ontology, because substance is not a thing in particular, not even the primary cause of the being of all things. In Kantian terms, substance is a special concept. It is not a property or attribute, but it is a category belonging to a set of categories of Pure Reason whose validity is transcendental. So, the substance is no longer called the first cause of a thing, but it applies to all possible experience (KANT 1998, p. 210). Whoever goes beyond this limit would make the thought about being fall into a dogmatic metaphysics; if we remain inside the limit instead, we shall practice a scientific metaphysics, according to Kant.

Taking the given examples as our background, I ask again: would it be possible to rank the philosophical question of being out of the alternative between a dogmatic metaphysics (discourse about the reality of the being) and a scientific metaphysics (transcendental condition of the experience)?

COGNITIO-ESTUDOS: Revista Eletrônica de Filosofia, ISSN 1809-8428, São Paulo: CEP/PUC-SP, vol. 8, nº. 2, julho-dezembro, 2011, p. 096-105

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The answer to this question is positive, because hypothetically, a philosophy and an ontology based on relations might exist as long as it counts on different adepts, as we will see further. To put it roughly – as a philosophy student would do - a relation can be previous and independent with regard both to the reality of being and to its transcendental condition. We can even say that the being's determination or its transcendental principle depends on the relations. So, beginning with relations we are able to put the question of being in different terms, other than those we usually learn from the History of Philosophy. Then, we are no longer in front of the first philosophy of being and its attributes, like in Aristotle. We have not taken as the beginning point a *Cogito* as a thinking substance, like Descartes. We have not adopted the centrality of a transcendental *Self* and their categories, like Kant. Then, the relations and their supposed independence and priority with regard to the terms that the first rated ontologies are commonly based on, might probably lead us to be cast in another philosophical landscape, in another thread of thought, where we walk under the shadow of the mainstream philosophies. So we have to ascertain whether this hypothesis is plausible. We need to know whether arguing for such a hypothesis will put us next to giant figures such as Aristotle, Descartes or Kant. Our student now will have to make his point of view more accurate.

We start our discussion about relations as the main philosophical issue and we start from new evidence. From this perspective our allies are very diverse in terms of philosophical tradition and affiliations. They seem not to belong to the same family tree. The following are a few key ways in which some authors' thoughts stand out and differ:

John Poinsot's thought because of the semiotics based on the difference between transcendental and ontological relations (DEELY 1994);

Duns Scotus's thought because of the formal distinction according to which objective and formal being are defined;

Espinosa's thought because of the concept of substance composed of multiple relationary attributes and because of the notion of affect (the relation is characteristic of a body);

Hume's thought because of the theory of relations that distinguishes the natural relation from philosophical relation;

Nietzsche's thought because of the conception of a world described in terms of relations/forces;

James's thought according to the radical empiricism that sets forth the definition of conjunctive and disjunctive relations;

Peirce's thought distinguishes relations from relationships and also proposes a logic of relatives and a mathematical treatment to multitudinous and multiplicities sets;

Whitehead's thought mainly because of the cosmology based in apprehensions and happenings where the ultimate entities are complex of relations;

Russell's thought according to which dyadic relations are not reducible to the terms connected;

Foucault's thought because of its historical ontologies, which depend on power relations;

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Deleuze's thought that holds a theory of relations that is based on their external character and on the ontology of multiplicities as systems of relations.

It is evident that we are not able to draw a common origin to these philosophers, as they do not belong to the same family tree. Nonetheless, it happens that these philosophers might possibly come into alliances around the conceptual issue that is common to them with regards to the philosophical issue of the relations. Thus, the names listed and their thoughts on selected items would eventually make up a research program to the ontology of relations.

Now that we have brought several philosophers to our side, the task of determining the problem of relations as a starting point of philosophy makes itself sound. So I shall be allowed to say that there were two criteria that point out to some conceptual alliances in order to build the ontology of relations:

a) Relations are external to the terms connected; and

b) Relations must be real.

These criteria and most of the nominees to probably subscribe the ontology of relations were formulated according to the thesis held by Bains in *The primacy of semiosis:* an ontology of relations (BAINS, 2006).

According to the departing proposition of the ontology of relations, I will summarize Peirce's concept of relation and I will look over some aspects of Peirce's doctrine of continuity (*Synechism*), which is in the heart of his metaphysics, in order to argue for the legitimacy of the two principles summarized above *vis-à-vis* his philosophy. We start with the most challenging definition for continuity on Peirce's writings. Continuity's mode of being depends on relations, for "*the continuum is a General. It is a General of relation*", states Peirce (NEM 3.925) and "*the general is seen to be precisely the continuous*" (CP 8. 279). It means, the general is the mode of being opposite to the singular and shares an internal unifying element – its continuity – which could be analyzed in terms of relations, but "*it did not appear quite evident as long as the doctrine of generals was restricted to non-relative*" (CP 8, 279). The singular comprises the domain of the actual, which Peirce ranked in the category of Secondness; while the general refers to possibility in two different senses (negative and positive generality), because possibility includes both Firstness and Thirdness, the category of qualities and the category of general, respectively (ROSENTHAL 1994, 103-105).

Then, I ask: how could the general be built from relations? And what does the category of being turn out to be in Peirce's supposed ontology of relations? To what extent are we allowed to talk in terms of *ontology* as the concept of relation on Peirce's writings directly defies the traditional metaphysics of *being*?

The answer to these leading questions will be drawn from Peirce's Scientific Metaphysics (Ontology/Cosmology), in order to adjust my focus through the huge architectonics of Peirce's Philosophy. Besides this thematic cut, I have restricted chronologically my readings to "*the revision of the categories*" period, from 1885 to the end of the nineteenth century, during which Peirce revised his architectural plan under the impact of the logic of relations and the Mathematics of continuity. Although some of my readings go beyond 1900, the reach of my attention is tied to the year of 1895. In fact, during this period, we found a deep connection between relations and continuity in Peirce's works. This link has been emphasized both in Peircean studies related to continuity and to relations. To be more specific, this period includes the

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third and fourth stages (out of five) of the development of Peirce's continuity according to Havenel, who called these periods the "*infinitesimal period*" (1892-1897) and "*super multitudinous period*" (1897-1907), during which the approach to continuity concerns on one hand Mathematics and Logics, while on the other it deals with the metaphysical continuity in Kant, Leibniz and Hegel (HAVENEL 2006, 37-39). Accordingly, during the 90's, Peirce applies the concept of relations he had been developing during the 80's in his New List of Categories, in order to settle the classical notions of logics, such as the syllogism and the judgment (LEO 1992, 3-4).

2. Peirce and the externality of relations (checking relational ontology's first principle)

We learn from Peirce that the most incisive question to be answered about the externality of relations on continuity is: individual/part or relation, which one comes first?

If we take into account discrete collections, individuals come first and then we can ascribe relations among them. But, relations are previous to individuals in continuous multiplicities, so there must be some kind of relation able to assign to the units of a *continuum* a continuous character.

In fact, individuals are distinguishable according to the relations among them and these relations are dyadic, such as A is r to B and B is r to C, so as to merely split individuals through different qualities they come to embody in their brute existence. Dyadic relations arise from the distinctness of individuals, so that collections compounded by such relations must remain discrete, as long as they set up limits beyond which their individuals would fall into vagueness. Being so, Peirce says categorically, "*we see that no perfect continuum could be defined by a dyadic relation*" (NEM 3.108).

On the contrary, discontinuities, discrete discontinuities, become impossible since relations between individuals of a collection are triadic such that A is r to B for C. The definitions of two individuals pass in a third, so that they merge in the continuity of their relations, but remain capable of being distinct as to their future determination. Comparatively, instead of depending on the distinctiveness of individuals, triadic relations are previous and external to the parts or individuals they connect. The connections of the latter depend on the whole, since, says Peirce, "*the perfect third is plastic, relative and continuous. Every process, and whatever is continuous, involves thirdness*". (W 5.301)

With regard to discrete collections, the *continuum* is merely possible and stands as, reassures Peirce, "*general and, as general, it ceases to be individual*" (NEM 3.106). It means that the parts of continuous multiplicities have one major property, namely, that they are vague but capable of determination as individuals due to the relations that rule their parts. Thus, they are vague although real, thus capable of future determination (cf. CP 6.174; 6.182).

My hypothesis hitherto is that the relationship in any continua are strong enough to accomplish a new sharing to the matter; and its strength comes out from their *external* position before the terms they bring into relation. Peirce exemplifies the external character of relations, especially the triadic ones, alleging that we are able to conceive a kind of space different from the space we know, if we build a three-

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dimensional space from continuous dimensions instead of the three metrical dimensions. Let us follow Peirce.

Describing a space is different whether their three dimensions are defined in terms of dyadic (actual parts) or in terms of triadic relations (continuous parts). Peirce himself sketched a space, a cave, whose dimensions would be described in terms of odors, degrees of warmth and textures regardless of the usual three dimensions in a dyadic space (cf. NEM 3.110-111). In fact, the shape of continuous space would eventually get rid of the walls, the floor and the roof, it means, the dimensions that any discrete space is restricted to, as long as odors, degrees of warmth and textures turned out to be dimensions with regard to continuous space and, after all, says Peirce, it would be "*an unbounded three-dimensional space, having a different shape from the space we know*" (NEM 3.110).

Besides, being "unbounded", continua are less or higher in respect to each other according to the number of dimensions they might include, though they could not really be compared since each dimension responds for a system of relations of their own. And this is the decisive point about relations or relationships, that is, their *exteriority*, as long as the *life* and the multidimensional performance of the continua depend on them.

3. Peirce and the reality/mode of being of relations (checking the relational ontology second principle)

Now I ask, if thirdness is of a general character and besides, is a special mode of being, what could we say about the triadic relations that perform continuity, as seen in the previous part? Could we assign to relations a mode of being of their own, besides their alleged exteriority? Does Peirce's Synechism have a response to these questions?

In the following lines, I will argue for the idea that triadic relations have a mode of being assured by the third category of phenomena (thirdness), according to Peirce. I will put side-by-side two passages on thirdness (1903 and 1891) and one on habit (1896) in order to emphasize on them the conceptual intersections around law and thought. In the first excerpt, law is the element of thirdness; in the second, thirdness is law from the outside and thought from the inside. In the third extract, habit assures the law of thought, so that we are allowed to refer to thought as a law – the law of habit - since mental law is different from the physical (natural) laws. The inspection of these passages will help us to present the mode of being of the triadic relations as continuity's reality.

Thirdness is the category of "phaneron" whose main feature is "prediction", defines Peirce in 1903 (CP 1.23-6), which are as ordinary as the qualities (firstness) and the facts (secondness), since "*five minutes of our walking life will hardly pass without our making some kind of prediction*" (CP 1.26). Predictions hold a "general nature" and therefore *could* be fulfilled by a current event. And, adds Peirce, predictions do have a tendency to be confirmed, because we wait that "*future events have a tendency to conform to a general rule*" (CP 1.26). For that reason, in the words of Peirce, thirdness "*is the mode of being which consists in the fact that future facts of Secondness will take on a determinate general character*". (CP1.26). The main characters of thirdness are prediction and potentiality and that is why continuity "*represents Thirdness almost to perfection*" (CP 3.337).

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Going back to 1896, we find Peirce's approach to thirdness somewhat different from that in 1903, in the sense that it is more explicit in its terms. The main point to be underlined at this moment is that thirdness keeps a twofold character, for it *behaves* both as thought and as law. It shares the mode of being of a *thought* that has the tendency to be confirmed by future facts included under a *law*. Peirce states on this point: "*the third category of phenomena consists of what we call laws when we contemplate them from the outside only, but when we see both sides of the shield we call thoughts*" (CP 1.420).

I am impelled to think over the two sides compulsorily tied in this mode of being of thirdness. I mean, what could we know more about the bind between law and thought? Is the thought only to be understood as the potential side of thirdness, a "law of mind", according to Peirce's terminology? But, is any law of mind eager to accomplish a fulfillment similar to the one required by a "physical law"? Or, rather, does it have a mode of its own, a reality more than *potential*, and a reality whose *behavior* is not exactly lingering like a would-be law in the physical sense of it?

In the article for *The Monist,* 1991, when pointing out the lack of good sense in some philosophical attempts to make theories of evolution out of the laws of science, Peirce states that law is something which claims an external explanation: "*law is par excellence the thing that wants a reason*" (CP 6.12). It must be so because law is the result of evolution. In fact, before/behind the "physical laws" which rule actual reactions or sensations, there is "*the one primary and fundamental law of mental action…*"(CP 6.20). This primacy of the law of mental action over the physical laws is assured by the main character which puts both in different positions, says Peirce, for a "*physical law is absolute*", while "*no exact conformity is required by the mental law*" (CP 6.23). Peirce gives the example of a physical force: if any force inserts a "component motion" in a system, it "*must actually take place exactly as required by the law of force*" (*ibid.*). In its own way, the "law of mind" does not demand absolute conformity, "*since it would instantly crystallize thought and prevent all further formation of habit*" (*ibid.*).

Therefore, *physical* laws refer to the "sensations or reactions" (secondness) that arise from the actual connections or comparisons between feelings (firstness). The *mental* law or law of mind, on the other hand, is open to the formation of habits so as to stuff thought with expanding relations between feelings. A habit, then, consists in the thought (third) as any interlinked collection of feelings (cf. CP 6.20). Thus, we can use the word *law* when referring to thought in the specific way of the *habit*, but not in a physical (natural) sense, because of the *unconformity* thought keeps. The mental process of habit can be properly compared to the physical processes, but according to Murphey "*the law is not a law (sic) in any rigorous sense*" (MURPHEY, 1993, p. 344).

The truth is that the mind is not subject to law in the same rigid sense that matter is. It only experiences gentle forces, which merely render it more likely to act in a given way than it otherwise would be. There always remains a certain amount of arbitrary spontaneity in its action, without which it would be dead (CP 6.148). And, adds Peirce, "*this is the world of triadic relations, thought. We are aware of it, and thus it might be included in our consciousness*" (CP 2.283).

Triadic relations have a reality of their own and this proposition verifies the second criterion that performs an ontology of relations according to Peirce's Synechism.

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Concluding remarks

We close by now alleging the issues that still remain to be taken into account with regard to the Peircean concept of relations, according to Cardoso Jr. (CARDOSO, 2010; 2012).

The hypothesis set forth throughout this article profits from different approaches to Peirce's continuity (HUDRY, 2004; JOHANSON, 2001; MYRVOLD, 1995; PUTNAM, 1995; ZALAMEA, 2003), but diverges from them, since their common aim is to evaluate whether or not Peirce's continuity stands up before the more recent developments of Mathematics. But they do not take into account the problem of relations in a mathematical-logical sense, for instance, they do not focus on the Peircean releases to discrete collections and continuous multiplicities as systems of relations according to Peirce's ontological challenges on Synechism. My approach is closer to the directions suggested by Havenel (HAVENEL, 2006), who understands continuity as a whole philosophical accomplishment in Peirce's thought, but also diverges from him, because he satisfies his aims by classifying Peirce's continuity as a branch of the Aristotelian metaphysics of potentiality, so as to retrace Putnam (PUTNAM, 1995, pp. 14–17). But, no metaphysics of potentiality could ever play at full length the role of an ontology of relations as it is presented on Peirce's writings (BAINS, 2006).

Nowadays, there is a double-faced challenge regarding Peirce's continuity. On one side, an ontological-mathematical defy is clearly pointed out by Hookway (HOOKWAY, 2010, pp. 33–35), that is, the discrete collections are characterized by numbers which are forms of relations ("number systems"), but the being of a number is the relation itself, since it assigns to any collection a meaning and then it becomes applicable to something. Though, the onto-mathematical challenge Hookway releases, if we put aside its structuralistic point of view, shall become aware of the fact that the being of a number is not its object but the being of a relation instead, which is the general of relation, according to Peirce's intriguing expression. On the other side, a mathematical defy is launched by Erhlich (ERHLICH, 2010, pp. 259–262): we could at present times compose "linear continua" up to an extent that was not allowed by the mathematical knowledge available to Peirce, so that the Peircean continua would appear as full of holes from a contemporary point of view. In fact, the Peircean continua is not absolutely dense, because a series of "possible gradations that are individually definable in terms of sets" (ERHLICH, 2010, p. 260) was not considered by Peirce. The holes on Peirce's continuum, to which he assigned the role of potential entities that argued for the Peircean metaphysical hypothesis on continuity, could be reduced to actual entities, as long as the ancient Peirce's continuum would be submitted to proper set and algebraic-theoretic operations. Consequently, the "premonition of continuity" as a metaphysical challenge would be postponed or, rather, it would be basically struck out. But what would the Peircean pragmatically-based world become if both the being of the numbers had eyes only for things and the potentialities turn into actual entities? Of course, this world would be less vigorous with regard to Thirdness as the proper relation's mode of being.

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Acknowledgements

* * *

References

ARISTOTLE. *Metaphysics*. Transl. D.W. Ross. London: Penguin Books, 2004.

BAINS, Paul. (2006) *The primacy of semiosis:* an ontology of relations. Toronto: University of Toronto Press, 2006.

CARDOSO JR., H. R. *Peirce's logic of relatives and the pluralism of continuity – relative and continuous predicates*; paper accepted to the Third Congress on Universal Logic, Estoril, Portugal, 2010.

CARDOSO JR., H. R. Peirce's mathematical-logical approach to discrete collections and the premonition of continuity, *Journal of Applied Non-Classical Logic*, vol. 22, No. 1/2012 (Uses of non-classical logic: foundational issues), pp. 19–41, 2012.

ERHLICH, P. The absolute arithmetic continuum and its Peircean counterpart. In: *New essays on Peirce's mathematical philosophy*. M. E. Moore (Ed.); Open Court Press, 2010.

HAVENEL, J. *Logique et Mathematique du Continu chez C.S. Peirce*. These de doctorat à l'École de Hautes Études em Sciences Sociales (EHESS), Paris, 2006.

HOOKWAY, C. Peirce and mathematical structuralism. In: *New essays on Peirce's mathematical philosophy*. M. E. Moore (Ed.); Open Court Press, 2006.

HUDRY J.-L. Peirce's potential continuity and pure geometry. In: *Transactions of the Charles S. Peirce Society*, Vol. 40, No. 2, pp. 229–243, 2004.

JOHANSON, A. Modern topology and Peirce's theory of the continuum. In: *Transactions of the Charles S. Peirce Society*, Vol. 37, No. 1, pp. 1–12, 2001.

KANT, I. *Critique of Pure Reason*. Cambridge: Cambridge University Press, 1998.

LEO, R. F. *Il concetto di relazione in Peirce*. Milano : Editoriale JACA Book, 1992.

MYRVOLD W. C. Peirce on Cantor's paradox and the continuum. In: *Transactions of the Charles S. Peirce Society*, Vol. 31, No. 3, pp. 508–554, 1995.

MURPHEY, M. G. *The Development of Peirce's Philosophy*. Indianapolis; Cambridge, MA: Hackett Publishing Company, Inc. 1ª ed.: Cambridge, MA: Cambridge University Press, 1993.

PEIRCE, C.S. (CP) *Collected Papers of Charles Sanders Peirce*. Ed. by Charles Hartshorne and Paul Weiss. Cambridge/Massachusetts, The Belknap of Harvard University Press, 1935.

COGNITIO-ESTUDOS: Revista Eletrônica de Filosofia, ISSN 1809-8428, São Paulo: CEP/PUC-SP, vol. 8, nº 2, julho-dezembro, 2011, p. 096-105

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PEIRCE, C. S. (NEM) *The New Elements of Mathematics*. Ed. by Carolyn Eisele. Haia; Paris: Mouton Publishers; Atlantic Highlands, NJ: Humanities Press, 4 v. in 5, 1976

PEIRCE, C.S. (W.) *Writings of Charles Sanders Peirce*: A Chronological Edition. Ed. by "The Peirce Edition Project". Bloomington; Indianapolis: Indiana University Press, 1982-2000.

PUTNAM, H. Peirce's continuum. In: *Peirce and contemporary thought*: philosophical inquires, K. Ketner (Ed.), pp. 1–22. New York, Fordham University Press, 1995.

ROSENTHAL, S.B. *Charles Peirce's Pragmatic Pluralism*. New York: New York State University Press, 1994.

ZALAMEA, F. Peirce's logic of continuity: Existential graphs and non - cantorian continuum. In: *The Review of Modern Logic*, Vol. 9, No. 1–2 [Issue 29], pp. 115–162, 2003.

COGNITIO-ESTUDOS: Revista Eletrônica de Filosofia, ISSN 1809-8428, São Paulo: CEP/PUC-SP, vol. 8, nº. 2, julho-dezembro, 2011, p. 096-105

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