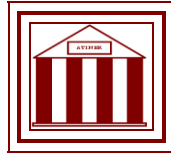


**Athens Institute for Education and Research
ATINER**



**ATINER's Conference Paper Series
LIB2015-1911**

**Reflexions on the Semiotic Articulation of
Information: Conceptual Analysis Demonstration
in Information Science**

**Marcos Aparecido Rodrigues do Prado
PhD Student
Sao Paulo State University
Brazil**

An Introduction to
ATINER's Conference Paper Series

ATINER started to publish this conference papers series in 2012. It includes only the papers submitted for publication after they were presented at one of the conferences organized by our Institute every year. This paper has been peer reviewed by at least two academic members of ATINER.

Dr. Gregory T. Papanikos
President
Athens Institute for Education and Research

This paper should be cited as follows:

Prado, M. A. R. do. (2016). "Reflexions on the Semiotic Articulation of Information: Conceptual Analysis Demonstration in Information Science", Athens: ATINER'S Conference Paper Series, No: LIB2015-1911.

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10671 Athens, Greece
Tel: + 30 210 3634210 Fax: + 30 210 3634209 Email: info@atiner.gr URL:
www.atiner.gr

URL Conference Papers Series: www.atiner.gr/papers.htm

Printed in Athens, Greece by the Athens Institute for Education and Research. All rights reserved. Reproduction is allowed for non-commercial purposes if the source is fully acknowledged.

ISSN: 2241-2891

08/07/2016

Reflexions on the Semiotic Articulation of Information: Conceptual Analysis Demonstration in Information Science

Marcos Aparecido Rodrigues do Prado

Abstract

This study verifies the semiotic aspects of the concept of information used in five review articles published in scientific journals by relevant researchers in the area of Information Science. These review articles were selected through search terms previously established in Google Scholar, which presented the highest number of citations by the scientific community. The objective of this analysis was to explore the peculiarities that distinguish the systematic characteristics of conceptual significance. As methodology, the analytical characterization presented in the categories developed by Charles Sanders Peirce (1838-1914) are used. This procedure is employed as a tool to broaden the understanding of the conceptual aspect from the prevailing significations of the analyzed items that relate to Information Science. Thus, we seek to identify the logical and phenomenological deduction in the concepts of information according to the three fundamental categories of Peirce's pragmatic system: quality, respect and representation. The development of study is given on the identification of the components used on the description of the studied object and configures the structure of a framework of analysis on the process of conceptual formation. The results provide compelling reflections supported on philosophical discussions to identify the conceptual context of the term information. The contribution of this study is to deepen essential discussions on the concept, which reflect the reference that underpin the Information Science domain.

Keywords: Information, Information Science, Semiotic Analysis.

Introduction

This study comprehends the concept of the term information as a semiotic construction process of signification in Information Science. This study aimed to develop a contribution to expand essential discussions that meet fundamental interests of the area.

Methodologically, the analyzed papers were retrieved in Google Scholar according to occurrence of the terms 'concept' and 'information' in the titles. The search was carried out in Portuguese, English and Spanish. We selected the five articles with highest number of received citations. The articles meeting this criteria were: Capurro and Hjørland (2003) – 601 citations; Belkin (1978) – 457 citations; Capurro (2009) – 24 citations; Araújo (2010) – 20 citations; and García Marco (1998) – 17 citations.

The development of the study was based on the identification of the components used for defining the term information on the five articles published in academic journals of Information Science or scientific journals with authors relevant to the area.

The semiotic categories developed by Charles Sanders Peirce (1838-1914) served as the analysis tool. It is noteworthy that the author characterized his trichotomic model to employ the classification of the object according to the following categories: Firstness, Secondness and Thirdness. This division was considered as a pragmatic standard developed by Peirce to distinguish aspects relating to quality, relation and representation of the object under analysis. This study focused on identifying logical and phenomenological deductions in the concepts of the term information from the three fundamental categories of the pragmatic system proposed by Peirce. It is noteworthy that the deductions were made from articles from the following characteristics: impressions, premises, inferences and arguments.

Thus, the reflections that articulate the semiotic of information are based on a conceptual process constructed by the author of the scientific paper and is explicitly and implicitly inserted in every analyzed article.

Peirce's Semiotic and his Categories

Semiotics is the science that focuses on the general study of symbols. As stated by Martin and Ringhan (2000), this area is interested in all the elements of cultural phenomena associated with the processes of interpreting signification systems. Semiotics identifies, in the perception of the object, the constitution of a sign, characterized as anything that represents something in the individual and social context. But the sign is not exactly the object, it only represents it from the interpretation of its characteristics (PEIRCE, 1955). Thus, this process is mentally elaborated by the interpreter's projection to idealize the sign and its phenomenological context.

Quality: The Category Firstness

Firstness is a category that considers the superficial character of the sign presentation and comprehends the quality perceived by the immediate consciousness of the subject on a given object. It refers to the first impression established to mentally manifest the search for sensory senses that project purely qualitative aspects of the mentioned object. This condition implies what Deledalle (2000) considers as the mere possibility of associations, for this category figures in the dimension restricted to impression.

Borges (2013) analyzes that the sign categorized as Firstness is just an icon. Thus, the sign is limited exclusively to the character of reference to the object, which signifies it in the symbolic field (MARTIN; RINGHAM, 2000). Thus, it is noted that the icon is a sign endowed with attributes that are types of representations and are associated with the symbol that represents it. However, what remains in this inference is only the sensory and emotional closeness that articulates under the similarity and dissimilarity between them (MERRELL, 2001).

Therefore, the icons have qualities that conceive the conceptual idea with the generalized image of the symbol. Though the symbol itself has no concrete existence. Sebeok (2001) emphasizes that Peirce elaborated three key characteristics to distinguish the icons: images, diagrams and metaphors. These aspects were called icon subclasses and support the symbolic qualities of the category Firstness.

Relation: The Category Secondness

The category Secondness consists on the character of relation that is needed to understand the reference location of the object. For this condition focuses on perceptive attitude of everyday existence as a major factor. Thus, this procedure is characterized by the action of setting the relationship mechanisms and the contextual and phenomenological association of the object.

Deledalle (2000) summarizes his description of this category as a process of distinguishing a given object from a singular kind of mental or material signification. The author also attributes the perception of empirical references in the logic denotation in which the aspects of feeling, truth or even thought manifest. This is what Borges (2013) identified as a particular individual experience to address the dimensions of density and extension applied to the object. This step is conducive to the development of concepts for considering what permeates the object and integrates it in the material reality and its ontological organization. In addition, it contemplates the projection of cognitive and mental references of the interpreter subject. Such an attitude requires essentially empirical parameters, in which descriptions are processed to understand the mechanisms of representation of the factual aspects of that reality.

However, Silveira (1989, p. 73) warns that "For the sign, being able to signify precedes effectively positioning in the object's place, and then come to determine the representation of the signification relation." It is in this dynamic configuration that the index finds fertile ground for semiotic firmament.

Merrell (2001) comprises the index as a process of interpretation that manifests as mediation resource in the category Secondness. The author defines index as a sign that interrelates with its semiotic object through real, physical or mental elements, but having causal connections. While De Villiers (2006) highlights the learning provided by the index. The author mentions that the association process is effectively inserted in the interpreter's learning, and that this experience is endowed with empiricism in which the interpreter's organism learns to associate elements such as sounds, images or sensations with other things from the contextual reality. The subject uses this experience to maximize the stimulus of the object's correlations and interpretations and to organize the necessary inherent associations.

Representation: The Category Thirdness

Thirdness, the last category comprises the sphere of human intelligibility. It is the cognitive manifestation of reasoning frameworks that are designed for an effective semiotic construction. This process includes subjective experience that articulates the functional repertoire of inferences, reflections and identifications of the signs. Thus, it permeates the establishment of mechanism sets used to represent and interpret the world (SANTAELLA, 1998). Undoubtedly, it is characterized by intellectual synthesis built in the combined development of mental and empirical aspects to make the contextual object elaboration. This semiotic interaction "[...] consists in the idea of law, thought, habit and temporality. It is the mediation, the element able to establish the connection between the other two terms. It involves, however, generality, purpose, continuity and representation" (BORGES, 2013, p. 175).

The dynamic undertaken in the category Thirdness is essentially linked with the semiotic processes of the previous categories: Firstness and Secondness. However, the interrelationship does not occur simply or automatically between the categories. De Villiers (2006, p. 16) argues that: "Thirdness requires Secondness, and Secondness requires Firstness, but Thirdness cannot be reduced to Secondness or Firstness (nor can Secondness be reduced to Firstness)". Hence, in summary, the first category stands out for the spontaneity of sensations, while the second category is presented with the object confrontation without systematic reflections with reality. But the last category is guided by the understanding of reflection and relationship processes, i.e., embraces the fullness of the sign. Therefore, the systematization established by triadic principle occurs within the process.

Queiroz and Merrell (2006), and Buchler (1940) analyze the triadic scheme and consider that the sign corresponds to an aspect related to the representation activity of qualities that are contemplated by the category Firstness. This element holds a triadic relationship with the Secondness category when articulates interpretations concerning the object. Such

procedures determine the contributions developed at the core of human intelligence to establish elucidation resources to the interpreter. And in this scheme, conditioned by connections, the inference of analogies on the evidence is found.

To this discussion Queiroz (2007) points out that the comparison of cognitive unit with the proposition unit is inevitable. Martin and Ringahan (2000) emphasize that this interpretation process is entirely arbitrated and is based on linguistic conventions. Such characteristics resonate immediately in the semantic factor as a link that preponderates cognitive development. Once, it reflects the condition of the human intelligence to promote the ontological and epistemological representation of the object.

The Concept of Information and its Semiotics Construction

The foundation process of Information Science as a specialized area to work with the dynamic phenomena related to information requires the determination of its fundamental construct. Araújo (2009) points out that, historically, Information Science has been guided by several theoretical currents from paradigms that establish, among other characteristics, the conceptual idealization of the object information. Dahlberg (1978a) attributes the systematization of concept to the descriptive use of terminology in which words represent the set of symbols assigned to objects contextualized by the elements of language. The author mentions that this process is a result of the representation mechanisms of human knowledge when devised in the ontological dimension. And the process that configures this dynamic adopts vocabulary resources, syntax and other communicative logic to cooperate in applying elements used in language as a major factor to establish terminological conventions. Dahlberg (1978b, p. 12) understands that "The formation of concepts is the synthesis of the necessary and true predicates about a certain object."

Understanding the dynamics which implies the elaboration of a concept requires identifying the influence of conventions established by the dimensions of space and time of the object and its social relationship. The scientific composition of Information Science is not immune to this process. It is noted that three paradigms are prevalent in Information Science, and several schools of thought guide the foundation of the concept of information that the area offers.

Capurro (2007) elaborated contributions to the hermeneutics characterization of the epistemological paradigms that anchor the fundamental foundations of Information Science. According to the author, the origins of Information Science were directly related to the idea of the physical paradigm, which focus ratifies the material condition of knowledge records. But when this model drives in direction of principles that are based on "[...] disregarding the subject in the search process and acquisition of information, it starts to be questioned" (ABDALLA; KOBASHI, 2012, p. 55).

In the late 1970s, another idea began to reflect the 'information', and then the cognitive paradigm emerges, with idealistic and predominantly individualistic characteristics. This paradigmatic model focuses on the individual's mental relation with information aiming at constructing knowledge. In the mid-1990s, the socio-cognitive paradigm emerges, centered in the constructivism of social dynamics. In this perspective, cultural and collective factors are major for promoting information resources and construct knowledge.

We follow with the publication analysis of Araujo (2010), Capurro (2009), Capurro and Hjørland (2003), García Marco (1998) and Belkin (1978). It is noteworthy that the semiotic aspect configures the major interest on the analysis of each of the articles. Thus, the concept of information presented by each one of the articles reflects appraisals aimed at identifying the resources and key elements considered in their semiotic construction.

The Semiotic Analysis of the Concept of Information

The identification of the conceptual process of constructing the term information focuses on a dynamic characterized by complex form that the signs and their elements interact (MAI, 1997). In this sense, the notion of the concept in Information Science permeates paradigms and theoretical perspectives that support the epistemological construction and even the phenomenological construction of reference basis of the term information (CAPURRO, 2007). In addition, it is possible to observe that different scientific thoughts diverge regarding the object information and its essential descriptive properties to contemplate its fundamental definition (ARAÚJO, 2010).

With so many diffuse discourses, it is inevitable that there is no consensus in semantics or even syntactic characterization. This ebullition of ideas are concerns that manifest reflections to support the growth, spatial and temporal maturation of the discourse developed in Information Science (FROHMANN, 1994; FROHMANN, 2001). It is highlighted that this effervescent dynamism is a natural characteristic of contemporary scientific activity. Therefore, this is not an exclusive phenomenon of the scientific community that makes up Information Science (GOMES, 2009).

Among the five analyzed articles, we verify a subjective character comprising the definition of the term information. This discussion matches the references determined by the discursive community the researcher integrates. Jacob and Shaw (1998) consider that discursive communities are social groups that share a certain structure of thought, language and knowledge. Such characteristics are manifestations of subjectivities drawn from cultural, social and historical constructions of these communities' members.

In the analysis carried out on the articles, it was found that only García Marco (1998) effectively articulates the physical paradigm, which originated from Information Science.

García Marco (1998) refers to biology to demonstrate that information is a process constituted by matter and energy. According to this author, information requires material structures to achieve its effective representation. Its fundamental bases permeate the theoretical conceptions of the physical paradigm, and establish an analysis characterized by the attributes of linguistic and complex systems established in the parameters of the Mathematical Theory of Communication by Shannon and Weaver. The properties of transmission and information retrieval are key factors to understanding the impressions structured in the pragmatic empiricism of the positivist philosophical movement. It is noteworthy that these perspectives find support in the semiotic dimension of Firstness to elaborate the description of the object information and the attribution of its qualities.

Buckland (1991) contributes to the debate when he mentions the idea of "information as a thing" and promotes an expansion of the meaning of this term to contemplate its tangible and intangible aspects. In this sense, the semiotic nature of the phenomenon information transcends the physical materiality to be articulated in effective relationships with certain cognitive context. García Marco (1998) discusses mental elaboration of impressions based on premises consistent with the cognitive paradigm. However, in fact, his arguments and inferences oppose the cognitive paradigm perspective and are restricted to the references of the physical paradigm of Information Science.

Effectively, the adoption of the cognitive paradigm was detected in three publications that composed this study. Thus, we highlight that Capurro (2009), Capurro and Hjørland (2003) and Belkin (1978) were characterized by the cognitive dimension in their fundamental arguments. The first two mentioned publications that praise the theoretical reflection associating interdisciplinary historicism of the concept of the term information. Capurro (2009) contextualizes the epistemological nature of reference conditions in which predicates of time and space of the concept of information are conjugated. His discussions involve an informed reflection on a thorough philosophical apparatus. Thus, the author develops a cognitive construction process characterized by the complexity of interpretation as a resource of mental projection. Capurro (2009) permeates argumentative allegories that extend the interpreter's condition to understand the historical and epistemological conjunctions of the phenomenon information. Despite the breadth and depth of his argument, the author warns that "[...] the task of exploring the past, present, and future of the concept of information which is maybe one of the most popular and controversial of our age [...]" (CAPURRO, 2009, p. 126).

Capurro and Hjørland (2003) persist in the interdisciplinary characteristic, so rejected by Belkin (1978). In the study produced by Capurro and Hjørland (2003), the categories Firstness and Secondness switch and connect in a dense and steady way. There is no center or periphery predominance to observe the object. The associative relationship is intense and meaningful and the terminological ambivalence is an unstable and variant condition in revealing the significance, factor provided by linguistic implications of the different

scientific conformations. It is the philosophical aspect that provides acquiescence to the epistemological nuances. But the objective and subjective characteristics persist and resist on the structuring basis of references matching the notion of the usual meaning of the term information.

On the other hand, Belkin (1978) comprises the user behavioral aspect and this is understood as a subject who manifests his/her information needs from previous knowledge. For this, the author highlights the quality of pre-existing repertoire in outlining the mental structure. Such characteristics confirm the cognitive factors that influence the emotional and situational attributes in search behavior and the use of information (PEREIRA, 2010). Belkin (1978) conceives the idea of information in a structured perspective as the views of the former Soviet Union in which the term *Informatika* was used to describe Information Science. In this logic, the concern lies on the processes themselves at the expense of social characteristics caused by the impacts of information (PINHEIRO, 1999).

Araújo (2010) presents the only publication linked to the socio-cognitive paradigm of Information Science. Rocha and Duarte (2013) consider that this model of thought is articulated on epistemological bases with emphasis on hermeneutics construction to conceive the socio-cultural relations of its object. Despite this structural categorization, Araújo (2010) carefully analyzes the three paradigmatic models emphasized by Capurro (2007). The arguments offered by Araújo (2010) incite inferences elaborated epistemologically by the references that underlie Information Science. The premises established by the author demonstrate a constructivist character to understand the concept of the term information. Thus, he does not offer a closed conclusion regarding his study and emphasizes that his research requires other approaches to determine effective results. In Araújo's study (2010), the concept of information is understood as a social phenomenon construction, interpreted by the collective in representation elaborated both by meaning and significance. In this sense, the conceptual construction process configures the reference identification of the category Thirdness, for the meaning of the signs is generated, interpreted and socially represented (MAI, 2001).

Conclusions

Information is a social phenomenon historically elaborated according to the component references of interpretation capacities. While the paradigms serve to provide fundamental contributions that shape theoretical thoughts and their ways of understanding the concepts. These standards postulate the historical and epistemological nature of human perception and their effects are inherent in all scientific practices, including Information Science.

The five articles demonstrate distinct ways of understanding the concept of the term information. However, the semiotic construction that interferes with understanding the concept formation process essentially finds support in the cognitive paradigm of Information Science. Thus, the conceptual construction

of the term information originates from the idea of a meaning generated in the mental context; this projection is the connection to the first aspect of the sign. The elementary discussion arguing the concept of information is the demonstration of the second aspect that configures the sign. The reflections based on theoretical and empirical experiments launch an arsenal of mental connections, this is the third aspect of the sign. Finally, the combination of the three properties is determinant to cooperate with the result of the conceptual formulation.

It is highlighted that this study does not aim to run out by itself. It gives the research the intention to foster salutary discussions on Information Science and enhance the articulation of its interdisciplinary dynamism.

Semiotics offers resources that qualify the repertoire of signification. And Pinto (1996, p. 91) mentions that "To signify is to generalize, it is moving farther from the world of things. It is winning in exploratory power and losing in the uniqueness of things". This mechanism constitutes the idea of reduction involving the descriptive characterization of the object, its context and its phenomenological manifestation. And reduction is a form of reaction to perception (COELHO NETTO, 2010). This condition configures the content of the established language in the discourse and, of course, in the adoption of the paradigm that shapes the conception of the meaning of a concept. The paradigm structures the argumentation, influences the presentation of inferences and serves as a parameter to determine the impressions and formulate the premises of the conceptual construction. Thus, the paradigm is the generator matrix of the set of scientific procedures that coordinates the idea and the linguistic repertoire of a particular community. Thus, the paradigm and its theoretical perspectives are structures that elaborate the construction of semiotic processes of conceptual formation.

References

- ABDALLA, Raquel Barioni; KOBASHI, Nair Yumiko. (2012). Information Science: reflections on the establishment of a scientific field. In: GUIMARÃES, José Augusto Chaves; DODEBEL, Vera Lúcia Doyle Louzada de Mattos. Challenges and scientific perspectives for the organization and representation of knowledge today. Marília: ISKO-Brazil : FUNDEPE. p.54-58.
- ARAÚJO, Carlos Alberto Ávila. (2009). Theoretical currents in Information Science. Information Science, Brasília, v.38, n.3, p.192-204, Sept./Dec.
- ARAÚJO, Carlos Alberto Ávila. (2010). The concept of information in Information Science. Information & Society: studies, João Pessoa, v.20, n.3, p.95-105, Sept./Dec.
- BELKIN, N. J. (1978). Information concepts for information science. Journal of Documentation, London, v.34, n.1, p. 55-85, Mar.
- BORGES, Priscila Monteiro. (2013). Iconic Sinsigns within Peirce's system of 66 classes of signs: a semiotic analysis of the typeface Univers Revolved. Galaxia: Postgraduate Program in Communication and Semiotics Journal, São Paulo, n.26, p.174-186, June/Dec.

- BUCHLER, Justus (1940). *Philosophical writings of Peirce*. New York: Dover Publications.
- BUCKLAND, Michael K. (1991). Information as thing. *Journal of the American Society for Information Science*, Hoboken, v.42, n.5, p.351-360, June.
- CAPURRO, Rafael; HJØRLAND, Birger. (2003). The concept of information. *Annual Review of Information Science & Technology*, Medford, v.37, p.343-411.
- CAPURRO, Rafael. (2007). Epistemology and information science. *Enl@ce: Venezuelan Journal of Information, Technology and Knowledge*, Maracaibo, v.4, n.1, Jan./Apr.
- CAPURRO, Rafael. (2009). Past, present, and future of the concept of information. *Triple C: cognition, communication, co-operation*, Salzburg, v. 7, n. 2, p. 125-141, June/Dec.
- COELHO NETTO, José Teixeira. (2010). *Semiotics, information and communication*. 7. ed. São Paulo: Perspectivas.
- DAHLBERG, Ingetraut. (1978a). Concept's theory. *Information Science*, Brasília, v.7, n.2, p.101-107, July/Dec.
- DAHLBERG, Ingetraut. (1978b). Fundamentals theoretical and conceptual classification. *Ciência da Informação*, Brasília, v.6, n.1, p.9-21, Jan./June.
- DE VILLIERS, Tanya. (2006). *Mind and language: evolution in contemporary theories of cognition*. 2006. 301 p. Dissertation (Doctor of Philosophy)-Stellenbosch University, Stellenbosch.
- DELEDALLE, Gérard. (2000). *Charles S. Peirce's Philosophy of Signs: essays in comparative semiotics*. Bloomington: Indiana University Press.
- FROHMANN, Bernd. (1994). Discourse Analysis as a research method in Library and Information Science. *LISR*, v.16, p.119-138.
- FROHMANN, Bernd. (2001). Discourse and documentation: some implications for pedagogy and research. *Journal of Education for Library and Information Science*, v.42, n.1, p.13-26.
- GARCÍA MARCO, Francisco Javier. (1998). The concept of information: an approach transdisciplinary. *Revista General de Información y Documentación*, Madrid, v.8, n.1, p.303-326, Jan./June.
- GOMES, Hagar Espanha. (2009). Trends of research in Knowledge Organization. *Brazilian Research in Information Science*, Brasília, v.2, n.1, p.60-88, Jan./Dec.
- JACOB, Elin K.; SHAW, Debora. (1998). Sociocognitive perspectives on representation. *Annual Review of Information Science & Technology*, Medford, v.33, p.131-185.
- MAI, Jens-Erik. The concept of subject in a semiotic light. In: SCHWARTS, Candy.; RORVIG, Mark (ed.). (1997). *Digital collections: implications for users, funders, developers and maintainers*. Medford: Information Today, p.54-64. (Proceedings of the ASIS Annual Meeting; 34).
- MAI, Jens-Erik. Semiotics and indexing: an analysis of the subject indexing process. (2001). *Journal of Documentation*, v.57, n.5, Sept.
- MARTIN, Bronwen; RINGHAM, Felicitas. (2000). *Dictionary of Semiotics*. London: Cassel.
- MERRELL, Floyd. Charles Sanders Peirce's concept of the sign. In: COBLEY, Paul (Edit.). (2001). *The routledge companion to semiotics and linguistics*. London: Routledge. Chap.2, p.28-39.
- PEIRCE, Charles Sanders. (1955). *Philosophical writings of Peirce*. Justus Buchler, ed. Nova York: Dover Publications.

- PEREIRA, Frederico César Mafra. (2010). Information needs and uses: the influence of the cognitive, affective and situational aspects on the information behavior of managers. *Perspectives in Information Science*, v.15, n.3, p.176-194, Sept./Dec.
- PINHEIRO, Lena Vania Ribeiro. Interdisciplinary field of Information Science: remote frontiers and recent. In: PINHEIRO, Lena Vania Ribeiro (Org.). (1999). *Information Science, social sciences and interdisciplinary*. Rio de Janeiro: IBICT. p.155-182
- PINTO, Júlio. (1996). Semiotics and information. *Perspectives in Information Science*, Belo Horizonte, v.1, n.1, p.87-92, Jan./June.
- QUEIROZ, João. (2007). Peirce's classifications of signs: from "On the Logic of Science" to "Syllabus of Certain Topics of Logic". *Trans/Form/Ação*, São Paulo, v.30, n.2, 179-195, July/Dec.
- QUEIROZ, João; MERRELL, Floyd. (2006). Semiosis and pragmatism: toward a dynamic concept of meaning. *Sign Systems Studies*, Tartu, v.34, n.1, p.37-65, Jan./June.
- ROCHA, Eliane Cristina de Freitas; DUARTE, Adriana Bogliolo Sirihal. (2013). Reflections about usability studies paradigms on Information Science. *DataGramZero: information journal*, Rio de Janeiro, v.14, n.4, Aug.
- SANTAELLA, Lucia. (1998). *The perception: a semiotic theory*. 2. ed. São Paulo: Experimento.
- SEBEOK, Thomas A. (2001). *Signs: an introduction to semiotics*. 2nd. ed. Toronto: University of Toron to Press.
- SILVEIRA, Lauro Frederico Barbosa da. (1989). Charles Sanders Peirce: science as semiotics. *Trans/Form/Ação*, Marília, v.12, p.71-84.