PEIRCEAN SEMIOTICS AND INNOVATION IN DESIGN

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Abstract
This paper is presented in the context of design in correlation with Peircean semiotics. It intends to reflect the design basis as a creative activity through conceptual correlations with semiotics developed by Charles Sanders Peirce. The paper explores the concept of representation, the Peircean theory of perception and describes one of the most important concepts from Peirce's theory that is related to design: the concept of abduction. Abduction is the reasoning propeller of the creation and the way of producing new ideas. This Peirce's original concept is fundamental for the maintenance of the constant commitment to the inherent innovation required by design.
Keywords: representation, perception, abduction, Peircean semiotics, innovation, design.

The concept of representation

"When *I* use a word," Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean— neither more nor less." (…) "They've a temper, some of them— particularly verbs, they're the proudest—adjectives you can do anything with, but not verbs— however, *I* can manage the whole of them! Impenetrability!"
"That's what *I* say!"
"Would you tell me, please," said Alice "what that means?"
"Now you talk like a reasonable child," said Humpty Dumpty, looking very much pleased. "I meant by 'impenetrability' that we've had enough of that subject, and it would be just as well if you'd mention what you mean to do next, as I suppose you don't mean to stop here all the rest of your life."
"That's a great deal to make one word mean," Alice said in a thoughtful tone.
"When I make a word do a lot of work like that," said Humpty Dumpty, "I always pay it extra."
(Carroll, 1899, p. 123-4)

The concept of representation constitutes itself as the heart of various theories such as semiotics and cognitive sciences. Nöth presents us how sign, signification and representation are in the historical origin of the doctrine of signs, which can be regarded as semiotics *avant la lettre*. It consists of all investigations into the nature of signs, signification and communication in the history of science. The origin of these investigations coincides with the origin of philosophy: Plato and Aristotle were theorists of sign and therefore semioticists *avant la lettre* (1995, p.20).

Representation can be understood in several ways, including as a synonym of sign. John Locke (1632-1704), who in 1690 used the term *Semeiotiké* to refer to a "doctrine of signs", considered sign and representation as synonymous concepts. Charles Sanders Peirce (1839-1914) also, in 1865, characterized semiotics as a "general theory of representations" (Santaella & Nöth, 1999, p.16).

In the Middle Ages, the term was *repraesentatio*. The semantic aspect of *repraesentatio* indicates the relationship between image and original sound. The medieval scholastics explains this term by means of the following equivalents (Boulnois, 1999): *Stare pro* (to be in place of) – signs are in place of things which they refer to; *supponere pro* (guess) – in a proposition, the terms are in lieu of things which they refer to; *similitudo*, *species*, *imago* (to be a resemblance, an image) – the concept represents the object which it resembles to; *supplere vicem* (play the role of) – the abstract knowledge is in place of the object. In the medieval period, therefore, to represent meant to be in place of, to resemble, put in scene.

The concept of sign was also a matter of interest to the scholastic Roger Bacon (1220-1292), who incorporated to the term representation, the relationship between the sensitive sign and the signified thing. The Baconian analysis reaches the formulation of Duns Scotus: "signifying is representing something to the intellect" (Boulnois, 1999, p. 24). Signification is a representation. Scotus' theory punctuates that the sign leads immediately to the meaning without the presence of intermediaries. The sign is not fixed to a single meaning; it only represents the thing under some aspect. Thus to Duns Scotus everything is sign, because everything that is known refers to something.

This is the foundation of Peircean semiotics. By the end of the XIX century, Charles Sanders Peirce, who was assiduous reader of scholastic semioticists, grounded his eminently triadic theory of signs in: sign, object and interpretant. In summary, Peirce considers that a sign is what, under certain aspect, represents something to someone, creating in his mind an equivalent sign. This operation generates the interpretant. What the sign represents is called its object.

Representation is characterized by the relationship between the sign and the object. To represent is to be in place of something else in such a way that, for the mind, the sign is treated as being the object itself, in certain respects. For Peirce, the term representation necessarily involves a triadic relation, which is a scheme of continuous process of generation of signs. The representative process defines itself by interwoven relationships that are established between sign-object-interpretant. Peircean semiotics is extensive and has as its main object of study not exactly the sign, but the semiosis (sign process, sign action).

"Don't stand chattering to yourself like that," Humpty Dumpty said, looking at her for the first time, "but tell me your name and your business."
"My *name* is Alice, but -- -"
"It's a stupid name enough!" Humpty Dumpty interrupted impatiently. "What does it mean?"
"*Must a* name mean something?" Alice asked doubtfully. (Carroll, 1899, p. 115)

Peircean theory of perception

The Peircean theory of perception was elaborated in the first years of the XX century with the purpose of solving impasses of semiotics related to the connection of language and reality. It was structured starting from a triad of logical elements:

Percept — it is external; it is what we notice; it comes and it continues. It behaves as the dynamic object of the sign in the semiosis process. Peirce affirmed to be the percept "those who have their own reality in the world out of our conscience and that are apprehended at once by the perceptive act" (Santaella, 1998, p.54).

Percipuum — it is the percept as it is interpreted by the perceptual judgment. It is the way the percept will be received by our sensorial-motor system. Thus, the percipuum behaves as an immediate object, conforming the percept. It is the interface between mind (perceptual judgment) and world (percept). *Percipuum* would be "the percept just as it comes in the perceptual judgment. Therefore, it would

be the percept in the subtle change of nature that occurs when it is incorporated to our mind, to our perceptive processing" (Santaella, 1998, p.59).

Perceptual judgment — it is the flow of thought; it is what will process things we are noticing. It is the mental schemes of which we are endowed with. It is sign. "The perception is determined by the percept, but the percept can only be known through the mediation of the sign, which is the judgment of the perception" (Santaella, 1998, p.64). The perceptual judgment is a logical inference but Peirce considered it as a peculiar type of inference: abduction.

In the aesthetic realm abduction behaves as a statute of hypotheses, of possibilities. Abduction includes every "process of generation, criticism, and possible acceptance of explanatory hypotheses" (Josephson & Josephson, 1994, p.09). The moment of formulation of a new hypothesis is poetic because at this point creativity is generated. Abduction was Peirce's creation: before that, just induction and deduction were considered reasoning methods. The theory of abduction, in its more complete description, is dated from 1901 and it comes from Peirce's manuscripts. The term abduction was developed in substitution to the word hypothesis because Peirce, "as he moved forward in the studies of the nature of the scientific investigation, he discovered another step in the process through which ideas and theories are engendered, what led him [...] to reject the hypothesis, introducing abduction in its classification" (Santaella, 1992, p.91).

It is pertinent to highlight that "discovery" happens when the raised hypothesis is true. However, in aesthetics, the objective is not to search for hypotheses that are proven true, it is just a statute of hypotheses contained in the universe of possibilities. We see that it is intrinsic to abduction to point at a true hypothesis, with enough theoretical foundation to indicate a direction, which is probably true. Abduction has the tendency of raising correct hypotheses, according to Peirce, due to man's natural instinct. The human mind is part of nature and there is not duality between mind and matter. Thus, there is a co-naturalness between mind and nature and both are developed together. The instinct for the truth is natural. That human capacity to guess correct hypotheses is the insight notion in Peirce's theory. These are characteristics presented by him for the insight to happen: it is not an immediate premise; the truth is not an individual conscience; and the insight is not indubitable.

But in spite of its instinctive character, abduction is a logical inference and the great subject that comes from it is which premises would be the ones of abduction. There are not exactly rules for the occurrence of abduction because freedom is its main characteristic. It is not possible to formalize it in a rule. There is no formula. This makes plenty of sense considering that no rule or pre-established structure could provide the appearance of something absolutely new.

Therefore, it is possible to establish similarities and differences between abduction and perceptual judgment. Both are endowed with general principles that drive them; they are hypothetical and, therefore, they can be fallible. The main difference is that, although fallible, the perceptual judgment is indubitable. We would not endure being always doubting of every moment of our judgments of perception. But in relation to abduction, it is necessary to always criticize it.

We see that there is not an absolute creativity; abduction occurs by pre-existent premises. The intuition comes from those previous premises (inferences). There is no immediate cognition; it is always a result of a previous cognition. Abduction is not innate; it presupposes a cognitive elaboration but the first premises are unconscious.

For Peirce cognition comes as a continuous process expressed by means of deductive, inductive and abductive inferences, not having a specific origin of the process. Inferences "are movements of thought within the sphere of belief. The function of inference is the acceptance (or sometimes rejection) of propositions on the basis of purported evidence" (Josephson & Josephson, 1994, p.12). Peirce divides the inference in the following trichotomy: conscious reasoning resulting from guiding principles; informal reasoning without the recognition of the guiding principles; and unconscious and uncontrollable mental operations. We have that Peirce, when denying the innate ideas or original premises, considered the unconscious inferences (abduction) as knowledge forming and responsible for our innovative ideas.

Proceeding, we have the presentation of the term *Play of Musement* as the beginning of the abductive thought, of the conjecture of the instinctive reason. Peirce developed this idea in 1908 on the manuscript "The Neglected Argument for the Reality of God". Musement doesn't have a purpose *a priori*, but it can be the principle of the appearance of innovative ideas. It is a deep reflection in order to articulate signs by means of possibilities of composition. The new thought was born free and it is formulated from the associations of ideas. The associations can be from different sources:

Contiguity — it corresponds to an elementary reasoning in which ideas are associated because they are close; they are suggested by daily experience, which impoverishes the originality and the creativity of the production of ideas.

Similarity — it is a higher reasoning; it is a conscious process in which ideas approach by some equality, some analogy. Similarity emphasizes the creative aspect because it is not the resemblance among ideas or facts that allows the association, but it is the association, as control of the reasoning, that produces the resemblance. Similarity can occur by resemblance of quality, juxtaposition or mediation. The first one happens when identity of qualitative characters exists among the parts of the sign; when the parts, in their physical and sensitive materiality, present qualities. Secondly, we have the resemblance of juxtaposition. In this case, in spite of elements being different, the proximity among them originates the resemblances. Ideogram is an example of this sort of association. The third way, characterized by mediation, happens when it is produced in the mind a third term that is good to unite the two states of conscience. As examples, we have verbal and visual metaphors.

These two main associative terms (similarity and contiguity) were developed by David Hume (1711-1776) in the XVIII century but it was Peirce who identified the similarity as a special form to produce ideas. Thus, we can relate the similarity with musement. There is no accident in the meeting of ideas; there is a harmonious tendency, an "affection" according to Peirce that takes charge of the creative associations generated by the Play of Musement. Peirce takes advantage of the idea of play developed by Friedrich Schiller (1759-1805), the German poet and philosopher who studied aesthetics. Schiller's reflections concerning beauty tend to be not built under the subjectivity, but under a universal reason. Schiller developed the concept of *Aesthetic Play* which is linked to the feeling of free sequence of ideas; of free flow of images to the detriment of the external impressions. The idea of play is the one of freedom. Only through the independence of reality can the creative activity reach a quality close to the ideal, for Schiller (2004).

Abduction is the reasoning propeller of the creation and the way of producing new ideas. This Peirce's original concept is fundamental for the maintenance of the constant commitment to the inherent innovation required by design.

Semiotics of design

Semiotics of design contemplates the communicative potential of objects, visuals, products and so forth; the transformation of them into signs. Design as a language, a sign system. This is the particularity of design we are investigating. Language is the ability of representing. The representation occurs by means of signs. The sign is the one which is in real substitution with its object (in the Peircean sense) and from this substitution an interpretant is generated. The several languages are systematized by its codes or set of signs. Each language possesses its own specific rules. From this dialogue among codes, messages are established and organized. Design depends on language

operators who will use new technologies, several materials, the characteristics of the consuming market and more to operate translations of languages and to develop products (Gambarato, forthcoming).

Products can be qualified as signs while anything can be a sign for somebody. Products, placed in a social repertoire, ought to communicate its function, convey its message. Its own shape is responsible for this communication. For the transmission of messages in a creative way, by means of design, it is necessary to work more intensely the associations by similarity to obtain objects-sign rich in information and analogies. Design communicates by all its constituent elements: shape, function, color, material, technique, technology, and etc. Therefore, signs of design join peculiar values from artistic signs as well as from communicative signs. The associated information is as much aesthetics (shape) as it is semantics (content).

According to Peirce's categories of signs, the icon is the one we consider especially connected to design innovation. We could perceive that designing is a genesis process, in which the designer has an endless repertoire of elements of shape, capable of defining aesthetic and functional specific characteristics of the product. The act of designing is, therefore, selective. In other words, to materialize a product that exists and works in the material world, we may choose some constituent elements in detriment of others to define its existence conditions. To select the constituent elements, we use associative processes — previously discussed. The wealth of the icon is directly related to the association by similarity: the one replete of communicative possibilities and analogies.

An icon by similarity produces a rhetorical figure denominated metaphor. The metaphor, in the context of Peircean semiotics, is considered as a peculiar sort of *hypoicon*. Hypoicons are subdivided according to the kind of firstness they take part in. The kind of hypoicon denominated metaphor is the one which portrays the representative character of the sign through the representation of a parallelism with something else. In terms of metaphoric sense, the interpretative possibilities of the message-product become rich. Undoubtedly, "the principle of 'metaphor' plays an important role in our days: the visual analogy improves the practical functions corresponding to the drawn products" (Bürdek, 1999, p.237). Therefore, in order for that to happen, a great elaboration of syntax "it is necessary to create the suspension of meanings. Suspending the meaning means promoting the ambiguity, promoting the relativity, removing the absolute sense of the sign" (Turin, 1992, p.44).

Design needs this ambiguity (characteristic of art) to escape from the production of merely conventional products; products which are already known. It is necessary to establish no expected

relations, not obvious, not previously accomplished. The sign — to produce this ambiguity effect towards the consumer — needs to be tied up to the interpretant.

Products carry its own information which reflects on the way of using them. Designers have the task of making objects speak for themselves. As we tried to demonstrate, it doesn't mean the designer should work, always and only, with symbols (in the Peircean sense) to be understood by the consumers. Designers' work should contribute to the improvement of users' repertoire, transmitting different messages, and projecting immateriality. It is necessary to create intelligible objects, capable of establishing, in fact, the communication process and not just develop mere copies from objects that already exist or are thoroughly known.

Conclusion

The real purpose of design or the language of design is in the sense of freedom, no conditioning, and elimination of the obvious. Designers should design rhematic iconic signs. Icons "are also necessary to create new ideas, since the only way to conveying new ideas is by means of a complexus of (…) icons. We can only create new ideas by transforming existing images. Only by means of a conjunction or a disjunction of icons we arrive at 'composite images of which the whole is not [yet] familiar' (CP 3.433)" (Nöth, 2000: p.26).

It is appropriate to find similarities and analogies to escape from the conventional, the arbitrary; it is appropriate to work equivalences in the set of signs. This is the beginning of creation, i.e. conscious creation. Conscience works with relations of substitution, the relation between sign/object/interpretant. Conscience is processing constantly with constant alteration. It is a dynamic process of generation of interpretants which are not absolutes, not static, otherwise the conservatism, the stagnation of the creative process is favored. This kind of substitution process by new interpretants is called infinitive semiosis. The creative process in design has the objective of relating signs and generating new interpretants.

Certainly, each consumer, according to his informational level, with his repertoire, will produce different interpretants related to the same object. This is a desirable characteristic of design: the variability of signification.

The generation of interpretants which are constantly brought up-to-date can transform the iconic character of the object in a symbolic character, through the simplification of its social use. The appropriation of concepts of Peircean semiotics contributes to the understanding of the creative process, which is crucial for the intellection and innovation through design (Gambarato, forthcoming).

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