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SYSTEMS & DESIGN

BEYOND PROCESSES AND THINKING

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The Pragmatism as a semiotic route to designing – Understanding the inferential logics of sense attibution

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Abstract

The aim of this paper is to theoretically discuss the inferential logics of sense attribution to everyday objects. Such discussion takes part of our attempt to explore the possibility of development of a method for systematic research and analysis of the relationship established between users and artifacts in their context of use and specific circumstances. Taking into account the notions of sensible effects, practical bearings, and sense, the argumentation, supported by the Peircean pragmatism, tries to frame their connections with processes of logical mental mediations that emerge when design-agents (e.g., users, designers, and design researchers) deal with everyday objects. The contribution and final considerations of this paper may address issues from the fields of design (practically) and semiotics and design (theoretically and empirically) through possibly enlarging the understanding of the mediation processes, so-called inferential logics of sense attribution.

Keywords: *Semiotics inside Design, Pragmatism, Culture, Product Analysis, Methodology.*

1. Preliminary statements, definitions, and issues

The activity of design has historical, cultural, and social responsibility. From historically being an input to enhance the production of artifacts, the activity of design has been turned into an intrinsic cultural aspect of the processes of evolutionary movements/advances of the contemporary society and, consequently, had its borders of actuation extended, being employed in fields as communication, services, marketing, and so forth (Zingale & Domingues, 2015).

Inasmuch as contemporary the actuation borders of design activity had been extended, as a discipline, in our viewpoint as well as in the view of specific areas that regard the field of design, the activity of design lacks systematic approaches (Cf. Deni, 2015); in addition, even though recognized as relevant (Kotler & Rath, 1984), the design activity is also criticized due its unstable scientific foundations (Findeli, 2014), and, as stated by Borja de Mazota (2014), misses the employment of scientific reasoning in its development. Considering that, we are taking a step backward, we are *working on the basis*. Thus, the core aspect of this paper is the debate on the inferential logics of sense attribution to everyday objects. In fact, the arguments herein presented take part of a broader investigation that aims at the evolvement of a full methodological research framework. Such framework intends to explore the possibility of development of a method of *systematic research* and *analysis* of the relationship established between users and artifacts in their context of use, which aims at supporting processes of materialization of intangible features into artifacts (e.g., global products).

In the field of design, specifically *semiotics and design*, the need of development of processes that foster the systematicity is considered crucial. Deni, in the essay *For a History of Semiotics of Design Projects*, has stated: "what is still missing [...] is a *systematic* [emphasis added] reflection on the predictive capability of semiotics" (2015, p. 10).

Said that, the discussion starts with two statements: Umberto Eco's understanding of *functions* present in the chapter *Function and Sign: Semiotics of Architecture*; and the pragmatistic maxim contained in *How to make our Ideas Clear*, by Charles Peirce.

Understanding the notion of function in the world of everyday objects may be considered a complex task. Usually artifacts are designed to fulfill specific needs, which are generally shaped by professionals commissioned to develop particular objects and projects or to solve determined problems through design. Nevertheless, by the end of product lifecycle – from conception to disposal, and reuse or recycle –, users are the ones who incorporate functions and "close" the design cycle of artifacts (Cf. Zingale & Domingues, 2015). Said that, from users' viewpoint, it seems that artifacts do not only function, they also communicate *possible* ways of performing tasks. In this sense, from this specific perspective, designing artifacts may be considered a particular provocation to semiotics (Cf. Eco, 1980). Thus, we might be facing what Eco stated concerning the relation among communication, functions, and semiotics:

Seeing functions from the semiotic point of view might permit one to understand and define them better, precisely as functions, and thereby to discover other types of functionality, which are just as essential but which a straight functionalist interpretation keeps one from perceiving (Eco, 1980, p. 12).

Let us now retrieve Peirce's statements on, in certain way, *possible functions*:

Consider what *effects* [emphasis added], that might conceivably have *practical bearing* [emphasis added], we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object (Peirce, CP 4.402).

From the Peircean pragmatistic maxim, attention should be called to the terms *effects* and *practical bearing*[17]. Both terminologies, associated with the concept of *sense*, are of great importance to support the evolvement of the theoretical discourse that will follow. The notion of sense herein adopted is also retrieved from Peirce's writings, where the term effect also appears: "Our idea of anything is our idea of its *sensible effects* [emphases added]" (Peirce, CP 5.401). According to Peirce, the senses of any sign (e.g., artifacts, advertisings) are associated with all possible *interpretative answers* and *practical consequences* derived from *sensible effects* that they produce or could produce (Zingale & Domingues, 2015). Therefore, considering that signs can be also understood as processes of *mental mediation*, interpretative answers and practical consequences, urged by sensible effects, are direct linked to inferential logic mechanisms – induction, deduction, and abduction – in processes of sense attribution to artifacts, characterizing what we will name as a *semiosic flux* (Figure 1).

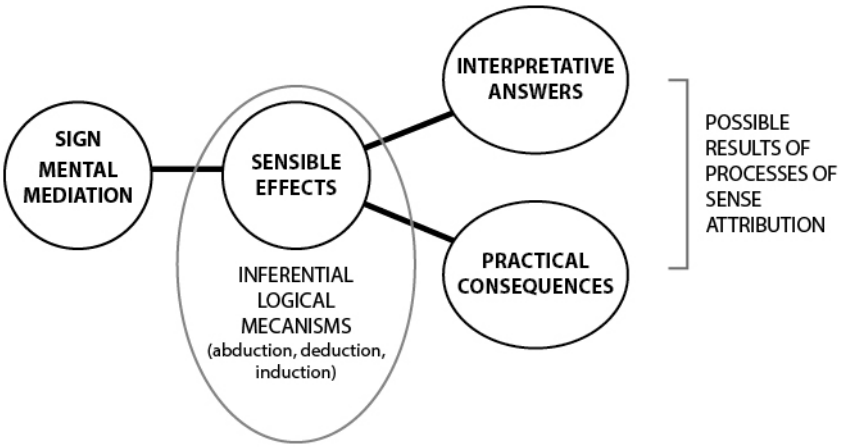

Fig. 1. General framework of the semiosic flux. Diagram by Felipe Domingues.

Such processes of mental mediation are an intangible aspect that conduces individuals, users, to a semiosic flux, that is, leads to a series of mental actions of sense attribution that, in their turn, have bonds with the individuals' cultural background. Stated that, one would ask: How to frame and analyze this sort of intangible aspects in the context of use and specific circumstances?

2. Design and the pragmatist approach

As previously stated, in semiotics functions can be seen as acts of communication, considering artifacts also communicate their *possible* functions (Eco, 1980). Acts of communication emerge from and are closely related to the cultural and social dimensions of design, specially when we focus on the semiosic flux of sense attribution, which regards to the mental action of agents[18,19] involved in artifacts fruition *and*

[17]In order to maintain reading linearity and connectivity among concepts along this essay, the term *practical bearing* will be replaced by *practical consequence*.

[18]It is noteworthy that, although many actors, or agents (e.g., industry, history, fields of study, and so forth), involved in the processes of design may be suitable for analyzes, in this essay the discussion is focused in three of them: the user, the designer, and the researcher.

[19]Actors like users, designers, and researchers will be generally named as *design-agents*, unless there is a need to specify which one we are refering to.

configuration. In such dimensions, users operate actions of standard use, redesign, invention and reinvention by expressing their free wishes in a full and unrestrained way (Cf. Deni & Proni, 2008; Bianchi, Montanari, & Zingale, 2010), but what kind of users? Considering that the term 'users' is a generic terminology, it would not be feasible to explore the possibility of framing individuals' mental logics of actions of use without defining which users we are referring to. In this essay, when using the terminology *user*, it concerns to standard and specialized ones involved in the processes of design and will be named *design-agents*, in contrast with what Zingale and Domingues (2015) named as *user-agent*. Regular-user, design-user, and research-user will be taken as sub-categories of design-agents. In our understanding, design-agents are bodied entities that are *affected* by their cultural backgrounds, and then have varying mental behaviors, which *effect* their interpretative answers and practical consequences when facing problem-solving situations.

Let us now consider that artifacts act like transmitters of personal and collective values, and, as stated by Eco (1980), communicators of possible functions, taking part of the definition of our cultural systems. Once accepted such qualities of the artifacts, due to their capability of affecting some of the individual's mental representations (e.g., beliefs), artifacts extend the social responsibility of the design activity.

In design semiotics, a better comprehension of such extended social responsibility can be reached through following a pragmatistic route started by Peirce, which can be firstly found in the pragmatistic maxim (Zingale & Domingues, 2015). In the pragmatistic approach, the notions of *interpretative answers* and *practical consequences*, which can substitute the notion of *sense*, respectively emerge as crucial matters due to their influence on cognitive and physical environments. In our viewpoint, in the design activity, the preconfiguration of sense into artifacts based on *actual* interpretative answers and practical consequences is a step further in the contemporary processes of conception, adaptation and positioning of design artifacts. Well, if, in order to place such features in design artifacts, we are fostering the need of better understanding immaterial characteristics by retrieving them from facts of everyday life, then we are also talking about searching for answers in the fields of Anthropology and Communications. It is to say that, the senses we are dealing with are not found and retrievable only in material artifacts and cannot be considered only a semantic value within a system, but a symbolic cultural feature. Therefore, differently from what Lévi-Strauss has taught us with the anthropological structuralism, the cultural understanding of Clifford Geertz, in our view, seems to better address the pragmatistic approach we are fostering. As stated by Geertz, culture is "a system of *inherited conceptions* [emphasis added] expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and *attitudes toward life* [emphasis added]" (1973, p. 89). Defined what is our actual understanding of culture, we can now turn back to Peirce, which clearly establishes the notion of meaning production in relation of systems of *inherited conceptions*, or *habits*: "what a thing means is simply what habits it involves" (Peirce, CP 5.400); and its *attitudes toward life*, or *practical bearings*: "consider what effects, that might conceivably have practical bearing" (Peirce, CP 4.402).

At this point, the theoretical link between what has being stated until now and the logics of sense attribution to artifacts must be established. Considering that even individuals located within the same cultural environment may give different interpretative answers when coming into contact with same issues, what could lead them to provide same mental and practical responses? What could conduce them to act differently in specific circumstances but facing same issues? Answering these questions seems to be a hard task due to the subjectiveness, then *how* to deal with it.

Peirce and Bonfantini seem to provide us paths to cope with such semiotic issues. The notions of *doubt*, *belief*, and *plausible hypothesis* then emerge to confront symbolic cultural issues. As stated by Peirce,

"both, *doubt* and *belief* [emphasis added] have positive effects upon us, though very different ones. Belief does not make us act at once, but puts us into such a condition that we shall behave in some certain way, when the occasion arises. Doubt has not the least such active effect, but stimulates us to inquiry until it is destroyed" (Peirce, CP 5.373).

It is to say that, *doubt* has the characteristic to put us in a state of probing, otherwise *belief* makes us aware of how we should proceed when events occur. In the activity of design, such state of probing can be associated with the passage from a *problematic state* to a *solution* to a problem by the identification of an *interpretant artifact* (Zingale & Domingues, 2015).

In the using scene, users, or design-agents, interpret problematic realities. That is, face issues that are not immediately fulfilled with standard interpretative answers in state of belief conducing them to a state of doubt, which fosters design-agents to, in brief *decision-making moments*, randomly come up with *plausible hypotheses* that aim at providing possible solutions to a problem.

The mental act of turning a problem into a process of decision-making leads to the execution of inferential design processes, also understood as inferential logical processes, which take into account the knowledge of the problem and the prefiguration of a possible solution (Cf. Bonfantini, 2000; Zingale, 2012). The prefiguration is based on the search for answers by selection within plausible hypothesis, as taught us Peirce.

Taking into account the previous statements, based on the aim of this paper, one might be wondering how to research, frame and better comprehend mental actions as the ones previously described – *inferential logical processes* and the search for *plausible hypotheses*. According to Zingale and Domingues (2015), the answer or a possible methodological approach to face inferential issues, which also can be addressed as the fundament of the pragmatistic design method, can also be retrieved from Peirce. According to the author, "the only way to discover the principles upon which anything ought to be constructed is to consider what is to be done with the constructed thing *after* [Emphasis added] it is constructed" (Peirce, CP 7.220). Furthermore, Peirce indicates a possible way to support the evolvement of the so-called pragmatistic design method: "That which is to be done with the *hypothesis* [Emphasis added] is to trace out its consequences by deduction, to compare them with results of experiment by induction, and to discard the hypothesis, and try another […] which shall resist all tests" (Peirce, CP 7.220).

From this passage, considering the logical sequence purposed by Peirce, an inferential logic could be drawn: abduction, deduction, and induction, remembering that, in Peirce's Macroargument, the emerging hypotheses are the abductive processes. According to Bonfantini (1980), this is an endless process, an unlimited semiosic cycle as described in the Peircean Macroargument (Figure 2).

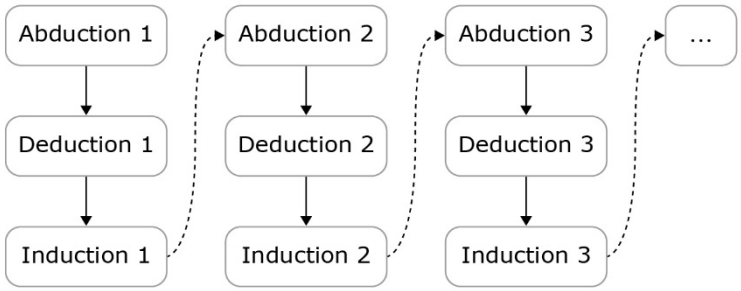

Fig. 2. Peirce's macroargument. Diagram by Salvatore Zingale.

As Peirce stated, such cycle “shall resist all tests” possibly leading to operative and productive stages (Zingale & Domingues, 2015). Though, this is an open-end process, once artifacts are placed in diverse contexts and individuals deal with specific circumstances, the tests start over and over again, and every use may constitute a new interpretant. “The inferential cycle is the ‘design life’ of a product and it acts before, during and after the design” (Zingale & Domingues, 2015, p. 3) and, in certain way, it involves all agents that use the artifacts (e.g., regular users, designers, researchers, and so forth).

Consequently, the senses of artifacts may be found inside cultural systems and searched within concrete consequences that they are involved in, where they in fact exist and affect individuals’ minds. Therefore, once an artifact is brought into the living scene, it can become a mediation artifact, starting mediation processes that, in turn, conduce individuals to act in specific way in order to find possible solutions to specific problems (Figure 3).

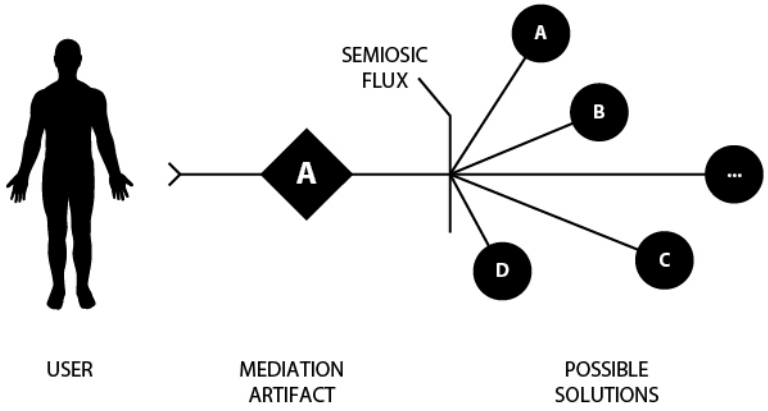

Fig. 3. Mediation artifact and possible solutions. Diagram by Felipe Domingues.

That is, the senses of artifacts change in its use, continuing and completing the meaning of them (Bonfantini & Zingale, 1999). The mental and practical consequences of using acts configure the achievement of the completion of the senses of everyday objects, fulfilling their functions in the long run. It is to say that, the use phase can be understood as an extension of the formal design phase (Zingale & Domingues, 2015). Thus, the full design process is composed by two cyclic phases: design and use phases, formal and informal design stages, respectively. In our understanding, the existence of such phases is one of the reasons that foster the need of comprehension of the logics of sense attribution in-depth, keeping in mind that, our focus is on the informal phase.

2.1 General logics of sense attribution

As previously stated, the senses of artifacts can be searched in many phases artifact development, from conception to use and consequences. In spite of that, the pragmatist approach does not regard only to search for the senses of artifacts, but also to better situate the emerging senses inside the frame of the inferential relations involving the agents of design (Zingale, 2009). In fact, considering that we understand the design activity as an open-ended process, it is needed to enlarge the notion of “design logic”. Recently Zingale and Domingues (2015) stated the “design logic” placing its dialogic correlation to the interpretation of use employed by user, defined as “user logic”, Figure 4.

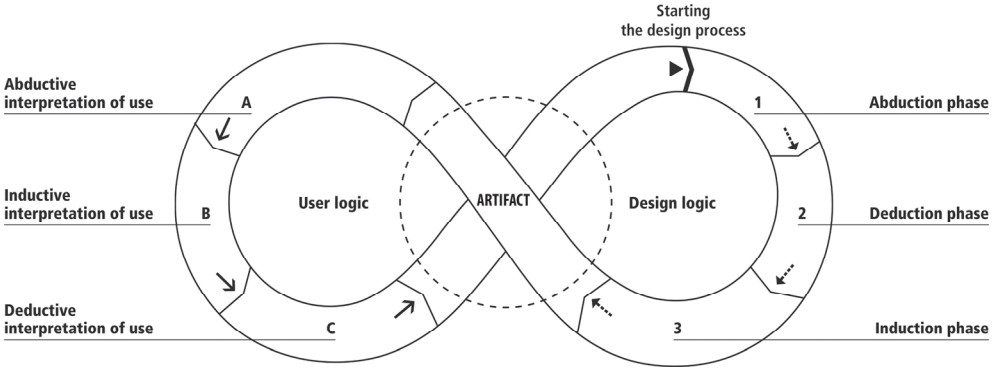

Fig. 4. User logic and design logic. Retrieved from Zingale and Domingues (2015).

According to the authors, the dialogic process may start with the initial idea of conception and production of an artifact. Subsequently, once the object is inserted in a specific context, the user is the one who perform actions employing the artifact. These performative logic actions guarantee the unlimited semiosic in a permanent design process. Moreover, due to its central position in the diagram, the artifact assumes a mediation role in the threefold process of design semiosis, becoming an "entity into which the designer *inscribes* value and from which the user *infers* value" (Zingale & Domingues, 2015, p. 4). In the diagram, a dialogical process of the design action is represented, where the former step is evolved in the designer's mind, materialized into an artifact delivered to any artificial reality, in which the user's mind take place. In its turn, the user's mind, on the basis of cultural standards and personal needs infers values.

The contribution of Zingale and Domingues (2015) to the understanding of the design logics establishes and clarifies relevant aspects of the process of sense attribution to artifacts. Nevertheless, one would ask how the *end-user's inferential responses* could be identified, analyzed, and reported back to the design(-logic) phase? This question states another key point: the role of the design researcher in the design activity as well as in discussions on design and semiotics.

At this moment, considering that this paper is a step toward a try to address the question, herein we will focus at the evolvement of what we consider part of the analytical phase: framing the logics of sense attribution. Keeping this in mind, the next topics, based on Zingale (2009) and Zingale and Domingues (2015), are our attempt to describe such logical processes by framing the logical inferential processes in the design-agents' minds.

2.2 Framing design inferential logics

The three inferential movements – abduction, deduction, and induction – contained in the Peircean Macroargument can be employed in design, as Zingale (2009) taught us. According to the author, and in the explanations that follow[20], **A** should be assumed as *antecedent* of the abductive reasoning, that is, *an* inferential logical process leads to a formal process of design, the artifact emerges; and, **C** stands to the *consequent* of the abductive reasoning, that is, during the use phase of an artifact consequences come out, new inferential cycles start. Let us now see case by case.

In the case of the *abductive inferential movement*, a hypothetical *sensible effect* or *effect of use* comes out. A consequent (**C**) derived from an antecedent (**A**), then (**C**) is considered worth for design – Figure 5.

[20] Considering that this paper is an attempt to evolve and keep up the discussion stated by Zingale (2009) and Zingale and Domingues (2015), in order to preserve the logical criteria, herein we will use exactly the same logical components: **A** stands for *antecedent*; **C** stands for *consequent*).

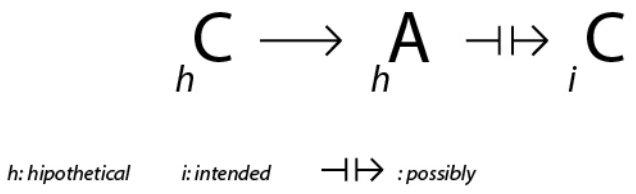

*Fig. 5. Abductive inferential movement in design. (1) A hypothetical effect or consequence (**C**) is thought and plausible to be brought into materiality; (2) An agent evolves the understanding of how the emerged artifact (**A**) has to be designed with the aim at fostering that specific consequent (**C**); then, (3) There is the possibility of the artifact conceived (**A**) produce the intended consequence (**C**). Diagram by Felipe Domingues.*

In abductive instance *sensible effects* or *effects of use* constitute the inferential movement. As result of the inferential movement, (**A**) is the produced artifact conceived according to hypothetical consequences (**C**), that is, designed aiming at inscribing sensible effects or effects of use emerged from the use act. According the Zingale and Domingues (2015), "the design hypothesis then develops from imagining the possible consequences of the object of design" (p. 5). Let us now switch to the second inferential movement: deduction.

In the case of the *deductive inferential movement*, consider that a given artifact (**A**) leads to a consequence (**C**) – Figure 6.

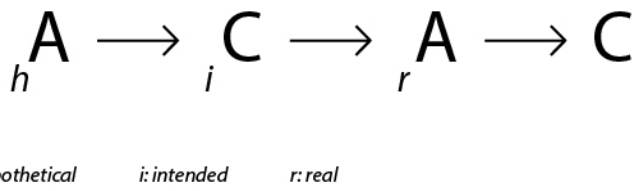

*Fig. 6. Deductive inferential movement in design. (1) If an artifact (**A**) is designed, expected consequences (**C**) can emerge; (2) The artifact (**A**) is materialized and brought to the real world; then, (3) (**A**) will surely produce (**C**) consequences. Diagram by Felipe Domingues.*

The deductive movement is an exploration that starts from a hypothesis based on cultural and previous knowledge, which includes experiences. The results of such exploration are mental evaluations on the design feasibility, that is, whether the artifact of matter can be brought into the material world, whether it *functions* as intended or not, producing determined consequences in specific contexts and circumstances. That is, this instance is characterized mainly by the attempt of answering questions (e.g., If the product we have in mind right now actually existed, what kind of features would it require What kind of interpretation of use would it bring with it).

Lastly, considering that the previous movement (deductive) leads to a positive response, the *inductive inferential movement* is characterized by testing and verifying *if* (**A**) *truly has* (**C**) as a consequence. A testing phase may take place; a logical inference should be empirically probed – Figure 7.

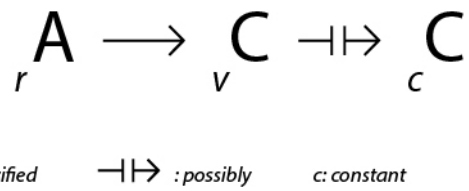

*Fig. 7. Inductive inferential movement in design. (1) The effect of sense is projected, an artifact is designed (**A**); (2) The effect of sense is probed: (**A**) provides consequences (**C**); (3) Perhaps the artifact (**A**) provides such consequences (**C**). Diagram by Felipe Domingues.*

The inductive movement is a phase of experimentation, is the phase of laboratory testing of hypotheses, prototypes, and models. According to Zingale and Domingues (2015), the experience-experimentation dyad is one of the core and decisive phases of design process: in the verifying phase, methods are required. Hence, the inductive inferential movement is the one that requires empirical tests; in the design phase real data should be analyzed in order to verify determined hypotheses, increasing their validity as projectable senses. But how do these inferential movements operate in the living scene.

2.3 Semiosic fluxes in the living scene

Inasmuch as the general understanding of design inferential logics has been stated, the actual issue should be now addressed to how such logics operate in the living scene, that is, now the focus is on real contexts of use and in specific circumstances.

Yet, in this kind of discussion, where the inferential interpretation is often based on partial knowledge (Zingale & Domingues, 2015), Peirce seems to provide us general guidelines: "The object of reasoning is to find out, from the consideration of what we already know, *something else* [emphasis added] which we do not know. […] The question of validity is purely one of *fact and not of thinking* [emphasis added]" (Peirce, CP 5.365). Thus, in order to make possible the theoretical framing of sense attribution, let us now consider individuals using a specific object in their cultural environment to solve a specific problem.

In the logics of sense attribution, our interest is in the something else that emerges from the fruition act, that is, in the *possible functions* identified, or conceived, by the user, keeping in mind that herein users are named design-agents. Such possible functions may be related to what Peirce stated on *Plausible Hypothesis*, discussed by Bonfantini (2000). According to Peirce, to regard a hypothesis as plausible, it must fulfill three requirements before being put into the experimentation phase: The hypothesis must be suitable for experimental tests, it must explain the surprising facts of matter, and must be economically viable (Cf. Peirce, 7.220).

Said that, starting from a suprising fact (e.g., the need to solve a problem), the mediation process is the complex of inferential processes that conducts individuals to *acts of use*, mental or practical, what Zingale and Domingues (2015) named as *user logic*. Nevertheless, such processes of sense attribution do not happen in a formal sequence in the using phase. In fact, they may occur randomly based on the individuals' needs and previous experience, retrieving knowledge from their cultural background and hypothetical ways of use fostered by the artifact itself. Thus, keeping this in mind, to a given artifact, it is ideal that the result of the inferential processes the artifact urges is the achievement of any mental or practical desired task, that is, a *pre-figured task*. Nevertheless, as previously stated, plausible hypothesis can lead users to act in different manners. Then, let us explore how the three inferential movements, deduction, induction, and abduction, hypothetically operate and foster *possible outcomes*.

Firstly, a *deductive* process is usually guided by rules to be followed: *law*, *impaired instruction*, and a *habit*, a *tradition* (Zingale, 2009). Guided by a *law* the design-agents' minds follow stated instructions, or cultural codes. Consequently, the inferential movements take general values as truth and are passive to juridical pronouncement. In the case of laws design-agents are restricted to almost no personal initiative. In here, mental actions may be defined as a plan to be followed to achieve a specific benefit. Differently, an *impaired instruction* is characterized by the transmission of information among individuals. In this case, the inferential movement is based on existing know-how. In its turn, a *habit*, as defined by Peirce, is

a guideline that leads individuals to take stable inferential movements, following cultural patterns. According to Zingale and Domingues (2015), a habit is a result of an abduction, that is, is a *desire to have*, a rule that one accepts […] but is not necessarily obliged to follow. […] Should be intended as the invention of a practice rather than allegiance to a code: a rule that a user designs, in a sense, and adopts autonomously (p. 7).

Secondly, the *inductive* movement takes place when there is no trace of rule. The inductive movement, as in the case of the abduction, is composed by three phases of reasoning: *observation*, *experimentation*, and *verification*.

The *observation* phase is exploratory. It is the try to identify significant associations contained in an artifact. According to Zingale and Domingues (2015), significant associations are connections among things that can conduce to cognitive contents, which, in turn, lead to identification of rules and constants. Thus, the exploration remains until the solution is found. In the inductive inferential movement the *experimentation* phase occurs based on previous and current experience. That is, individuals act in accordance with previous deductive knowledge plus ongoing comprehension gained during processes of *verification*. Therefore, induction is the introduction of the sense attribution process, is the understanding of use by experimenting an artifact, a first phase of an abductive process.

In the absence of rules (deduction) as well as possibility of experimentation (induction), the inferential movement that takes place is the abduction (Cf. Zingale, 2009). In abductive inferences, individuals may *try* to find answers based on their own experience and cultural background. Thus, the logical movements in the design-agents' minds occur on the basis of *habits*. Supported by their own knowledge, individuals attempt to hypothesize rules (Bonfantini & Proni, 1980). In fact, the abductive reasoning precedes inductive experimentation, because in the attempt to use a product appropriately, the first 'stab' is always a gamble (Zingale & Domingues, 2015). Furthermore, abductive processes can be regarded as abductive-invention, or reinvention. Therefore, the abductive movement, also named *retroduction*, is a return backwards, from effect to cause, is a "projective gaze" (Zingale, 2009, p. 186). That is, "from the formal configuration of an artifact (effect) it is possible to abduct the rules of use planned into it (cause) (Zingale & Domingues, 2015). Abductive-invention usually succeeds in dealing with the limits of artifacts: suitability, feasibility, and availability. *Suitability* to purpose, the artifact does not do what it is supposed to do; *conception*, a possible use has not been envisaged; *availability*, the artifact does not exist or is impossible to find (Zingale, 2009).

3. Discussion

It is important to highlight that one of the aims of this paper is to foster discussions on the employment of the pragmatistic semiotics within processes of product development, particularly in early stages of product analyses and design. Said that, let us now retrieve the questions we stated along this essay.

The first question concerns to whether is possible to develop a method to frame intangible aspects in the context of use and specific circumstances. Even though, at this stage of the research we are taking a theoretical "stab", in our viewpoint, it *is* possible and a *valid* research our attempt to frame intangible aspects such as cultural interpretative answers and practical consequences. In this sense Peirce gave us fundamental theoretical guidelines that support the research method we are evolving. As stated by Peirce, "the question of validity is purely one of *fact* [emphasis added] and not of thinking" (Peirce, CP 5.365). It is to say that, the answers for this sort of research question are in the *living scene*, in the *consequence of things* in the users' lives. Along this essay, based on Zingale (2009) and Zingale and Domingues (2015), we have theoretically shown how users' mental behavior may act in order to attribute sense to artifacts

(Cf. Figures 2, 4, 5, 6, and 7). In spite of that, as a theoretical exploration, other questions naturally emerge, conducing the discussion to another issue.

The second question regards to user specificity. Zingale and Domingues (2015) have presented a diagram that graphically explains the endless design cycle (Cf. Figure 4). In the diagram, which has an artifact in its center as an entity where values are inscribed and inferred, the authors described the processes of design semiosis regarding *user-* and *design-logics*. Contemporary, there are academic and industrial demands for *systematic* and *scientific* research in the fields of design and semiotics (Cf. Deni, 2015; Borja De Mazota, 2014; Findeli, 2014; Domingues, 2011), thus, our attempt is to bring the pragmatistic semiotics into de field of design. In this sense our contribution to the evolvement of the already mentioned diagram, is including the figure of the design-researcher, Figure 8.

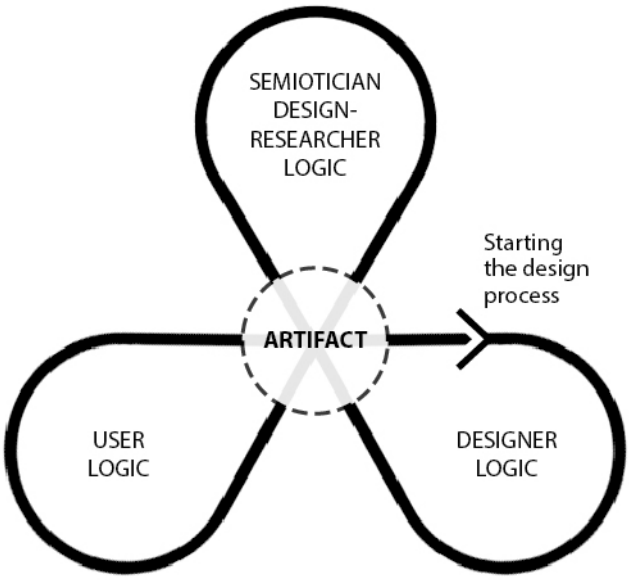

Fig. 8. The propeller model: design-agents' semiosic flux. Diagram by Felipe Domingues.

The diagram above is also a try to bring into the discussion the role of the *semiotician design-researcher* in processes of product development and analysis; is also an attempt to confront Eco's statement on the role of the designer, which we do not believe is possible in case of most designers. Eco (1980) says that before thinking as a designer, the design professional should "think like a sociologist, an anthropologist, a psychologist, an ideologist, etc." (p. 48). Nevertheless, in this paper it was not possible to develop the diagram present in the Figure 8 due to, in our viewpoint, the need of empirical research and discussions on the theme. In addition, the contemporary literature, does not provide answers for the presented triadic relation. Consequently, at this moment we have no answer to the actual issue and the ones that may emerge from it. Consequently, the third and forth questions, which are interrelated and inquiry the correlation among individuals vs. contexts vs. interpretative answers vs. practical consequences, in our viewpoint, also require empirical and experimental research.

Lastly, the fifth question, is also related to the role of the semiotician design-researcher, that is, concerns in answering how the end-user's semiosic responses could be identified, analyzed and reported back to designers in early stages of design as well as in the design-logic phase as shown in Figure 8. It is to say that we have, at least three stages to be taken into account and evolve. In different levels of depth, these

phases are under development[21], but herein we have no enough space to bring them into the discussion, keeping in mind that in this paper our focus was on the analytical aspect of the pragmatistic semiotic research in design.

4. Conclusion

Regarding to implications for theory, this paper adds knowledge to the discussions postulated by Deni (2015), on the need of the evolvement of systematic analyses on the predictive faculty of semiotics concerning specific circumstances. In addition, incorporates information at the dialogue with Boztepe (2007), regarding the establishment of research frameworks that take into account the analyses of cultural aspects for the development of global products.

With respect to implications on empirical and practical applications, the statements presented in the paper intends to allow the actors involved in the process of analysis and design of artifacts to better comprehend and frame what is behind the fruition act: the inferential logics of senses attribution. Moreover, it is believed that such comprehension may aid the processes of decision-making at the very early stages of design, adaptation and market positioning of goods (e.g., global products).

Through discussing and evolving the purpose of a method of framing the pragmatistic dimension of the artifacts purposed by Zingale and Domingues (2015), this paper may contribute to fields related to the design activity fostering interdisciplinarity. We believe that the better theoretical comprehension of the semiosic flux strengthen the analytical phases of design process, especially by placing the pragmatistic semiotics approach in processes of product development; keeping in mind that, in these processes experimental tests are crucial to validate the materialization of intended consequences.

Concluding, in further stages of the so-called broader investigation, the evolvement and application of such inferential examination, considering data retrieved from the living scene, may aid the analyses and introduction of symbolic features into artifacts in the very early stages of design. Consequently, providing scientific instruments to increase the understanding and validity of the intangible aspects of design by systematic analyses.

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[21] For the *identification* phase, refer to Domingues (2011) and Domingues, De Moraes and Zingale (2014), both investigations were supported by the Research Foundation of the State of Minas Gerais (FAPEMIG/Brazil) in partnership with Whirlpool Latin America (Advanced Design Sector – Joinville, SC, Brazil). For the *reporting back* semiotic information to designers, Domingues developed formal workshops/lectures on semiotics at Whirlpool Latin America (2010-2013, Joinville, SC, Brazil) and carried out the experimental workshop *Semiotic Interferences in the Artifacts Design* [translated from the original in Portuguese] at the University of the State of Minas Gerais (2013, Belo Horizonte, Brazil).

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