



The Design Journal

An International Journal for All Aspects of Design

ISSN: 1460-6925 (Print) 1756-3062 (Online) Journal homepage: <http://www.tandfonline.com/loi/rfdj20>

Aesthetics in Design Semiotics Research. Developing foundations to better comprehend cultural habits and codes in bottom-up design processes

Felipe Domingues, Salvatore Zingale & Dijon De Moraes

To cite this article: Felipe Domingues, Salvatore Zingale & Dijon De Moraes (2017) Aesthetics in Design Semiotics Research. Developing foundations to better comprehend cultural habits and codes in bottom-up design processes, The Design Journal, 20:sup1, S49-S62, DOI: [10.1080/14606925.2017.1353028](https://doi.org/10.1080/14606925.2017.1353028)

To link to this article: <https://doi.org/10.1080/14606925.2017.1353028>



© 2017 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 06 Sep 2017.



Submit your article to this journal [↗](#)



Article views: 88



View related articles [↗](#)



View Crossmark data [↗](#)

Aesthetics in Design Semiotics Research. Developing foundations to better comprehend cultural habits and codes in bottom-up design processes

Felipe Domingues^{a*}, Salvatore Zingale^b, Dijon De Moraes^c

^a Politecnico di Milano (Italy); National Council for Scientific and Technological Development (CNPq/Brazil)

^b Politecnico di Milano, Supervisor

^c Minas Gerais State University (Brazil), Co-supervisor

*Corresponding author e-mail: felipe.domingues@polimi.it

Abstract: Designers play an important role in shaping artifacts, but they are no longer in charge of the entire design process. Who else then is in charge? How to cope with scientific research in design? This paper is motivated by discussions on *how* to analyze bottom-layer features and the role of design-agents (designers, users, and researchers/semioticians). Focusing on sense attribution to artifacts and consequences thereof that unfold when they are positioned in specific contexts, the concepts of cultural habits and codes have supported our reflections on aesthetic issues in field research. We are delving into how to *systematically* inquire into *habits* that lead users to attribute functions to artifacts. As a result, the Trefoil Model have emerged as a theoretical proposal to support the comprehension of semiotic fluxes in development, fruition, and analysis of artifacts, which may foster interplay among design-agents in processes of design of artifacts from a pragmatistic perspective.

Keywords: Semiotics, Pragmatism, Aesthetics, Design Analysis, Methodology.

1. Introduction

Industrial Design has evolved significantly over the past years; its definition has been extended to a strategic problem-solving process which links, among others, transdisciplinarity, research, business, and customers (ICSID, 2015). Therefore, the design activity plays an important role in shaping the artificial world in which we live, affecting us even culturally in the long run. It has evolved from an input in the production enhancement of artifacts to an intrinsic cultural aspect of advances in the society, eventually broadening its own scope to other fields such as communication and management (Zingale & Domingues, 2015).

Nevertheless, as a field of research, design lacks systematic approaches. Even though design has been recognized as a relevant activity (Kotler & Rath, 1984), it has also been criticized due to its unstable scientific foundations (Findeli, 2014) and lack of scientific reasoning in its development (Borja de Mazota, 2014). In design semiotics, systematic methods are considered crucial: “what is still missing [...] is a *systematic* [emphasis added] reflection on the predictive capability of semiotics” (Deni, 2015, p. 10).

Focusing on design semiotics, this paper intends to foster the debate on the understanding of inferential logics of sense attribution to artifacts. The aim is to contribute to the development of a method of *systematic research* into and *analysis* of the relationship established between users and artifacts in their context of use and under specific circumstances (cf. Domingues, Zingale, & De Moraes, 2016a). The starting point is Eco’s understanding of *functions* (cf. Eco, 1980) and Peirce’s Pragmatic Maxim (Peirce, 1931-1958).

Understanding the notion of functions may be a complex task in the world of artifacts, which are designed to fulfill either specific needs or to solve problems. However, throughout the product lifecycle – use, disposal, reuse and/or recycle – the users are the ones who usually incorporate functions and complete the product design chain (cf. Zingale & Domingues, 2015). From the users’ standpoint, it seems that artifacts both function and communicate *possible* ways of performing tasks. Hence, designing *possibilities* is a provocation to 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* [emphasis added] interpretation keeps one from perceiving.” (Eco, 1980, p. 12)

Peirce's Pragmatic Maxim also provides guidelines on designing possibilities into functions of objects:

“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)

The association of both italicized terms – *effects* and *practical bearing*¹ – with the notion of *sense* is relevant to the following statements, since the term *effect* also appears in Peirce’s notion of sense: “Our idea of anything is our idea of its *sensible effects* [emphasis added]” (Peirce, CP 5.401). According to Peirce, the senses of any sign (e.g., industrial goods) are associated with *all* possible *interpretative answers* and *practical consequences* derived from the sensible effects they produce or could produce (Zingale & Domingues, 2015). Domingues, Zingale, and De Moraes (2016b) contends that processes of mental mediation, too, are signs, and thus interpretative answers and practical consequences, both derived from sensible effects, are affected by inferential mechanisms such as induction, deduction and abduction typical of semiotic fluxes (Figure 1).

¹ Practical bearings and practical consequences are equivalent in meaning.

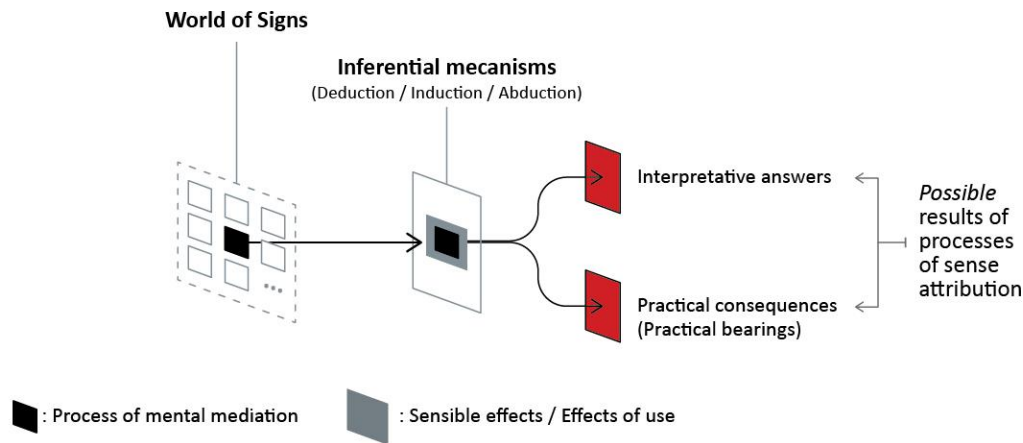


Figure 1. General framework of the semiotic fluxes. Source: Adapted from Domingues et al. (2016b).

Semiotic fluxes are subjective processes of sense attribution to artifacts (Domingues et al., 2016b). As such, they may be regarded as intangible processes that lead individuals² to a series of mental actions, which possibly result in mental and/or practical responses in the social nexus. Such responses are either intentionally or tacitly linked to the individual's cultural habits (cf. Peirce, 1931-1958), social codes (cf. Eco, 1980), and life experiences often *expressed* or *materialized* through *informally* designed artifacts [material culture] and/or the individual's mental and practical behaviors [cultural habits and codes].

2. Artifacts, functions, and pragmatism

Assuming artifacts communicate *possible* functions (cf. Eco, 1980), industrial design³ can be deemed as an act of communication thereof that emerge from cultural habits that may be identified in the social nexus and in daily life. This holds especially true when we focus on sense attribution, which also concerns to the *mental actions* performed by the users involved in the configuration, fruition, and analysis of artifacts.

The mere placement of an artifact (e.g., a refrigerator) in human environments may provoke contrasting responses from users as well as social and environmental changes (e.g., psychological dependence, structural adaptations). In this situation, *design-agents*⁴ act randomly, *inferring* and *interfering* with artifact functions⁵, as well as performing actions of standard use, redesign, invention and reinvention by expressing deep wishes in a fully unrestrained way (cf. Bianchi, Montanari, & Zingale, 2010; Deni & Proni, 2008; Zingale, 2016;). In other words, contemporary processes of design are far from being processes in which the professional designer is the only one who designs.

The professional designer is the one who *formally* designs artifacts, but the end users *informally* complete the process. End users include *all* players around the artifacts since objects are part of the social nexus.

² The term *individual* may also correspond to *social groups*.

³ Eco (1980) defines architecture as "phenomena of industrial design" (p. 11).

⁴ Following Domingues et al. (2016b), users, designers, and researchers will be named as *design-agents*.

⁵ cf. Eco (1980) and Barthes (1957 [1972]).

Eco (2015 [1968]) pointed out the need for a transdisciplinary design activity. However, coping with such a complex interaction of disciplines in which diverse actors take part in interplay demands a clear definition of *who* these players are and *what* their roles are in the processes of inferring and interfering with functions and conception of artifacts.

Domingues et al. (2016b) framed design-agents⁶ in a theoretical model (Figure 2).

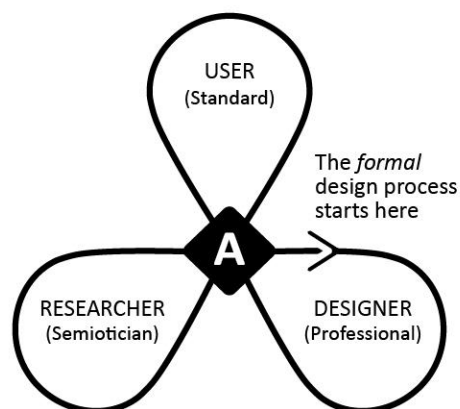


Figure 2. *The Propeller Model: Design-agents around the artifact.* Source: Adapted from Domingues et al. (2016b).

Naming users as design-agents, from within design semiotics, is a step forward in the process of semiotic analysis. It increases the feasibility of understanding the individuals' rationale of sense attribution to artifacts in many aspects. Design-agents are then *embodied entities* that are *affected* by their cultural backgrounds and habits, and consequently have *varying* mental behaviors, which in turn *affect* their interpretative answers and practical consequences when they deal with specific circumstances and/or face either personal or collective problem-solving situations.

Let us then consider artifacts as bearers of personal/collective values/codes and communicators of possible functions (cf. Eco, 1980). As a part of our material and cultural systems, they broaden the design activity's social responsibility, which may reasonably be approached by employing a pragmatic perspective. The impacts of the notions of interpretative answers and their practical consequences on our cognitive and physical environments seem key to the comprehension of artifacts, since they can be replaced with the notion of sense.

Sense attribution to artifacts on the basis of actual interpretative answers and practical consequences is an advance in the contemporary processes of conception, adaptation and positioning of designed artifacts (cf. Domingues et al., 2016b). Such assertion leads us to search for answers in the applied social sciences (e.g., anthropology, information science), and in the symbolism that arises from our material culture, instead of *only* in the artifacts themselves or in their semantic values (cf. Boztepe, 2007).

Geertz (1973) clearly conceives culture as a symbolic system, i.e., "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]" (p. 89). Two key concepts in this fragment can be associated with concepts in Peirce's framework. *Inherited*

⁶ Although many design-agents involved in design activities are suitable to analyses (e.g., governments, industries, etc.), we are focusing on sub-categories: standard-users, professional designers, and researchers/semioticians.

conceptions relates to *habits*: “what a thing means is simply what habits it involves” (Peirce, CP 5.400). *Attitudes toward life* relates to *practical bearing*: “consider what effects, that might conceivably have practical bearing” (Peirce, CP 5.402).

On the basis of said concepts, individuals located within the same cultural environment may have contrasting attitudes toward life, i.e., they may provide different answers when they face similar problems. Then, interpretative answers and practical consequences that come out as problem-solving responses are *key information* to solve design issues. Although that is no novel conclusion, it still poses the question: How to tap into such a subjective matter in varying contexts? At this point, the notions of *belief*, *doubt* and *plausible hypothesis* emerge as guidelines to deal with symbolic cultural issues in field research in design.

3. Belief, doubt, and plausible hypothesis

Symbolic cultural features are related to inferential processes in the individuals’ minds. Peirce and Bonfantini provide ways to cope with such a semiotic issue. As stated by Peirce, *belief* and *doubt* affect us in different positive ways. Belief does not make us act at once, but pushes us to a condition whereby we shall behave in certain way under specific circumstances. In contrast, doubt makes us inquire and leaves us in a state of probing until it is destroyed (Peirce, CP 5.373). According to Zingale and Domingues (2015), such a state of probing can be related to the passage from a *problematic state* to a *problem solution* through the identification of an *interpretant artifact*, which characterizes the activity of design.

In daily life, design-agents deal with problematic realities, facing situations that are not immediately coped with through interpretative answers in a state of belief. In a state of doubt, *plausible hypotheses* come out aiming at providing possible solutions to problems. In fact, turning problems into processes of decision-making leads to inferential design processes, which mentally take into account previous knowledge of correlated problems and the prefiguration of possible solutions (cf. Bonfantini, 2000; Zingale, 2012). Prefiguration is based on the search for answers by selection from plausible hypotheses. But how to research into, frame and better comprehend mental actions as inferential processes and plausible hypotheses? A reasonable way to deal with such issues may lie on pragmatism: “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). Peirce points out what Zingale and Domingues (2015) understood as the pragmatistic design method:

“That which is to be done with the hypothesis is to trace out its *consequences* [emphasis added] 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)

Considering the logical sequence – abduction, deduction, and induction – proposed in Peirce’s Macro-argument (Figure 3), which is an unlimited semiotic cycle (Bonfantini & Proni, 1980), the emerging hypotheses consist of abductive processes.

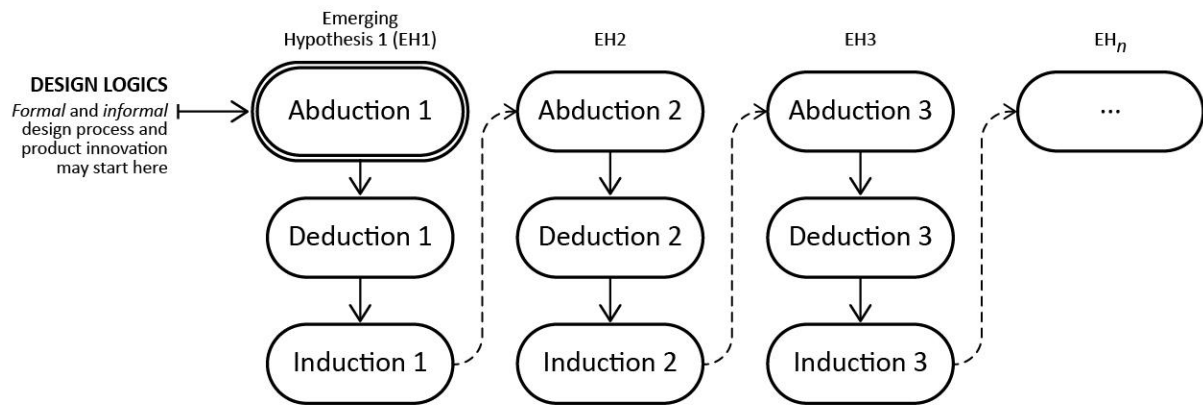


Figure 3. Graphic representation of Peircean Macro-argument in design. Source: Adapted from Zingale and Domingues (2015).

Following design logics, artifacts *shall resist all inferential tests* prior to heading to the production phase. Nevertheless, the design life cycle is an open-end cycle, in that tests may occur over and over again in the long run. Since design-agents extensively interact with objects, new interpretant artifacts may appear, and *plausible consequences* may be suitable for industrial design, entailing informal to formal processes of design inquiry. Consequently, artifacts are permanently exposed to semiotic fluxes (Figure 4), which lead individuals to act and react in specific ways to solve problems, thereby changing its senses and consequences.

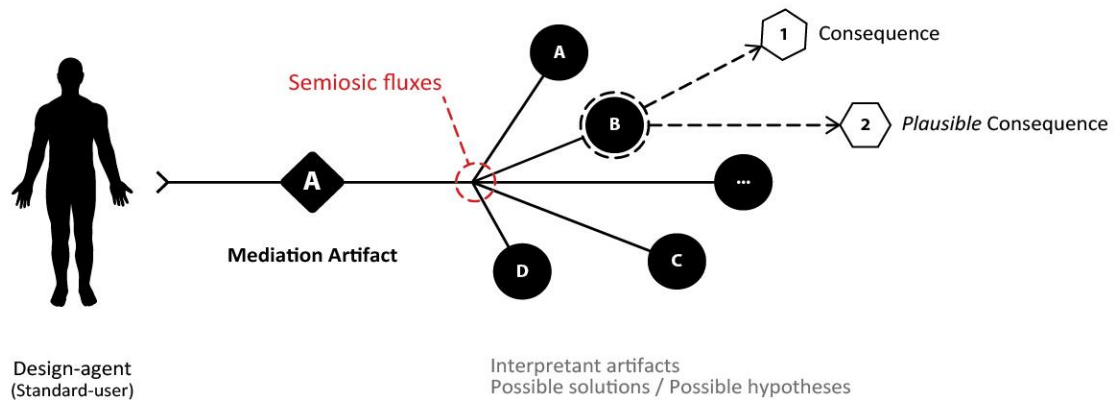


Figure 4. Mediation artifact unfoldments: Possible solutions and plausible consequences derived from semiotic fluxes. Source: Adapted from Domingues et al. (2016b).

Inasmuch as the senses and consequences of artifacts change throughout their use, thereby continuing and completing their meaning (cf. Bonfantini & Zingale, 1999), mental and practical consequences of acts of use lead to the achievement of their complete sense. The use phase is an extension of the formal design phase (Zingale & Domingues, 2015). Thus, the entire design process is composed of two theoretically conjoined cyclical phases: design [*formal*] and use [*informal*] phases. How then to join them in order to enhance earlier stages of design? How design-agents' rationale would affect and aid bottom-up design processes?

3.1 Design-agents and the general logics of sense attribution

The senses of artifacts may be apprehended in many phases of the design of artifacts, from conception processes to use and consequences derived from informal processes of design. The pragmatic approach is aimed at locating the emerging senses by identifying design-agents' rationale. It broadens the design logics, i.e., it allows for a dialogic correlation between conception phases and the use interpretation employed by users (Domingues et al., 2016b; Zingale, 2009; Zingale & Domingues, 2015), as shown in Figure 5.

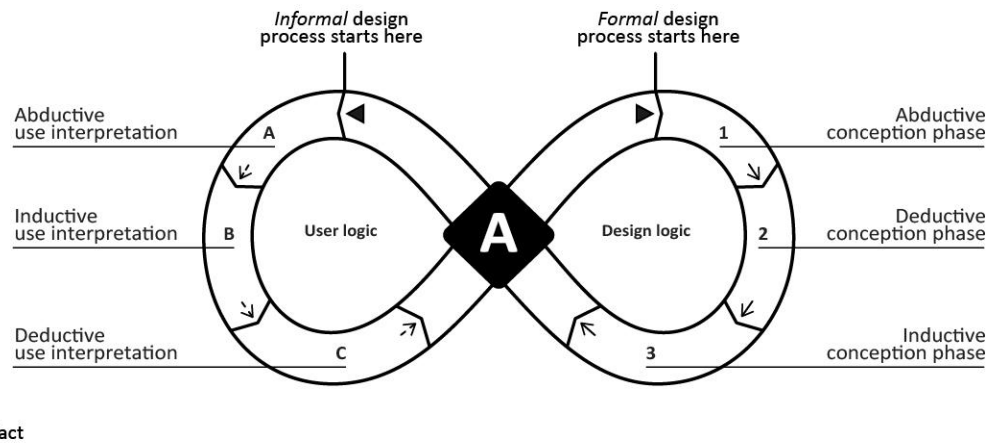


Figure 5. *The Dialogical Design Model: User and design logical movements.* Source: Adapted from Zingale and Domingues (2015).

According to the Authors, the dialogic process may start with a *formal* design process, i.e., the conception and production of an artifact. Once it is released within a context, the user performs artifact-employment actions, and inferential logics ensures the permanent design process.

In Figure 5, the artifact assumes a mediation role, while designers *inscribe* values and standard-users *infer* and *attribute* values. In this dialogical process, the designer conceives of the artifact, bringing it into the real world, where the user assumes control. Zingale and Domingues' (2015) contribution clarifies aspects of processes of sense attribution to artifacts, yet the model has limitations. For now, let us first take a look at the logics of sense attribution to artifacts.

3.2 Logics of sense attribution to artifacts

In Figure 5, Zingale and Domingues (2015) framed six inferential movements organized into two phases: use interpretation and conception, both distributed into abduction, deduction, and induction sub-phases. An inferential process leads to a formal process of design whereby artifacts emerge and inferential cycles get started. Considering each inferential process has its particular characteristics as shown in the following explanations and figures, let us assume that **A** stands for *Antecedent* and **C** for *Consequent* (cf. Zingale, 2009; Zingale & Domingues, 2015).

In *abductive movements*, an *antecedent* (**A**) caused by an *effect of use* emerges in the user's mind. A *consequent* (**C**) is derived from the *affected antecedent* (**A**), leading to the development of a *hypothetical artifact*. Thus, it is feasible for a consequent (**C**) to be designed (Figure 6).

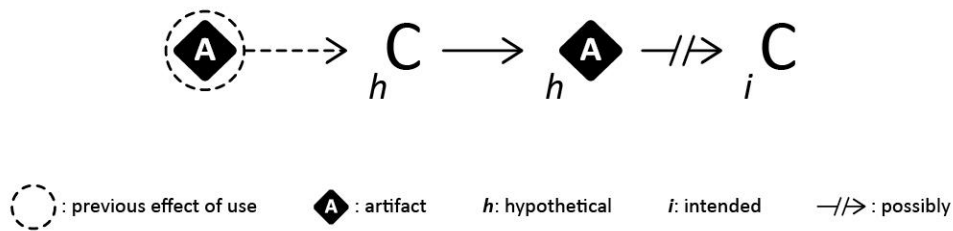


Figure 6. Abductive inferential movements in design. (1) A hypothetical consequent (C) is thought of and plausible to be designed due to a previous effect of use; (2) a design-agent mentally develops the understanding of how the emerged artifact has to be designed aiming at fostering hypothetical consequent (C); then (3) the conceived hypothetical artifact (A) can possibly produce the intended consequent (C). Source: Adapted from Domingues et al. (2016b).

In the abductive instance, *effects of use* constitute the inferential movement. As a result, the produced artifact is conceived of according to hypothetical consequents (C) designed with a view to attributing effects of use emerged from the act of use.

In the *deductive movement*, let us assume that a hypothetical artifact leads to a consequent (C) (Figure 7).

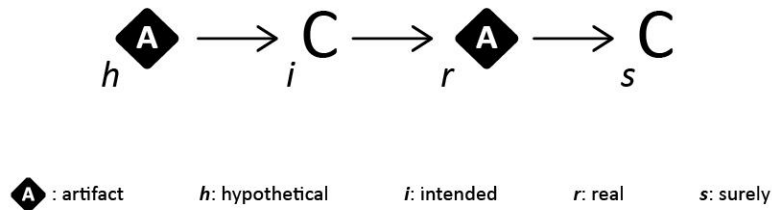


Figure 7. Deductive inferential movement in design. (1) If a hypothetical artifact is designed, intended consequents (C) may emerge; (2) the artifact is materialized and launched; (3) the artifact will surely produce consequents (C). Source: Adapted from Domingues et al. (2016b).

The deductive movement starts from a hypothesis based on habits. The results of such exploration are mental evaluations on design feasibility, whether the hypothetical artifact *functions* as intended. The deductive movement is characterized by an user’s attempt to answer questions (e.g., existence of the hypothetical artifact, features needed).

The *inferential movement* encompasses the deductive movement, since it leads to positive responses. It consists of testing and verifying if the artifact surely has (C) as consequent (cf. Zingale & Domingues, 2015), which leads the design process to a probing phase (Figure 8).

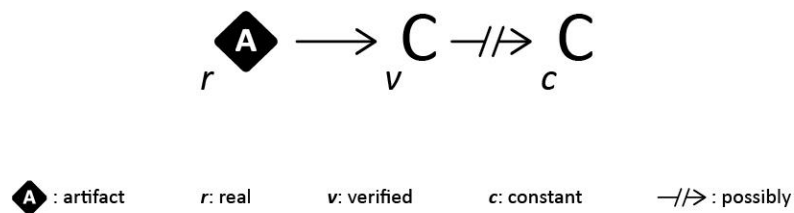


Figure 8. Inductive movement in design. (1) An artifact is designed; (2) the effect of use is probed: the artifact provides verified consequents (C); (3) the artifact possibly provides such consequents (C). Source: Adapted from Domingues et al. (2016b).

As a verifying phase, the inductive phase is one of laboratory testing, prototyping, and validation (cf. Zingale & Domingues, 2015).

Nevertheless, assuming that the *user rationale* exists and is suitable to embedment in bottom-up design processes, *how* to identify plausible hypotheses in specific contexts considering they emerge from such subjective processes as semiotic fluxes?

3.3 Identifying plausible hypotheses in contexts of use

Considering designers are not usually trained to be formal field researchers, identifying plausible hypotheses may be possible by employing methods from applied social sciences in the context of use. Therefore, design researchers/semioticians should be in charge of this task.

Following the Dialogical Design Model (cf. Figure 5, p. 7), the design cycle is completed when standard-user infers senses from artifacts or attributes senses to them. Yet, which design-agent inquires into such senses? The Trefoil Model⁷ then emerges as a theoretical proposal that increases the comprehension of the interplay among design-agents (Figure 9).

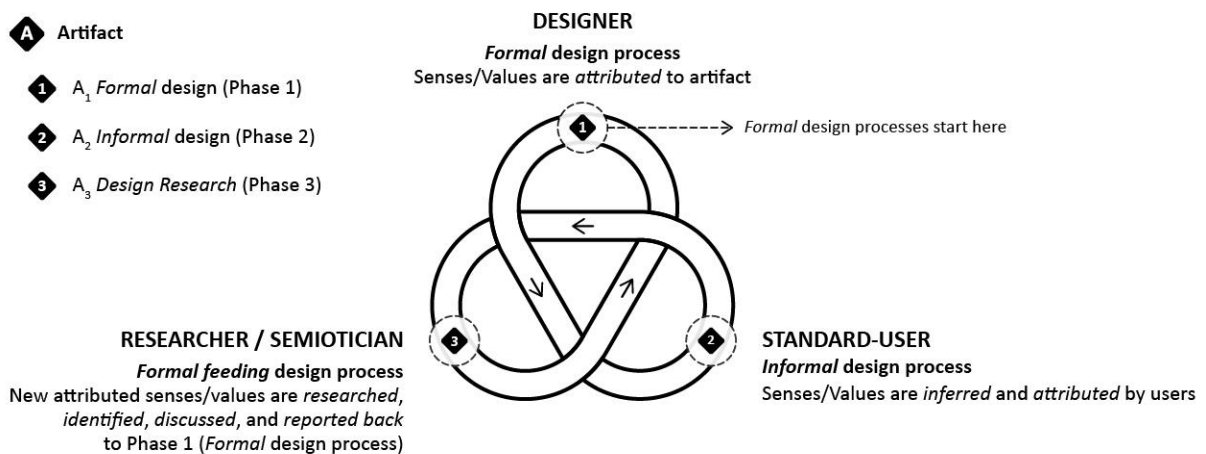


Figure 9. The Trefoil Model: The interplay of design-agents in the design cycle.

Assuming the Trefoil Model as a valid proposal to define who the design-agents are and what roles they play, then how does such an interplay operate in field research considering that inferential

⁷ The Trefoil Model was formally presented at Politecnico di Milano, Department of Design, on May 18th, 2016.

interpretation is often based on partial knowledge as stated by Zingale and Domingues (2015)? Peirce points out that

“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)

Either the present or the past acts of using an artifact may be amenable to a pragmatistic approach in cultural environments. The “interest is in the something else that emerges from the fruition act” (Domingues et al., 2016b, p. 249) or both an *action* itself and a *fact* identified as *possible function(s)*, possibly related to Peirce’s plausible hypothesis.

According to Peirce (7.220) a plausible hypothesis must explain surprising facts or subject matter, be amenable to experimental tests, and be economically viable. A surprising fact (i.e., complex of inferential processes) leads individuals to acts of use – either mental or practical – named *user logics* (Zingale & Domingues, 2015), which occur “randomly based on individual’s [...] cultural background and hypothetical ways of use urged by the artifact itself” (Domingues et al., 2016b, p. 249), e.g., *prefigured tasks*. However, how these random acts may operate in each inferential process?

A *deductive* process is usually guided by *laws*, leading design-agents to follow (1) *cultural codes*, i.e., instructions restricted to barely any personal initiatives; (2) *impaired instructions*, information conveyed from an individual to another; and (3) *habits* (cf. Zingale, 2009), which lead individuals to follow cultural patterns (Peirce, 1931-1958).

The *inductive* process takes place when there is no trace of rule. Induction is the introduction of the sense attribution process; it is the understanding of use by experimenting an artifact. It contains three reasoning phases: *observation*, *experimentation*, and *verification*. *Observation* is exploratory, it is an attempt to identify significant associations in an artifact that can entail cognitive contents, leading to identification of rules and constants (Zingale & Domingues, 2015). *Experimentation* occurs on the basis of previous deductive knowledge and comprehension gained during processes of *verification*.

Ultimately, in *abductive* processes, design-agents based on habits may *hypothesize* to solve problems (cf. Bonfantini & Proni, 1980). The abductive reasoning precedes inductive experimentation because: (1) it is an attempt to use a product appropriately on the basis of its shape (Zingale & Domingues, 2015); (2) it is a *retroduction* from effect to cause; and (3) it is a “projective gaze” (Zingale, 2009, p.186), i.e., the formal configuration of an artifact [effect] is possibly abducted from planed rules attributed to it [cause] (Zingale & Domingues, 2015).

4. Discussion

Theoretical models like The Propeller Model (cf. Figure 2, p. 4) are not exclusive to design as a research field. However, in design semiotics it may foster further theoretical/empirical/experimental analyses, considering the amount of design-agents involved in design processes. Thus, it was conceived to allow for attaching as many design-agents as desirable, avoiding limited thoughts on its intrinsic relevance to research and practice in design semiotics (Figure 10), bearing in mind it is a model that stresses *interplays* instead of polarities.

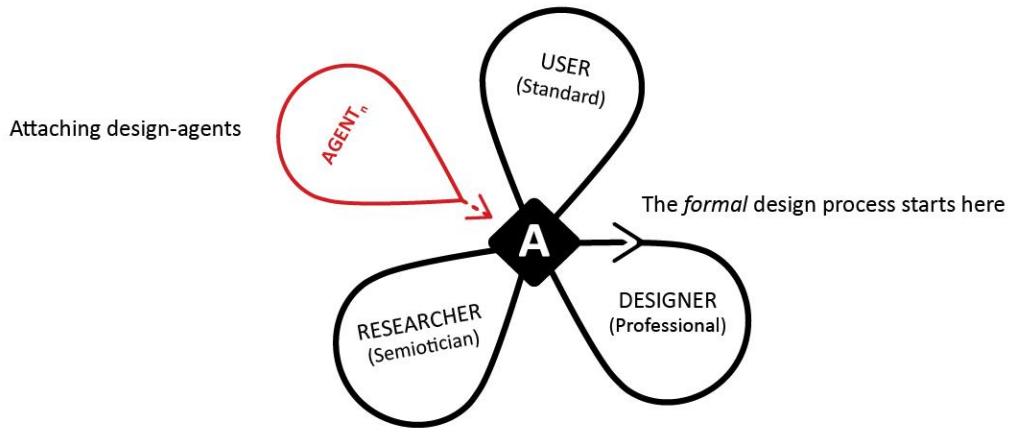


Figure 10. Broadening The Propeller Model.

The Trefoil Model (cf. Figure 9), which is suitable to similar considerations, tries to broaden the understanding of design-agents’ inferential interplay, as connecting three agents may be insufficient to provide answers to semiotic design issues for industrial design. Nevertheless, The Trefoil Model’s contribution is bringing design researchers/semioticians into design processes, i.e., it opens up discussions on the role of pragmatism in field research and holds design semioticians accountable for *empirically/experimentally* understanding sense movements in the material culture and *how to report* them to designers from a pragmatistic approach, inasmuch as artifacts senses are likely to cultural change in the long run. A further contribution would be analyzing design-agents like Zingale and Domingues (2015 [cf. Figure 5, p. 7]) have done, while also introducing the design researcher/semiotician logics (Figure 11) in further studies.

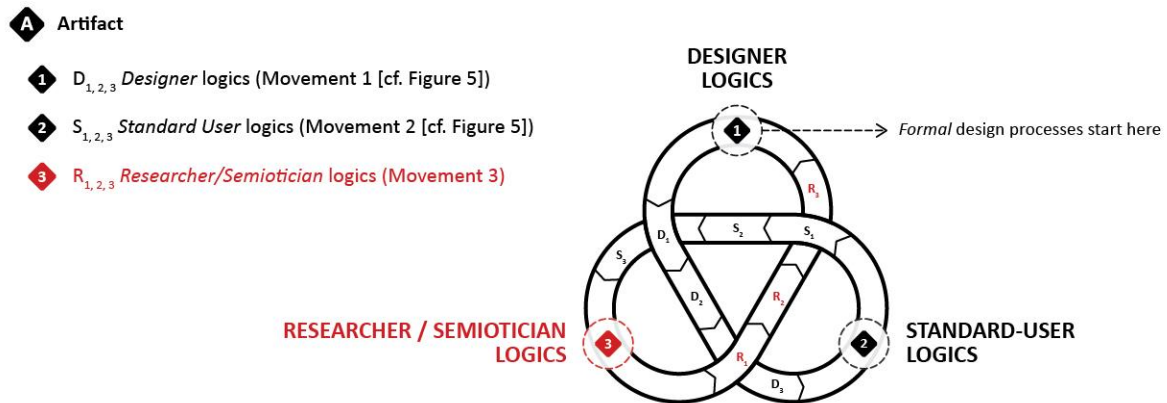


Figure 11. Proposal of interdisciplinary analysis of the logical behavior of the researcher/semiotician.

Discussing and employing Peircean statements in design semiotics is not a novelty (cf. Chow & Jonas, 2010; Chow, 2005; Chow, Jonas, & Schaeffer, 2009). Nevertheless, the employment of Peircean pragmatism, which is not necessarily correlated with Peirce’s classification of signs, seems to have been neglected in design semiotics. In adopting Peirce’s theories to cope with issues within design semiotics, Zingale (2016), Domingues et al. (2016b), Zingale and Domingues (2015), Domingues (2011a [2008], 2011b), Chow, Jonas and Schaeffer (2009) and Chow (2005) have been contributing to research in design semiotics, providing both theoretical and empirical qualitative data. For instance, empirical qualitative primary data have been collected and analyzed with a funding by Whirlpool

Latin America in partnership with Research Foundation of the State of Minas Gerais (FAPEMIG/Brazil) (cf. Domingues, 2011a [2008], 2011b), as shown in Figure 12.

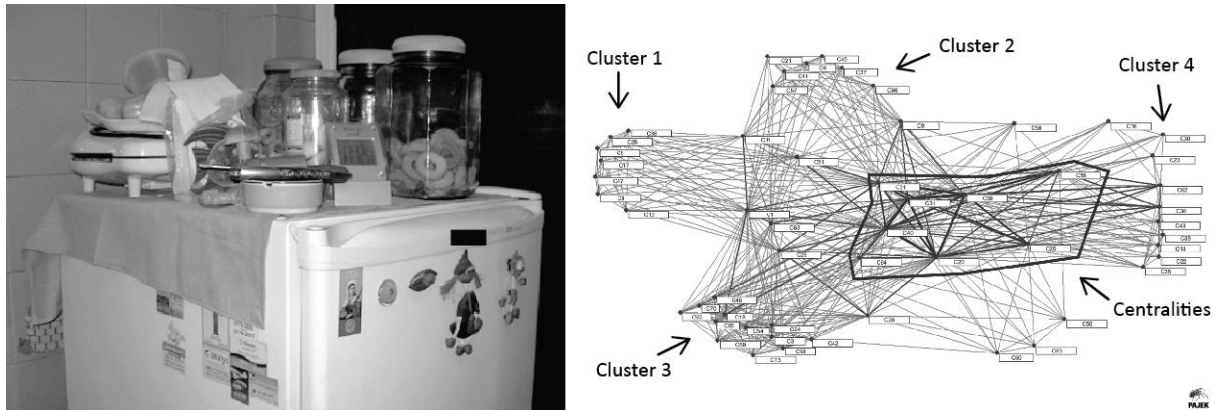


Figure 12. Design semiotics research in the field: Empirical primary qualitative data and categories analysis using Pajek software. Source: Adapted from Domingues, De Moraes, and Dias (2014, ongoing research).

Furthermore, Zingale (2016) presented theoretically-grounded qualitative data aiming at supporting the thesis of employing a pragmatistic method to assist contemporary design practices, e.g., the *Cage Lamp* (Figure 13).

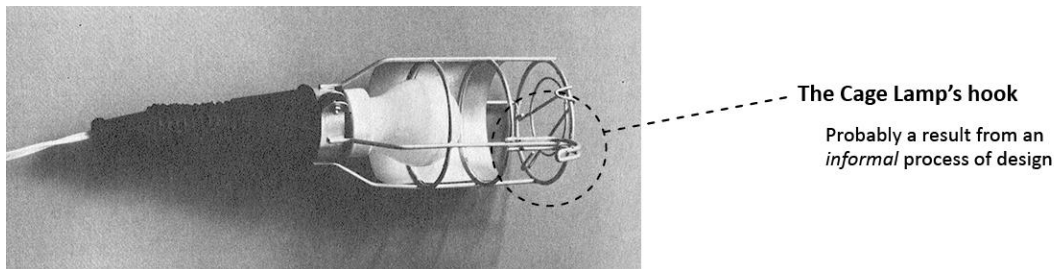


Figure 13. The Cage Lamp, unknown author. Source: Munari (1997 [1981]).

Through an abductive inferential movement, a design-agent (standard-user) has probably *made inferences* and *attributed* the hook as a *sense improvement* to the artifact [lamp] aiming at having hands free while operating tasks under specific circumstances (e.g., working in lightless environments). Hence derived from an *informal* design process, an enhanced artifact has been projected through a *formal* design process, and then brought into the real world (e.g., car shops).

5. Conclusion

Even though Postmodernists [have] dismantled Modernist construction in the name of difference, we believe that it is possible to search for a coherent set of aesthetics frameworks to shape the world of artifacts in the name of plurality: It is a matter of balance, rather than polarization. Considering the studies mentioned in the previous section, conclusions should not be overdrawn on the use of semiotics in design practices. However, design semioticians are both becoming aware of and positioning themselves toward the development of methodologies that enhance the engagement of semiotics in design practices, research, and pedagogy (e.g., Chow, Jonas & Schaeffer, 2009; Zingale & Domingues, 2015; Zingale, 2016). As stated by Chow, Jonas and Schaeffer (2009), “to understand and to employ deliberately, *projection* [emphasis added] cannot be neglected any more” (p. 4). Projection [Abduction] is part of the inferential movements contained in the pragmatistic

approach proposed by Zingale (2016), which has been developed by Domingues et al. (2016b) and Zingale and Domingues (2015) in collaboration with Domingues et al. (2014) and Domingues (2011a [2008], 2011b). In conclusion, this paper may contribute to design practice, research – both theoretically and empirically – and pedagogy, since it presents frameworks and concepts that may allow for a better understanding of the interplay established among design-agents in processes of conception of artifacts. In further phases, these contributions may also be helpful to specific areas of design practice (e.g., strategic design, global product development, co-design).

References

- Barthes, R. (1957 [1972]). *Mythologies*. New York: Noonday.
- Bianchi, C., Montanari, F., & Zingale, S. (2010). *La semiotica e il progetto 2: Spazi, oggetti, interfacce* [Semiotics and the project 2: Spaces, objects, interfaces]. Milano: FrancoAngeli.
- Bonfantini, M. A. (2000). *Breve corso di semiotica* [Brief course of semiotics]. Napoli: Esi.
- Bonfantini, M. A., & Zingale, S. (Eds.). (1999). *Segni sui corpi e sugli oggetti* [Signs on the bodies and objects]. Bergamo: Moretti & Vitali.
- Bonfantini, M., & Proni, G. (1980). To guess or not to guess? *Scienze Umane*, 6, 249-265.
- Borja De Mazota, B. (2014). Notes from the lecture *Humanities as design knowledge in the design process*. Politecnico di Milano, Department of Design, Humanities Design Network.
- Boztepe, S. (2007). Toward a framework of product development for global products: a user-value-based approach. *Design Studies*, 28(5), 513-533.
- Chow, R. (2005). *For User Study. The Implication of Design* (Doctoral Dissertation, Braunschweig University of Art). Retrieved from <http://opus.hbk-bs.de/files/2/ForUserStudy.pdf>
- Chow, R., & Jonas, W. (2010). Case transfer: A design approach by artifacts and projection. *Design Issues*, 26(4), 9-19.
- Chow, R., Jonas, W., & Schaeffer, N. (2009). Peircean abduction, signs and design transfer. *Proceedings of the European Academy of Design, Scotland*, 9.
- Deni, M. (2015). For a history of semiotics of design projects. *Proceedings of the European Academy of Design, France*, 11.
- Deni, M., & Proni, G. (2008). *La semiotica e il progetto: Design, comunicazione, marketing* [Semiotics and the project: Design, communications, marketing]. Milano: FrancoAngeli.
- Domingues, F. (2011a [2008]). *Design e cultura em produtos globais: A semiótica como ponto de convergência* [Design and culture in global products: Semiotics as a converging point]. São Paulo, Brazil: Blucher.
- Domingues, F. (2011b) *Design, Cultura e Semiótica: Em direção a um modelo para análise de aspectos semântico-culturais* [Design, Culture and Semiotics: Towards a model to analyze cultural-semantic features [Master's dissertation]. Retrived from <http://www.ppgd.uemg.br/wp-content/uploads/2012/08/Felipe-Domingues-dissertação.pdf>
- Domingues, F., De Moraes, D., & Dias, R. A. (2014). Design, Culture and Semiotics: Towards a model to analyze semantic-cultural features. In D. De Moraes, R. A. Dias, & R. B. C. Sales (Eds.), *Diversity: Design/Humanities*. Proceedings of International Forum of Design as a Process, 4. Barbacena, Minas Gerais, Brasil.
- Domingues, F., Zingale, S., & De Moraes, D. (2016a, July). Semiotics inside Design: Pragmatism as epistemological basis to designing [Abstract]. *Book of Abstracts of the PhD in Design Research Meeting, Portugal*, 5.
- Domingues, F., Zingale, S., & De Moraes, D. (2016b). Pragmatism as a semiotic route to designing: Understanding the inferential logics of sense attribution. *rdis*, 2(1), 241-253.

- Eco, U. (2015 [1968]). *La struttura assente: Introduzione alla ricerca semiotica* [The absent structure]. Milano: Bompiani.
- Eco, U. (1980). Function and sign: The semiotics of architecture. In G. Broadbent, B. Richard, & J. Charles (Eds.), *Signs, symbols and architecture* (pp. 11-69). New York: John Wiley & Sons.
- Findeli, A. (2014). Notes from the lecture *Some epistemological aspects of design research*. Politecnico di Milano, Department of Design, Laboratory of Innovation and Research about Interior.
- Geertz, C. (1973). *The interpretation of cultures: Selected essays*. New York: Basic Books.
- ICSID. (2015). Definition of Industrial Design. Retrieved from <http://www.icsid.org/about/definition/>
- Kotler, P., & Rath, G. A. (1984). Design: A powerful but neglected strategic tool. *Journal of Business Strategy*, 5(2), 16-21.
- Munari, B. (1997 [1981]). *Da cosa nasce cosa: Appunti per una metodologia progettuale* [Things arise from things: Notes for a design methodology]. Bari: Laterza.
- Peirce, C. S. (1931-1958). *CP of Charles Sanders Peirce*. Cambridge: Harvard University.
- Zingale, S. (2009). *Gioco, dialogo, design: Una ricerca semiotica* [Game, dialogue, design: A semiotic research]. Milano: ATì Editore.
- Zingale, S. (2012). *Interpretazione e progetto: Semiotica dell'inventiva* [Interpretation and project: Semiotics of inventiveness]. Milano: FrancoAngeli.
- Zingale, S. (2016). Qual semiótica para o design? A via pragmatista e a construção de uma semiótica do projeto (pp. 13-27). [What semiotics for design? The pragmatistic way to build a semiotic project (pp. 101-115)]. In D. De Moraes, M. R. Dias, & R. B. C. Sales (Eds.), *Cadernos de Estudos Avançados em Design: Design e Semiótica* [Collection of Advanced Studies in Design: Design and Semiotics]. Barbacena, Minas Gerais, Brasil: EdUEMG.
- Zingale, S., & Domingues, F. (2015). The consequences of things: The semiotics and the pragmatistic route to designing. *Proceedings of the European Academy of Design, France*, 11.

About the Authors:

Felipe Domingues. PhD Candidate, Master in Design and Master in Management, Bachelor of Communication. Junior researcher, lecturer and workshop instructor for the advanced design section of Whirlpool Latin America (2010-2013/Brazil). Award winner for creative advertising. Interested in design semiotics and research methodology.

Salvatore Zingale. Researcher at Politecnico di Milano (Italy), Department of Design, and professor of Semiotics at the School of Design. His most representative books on design are: *Gioco, dialogo, design* (2009); *Interpretazione e progetto* (2012); and *Semiotica dell'inventiva* (2012).

Dijon De Moraes. PhD and Post-Doctorate in design research by Politecnico di Milano (Italy). Current University President of the Minas Gerais State University (Brazil). Author of the awarded books: *Limites do design* (1997); *Análise do design brasileiro* (2006); and *Metaprojeto: o design do design* (2010).

Acknowledgements: This research was supported/partially supported by The National Council for Scientific and Technological Development (CNPq/Brazil), Politecnico di Milano (POLIMI/Italy), Minas Gerais Foundation for Support and Development of Education, Science and Technology (FADECIT/Brazil), and the Research Foundation of the State of Minas Gerais (FAPEMIG/Brazil) in partnership with Whirlpool Latin America (Brazil). The authors are thankful to the "anonymous" reviewers for their insights and Doctor Igor A. Lourenço da Silva for his precious comments along the proofreading process, although any errors are our own and should not tarnish the reputation of these esteemed individuals.