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Design, meaning making and constructive fixation

Conceptualizing semiotic conditions to the process of designing

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Abstract: Current debates in design question the effects of "fixation." On the one hand, to be creative, designers should avoid fixing the meaning of objects or proposals, On the other hand, positive effects of fixation have also been observed in various design practices. For instance, "early fixation" or "early crystallization" have been conceptualized as ways that significantly help starting the design work without limiting its creative potential. To understand these contrasting positions, we take a semiotic perspective on the phenomenon of fixation. Peirce's triadic model of sign (representamen, object, interpretant), defines meaning making as an infinite process through the "interpretant" based on personal and social experience. Fixation is therefore a basic semiotic condition through which human beings make sense of the world. As pointed by Peirce, the "final" interpretant is the way by which we can actually communicate meaning to further expand it. Following on this model and the Peircean categories (firstness, secondness, thirdness) we identify three different ways in design that structure how meaning making can be stabilized, e.g.: the feeling of some potential (firstness); the combination of events or things (secondness); the establishment of a belief, habit or law (thirdness).

Key words: fixation, semiotics, design process, meaning making, interpretant, Peirce

1. Introduction: design research and meaning making

In the field of design research, a number of scholars have focused on how designers make sense of things and produce new meanings. In his book on design and the semantic turn, Krippendorff combines a theory of sign with a model of our relationship to tangible things that comes from anthropology. He comes up with a design methodology that is called semantic design. Semantic design is in fact based on a pragmatic of design. Product semantics is "a study of the symbolic qualities of man-made forms in the cognitive and social contexts of their use and the application of the knowledge gained to objects of industrial design [34]". Designers and users make sense of things out of specific situations that lend meaning to a particular object and a particular activity. The design methodology therefore consists in listing the different elements that contribute to the meaning of the object in situation, when it is actually acted upon. Though partly using semiotic methods of analysis, Krippendorff considers that "traditional" semiotics are limited in scope to the analysis of linguistic and non linguistic signs that stand for "something other than themselves" or to the understanding of information displayed by media. Close to this train of thoughts, is system theory [3, 31] that sees the product as a component of social interaction and

therefore part of a global meaning making process. From a slightly different angle, researchers in design have focused on how this meaning making in situation implies a communicational model of producer and receiver. The product can therefore be seen as a message or medium in a sender-receiver process: communication process perspective [21]. Following Dennet's intentional stance (in addition of the two other stances : Physical : how it works, Design: what is it for) [15], Crilly contends that people make sense of things because they elaborate an understanding of the designer's intentions [9]. Meaning making is then from the user's perspective this social culture of material artifacts and the way and reasons why they are made. Design as communication has also been understood as the process by which design embeds ideas in objects and therefore communicates these ideas through features. The product is seen as an instrument of persuasion or argument as in the rhetorical perspective [6, 7].

These theories are based on how people make sense of things out of their interpretation of affordances and conventions, as pointed by Norman [38]. Products are part of a sign system with which users construct meaning. Research from management science and originally from the sociology of consumption have pointed out the role of symbolic values to understand design semiotics [29, 37, 47].

These models are particularly efficient to explain why people make sense of existing things through material and social interactions, cultural knowledge, and communication skills. These contributions help define design methods that are going to anticipate these patterns of meaning making. On the other hand, it is less clear how they account for the capacity to create new meanings for things designers create or things that people discover. This particular creative process of meaning making has attracted the interest of design researchers who reconsider the contribution of Peirce's semiotics to understand design. In particular Chow and Jonas [8] consider how in Peirce's semiotics there are certain dynamics of signs that open the creative process because they point to qualities of things, situations, feelings and therefore are not fixed in a solid definition of what this thing is, either in an actual situation or by habits or laws.

This new trend in design studies follows scholars from anthropology of material culture who after a first phase of structural studies that aligned objects on the linguistic models, have strongly advocated for a consideration of artifacts as specific objects with which human beings interact before using them as signs in a symbolic system of representations [33]. When semiotics is limited to the analysis of signs, part of the design research, following anthropological studies, contends that material objects cannot always be considered as signs for something else. The other part of the criticism is that on an empirical basis semiotic analyses do not concentrate on the user's actual reception but rather on the production of sign from the designer's perspective [35]. Following Chow and Jonas [8], we think that a close reading of Peirce's semiotics allows us to account for meaning making as a truly creative process rather than the recognition of known traits in artifacts or situations.

We think that Peirce's semiotics includes our relation to tangible artifacts as well a symbolic representation, as we use and as we interpret them.

To account for the transition from Peirce analysis of the semiotic process of interpretation to a semiotic model of design, this paper focuses on the question of fixation as being both part of the semiotic process and a specific issue of design. Fixation, whether it is considered as a negative outcome of design constraints or the positive starting point of a design process, is here considered as part of a dynamic making meaning process. The authors want to consider how the semiotic process as defined by Peirce can account for the ambivalent concept of fixation

in the design literature and how this concept is related to several design operations that we qualify as: to expose oneself, to combine and prototype, to establish.

2. Contrasting views in the design literature: positive or negative fixation?

Over the last decades, many design theorists have analyzed the issue of "design fixation." This attention was mostly raised and influenced by experimental results in "creative cognition", namely the field of research that focuses on the cognitive processes and structures which underlie creative thinking [46]. The term "design fixation" was indeed first introduced by cognitive psychologists Jansson and Smith [30] in their seminal work on the existence of "fixation" in design processes. Before this work, the phenomenon of "fixation" had rather been studied in the context of problem-solving and defined as "people tendency to focus on specific characteristic of a problem that keep them from arriving at a solution" [26]. Such understanding of fixation was also related to the concept of "functional fixedness" brought by experimental cognitive psychology since the 1950's. In that perspective, fixation was thus considered as a cognitive phenomenon that would carry negative effects on human reasoning in general. As for design fixation, Jansson and Smith demonstrated the existence, in the particular context of conceptual engineering design, of "a blind adherence to a set of ideas or concepts limiting the output of conceptual design." While their work aimed at extending prior research on fixation in problem-solving to design and creative thinking, they acknowledged that on the basis of their results it was not clear "whether fixated behaviour [was] only detrimental or whether there [were] some beneficial effects to such phenomenon." This point was not clarified in subsequent studies. In other words, experimental cognitive psychology identified a phenomenon of fixation in conceptual design processes but did not definitely state on the value of this phenomenon for the creative work, which could be either negative or positive, or even simply just necessary to the design process.

Likewise, in design studies, the issue of fixation is still an open question. For instance, Purcell and Gero [42] have pointed to the fact that presenting visual examples might either provoke too premature commitments to a particular problem solution or stimulate creativity, depending on the type of examples and their distance with the existing knowledge base of the designers. This twofold effect of examples, either restrictive or expansive, has recently been investigated by Cassotti and Agogué [1] further. Moreover, as recalled by Visser [48] "designers often tend to generate, at the very start of a project, a few simple objectives in order to create an initial solution kernel to which they then are sticking in what is going to become their global design solution". Many design studies have demonstrated that such "early fixation", "premature commitment" or "early crystallization" [2, 10, 25] were needed to the design work. According to Visser, the role of the initial solution kernel, first qualified by Darke [12] as a "primary generator," has then received much attention as well as various labels such as "kernel idea," "central concept," "early solution conjecture," "primary position," or "guiding theme" [10, 11, 13, 27, 32, 36, 44]. According to design theorists Hatchuel and Weil [28], any design reasoning starts with the formulation of an initial "concept" that must be undecidable. As a conclusion, both theoretical and experimental research works lead to contrasting views on the effects of design fixation. While some results suggest that design fixation can have negative effects on the creative work of design and provide ways in which to reduce them [49], other results, sometimes based on the same experimental study [42], reciprocally suggest that design fixation can also have positive effects and even be necessary to start any design work.

In this paper we develop the viewpoint that the origin of such contrasting views on design fixation originates from the fact that past research only considered the cognitive aspects of this phenomenon. This focus on the cognitive processes and structures that underlie creative thinking has tended to overlook how designers make sense of things and create new meanings. While not being contradictory with the creative cognition approach, we here explore an alternative approach to design fixation that is based on semiotics, namely we focus on the semiotic operations and structures that underlie design processes. Our aim is thus to understand design fixation from the viewpoint of meaning making. To do so, we rely on Peircean semiotics which the next section presents.

3. Peirce's theory of meaning making

Peirce's semiotics is a pragmatic theory that considers how "signs" are used and produced in situations of meaning-making. In particular, Peirce conceptualizes categories or "modes of being" of signs through which individuals necessarily rely on to make sense of reality. According to Peirce there is no such a thing that could be named "thought" without a "sign" that renders it possible and signs exist along three modes of being: firstness, secondness, thirdness. Firstness is the mode of being of a sign as a full "potentiality." In terms of individual experience, this relates to the subjective and emotional life and how we make sense through perceiving and experiencing qualities. Each of these experienced qualities is a sign that exists in the realm of Firstness. Secondness is the mode of being of a sign as an "actuality." In terms of personal experience, this relates to the relational and practical experiences and how we witness facts or events. It is the realm of actualization, the here and there of elements in tension or interaction. Thirdness is the mode of being of a sign as a "Symbol." In terms of personal experience, this relates to the social and intellectual life and how we generalize through norms, rules, or habits. It is the realm of generalization. Though the three categories are into play at all times [33], Peirce and Peircian scholars identify examples that show how they can be distinguished as different modes of being.

In the following section, we will describe, first the way a "sign" can be described (as it exists as a potential concept, representing something, in relation to other experiences and concepts), second we will emphasize the role of the interpretant in the potentially unlimited semiotic process.

3.1 Description of the triadic model of sign: unlimited semiosis

The Peircean theory of signs articulates three elements. A representamen (or physical sign) denotes an object (which is an object of thought or a real object) through an interpretant (which is the mental representation of the relationship between representamen and object). The interpretant organizes the dynamic meaning relationship between object and representamen. "A sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign." [40]

The relation between the object and the representamen generates an interpretant, which in turn becomes a representamen by generating another interpretant which refers to the same object as the first representamen. "Finally, the interpretant is nothing but another representation to which the torch of truth is handled along; and as representation, it has its interpretant again. Lo, another infinite series. " [41] Therefore, the process of semiosis is theoretically unlimited.

Processes of meaning analyzed by Peirce consist of three major trichotomies related to the three elements of the sign presented above. First the semiosis is concerned by the type of signifier/representamen: it can be either a quality as a sign, an event as a sign, or a repetition as a sign. Second the semiosis is concerned with the relations established between the representamen and the object: it can be a relation of similarity, an iconic relation; a relation of contiguity, an indexical relation; or a conventional arbitrary relation, a symbolic relation. Within the detailed system of trichotomies, we focus on the third trichotomy which looks at what kind of interpretant is triggered by the relation between the sign and the object. The interpretant is this "third party" that borrows from other experience and situation to make sense of the specific relation between an object and its representamen. In Peirce's semiotic system the interpretant is the fundamental element of meaning making. Interpretation is the movement that explains why we do not live in signs only (in representamens or signifiers). It also explains why we are not resumed to a material entity in a material world. The interpretant forces us to distance ourselves from material life but also from an interpretation of reality that would be pure impressions by considering our personal or social experience and the situation as part of the meaning itself. Neither totally subjective, nor totally objective, the interpretant merges the here and now (Secondness) and feelings (Firstness) to other experiences (Thirdness). To use Umberto Eco's expression, the semiosis is an encyclopedic experience rather than a dictionary experience [19]. One sign does not have only one single meaning, but refers to and broadens into a diversity of meanings. However, this diversity is grounded in personal and social experience.

Two things need to be underscored in this model: there is always a "third party" involved to make sense of things. This "third party", the interpretant, is based in the wealth of personal and social experience. It structures the way we make sense by gathering elements from other experience to deal with a new one. By the same token, it expands the way we look at things by connecting the actual experience (the here and there) or the subjective experience (our feeling and sense of potentiality) to other experiences. This capacity to enlarge the immediacy of feeling and actual experience to other qualities, traits or regularities allows us to come up with new interpretations and new concepts. The semiotic process is therefore always creative.

3.2 Unlimited semiosis and fixation

While the semiosis is in practice creative and infinite, Peirce argues that the process of meaning making is limited in practice. Habits, norms, eventually end the process and stabilize meanings. The « final logical interpretant » is the name Peirce gives to our habit of attributing a certain signification to a certain sign in a certain context with which we are familiar. The power of habit temporarily fixes the unlimited movement from one sign to other signs. The final interpretant in the theory of Peirce follows two other states:

- the immediate interpretant is related to the impression or the potential as we experience it: the feeling of red before anything red is under our eyes. As Nicole Everaert-Desmedt says, it is almost like perceiving an empty case that we feel should be filled with- in this instance-red [20].

- the dynamic interpretant is related to the actualization in a specific fact or object : the actual red light that we distinguish from other present colors: green for example. Both colors compose an image of contrasts.

- the final interpretant is related to a law (of nature or habit) that can settle the discussion for good : the traffic light where red means "stop" and green means "go."

In this respect, Peirce points out that the dynamic interpretant tends towards a final interpretant, in other words a certainty in our interpretation that would be brought about by a law. The fixation by belief is such a final interpretant that he describes as being extremely comfortable though rather fragile as it can be contested more easily than a scientific law.

Belief, habits, and laws, all have in common to give a social group the certainty of its ways and understanding of the world. They support a common horizon between all members of a social group. This fixation is a condition of our social interactions. Theorist of translation, who work precisely on a possible disjunction of world of references between the text of origins with readers of a same culture, and the text of arrival that is addressed to readers with a different culture contend today that translation should be oriented towards the targeted audience "skopos theory," [43] in other word it should recreate a similar experience for the new audience. But in doing so, it always creates a new text, and potentially an infinity of texts as time and space always change the way people are going to understand things.

In the analysis of the semiotic process, the need to stabilize the meaning of things is central to the situated practice of meaning making. In a whirlwind of possible interpretations, to choose one meaning more or less arbitrarily is the only way first to be able to communicate with others and also to get an understanding of our own feelings. It is also a starting point to deconstruct the established meaning in the face of new emotion, or new events (Peirce speaks of the "outward clash" [39] that destabilizes a temporarily achieved fixed meaning). Peirce's model is dynamic in the sense that it is potentially infinite but more to the point because it describes a system that strives to both stop and go.

4. Fixations and design situations

We want to see if this model can be further developed to explain how, in design, we establish a relationship to a world that has to be invented. Our hypothesis is that we can define a semiotics of the unknown on the basis of the semiotic operations at work in the interpretive work of design.

4.1 Constructive fixation

"Semiosis" is an unlimited interpretative process that occurs through successive operations that construct meaning. "Fixations" are therefore the basic semiotic operations through which human beings make sense of the world. Thus, this model explains why fixation needs to be explicit both in their constructive and negative forms:

- the necessity of feeling: it supports the fact that design is expressed also in terms of intuition, hunch, subjective sensitive experience.

- the necessity of actual compositions, confrontations, interactions. It supports a model of design that is not only sequential - ideas preceding realization – but also compositional with what happens here and now and therefore supports a model of design as a model of tensions.

- the necessity of cultural frameworks : The design project challenges values and habits in society and at the same time take into consideration the social, institutional, cultural side of human activities.

This model leads to qualify several semiotic regimes in the design process. Firstness is the regime that addresses the feeling of quality. It is the regime in which individuals experiment chances, possibilities. Therefore, as a design process the meaning making consists in feeling things, letting oneself opened to possibilities. Secondness is the regime of reaction, resistance, dyadic relation between things in context. As a design process,

the meaning making is to combine objects and relations (as is done in prototyping). Finally, Thirdness is the regime of representation, mediation. Individuals experiment it as habits, laws and beliefs. Design activities can be qualified as challenging social institutions and establishing a new set of values and uses.

4.2 Fixation and design operations

For each semiotic regime (Firstness, Secondness, Thirdness), various examples can be given about design actions in relationship with positive and negative fixations (see the figure below).

First, the "kernel idea", or the "primary generator" [48] are examples of fixations that correspond to the Firstness category and that can be qualified as getting inspiration or seeing the potential of something by fixing a sensation. Reciprocally, to be overwhelmed by sensation or to have "blind adherence" [30] can also be considered as Firstness operations. The case study of a French garden design agency described in [4] llustrates such type of fixation. To start a garden design project the designer-in-chief needs to get immersed within the place of the future garden. Before drawing any sketch, she takes a long time to walk across the place to get a driving sensation. This early fixed feeling is used to start the design project but can also be revised afterwards when discussing with clients.

Second, working in physical design environments that facilitate prototyping, and/or working in design groups [49] are examples of situations where fixations effects are limited. It shows how designers proceed with composition, modularity, combination and/or confrontation that are based on the Secondness category. The experience described in [24] of writing a show with stage director and new media artist, Michel Jaffrennou, supports this conclusion. Jaffrennou experiments with theatrical forms and to do so he uses a multiplicity of writing tools (software such as word, excel, director, or html) that reveal other possible formats of shows [5]. Jaffrennou's use of excel is a point in case as the spread sheet decomposes the narrative in random elements to be aggregated. The show is produced by recombining units such as characters, places, objects, sounds. The elements are loosely associated and tried for effects. The element of surprise [45] is supported by the combinatory proprieties of the table.

Finally, some designers present their work as critical design [16, 18]. What matters for them is that design questions social assumptions and engages citizens in a public debate. They place their design initiatives in the line of the artistic and political movement: the "Situationist International" [23]. These artists created subversive artworks —collages but also performances — that questioned people's relationship to the world and in particular the Society of the spectacle [14]. In this respect, critical design produces objects that tread a fine line between on the one hand being overtly controversial as some art pieces can be. In this instance, Dunne and Raby fear that these artifacts could scare away people. On the other hand, they want to trigger an interpretive process but then they risk being too open and ending up empty. "Things have to be not-quite-right; this awkwardness is a way into the object, an invitation to explain why it is the way it is, why it's not quite right. If it was too correct and as expected, they would glance once and move on." [17] The design action is based on an analysis of what constitutes habits, or laws, or beliefs, and a subversive production: objects "not quite right". Designers need people to know the rules (implicit or explicit) and they use this competence based in Thirdness to question them. Probes are a case in point [23]. Defined by Gaver and Dunne as ways to spur the imagination of the designer, they rely on how people question their own representations and habits. In this respect, they rely on what Garfinkel

defined as breaching experiments, that is to say experiments that produces unexpected interactions in order to see how people try to restore the situation by calling up rules, habits and norms of situations of everyday life [22].

Table 1. Semiotic understanding of design operations

Peirce's categories	Typical characterization	As universe of experience	As design operation
Firstness	Quality of feeling	Chance, possibility	"Expose onseself"
Secondness	Reaction resistance, (dyadic) relation.	Brute facts, actuality	"Combine"
Thirdness	Representation, mediation.	Habits, laws, beliefs	"Establish"

Table 2. A semiotic understanding of design fixation

Peirce's categories	As design operation	Example	As design situation
Firstness	"Expose onseself"	Walking in a garden	Flash of insight
Secondness	"Combine"	Combining random elements in a table	Outward clash
Thirdness	"Establish"	Probe	Debate

5. Conclusion

Designers operate in a world that does not exist yet but has to be invented by means of imagination and interpretation. The so-called phenomenon of « design fixation » therefore gains in being investigated also from a semiotic point of view, namely by considering the interpretative processes underlying the creative work of design. Design can be considered as a process of closure of meaning and not only of opening of meaning. In this article, based on a Peircean understanding of semiosis, we classify observations and practices that have thus far appeared paradoxical or heterogeneous by giving them a theoretical basis. For instance, in this model, the concept of "design fixation" is extended to an understanding of the different modalities of meaning making, either as quality, as event or as norm. These different modalities also account for the rich set of individual, inter-personal and social dimensions that designers bring into play during their creative work.

This analysis still needs further research. For instance, an ethnographic study of design situations could provide interesting insights by extending our work to collective creation, which is often shaped by institutional tools and frameworks. This would make it possible to confront our semiotic analysis to a communicational analysis and investigate implications for the creative process of design in those collective situations. Such an analysis could necessitate the investigation of material artefacts, representations and devices which instantiate or sustain some of the design operations that we describe in this paper (e.g. prototypes, mock-ups…). Finally, our study also calls forth a new understanding of the situation of reception that is at stake when users participate to the design process.

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