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AN ENTIRE CULTURE can be recognised on the basis of the design of its product environment, because that environment embodies human conceptions and values. Architects and designers have contributed to its formation and can be seen as responsible for the artefacts, though they are by no means the only ones, and do not actually make final decisions. Moreover, design is not exclusively about the professionally planned artefact. This is a fascinating fact and also a key question for the designers, who play their part in constructing the environment. Hence, design research must look for ways to integrate and understand people's choices, attitudes, and expectations in the design process to be able to improve the outcome of design.

Semiotics is the study of meaning formation, signification and communication. It is also an umbrella term for several research approaches. To begin with, it is worth noting that there are two or three quite disparate traditions in modern semiotics, and all have been applied to the study of artefacts in the built environment. The so-called American tradition starts with the thinking of Charles S. Peirce and the other, the so-called continental tradition, is based on the Swiss linguist Ferdinand de Saussure's ideas about language. Both traditions have produced a vast amount of scholarly texts and discussions, some of which are well-known worldwide. In addition to these two,

ON DESIGN SEMIOTICS

the tradition of the so-called Paris School established by A. G. Greimas deserves separate mention because of its specific characteristics and terminology. The traditions sometimes seem to include incompatible ways of thinking; hence, it is necessary to be aware of the basic assumptions of a text, or it may be impossible to pull the arguments together.¹

In this article, the reader will be introduced to an approach mainly based on Peirce's philosophical assumptions, which offer opportunities for a design researcher to gain knowledge and deeper insights about the interpretation of product characteristics and how material artefacts interact with humans. Someone may still wonder: what is the point of bothering with such analyses, particularly if one conceives of design as the technical and practical construction of artefacts and their marketing? If design is seen predominantly as a practical undertaking the purpose of which is to provide people with affordable tools to facilitate their job, semiotic scrutiny would indeed appear a superfluous undertaking.

A DESIGN CONCEPTION

Technical skill, business understanding and other competencies are generally all represented in design teamwork nowadays. The role of designers may vary according to the task and context at hand, but they must nevertheless claim for themselves a speciality that cannot be replaced by engineers, economists or other experts.² According to a familiar design historic discourse, designers are experts on form (e.g. 'Formgeber' and 'Formgestalter' in German, 'formgivare' in Swedish, 'muotoilija' in Finnish). Conceived in the broad sense of the term this may be true, and designers can be seen as experts in the dynamic between humans and the form of artefacts. Actually, this conception of design demonstrates a holistic view, which cannot leave out symbolic and historical issues of forms. Humans are capable of constructing meanings and interpretations, and communicating with the forms of artefacts. The core argument of the article is in fact that these topics of signification and the expertise in semantic features are vital to the trade.

¹ For a brief but very helpful introduction to the many approaches see Nöth 1995.
² They will "design" the product somehow anyway.

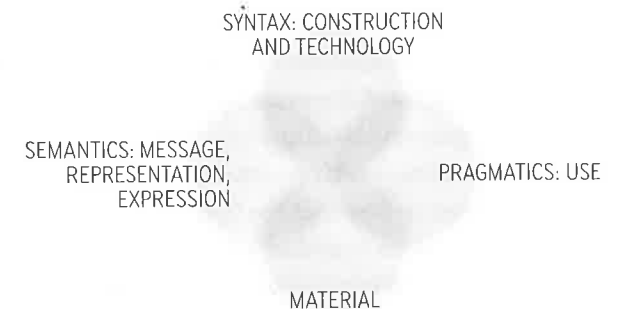
This is why semiotic considerations belong to design.³

To illustrate the design conception in question, a schematic division into three dimensions is indicating the material, technological and practical use-related dimensions. No doubt all three dimensions need careful consideration, and are explicated and argued in design briefs and later in the presentation of design options. These dimensions can be termed as the material, the syntax, and the pragmatics of design. Is this all, however? Does this schematic really describe design by means of its relevant characteristics? In the view argued in this article, this can only be the beginning.

POSITIONING THE DESIGN SEMIOTIC APPROACH

As is well known in an actual design situation, the designer reflects on many issues and demands, not just technical construction or practical needs, because there are a huge variety of options of form in any case. Design solutions are also based on style, personality, cultural and contextual demands. What could these bases be called? What kind of arguments and visions could a designer aim at concerning style and context? These are the key questions to be answered if design is seen as a field that comprises more than just solving problems of technical construction, usability, and business. Here the new semantic field enters the picture and a fourth dimension can be added to the scheme: the expressive, signifying and communicative dimension, as illustrated in Figure 1.

Figure 1. The four dimensions of design. Accordingly, a design outcome can be studied from four perspectives using relevant methods respectively.



³ Modernism has long neglected these issues by stressing the ideology of "form follows function". Or rather, modernism has explicated a specific viewpoint and semantics.

A designer reflects upon such questions as why draw a specific shape or add a particular kind of colour into the assignment at hand. Someone concerned with design may ask, what makes the iPod form seem cool to so many people? Why do people prefer flower decorations on their teacups, or wrap their gifts in glossy paper? Why are fast motorboats often white in colour? Why do companies spend money on certain images or bother about exhibition design? Why do some places feel more cosy and comfortable than others? Surely the design of artefacts aims at reaching some purposes and draw attention to them, and also to communicate contents and values, display or increase some effect and style, etc. Considering these aspirations, it is clear that design always comprises a semantic dimension which is not measurable in the same way as the other three, because semantic analysis is about interpretation and requires other means for its study.

The interpretation of the design outcome can be studied from many different positions: that of the designers', the users', the producers', that of a group, a larger cultural community or society, and so on. A study of the semantic aspect of design would therefore need its viewpoint to be positioned so as to avoid the fallacy of a neutral (non-existent) observer or "the god's eye view", which results in excessively broad generalisations.

Still, these theoretical considerations are not enough to cover the entire complexity of a design activity and the aspects of its outcome. One more dimension needs to be added, namely the aesthetic one. It follows that the semantic and the aesthetic dimension are conceived as separate facets of the product, which may further assist the analysis. If we examine the design process with semantics and aesthetics merged or mixed, important content is easily overlooked. Value-laden aesthetic feelings may come to dominate semantics, which is then ignored. For example, an aversion against walkers may obstruct an analysis of optional formal qualities and style of the walker as a tool.

The five dimensions presented above might possibly be complemented by still other ones, or they could be further divided into more detailed ones. Here the point is only to draw attention to the complexity and broadness of design, which embraces very diverse dimensions that require appropriate methodological and conceptual tools for their research.⁴

4 I have previously (Vihma 1995) touched briefly upon this schematic division. The idea was inspired by my reading of Max Bense (1971), who, it appeared, defines the

Up to this point, not much has been said about semiotics in connection with the schematic above. Only the term *semantic* has been brought up. The semantic has been discussed as a dimension. It could also be called a field of inquiry, a topic that calls for specific approaches and concepts. As a theoretical undertaking, semiotics seems to offer suitable methods for studying this field.⁵ However, in the history of design research, different approaches have been introduced to examine semantics, not all of which are called semiotic.

A BRIEF INTRODUCTION TO PEIRCEAN CONCEPTS FROM A DESIGN RESEARCH PERSPECTIVE

One inspiring starting point is the semiotic concept of *sign*. Charles Peirce wrote an introductory text precisely about this idea, entitled *What Is a Sign?*⁶, which is recommended reading for anyone interested in his philosophy. For the purposes of design research, it is perhaps sufficient to say that the concept of the semiotic sign both initiates a theory and explicates its basic assumptions. In semiotics, a sign represents something in some capacity, when it is interpreted.⁷ It follows that a sign consists of relations between three components: that which represents (*Representamen*) something (the reference, *content*), and the interpretative act. In semiotic literature, these elements are named Representamen R, something O (the Object to which R refers), and *interpretant* I (which is an ongoing process, not to be confused with any individual interpreter). The concept of sign is thus seen as consisting of relations between R, O and I, a triadic configuration that cannot be reduced any further. In an act of interpretation, a person generates reference relations of different kinds. A sign is not a thing, but a theory about relations, and the Peircean sign consists of reference relations and interpretation of these relations. For example, when someone looks at a door, s/he may see the possibility to enter; the door may

dimensions in a different way.

5 In my experience, students often need to ask about the difference between semantics and semiotics. Semantics here denotes a dimension or a field; semiotics in turn, is a theoretical approach into this field.

6 Peirce, MS 404. Published in part in CP 2.281, 285, and 297–302.

7 "A sign or representamen, is something which stands to somebody for something in some respect or capacity"(CP 2.228)

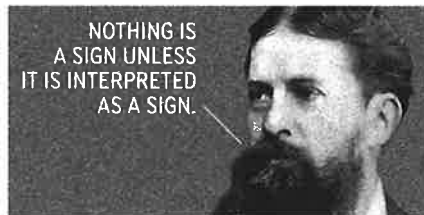
afford entering, to use Gibson's term⁸. Nonetheless, the door refers not only to a possibility of action, the opening of the door and the possibility to enter, but also to other issues (other contents, O). The sign refers not only to actual possibilities of human action, but also to a complexity of issues evolving through time by virtue of the interpretative act. A string of signs evolves. Interpretation produces various kinds of contents and is "productive labour", as formulated by Eco (1979).

The complexity of reference relations makes the sign a useful theoretical tool for analysis, but also tricky one. Let us look closer at the example of the door. Through its material qualities, its shape, colour, constitution, components (syntax), and so on, the door may refer to (represent the possibility of) pulling, welcoming, calmness, authority, as well as other attitudes and emotions. The semantic qualities materialise for anyone who perceives and uses the door. Humans not only see and act; we also react and interpret simultaneously. Therefore, it seems important to design the door so that its reference relations meet people's needs, wants, expectations and values.

REFERENCE RELATIONS DESIGNED INTO PRODUCTS

A product as a sign, then, allows interpretation to embrace many qualities. That is precisely why the Peircean sign is so useful for semantic analysis. Peirce discusses three different modes of reference relations: the iconic, the indexical, and the symbolic. Most of the semantic analyses used in design research focus on just one of these, namely the symbolic mode, or they persist in looking at just the functional qualities in order to improve the effectiveness of use, thus omitting other possible functions. Peirce's concepts, however, seem to open up a versatile interpretation, one that would seem to suit design analyses.

Figure 2. Charles S. Peirce: Anything can be conceived to be a sign. On the other hand, nothing is a sign unless it is interpreted as a sign.



8 Gibson 1976. In semiotic terms: the door as a sign (perceived form) may refer to entering when interpreted in some capacity, i.e. as icon, index and symbol.

The grounds of reference relations are different, which is noteworthy, and this is what distinguishes the Peircean approach from many others. The first ground, called iconic, is likeness. The reference relation consists of common qualities, and also this connection is created by an interpreting mind. Metaphors, for example, are iconic connections. In addition to linguistic metaphors, *visual metaphors* can be produced. For example, a material product can be seen as showing a face or a facial expression when it is interpreted as a sign. A door can be said to refer to a facial expression (associated with it) and to have features in common with a face. A material product can be conceived as assuming a pose which resembles a human posture. By virtue of this association the product is said to express an attitude, an emotion, a tradition, etc. Even solid static material objects can seem to move forward or slink. In this way they acquire characteristics which are not related to their actual practical function, but ascribe expressive and representational attributes to them. Products are thus perceived (metaphorically) as active, smiling, dull, sad or exciting.

Metonymy is an apparently important connecting concept, though less used in design theory. In a metonymic relation, interpretation is influenced by the proximity of objects. Qualities from one nearby object seem to be transferred to the other one. In painting, photography and graphic design, such as in advertising, metonymic relations are often used as an artistic means of emphasising a specific content (reference relation) in the composition, such as a power relation.⁹ However, in the design of the product environment it is hardly examined at all. Conceived as signs, products can be seen as communicating with one another, e.g. furniture in a room interestingly in iconic and metonymic relations.

The second ground, the indexical sign, establishes an actual connection between the representation (R) and its cause (O). This mode of reference is usually left out in design analyses. Traces of manufacture and use are typical indices of material products. They seem crucial, however, because they in fact link the semantic dimension of the product to its material and syntactical bases, and importantly add qualities to the overall semantics. The third mode, called the symbolic, is grounded on agreement and has to be learned. Interpretation of symbolic content cannot be deduced just by perceiving the object. Coming back to

9 A well known example is the Panzani poster analysed by Roland Barthes. In this picture the freshness of the tomato is transferred to the package on the basis of proximity.

the example of the door: interpretation of the door for the first time may not afford opening. Hence, the learned symbolic mode has to be introduced to a user.

According to Peirce, all modes of reference relations are prevalent and merge together. As a result, iconic signs such as metaphors and symbolic reference relations cannot be understood detached from their actual and causal connections. This enables us to avoid the dualistic fallacy of cutting the mental off from the material, as when we have interpretation on the one hand and the material outcome of something like design, on the other. In addition, by including indexical signs in semantic analysis, we avoid being trapped in linguistic conceptions, which perceive representations of material artefacts as language like systems – words and sentences. In this tradition, design discourses often use such formulations as *design language*, *form language*, *storytelling and narration*, *reading images*, etc. in an attempt to clarify semantic features: expression, communication, style, and even aesthetic values of products. Interaction by design entails, however, more than language.

Peirce's semiotics does not split the inner and outer into separate domains, but conceives them in mutual interaction: "The mind is not a receptacle, which if a thing is in, it ceases to be out".¹⁰ Furthermore, one may ask what feelings a design product awakens and what qualities are experienced with it. When feelings become involved in interpretation, the analysis includes appreciation and evaluation, and it enters the realm of aesthetics.

CRITICISM

One criticism against semiotics and Peirce's philosophy concerns the concept of *representation*, which according to some researchers only denotes a visual manifestation (drawing or photo) of the product. This means that actual material objects cannot be representations of anything and do not refer or connect to anything ("outside them") when interpreted. This conception seems very restrictive and cuts off the stylistic options of design. As a result, they are not examined in these studies. Products are nevertheless seen as language-like constructs negotiated between stakeholders, and as affording possibilities of use. For example, Krippendorff (2006) applies Gibson's conceptions of direct perception and affordance to his Product Semantic theory. Also in this theory, expressive and

¹⁰ CP 8.16

representational qualities of products receive surprisingly very little attention. Thus, his Product Semantic theory acquires another emphasis altogether.

Affordance is about the potential of action and use. And, as most of us know, there are always various alternatives for how to design affordances, but variations are not much discussed in the Product Semantic theory, which rather represents features from Modernism, in my view.

Semiotic research is sometimes criticised for being led by theory, implying also that theory becomes somehow alien to practice: it would lead design research away from practice. Instead of promoting understanding, it would lead research off track, forcing design practice in a theoretical straitjacket. One answer to this critique is that research always includes basic assumptions, be they explicitly stated or not. Thus any discussion should question their relevance. The semantic dimension in particular, which requires interpretation and integration of knowledge from many fields, flounders without careful theoretical reflection. From this it does not, however, follow that a specific theoretical stance would require a specific design outcome.

APPLICATION

All three grounds merge in everyday interpretation as well as in design analysis, on which conclusions are drawn to form the outcome. Nonetheless, for the purposes of research, it is best to look at each one of them separately, allowing us to deal with the multifaceted reference relations in a careful, more detailed and systematic way.

Sometimes, a mode of reference can dominate the interpretation of the product form as, e.g. the symbolic connection. For instance, control equipment, product graphics or packages function mainly on symbolic grounds, but can often include iconic references such as a schematic illustration of a hand or a sun. Graphic figures are designed onto electronic equipment and contain, as said, all three modes of references. The system of traffic posters and signals is a helpful example for understanding the three grounds as presented above.

The Peircean approach stimulates different modes of interpretation: design objects can be analysed by looking at likenesses, causal connections and *replicas* of symbols, all three modes in turn, and then synthesised for further discussion.

Indeed, the role of the context needs to be brought up. Reference relations cannot be understood without knowledge about the contexts in which

interpretation takes place and the situation the product is aimed at and used for, etc. The production (interpretation) of iconic references can be understood better when we know the cultural setting for interpretation. It is exciting to become aware of people's shifting iconic interpretations, because they often vary for different reasons. However, it is not enough to list all possible modes of references, most importantly: we also need to explicate the arguments for each of them. Only then will the researcher be able to discuss similarities and differences between the many interpretations, and proceed by thematizing the responses.

Students often mix the concept of the sign with the material product or with a detail of it. They say, for example, that "the product refers to a happy face". However, the product does not refer to anything, it is the interpretation that produces the connections when a person is, let us say, using the product. For this reason, we need to introduce one more concept, the *sign vehicle*. A material product can carry meanings when interpreted. The material product triggers interpretation by means of its form and colour. Although the material product may function as a sign, it would rather be called a *sign vehicle*. If the sign would consist of a product (a product incorporates the reference relations), then, the content of interpretation would be fixed to the product, which it is not. Or, the product would contain something that should be opened. The point is to look at the relationship.

There are a few key questions to continue the discussion of the design semantic dimension. These questions concern the content of the references:

1) *What* do the reference relations on all three grounds represent when they are interpreted? What O is R referring to in the triadic relation? To put this in another way: what are the contents of the relations?

2) *How* are the contents represented?

The second concerns the ways or styles in which the content is expressed or represented. Surprisingly often only the first question is addressed and the second one, which is typically a design issue, is passed over.

An answer to the first question often includes technical or practical functions. A car is perceived as referring to driving and moving, a rain coat to protection, etc. In an essay, Roland Barthes (1964) pointed to this primary functional aim. In the same text, he then discussed also other modes of reference and answered the question of *how* a product may express its functional task. The semiotic sign – as iconic, indexical, and symbolic modes – gives answers to what a product refers to, and also to how a product refers (connotes) to its functions

and to other issues. That is why the sign is capable of offering a platform that is versatile enough for the task.

POST SCRIPTUM: DESIGN AND SEMIOTICS AT HfG ULM

One of the first attempts to get to grips with this topic took place at the Hochschule für Gestaltung (HfG) Ulm in Germany in the early 1950s, when semiotics entered the curriculum. Since then, many design schools have offered education in semiotics, and designers have applied ideas from this theoretical approach in their work. Even prior to Ulm, many scholars had been interested in the material culture of everyday life and mass-produced artefacts¹¹ and had analysed cultural meanings with the help of semiotics. One need only think of Roland Barthes' writings and Gillo Dorfles' book *Gute Industrieform und ihre Ästhetik* from the early 1960s. It seems, however, that these texts were not read much in professional design circles or discussed in design journals and in education. It is only later that semiotic concepts, terminology and views have become usual, at least in the Western part of the design world. Semiotic concepts have entered everyday vocabulary through the mass media and thanks to a growing interest towards communication by design. Talk about messages, codes and meanings has become commonplace.

At the progressive HfG Ulm, however, semiotics seems to have been difficult to apply to design work and professional routines. What could have been the reason? Perhaps not enough time was given to these first initiatives to be developed. After all, HfG Ulm existed only from 1954–1968, and a specific formal type of semiotics was taught there by Max Bense¹², a visiting philosopher, and by Tomás Maldonado¹³, one of the leading theoreticians and pedagogues at HfG Ulm. Their thoughts are, nevertheless, fairly well documented. What is not documented is how the students at HfG Ulm received these lectures and how they made use of them in their design work.

Figure 3. Tomás Maldonado teaching at HfG Ulm in 1966.



11 A literature review is included in Vihma 1995.

12 Documented in e.g. *Zeichen und Design* 1971

13 E.g. *Uppercase* 1961.

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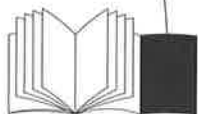
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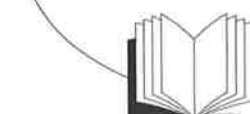
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