SEEING IS BELIEVING: THE CHALLENGE OF PRODUCT SEMANTICS IN THE CURRICULUM

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ABSTRACT

This paper outlines an approach for deconstructing product semantics into a language that is appropriate for design education. The author's evidence that this enables students to articulate design problems in a new way; to engage in research about the meanings their designs might have for others; and to enhance their ability to defend their proposals in the face of competing discourses. Case studies and examples of student engagement are presented and discussed.

Keywords: product semantics, visual language, form, product meaning

1   INTRODUCTION

The complex subject of product semantics – the 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 industrial design – was introduced to design discourse in the 1980s [1]. Its popularisation opened up an area that is wholly relevant to contemporary design practice. With advancements in technology, the form of objects is no longer driven by the technologies within them. Traditional modes of understanding for the product's expression of meaning no longer apply [2,3,6].

By introducing product semantics to students as a language for design, products, whose meanings matter and whose operation is dominated by problems of human understanding, can be deconstructed and demystified. The authors detail a framework that introduces the basic ideas, concepts, principles and language of product semantics, and practices them during seminar discussions and critiques. Additionally, students are guided through a process that increases their competence in translating these approaches into design activities, applying replicable design methods for potential design concepts.

2   PRODUCT SEMANTICS

Product semantics presents a new challenge in design. It recognises that people do not respond to the physical qualities of objects but act on what they mean to them. While simple and obvious, this observation gives product designers the opportunity to rethink their mission and to develop a language of their own [1,4].

Traditionally, product design has identified itself with the tangible nature of the artefacts it creates, and with the industrial production and mass consumption it supports. Some writers add aesthetic ambitions and cultural responsibilities to this list. This area offers product design an empirical domain not claimed by others, one that affords designers a unique role in the collaborative construction of material culture, and one that

opens virtually unlimited possibilities for exploration and reflection. Product semantics recognises that meanings are neither universal nor necessarily shared and certainly not simply mappable onto particular forms. Forms can have very different meanings for different cultures, social groups, or individuals, and in different contexts. Product semantics is the designer's way of coping with the many interfaces between humans and the artefacts they help to realise [4].

3   PRODUCT SEMANTICS – KEY CONCEPTS

Product semantics is constructed from a language that enables product designers to talk about meanings, self-evidence, cognitive models, affordances, coherence, interfaces, etc. and about the everyday language used to create, negotiate, and maintain these meanings. The following is an overview of key concepts [1,2,3,4,5,7,8]:

- **Making Sense:** Something makes sense when we understand the role it plays in a particular context or situation, when we have a coherent explanation of why it is there, what we do with it, and what it does to us. The sense something makes always resides in someone's understanding.

- **Meaning:** The meaning of something is the set of contexts in which we are able to imagine it to make sense to us. What something is for and the distinction between sense and meaning often are confused in everyday language. Asking people what something is can elicit very many kinds of meanings.

- **Categories:** We know a table, car, kitchen, or bank building when we see one. This does not mean the world is organised into homogeneous classes or categories of objects. The fact that it is quite natural to speak of a typical kitchen, for example, implies that we can conceive of not-so-typical kitchens that we have a standard against which we judge how typical a kitchen is. The use of this standard reveals the operational existence of a type (in psychology this is called the prototype) which defines a category.

- **Interfaces:** People have access to material objects only through interfacing with them. Interfaces exist neither on the surface of artefacts nor in the mind of their users but involve parts of both in dynamic interaction. Artefacts cannot be designed in the absence of human participation. Designers must provide motivation for people to get involved, display surfaces that are self-evident or self-instructing, controls that are easily manipulable, and ways for participants to monitor their own participation.

- **Affordances:** In everyday life, we live with the certainty that a chair affords sitting, that stairs afford stepping up on them, wheels afford rolling, that a house affords protection, etc. When the affordance of an object corresponds with its intended function, the design will perform more efficiently and will be easier to use.

- **Motivation:** People surround themselves with objects they can understand, are competent to handle, and feel comfortable to live with, especially with other people. For example, we drive expensive cars although cheaper ones would transport us as well. Motivation by human participants is necessary for interfaces to arise. We distinguish two kinds of motivation:
    - *Extrinsic Motivation* resides in seeing the opportunity to accomplish assignments, reaching goals, and expecting to be rewarded or escaping punishment in the end.
    - *Intrinsic Motivation* resides in the fun something is, in the pleasure of being involved, in enjoyment for its own sake, in play.

- **Cognitive Models** are complex and coherent constructions of meanings and occur in mental spaces. These can be occupied by objects, people, their conceptual models, and the social phenomena in which humans locate themselves. Cognitive models do not

represent what objectively exist. They are more or less afforded by a reality that includes the user. Cognitive models are therefore neither true nor false, but more or less workable. We distinguish four kinds of cognitive models:

- *Users Conceptual Models (UCMs)* are the cognitive models users have acquired in coping with particular artefacts. UCM's are like logical frames or construction principles that enable people to organise their perceptions, including in new situations, filling in missing details as they go along.

- *System Models* account for how an artefact operates under all relevant stimulus conditions. System models are objective by excluding the cognition of their creators. They are stated in a language that users rarely understand and should not need to. Designers should not be required to 'translate' systems conceptions into users terms.

- *Interface Models* are models designers construct to simulate or explore the possible interfaces that can emerge when humans involve themselves with the artefact being developed or proposed. An interface model enables designers to evaluate which users conceptual models are afforded by the system being designed and what happens when the interface is interrupted or breaks down.

- *Models of Designers Minds* explain what designers are doing in their world; the kind of artefacts they believe they are continuously constructing, reconstructing, and reinserting into ecologies of artefacts. This is kept alive by interfacing with a range of conceptual models. Product semantics is part of this model.

The above list provides a summary of the key concepts of product semantics and is not intended to detail every aspect of its make up.

4   PRODUCT SEMANTICS IN THE DESIGN CURRICULUM

The authors have developed an approach for embedding product semantics in the design curriculum and deliver a module that develops the theories presented within this paper into a coherent curriculum. Each session covers two or three concepts. Each assignment is discussed the following week, and in response to criticism and discussion, students are allowed to revise and improve their examples throughout the module. A (digital) log is developed and demonstrates an understanding of product semantics and their value to design. The following is a selection of approaches [2,4,5,6,9]:

•   **Signifiers:** Signifiers are features (mini-objects) constructed and recognisable in the sense they make to users. Signifiers signify meanings. Users direct their attention to particular signifiers and interpret them in the context of the scenarios they pursue. The interface language is a designers language and the signifiers we differentiate below are intended to make sense in the process of design:

- *Character Traits* contribute to overall appearance qualities, usually expressed by adjectives, for example, fast, modern, expensive, high-tech, rugged, feminine, beautiful, clever, etc. Character traits can also be styles like Bauhaus or Memphis for example. A combination of such traits can form the character of a product. Characters often are associated with user groups, tend to be used for classification purposes, form the basis of overall judgements, but do not inform the user about the details of how an interface works.

- *Intrinsic Motivators* invite users to attend to, observe, touch, listen to, play with them. A flashing light commands attention. A funny shape invites exploration. Intrinsic motivators also can distract the attention of a user from what

he or she is doing, thus changing a previous motivation (By contrast, the following five signifiers could be said to be extrinsically motivating).

- *Identifiers* suggest to users what something is, the category it belongs to, which conceptual model applies. Identifiers often conform to ideal-types, relate the gist or deep structure of something.

- *Distinguishers* encourage users to punctuate a scenario into separate tracks or draw distinctions among parts, suggesting that different meanings pertain to what they separate. Distinguishers can show the difference, for example, between what can and can not be touched (the wooden handle on a frying pan), between the part (say of a surgical instrument) that is disposable and the one that must be kept, each affording different behaviours.

- *Expressives* promise users the ability to do something with them that enable users to see how to move ahead in the scenario they occupy (by virtues of how they have been identified). Expressives tell about their own qualities, for example, being flexible, breakable, moveable, adjustable, untouchable, recyclable, disposable, etc. but also lightweight, fragile.

- *Pointers* direct attention to something other than itself that indicate where something came from, leads to, or belongs. We distinguish between *analogies* (when users see movements, arrangements, or shapes of controls as corresponding to or mapping onto what they are to affect, following the schema: A is to B as C is to D), *icons* (resembling what they point to), *indices* (being causally connected with what they point to), *pictographs* (systematised iconic simplifications), *metaphors* (features suggesting certain experiences from another domain to be applicable here), *symbols* (a pointing by arbitrary convention or code).

- *Instructions* are features, pictorial but more often verbal, informing users about how to proceed, marking possible paths, suggesting interpretations, defining the meanings of particular identifiers, distinguishers, expressives, and pointers within a conceptual model, or enabling the user to construct such a model.

- **Metaphors:** Metaphors transfer meanings from one usually familiar domain of experiences to another usually less structured or novel domain. Metaphors are mental operations that can be encouraged by certain visual or linguistic forms. In the theory of metaphors [9]:

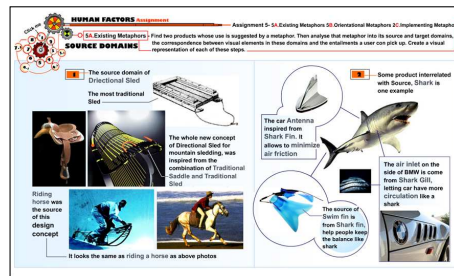Figure 1. Exploration of metaphors: source and target domains

1. People must be able to see some (usually quite superficial) correspondence between the elements in a source domain and those in a target domain

2. The elements in the target domain become (often quite drastically re-) organised in terms of the structure taken from the source domain, thus changing one's perception in the target domain

3.   Having organised the target domain, pertinent entailments from the source domain are then transferred. Thus, metaphors can make an operational logic known in a source domain available to a target domain

• **Semantic Dimensions:** Language provides the most important context for artefacts. We talk about things, tell each other how to use them, evaluate how suitable they are to do a job, define us in their terms, and judge others by what they have or do with them. These linguistic forms are very varied. Semantic dimensions can describe the character of artefacts. There are two kinds of semantic dimensions. One is defined in terms of polar opposite scales, for example:

good   :__:__:__:__:__:__:__: bad
traditional   :__:__:__:__:__:__:__: modern
low-tech   :__:__:__:__:__:__:__: high-tech

The other kind is defined in terms of feature scales, which are scales that express the degree to which an attribute is present and go from 'complete absence' to 'fully present'; for example:

0   :__:__:__:__:__:__:__: post-modern
0   :__:__:__:__:__:__:__: craftsmanship
0   :__:__:__:__:__:__:__: voluminous

Figure 2. Use of semantic dimensions to illicit user perceptions

In the latter stages of the module, students develop small semantically problematic design projects, enabling them to demonstrate their acquired competence. They apply existing design methods (or articulate new ones). The projects results in something sufficiently tangible to be evaluated relative to the initial intentions.

The remaining weeks of the module address issues of product semantics as they arise out of work on the projects chosen. Reports on preparatory research conducted, accounts of the design methods used, self-critical appraisals of the result, and their communication in the form of models, photographs, line drawings and texts are to be completed at the end of this period. These final week(s) are reserved for putting everything into suitable form, to summarize the experiences gained, and to review the role of product semantics in industrial design.

5 CONCLUDING REMARKS

There are many experienced designers that do not fully understand the many nuances of product semantics; indeed, many design educators are not fully conversant with this area. If students must understand these techniques to be better designers, they must also recognise their responsibility to the end-user and their understanding of the ever changing products and technology that surround them. With an ever changing landscape of technology, in addition to user expectations, wants and desires, design education

faces a challenge to provide meaningful direction to future solutions to our technologically fuelled lifestyle. The approach detailed within this paper benefits design education as it:

- Introduces the basic ideas, concepts, principles and language of product semantics and to practice them during seminar discussions and critiques. This enables students to articulate design problems in a new way, to engage in research about the meanings their designs might have for others, and to enhance their ability to defend their proposals in the face of competing discourses

- Increases the competence of translating these ideas, concepts and principles into design practices, applying replicable design methods towards proposing particular products whose meanings matter and whose use is dominated by problems of human understanding

- Leaves behind a record of the process in the form of a logbook (and display materials) to serve as a personal collection of 'semantic examples'.

An identified benefit of this approach is to provide meaning to products not only today, but also in future timeframes. By providing a supportive framework for designers to consider potential future scenarios, it allows 'clues' to be embedded into future driven design concepts and provides users with an understanding of the meaning of products today, and into the future. Product semantics constitutes a new language for design and design education.

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