

STRATEGIES AND APPROACHES TO USER-ORIENTED PRODUCT DESIGN

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ABSTRACT

*This project explores some of the different approaches to user-oriented product design. In this study the product is taken as being a sign that belongs to a relational system resulting from the balance between its semiological dimensions. Emphasis is placed on the communicative language of the product as a bearer of messages composed of shapes, wishes, emotions or memories, and on the value of Product Semantics in order to determine the relations and expectations of the user. Attention is also drawn to the fact that knowing the market trends is very important for product development, and that Kansei Engineering enables consumers' feelings about the product to be turned into design elements. Finally, we show how cognitive concatenation is a factor that can help us to ascertain the possible perception and the cognitive structure of the user towards the product, thus helping us to determine the requirements for the product design.***Key words:** Product semantics; Kansei engineering; Cognitive concatenation; Market trends

1. INTRODUCTION

Knowing users' cognitive structure regarding a product and their perception of it can provide the specifications and requirements that give the meaning and functional nature needed to succeed in user-oriented design. The object constitutes one of the primary data about the world for the individual; it provides us with a purpose, offers us learning experiences, emotions and feelings, and by submitting it to our will we construct our existence.

As pointed out by Barthes [1], an object, or industrial product, can be considered to be a sign. It is a sign of what it does, and what it does grants it a signification. The elements that play a role in such signification are the subjects (interpretant), the signified thing (object) and the representative or signifier (sign). These combine to make up a relational system according to which it is possible to define a series of dimensions. The first dimension is *syntax*, which sets out the formal relations between signs, links up their parts, their shape, their order and their make-up. If we give priority to this dimension, the result is formalism, where value is given chiefly to the product's geometry, its spatial organization, the description of its elements and a prevalence of technology. *Semantics* associates the sign with its significance, provides us with the meaning of objects, and underlines the emotional element. If it predominates the trend will be towards stylism, visual seduction, emotional charge, symbolic charge, affective charge, fashion, and so on. Finally, *pragmatics* links the sign with the interpreter. This is the dimension of logic, its usage, function, the degree of success, its destination; and if we emphasize it we fall into functionalism, which would amount to a commercial description, the technical data, or just a set of specifications.

According to Quarante [12], when a product is being conceived and designed the technical data, the layout of its components, the product/user relationship, its specifications, its signification, and its symbolic charge, i.e. the way it will be accepted, perceived and understood, are all taken into account.

A well thought-out product should be a coherent whole that is the result of a balanced consideration of the different criteria and requirements of the problem. If we grant priority to one of the dimensions of the product, we run the risk of reaching unbalanced solutions.

2. USER PERCEPTION AND RELATIONS WITH REGARD TO THE PRODUCT

Human needs follow a sequence. Molés [6] claims that we go through five stages: *longing for the object* (due to a prolonged desire, a need or a compulsive desire), *liking the object* (possessing it triggers a diminished or milder pleasure after the discovery of its defects or qualities), *taking the object for granted* (now possessed and explored, it slides into the background of consciousness, a cognitive devaluation takes place, the object becomes an integral part of the world around us, it is neutral), *keeping the object in good condition* (the individual gives it a life expectancy, and assigns a value depending on the time that has passed) and, finally, the object becomes established/necessary as soon as the individual decides to *replace it and formulates some kind of judgement* about it.

Human needs also follow a hierarchy, with very demanding values that are seldom completely fulfilled. As put forward by Jordan [4], consumers demand that a product satisfy a number of characteristics, namely, *functionality* (the object fulfils a purpose or function, it solves some problem), *usability* (the product must be easy, comfortable and safe to use) and finally, they must provide a *pleasure* (which can be physical, social, psychological or ideological). As Tiger [13] states, emotional benefits are sought as well as functional ones.

Yet it would seem that the perceptive apprehension of a product goes beyond its offering functionality, ease of use, an acceptable degree of safety, some pleasure and a suitable price. Emotion, possibly triggered by the aesthetic reaction the user feels with regard to the product, is also generated by a collection of factors that exert an influence on whether it is accepted or not. Quarante [11] highlights the following:

- a) *Purely emotional factors*, linked with subjectivity;
- b) *Cognitive factors*, linked with what is known, with what has been learned;
- c) *Intellectual factors*, these refer to the logical satisfaction that comes from understanding a product;
- d) *Psycho-physiological factors*, these depend on the quality of our sensations, on the physiological thresholds of perception, and on our own psychological state.

Lin [5] draws attention to the involvement of other factors related to perception – such as the function, personality and creativity of the product – and to how we assess it in terms of the creativeness of its design, its practical and decorative trend, and the value of the colours used.

All the factors stated above take part in the relation we establish with objects to varying and individual degrees of intensity. As a consequence, the analysis of this system of relations is complex and its study requires the combined efforts of different disciplines and of professionals from distinct specialities. It should also be borne in mind that the relation the individual establishes with the object is maintained and reinforced by the consumer society, by social prestige and by the mass media.

3. INSTRUMENTS AND METHODOLOGIES FOR PRODUCT DESIGN

3.1 The semantic differential

Semantic differentials are measuring instruments used to obtain the connotative value of an object or an image. A pioneering work in this field was *The Measurement of Meaning* (1957) by Osgood, Suci and Tannenbaum [10], which is a study of *affective* meaning, that is, of the emotional reactions that accompany a word. The procedure can be outlined as follows: a subject is shown an object or image and asked to give a subjective opinion of it. This judgement is to be given according to a scale with two opposing adjectives as its extremes, for example *comfortable / uncomfortable* or *fragile / sturdy*, and the subjects are asked to rate the word and place it somewhere on the scale. The *semantic differential* procedure does not provide information about the meaning of the object or image, but instead about the emotions it generates. Its application is possible because it is through words with an emotional meaning that we are able to read, understand and interact with objects. This procedure has

been applied in a wide range of fields, such as high voltage pylons, telephones, mascots, street furniture, cars, etc.

3.2 Kansei engineering: an ergonomic technology at the consumer's service.

Kansei Engineering (KE) came into being in the 80s through the work of Mitsuo Nagamachi [9] as an ergonomic technology for product development oriented towards the consumer's needs and feelings. In Japanese, Kansei means the psychological feeling of consumers and the image they have about a product. KE allows the user's image and feelings to be employed in the design of a product. KE is defined as "the technology of translating consumers' feelings about a product into design elements" [9]. The KE strategy is based on consumers' wants and preferences, and is built on four main pillars:

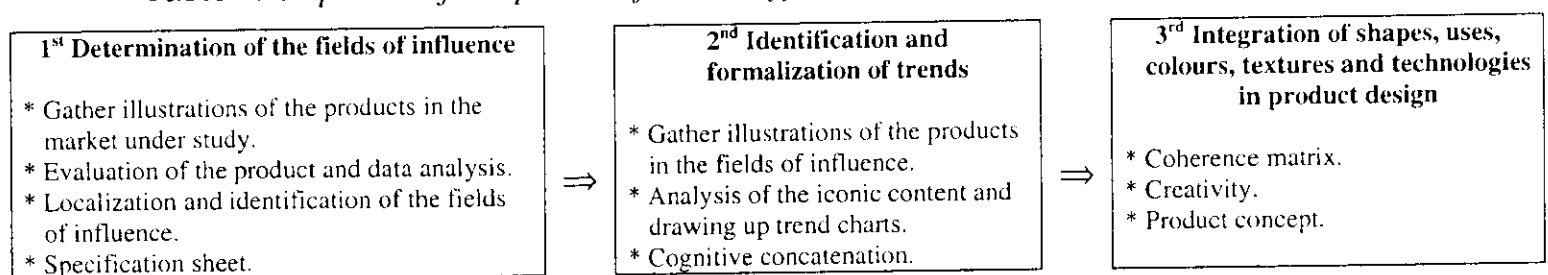
1. The Semantic Differential is used to find out consumers' feelings about the product as an ergonomic and psychological evaluation. KE gathers images and words (from 600 to 800) related to the new product from sales outlets and magazines. This sample is then submitted to a selection process in order to extract the most relevant words (100).
2. The characteristics of the product design are identified from the consumer's image and feelings by studies or experiments in which the relations between words and design elements are observed.
3. To construct a systematic Kansei technology structure, advanced computer technology is used. Artificial intelligence, the neural network model, genetic algorithms and fuzzy logic are also employed in the KE system to build databases and the computerized interference system.
4. Fitting product design to change is achieved by means of data banks that are adjusted to the new trends of consumers.

The possible applications of KE are varied and numerous. They range from the analysis of semantic structures and product evaluation to applications in telephones, vehicle interiors, office chairs, photocopiers, façades and doors. Corporations such as Ford, Sanyo, Nissan, Sharp, Komatsu, Mitsubishi and Mazda, among others, have introduced KE into the development of their products.

3.3 Market trends in product design.

Anticipation, innovation and competitiveness are commonly used terms in the field of economics and commerce. Reducing the amount of time involved in the conception of a product, as well as ensuring its formal and semiotic coherence (e.g. its sociological, chromatic, textural, formal and ergonomic trend), are in line with Concurrent Engineering and provide added value. The identification and integration of trends in product design is what Bouchard, et al, put forward in their work [3], from which we get the feeling that the communicative aspect of the product is of great importance. The method used to identify and integrate product design trends can be summed up as follows (Table 1):

Table 1. Sequence of the process for identifying and integrating product design trends



The work of these authors also places a great deal of emphasis on identifying the usage trends, so that they can be integrated into other products, an example of which could be the menu windows from computer software used in video systems or cellular phones. The results of the trend analysis are used by the management and project team to draw up the design specifications and requirements sheet, in the conception of the attributes of the product, and as a means of communication between engineering, style and marketing.

3.4 Mental structure and cognitive concatenation.

In 1975, Young and Feigin [16] defined some of the elements that are currently used in cognitive concatenation. Based on the results of surveys, they observed that consumers associated product *attributes* to a series of manifest *benefits*, and that these in turn gave rise to others that are more abstract and personal, i.e. *values*. Joining these associations together weaves a network or string of latent benefits for each individual. From there, Aurifile (1991) and Aurifile and Valette-Florence (1992) [14] offer an explanation to the model of the cognitive structure that each user, in his or her psycho-social universe, realizes when faced with a product. It becomes increasingly clear that cognitive concatenation is potentially valuable not only for improving advertising communication and positioning strategies, but also for improving the quality of forecasts that this type of process is likely to offer as regards product consumption.

4. CONCLUSIONS

It is clear and obvious that designers enjoy being creative and innovative, bold and different in their creations in an attempt to modernize and stand out. This means that the language of use of a product is replaced by a new language that has to be learned. Moreover, the acceptance and success of a product are achieved by connecting with the pace and scale of values of the target group. The challenge, therefore, lies in tuning the designer's language in with that of the user. In other words, there is a need to study how the conceptual models of users and of designers are related in terms of *product semantics*.

Product semantics attempts to make the possibilities of a product visible to both the designer and the user. To apply it, some fairly promising theoretical models are being developed (semantic differential, KE, trends, cognitive concatenation, etc.) which ought, in turn, to give rise to practical instruments. The collaboration of multidisciplinary teams from the fields of marketing, socio-psychology and engineering will be needed for both their development and their application.

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