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Influence of the mode of graphical representation on the perception of product aesthetic and emotional features: An exploratory study

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ABSTRACT

The use of graphical representations of objects for their visualisation on computer screens is becoming increasingly common, as much in e-commerce as in the product design process. In this context, the reliability of the type of representation used to transmit the physical or functional features of the objects to the viewers is vital. In the case of products with a great symbolic value, the representation format must also be capable of arousing (as much as possible) in the user the same psychological feeling, the same emotions that the real product induces. This is of crucial importance in mature markets with a large variety of products that address the same need, because in such markets the purchase decision can depend on the user's perception of the object. The aim of the present work is to determine, by means of a case study, how different ways of representing a product can affect the ability to transmit the product's symbolic value to the observer. The perception associated to a computer loudspeaker and four different ways of graphically representing it, namely photography, static infographic image, three-dimensional navigable model and three-dimensional navigable stereographic model, have been analysed using the Differential Semantics Method. If the results of the real product are compared against the different types of representation, it can be observed that the representation mode has a significant influence when transmitting the concepts that compose the product semantic space. These differences are more significant in static representations than in dynamic or interactive ones. Nevertheless, there is a majority of concepts that the product is able to transmit in the same way independently of the type of representation, so the decision to use more advanced representation models will rather depend on the application, the type of product and the firm's expectations.

Relevance to industry

Knowledge about the possible limitations of product representations to effectively transmit the message intended by designers is important in the early phases of product design projects, as well as in marketing and sales strategies, e-commerce planning and website design.

1. Introduction

The use of representations of existing or future products is a widespread practice and an object of study in different areas such as architecture, ergonomics, landscape design, marketing, product design, product development and computer science (Söderman, 2001).

In relation to product development, graphical representations play an important role in describing and explaining a future product (Kaulio, 1997). They are considered by Engelbrektsson et al. (2000) as one of the four essential factors (along with environment, methods and users) in the methodological approach to communicate with customers.

Many representation methods are used throughout the product design process, from the emergence of the idea to its launching in the market (sketches, scale models, prototypes, mock-ups, computer-aided design, virtual reality). It is common, for instance, to use synthetic displays (digital prototyping) before beginning the detail design, in order to evaluate if the product is able to transmit the concepts that have guided its design (virtual concept testing) to the observer. Within the design process, modes of representation have been thoroughly studied in several areas: representations as means to enhance communication within design teams (Leonard-Barton, 1991), communication between suppliers and customers (Schrage, 1993), assessment of preliminary product concepts (Alba, 1980; Bont De, 1992; Finn, 1985;

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Holbrook and Moore, 1981; Loosschilder and Ortt, 1994; Louviere, 1987; Ulrich and Eppinger, 1995) or customer preferences or purchasing interest analysis (Dahan and Srinivasan, 2000; Dickinson and Wilby, 1997). In all of these cases, prior knowledge of the way in which those methods of representation influence the perception associated to the object is necessary. Actually, the ability of consumption products to transmit emotions and concepts to the observer grows in importance and significantly influences the purchase decision (Holbrook, 1985; Desmet, 2003). In the actual marketplace there is a wide range of similar products in terms of functionality, price and quality. In this kind of markets, attention is increasingly focused on the visual characteristics of products, as their functionality and performance are often taken for granted (Crilly et al., 2004). This fact makes the visual appearance of products a relevant factor on consumer response and product success (Bloch, 1995).

On the other hand, product sales through Internet are rapidly increasing. This sales method limits the user-product relation to visual interaction with graphical representations of products. Although these representations are usually completed by a written description of some relevant features, the transmission of product perceived qualities is mainly upheld by graphic representations (Dahan and Srinivasan, 2000; Vriens et al., 1998). In this sense, the ability of the different ways of representation to transmit the semantic and aesthetic messages of the product becomes especially important because communications via Internet occur mostly through limited affective bandwidth (Picard and Klein, 2002).

In every case, the graphical recreations of the product used for its visualisation in computer screens should be able to transmit as closely as possible all the product expressive qualities to the user. This fact can be of especial importance in products with a high allegorical or aesthetic component.

In general, the most common representation methods enable the display of valuable information to the observer concerning the product physical features or functional capabilities. Nevertheless, various studies point out that the way the observer perceives an object is influenced by its mode of representation: synthetic representation affects colours and textures, perceived depth could be altered as well as information related to size, material properties and position of the object (e.g. Knill and Saunders, 2003; Tversky et al., 2002; Sharples and Saikayasit, 2006). Since the mode of representation influences the perception of the object by the observer, it can be thought to also affect the ability of the object to transmit its aesthetic impression and symbolic value. This hypothesis is reinforced by studies showing that virtual or indirect product experiences generate less affective responses and thus are less effective than real or direct ones in changing consumer attitudes towards the product (e.g. Gibson, 1996; Li et al., 2001; Millar and Millar, 1996), and is thought to induce less confidence in the consumer when making a buying choice (Hoch and Deighton, 1989).

The aim of the present work is to determine, using the analysis of computer loudspeakers as a case study, how different ways of representing a product affect the ability to transmit to the observer the product's aesthetic attractiveness, symbolic value and semantic information. The objective is to verify if the mode of representation could operate as a "noise" variable distorting the designer–consumer message transmission. The starting hypothesis is that the perceptual response provoked by different types of product graphic representation (indirect experience) can differ from that generated by the real product (direct experience). In this sense, taking the real product perception as the standard control to be compared against the perception aroused by the other modes of representation, the second hypothesis is that perception differences will decrease as the degree of realism is augmented by means of immersion, interactivity, real-time and three-dimensional (3D) experience.

To contrast these hypotheses, the psychological feeling related to the observation of a loudspeaker real model is compared to the feelings aroused by different ways of graphically representing it using the Differential Semantics Method. Basically, a product semantic analysis using semantic differential method involves three steps (Osgood et al., 1957). The first one is the construction of semantic scales for product evaluation (semantic space), which includes collecting a large number of words describing the product, grouping these words into categories related to the same concept (semantic axis), and choosing one or several words from each category to represent the concept in order to evaluate the product. The second step involves product assessment using the semantic scales or axes, and the last one refers to the interpretation of the semantic assessment results.

These three stages have been developed here in two separated studies. The first one corresponds to the semantic axes definition, whereas the second study comprises the product and representation modes perception assessment. Both studies are described later in the paper.

2. First study: identification of the product semantic space

The purpose of this study was to identify the semantic scales that constituted the semantic space of the product. This would let us know the main concepts that users considered when performing the aesthetic, symbolic and emotional appraisal of the product.

2.1. Experimental materials

First of all, it was needed to choose a suitable product to be represented in order to compare the influence of the different representation modes on the user visual appraisal. The main criteria considered was that the product should have a wide variety of distinctive and interesting designs, to which aesthetics and affective properties were very relevant in purchase decision processes. The other one was that designs should have an appropriate level of complexity—simple enough to reproduce them without difficulties, but complex enough to engage users in the evaluation task. On the basis of these criteria desktop computer loudspeakers were chosen as the product object for the study.

The identification of the semantic space was performed according to guidelines given by Alcántara et al. (2005a) applying differential semantics. The first step to obtain the semantic axes was to gather as many words and expressions as possible of those used by people to express loudspeakers attributes, thereby obtaining the Initial Product Semantic Universe. Only Spanish words were compiled. The sources used were interviews with 64 users, publications related to computer loudspeakers, and web sites of the main loudspeaker commercial trademarks.

The Initial Product Semantic Universe was considered to be completed when interviews or searches identified no new relevant words or expressions. The collected words and expressions were reduced to a smaller set to avoid loss of reliability due to subjects tiredness during the evaluation phase. This was done by a panel of three experts in product semantics. Those words formed the Reduced Semantic Universe. It is common for semantic evaluation to use from 40 to 100 words (Tanoue et al., 1997), excluding a work where 346 words were used (Nakada, 1997). The goal for this work was established between 40 and 70 words. The reduction criteria were synonyms and antonyms elimination (Küller, 1975) as well as adjectives related to materials, specialised terms and adjectives and expressions indicating a purpose or aim (Jindo et al., 1995).

Using these criteria a total of 256 adjectives and 26 subjective expressions compiled from various sources were reduced to 67.