INCORPORATION OF EMOTIONAL DESIGN METHODS IN CERAMICS. DESIGN PARAMETERS AS FEELING MODULATORS.

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ABSTRACT

Products are known to be not only material objects, but also to have certain symbolic values [4]. In fact a product relates a complex set of messages and values captured by the user. The combination of both aspects determines user satisfaction relative to the product at issue. The value of a product only exists as a function of the user and of the particular context in which both elements interact. Kansei engineering enables integrating emotional design into ceramics and obtaining structured knowledge of a function to which increasing importance is being attached. Kansei engineering **is a translation technology** *of the image and of the* **perception** *that a user has of a product into* **design elements**. *Its aim is to create products that satisfy user needs by relating design elements to the perceptions they rouse in users. It is a generic methodology, referring to the external appearance of the product, and should be used to improve products when these have already passed the concept design phase and it is known how to eliminate the safety and functionality problems.*

The present Poster sets out an approach of this methodology in the Spanish ceramic sector and is framed in the CERGOCIVIS (CergoCIVIS Innovation Project: Ceramic systems with integrated ergonomic functionalities and universal design for covering different surfaces) To elaborate this TAU CERAMICA, in collaboration with IBV and ALICER, have conducted a study with 30 subjects of both sexes between 35 and 45 years of age, who evaluated a set of integrations whose design parameters were predetermined by the methodology. The different responses were based on the evaluation of a certain number of concepts or semantic axes. These concepts – the outcome of previous studies – are known to be independent and, in addition, to synthesise and define most of the sensations that ceramic products are able to transmit.

The information gathered enables extraction through statistical analysis of the importance and influence of the design parameters contemplated in the study. Parameters such as colour, joint size, tile size, installation, relation between sides, tile shape, texture, the presence of screen prints have been defined by their importance and influence when it comes to communicating each of the axes or concepts a ceramic product is able to transmit.

1. INTRODUCTION, OBJECTIVES AND BACKGROUND

At present consumers not only attach importance to the functional aspects of floorings; in fact, the purchasing decision is largely affected by the emotional qualities that the product does or does not manage to transmit [2]. In products with short or medium life cycles this is a highly exploited fact, as in computers, cell phones, or utility vehicles (e.g. Apple Mac, Nokia cell phones, Volkswagen Golf); in contrast, the lasting character of ceramic tile has led to very conservative development strategies in the ceramic sector, since it is difficult to incorporate important design decisions when it is not known how users are going to react. In addition, as the users do not want to take compulsive purchasing decisions on an article that is going to remain such a long time, reflection is prioritised of the functionalities and known design preferences. On the other hand, unfamiliarity with methodologies for addressing the emotional side in a systematic way has not stopped manufacturers in their persistent endeavour to attempt to exploit the clear potential of ceramics in this sense, leading them to decisions based on trial and error; however, this has flooded catalogues with innumerable collections, complicating the manufacturer's production and distribution, and creating confusion and indecision in consumers.

One of the main problems in tackling the emotional part of floor and wall tiles, therefore, is an absence of methodologies and knowing how to approach this in a controlled way. Perception has usually been catalogued as an abstract and uncontrollable phenomenon, besides incorporating an important charge of individualism [3]. However, methodologies can be established at present that are able to estimate with a known likelihood of success, the way product-related feelings are perceived and how these can be controlled by their design elements. In addition, the problem of individualities has been widely studied [1] (Kolter, 1992) and it has been possible to restrict these to an appropriate characterisation of the consumer population, thus, effectively reducing individualistic variability to non-significant levels.

The present poster seeks to show the application of one of the methodologies that are able to create tangible and hence controllable knowledge of the emotional part relating to the ceramic design elements (Kansei engineering). This first approach has been conducted on ceramic floor tiles for interior public spaces.

The proposed methodology is based on the study of the independent concepts that ceramics is able to transmit in the types of floor tiles studied. This study was performed in previous projects, in which differential semantics was applied to interior floor tiles subject to heavy traffic. Thus, the total number of words and expressions obtained was grouped, eliminating the repeated ones, obtaining **288** terms employed by users in describing these floor tiles. This set formed the Initial Semantic Universe. These terms were in turn related according to analogous meanings, in order to begin to eliminate those considered devoid of interest. Groupings of terms with similar or opposite meanings were then made, eliminating very subjective terms or those of doubtful significance. Thus, a final number of **54** terms was established, which formed the Reduced Semantic Universe. These 54 terms were then again analysed by users to define the final axes which embodied the concepts that best synthesised the variability of the feelings transmitted by the product.

In this study it was concluded that thirteen independent concepts allowed defining 57% of the entire variability of feelings that this product was able to transmit. These thirteen concepts, known in semantics as the semantic axes, which define the perception of this type of flooring are:

AXES
SAFE
INNOVATIVE, ORIGINAL and IDENTIFYING
COMFORTABLE and WARM
ELEGANT and SELECT
FUNCTIONAL
QUALITY and RESISTANT
ARTISANAL and NATURAL
LUMINOUS, heightens the FEELING of SPACE
HYGIENIC, with a FEELING of CLEANLINESS
COLOURISTIC, DISQUIETING
COMPLEX
SOBER and AUSTERE
DELICATE and FRAGILE

Table 1. Semantic Axes defined for internal flooring subject to heavy traffic.

2. MATERIAL AND METHODS

The study presented is thus based on the results that relate the 13 concepts (semantic axes) of Table 1 to most of the feelings transmitted by ceramics.

The first objective consisted of generating an orthogonal design of experiments, with which to determine the characteristics that a group of prototypes must have so that analysis of these would establish with assurance the possible significant influences of the design parameters with regard to the feelings of interest in the study (Semantic Axes).

For this, those design parameters were defined and their levels were established which could be susceptible, a priori, to acquiring a significant influence (all of these being visual parameters, Table 2) Thus, 27 visual prototypes (graphic integrations) were defined, which were developed and integrated by ALICER in the same environment, solely modifying the floor tile. (See ANNEX)

The visual prototypes were **evaluated** by a representative group (32 people) of Men and Women between 35 and 45 years of age, who expressed, in a range of 5 levels, to what extent each of the prototypes affected the pre-set feelings or axes.

PARAMETER	LEVELS
Dimension	20 cm
	60 cm
Relation	Square
	Rectangle (1/2)
Colour	Cold (predominant)
	Warm (predominant)
	Neutral (predominant)
Micro-Macro texture	Dressed stone
	Geometric screen print
	Natural screen print
	Natural
	Gloss
	Satin
Relief	Without relief
	With relief
Joints	Fine
	Medium

Table 2. Established design parameters

Finally, based on the results of the evaluation the Kansei design rules were defined. The present study presents the result of using the analysis technique by means of contingency tables, which enable determining whether a design parameter is affecting any of the described axes in a significant way, and provides the degree of relation between both through Sommers' D parameter. This parameter provides an order of magnitude that indicates the measure of importance and whether the influence enhances the feeling or reduces it. The relation is one of cause and effect between design elements and perception.

3. RESULTS AND CONCLUSIONS

The following describes the results and conclusions of the **contingency tables** and shows a graph (Figure 1) visualising the respective importance of the design elements that statistically influence in a significant way each semantic axis.

It can be observed that each of the 13 axes is located on X axes. Each semantic axis is significantly influenced by the symbolised parameters, listed on the right side of the graph. The non-influencing parameters have not been introduced, so that only the ones are marked that achieved significant influence. The parameters represented below the line of origin (Y=0) influence negatively the corresponding semantic axes.

It is possible to distinguish between important and very important influences. The very important parameters, with a Sommers' D of 0.25, are located above the dotted line in the positive part and underneath it in the negative part. This signifies a cause-and-effect relation of 25% as set out below.

Analysing by axes:

The **Artisanal and Natural** axis is only influenced by two of the studied parameters: the presence of relief and a warm colour; however, though they are important parameters they do not exceed 0.25, but do have the property of being the only influencing parameters that enhance this feeling.

The **Colouristic and Disquieting** axis is clearly heightened by the presence of geometric screen prints: the other parameters of positive influence, in order of importance, are relief Natural Screen Print, whose colour shall not be neutral, and fine joints.

The **Complex** axis has two very important features that provide the design with complexity: these are geometric screen prints and relief. Another, less important factor, is the Natural screen print. On the other hand, satin finish flooring reduces the feeling of complexity, providing simplicity. It can be observed that the micro-macro textures are able to heighten and diminish the perceived complexity of the flooring.

The **Comfortable and Warm** axis is of significant importance, since it explains the greatest percentage of variability in all the axes. The cold colour influences this feeling very negatively, while the warm colour heightens the power. On the other hand, the absence of relief and fine joints makes the flooring look comfortable and warm. Thus, around 40% (Sommers' D of 0.4) of the floors perceived as comfortable and warm are perceived as such owing to their warm colour and vice versa.

The **Quality and Resistant** axis is not influenced by any of the studied perception-related parameters, which is means that the group of subjects surveyed does not relate the feeling of quality and resistance to any of the parameters involved in this study; therefore, in order to extract influences, it might be necessary for the subjects to touch and try the flooring and not, as in this case, simply perceive the flooring visually for the evaluation. It could also be because this concept is not very well defined at user level.

Gloss and the absence of relief provide **Delicacy and a feeling of Fragility**.

The **Elegant and Select** feeling axis only has strengthening influences. Gloss is the most important parameter followed by the Satin finish, neutral colour, warm colour and a dimension of 60 cm. The coincidence is notable with this season's style trends, so that it may be stated that what the public appreciates in the new lines is elegance.

The studied parameters contribute positive and negative influences to the **Functionality** axis. Satin finish and absence of relief improve the functional feeling, whereas the Natural screen print and especially the geometric screen print reduce perceived functionality qualities.

The axis influenced by the greatest number of factors is that of **Hygienic, with a Feeling of Cleanliness**. In order of importance, the absence of relief, satin finish, neutral colour, fine joints and the dimension of 60 cm heighten the feeling of cleanliness. Quite the opposite occurs with the cold colour and especially with the geometric screen print and the Natural Screen Print.

The **Innovative, original and identifying** axis is heightened by the incorporation of geometric screen prints, the presence of relief, Natural screen prints, Fine Joints, and a relation between sides of square proportions. This axis, just as the rest that only have positive influences, can be related to excitement quality characteristics, since the people do not attach importance to parameters that reduce these feelings, matching the characteristics of the excitement quality properties of Kano's theory. This axis in turn deserves to be noted, since the properties described here are able to differentiate a product significantly.

The parameters that provide **luminosity and a feeling of space** are, in particular, the warm colour, followed by gloss, satin finish and fine joints, while they are reduced by a dressed stone finish, geometric screen print and, particularly, the Natural screen print and cold colour.

Safety is one of the axes to which most importance has been attached in this study and, in contrast, it is one of the axes that have received fewer parameters of influence. Gloss is the only parameter that influences safety, and does so in a negative way. The importance ratings obtained with older people are to be noted, compared with those found with an age group that is not so sensitive to the need for safety.

The cold colour, the absence of relief, and the medium joints raise the feeling of **Sobriety and Austerity**, whereas the geometric screen print reduces this.

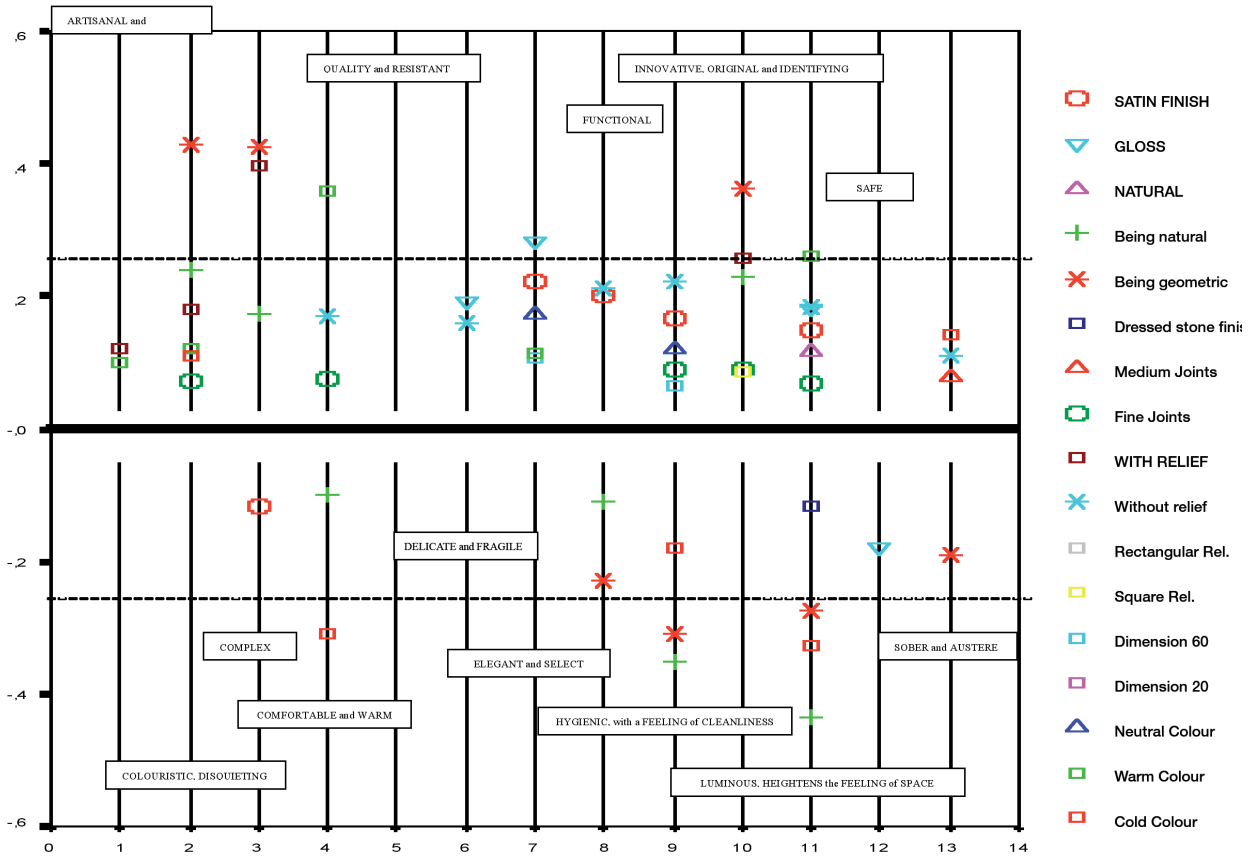

Figure 1. Graph of design parameters that affect the different studied feelings in a positive or negative sense. The parameters below the X axis negatively affect the feeling embodied in the vertical line, whereas those that lie above this have a positive influence. (And rising indicates a greater influence on the axis)

ANNEX

Examples of visual prototypes

Visual prototype: Design 3. Colour warm, dimension 20 cm, Relation of sides square, Relief with relief, Joints fine Joints, Texture Gloss

Prototype Design 7: Colour cold, dimension 60 cm, Relation of sides rectangular, Relief without relief, Joints fine joints, Texture Natural

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