Study and Design of Intelligent Kitchen Scale

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Abstract. *Objective* In the design of intelligent kitchen scale, modeling elements occupy a high proportion. *Methods* We choose the typical image vocabulary of intelligent kitchen scale in the aspect of modeling style to study, using the Semantic difference method (SD method) etc. to estimate the perceptual image vocabulary, using the method of literature induction to extract the elements of modeling design, and finally, we match the Emotional value with the modeling elements using the quantification theory Ⅰ class. *Conclusion* It gained the correspondence between the modeling elements and emotional semantic trtwo guide the intelligent kitchen scale design on the basis of this results.

Introduction

With the improvement of people's living standards, the quality of life is becoming higher and higher, and smart health will become the main theme of life. Diet, as the most important way for people to receive nutrition, is the most concerned aspect. How to choose scientific and healthy food according to the condition of your body has become a hot topic in current social life.

In the design of smart kitchen scales, design and locate them, analyze the characteristics of specific people and find out their functional requirements. In the design of smart kitchen scales, traditional design methods can not meet people's pursuit of new lifestyles. Here, the sensibility engineering [1-6] idea is used to guide the design of the kitchen scale.

Styling Design

In the design of smart kitchen scales, the sample selection was carried out by E-prime [7,8] software, and the semantic imagery vocabulary evaluation was carried out by the semantic difference method (SD method) [9], and the modeling design elements were extracted by the literature induction method. The quantitative evaluation theory class I [10] is used to match the inductive evaluation value with the modeling feature, and finally the design of the smart kitchen scale is obtained.

Sample Collection, Acquisition and Selection.

Taking the smart kitchen scale as the research object, 40 smart kitchen scale pictures were collected according to the network and books, and the specific population was tested with E-prime software. The subject presses any button on the keyboard to select the favorite kitchen scale shape in the first time. After the end of the experiment, the software performs data statistics and analysis on the reaction time when the participants participate in the test. The pictures with the cumulative selection frequency exceeding 50 times and the first reaction time within 0.800 s are selected as representative pictures, and finally selected A representative sample picture 12 is shown in Fig.1.

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03	07	11	16	17	20
24	27	28	31	35	38

Figure. 1 Selected result of representative sample

Collection and Selection of Sensible Intention Vocabulary.

First of all, through the psychological analysis of young middle- and high-level white-collar workers, the project team members obtained 15 representative vocabulary words for the sensory perception of the kitchen scale through brainstorming, network, magazine and other means. The study was conducted on 20 white-collar women with design skills. Observe the 12 representative images selected by E-prime software analysis and renumber the images, numbered 1-20. Combine your own actual feelings and choose the most appropriate emotional image. According to the cumulative number of selections of the number of pictures, four sets of eligible emotional vocabulary words within 80% of the cumulative number are selected, as shown in Table 1 Tab.1.

Tab 1 Representative perceptual image vocabulary about Intelligent Kitchen Scale

CONCISE – CUMBERSOME	INTELLIGENT – MECHANICAL	MODERN – TRADITIONAL	SMOOTH – BLUNT

Perceptual Semantic Evaluation.

Using the semantic difference method (SD method), 50 experimenters were selected to evaluate the perceptual vocabulary by scoring each representative sample using a seven-level semantic difference scale (see Tab.2), and all the scores were counted and the average was calculated. (See Tab.3).

Tab 2 SD amount of sample 3

CONCISE	3	2	1	0	-1	-2	-3	CUMBERSOME
CONCISE	3	2	1	0	-1	-2	-3	MECHANICAL
MODERN	3	2	1	0	-1	-2	-3	TRADITIONAL
SMOOTH	3	2	1	0	-1	-2	-3	BLUNT

Sample 3

Tab 3 The Average Of Perceptual Semantic Evaluation

Specimen	1	2	…	20
Concise – Cumbersome	0.32	1.60	…	2.36
Intelligent – Mechanical	1.68	0.46	…	1.20
Modern – Traditional	0.70	0.23	…	1.30
Smooth – Blunt	0.55	0.23	…	1.38

The Establishment of Perceptual Semantics and Modeling Elements.

The sensibility evaluation scale is converted into engineering scale. This paper uses the quantitative theory *I* to establish the relationship between sensible semantics and smart kitchen scale modeling elements. The average value of the perceptual semantics is used as the dependent variable, and the modeling elements are independent variables. A multivariate linear mathematical prediction model is established:

$$Y=W_{11}E_{11}+W_{12}E_{12}+W_{13}E_{13}+W_{14}E_{14}+W_{21}E_{21}+W_{22}E_{22}+W_{23}E_{23}+W_{24}E_{24}+W_{31}E_{31}+W_{32}E_{32}+m$$

□□□

In the Eq. 1, Y is the average value of the perceptual semantic evaluation; W_{ij} is the weight coefficient of each independent variable, E_{ij} is the reflection value of the modeling element (i is the item, j is the category); m is a constant term.

Regression analysis was performed using SPSS software to obtain the partial correlation coefficient between each perceptual vocabulary and design project. Take "modern - traditional" as an example, the results are shown in Table 5.

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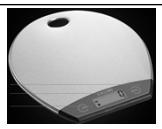
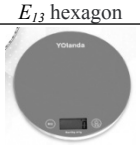
Tab 4 Main modeling elements of Intelligent Kitchen Scale

PROJECT（X）	FORM（E）			
Scale surface（X_1）	 E_{11} circle	 E_{12} square	 E_{13} hexagon	 E_{14} irregular body
Foundation（X_2）	 E_{21} square	 E_{22} irregular body	 E_{23} circle	 E_{24} hexagon
KEYPRESS（X_3）	 E_{31} touch key-press	 E_{32} highlight the key		

Tab 5 Associative analysis between modeling elements and perceptual words "modern -- traditional"

PROJECT（X）	FORM（E）	coefficient of partial correlation	Category score	
			Modern	Traditional
Scale surface（X_1）	C_{11} circle	0.90	0.69	
	C_{12} square		1.66	
	C_{13} hexagon			-0.04
	C_{14} irregular body			-0.12
Foundation（X_2）	C_{21} square	0.76	1.31	
	C_{22} irregular body		exclude	
	C_{23} circle		1.11	
	C_{24} hexagon			-0.71
KEYPRESS（X_3）	C_{31} touch key-press	0.82	1.57	
	C_{32} highlight the key			-0.86
DETERMINATION COEFFICIENT	0.86	CONSTANT	1.53	

Smart Kitchen Scale Design

Using modern design methods and concepts, innovating on the basis of the above design elements, designing a product that meets specific populations is shown in Fig. 2. The smart kitchen scale is inherited from X1-C12，X2-C21，X3-C31. The design gives people a modern, intelligent, simple and smooth aesthetic enjoyment.

In the function design, according to the characteristics analysis of the target group, find out the design requirements, and combine the kitchen scale and the commonly used intelligent terminal through Bluetooth wireless, and display all the nutrition information on the smart terminal (smartphone, tablet, computer). Make kitchen scales intelligent. The design of a proprietary APP is the key to achieving the functionality of this product. Through the APP, we can control the weighing of the electronic scale, analyze and summarize the relevant data.

The smart kitchen scale will weigh the weight of each meal, calculate the nutrient content according to the type of ingredients, and count the total nutrient content of the meal and analyze the user's nutrient requirements, and give appropriate dietary recommendations.

Figure. 2 Rendering and explosion of Intelligent Kitchen Scale

Conclusion

In the design and research of smart kitchen scales, through the design analysis of the target population, the specific design requirements of the target group were obtained. In terms of specific design and design, under the guidance of sensible engineering, designers should consider the design of modern smart kitchen scales, the main focus should be on the scale surface, when the partial correlation coefficient of the scale surface is higher than other modeling elements, The perceptual image of the designed product can satisfy the emotional needs of the customer, which makes the design process more obvious, and has a clear guiding route in design, which is convenient for design and has a guiding role for the designer's design.

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