

A Study of Product Form Preference of The Elderly

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Abstract

Population aging is a phenomenon faced by most of the countries around the world. Despite the fact that there is an increasing number of consumers, there is a lack of studies investigating the psychological dimension of elderly consumers for products.

The research is implemented from the perspective of Kansei Engineering, to summarize the product images anticipated by the elderly and the product shapes preferred by the elderly through questionnaire survey, selection of picture, interview with respondents, and statistical regression analysis, and by taking the products commonly used by the elderly in their daily lives as an example.

Preliminary understanding of the basic cognition of the elderly on shape and image interpretation as a result of the research will contribute to the accumulation and succession of design experience on one hand and will provide a reference in product design practice on the other hand.

Keywords: the elderly, anticipant images, form elements, design practice.

Research Background and Literature Review

The elderly over 50 years old in Taiwan will exceed 9.12 million by 2020, accounting for up to 40% of the total population [1].

In respect of the silver hair business opportunity, however, most enterprises are lack of information regarding the consumption of the elderly group. The stereotyped image that the general public has about the consumer products intended for seniors is usually associated with such descriptions as dark-colored, function-oriented, easy in operation, simple in appearance. (figure 1.) But do senior consumers really like these kinds of products?



Figure1.Photos of consumer products used by seniors are searched through Google search engine.

A review of the research literature on seniors published in recent years shows that most of them focus on discussion of the effects of their declining physiological functions, such as the Exploration of Cell Phone Operation Interface for Seniors (Yu Jing, Ji Ting, and Xu Jianbo, 2016) [2]; to understand the different perceptions of color matching in the elderly.(Zhigang

Hu, Wenlei Wang , Xianling Qiao,2016) [3]; General Design Principles Attempting to Draw Conclusions on Seniors' Visual Demands for Their Products (Jeff, Johnson. & Kate, Finn., 2016) [4]; the Effect of Overall Environment and Social Effects on the Seniors (Tad Hirsch, Jodi Forlizzi, Elaine Hyder, Jennifer Goetz, Jacey Stroback, Chris Kurtz, 2000) [5]; Exploration of Seniors' Demands for Product Designs Sponsored by Enterprises (Matsushita Electric Works, Ltd., 2005) [6]; and propose robots and mechanical methods as an aid to improve the lives of the elderly. (M. Nagamachi, 2014) [7] ; used Kansei theory as method to define elder's needs to design built-in urban environment (Mohsen, Ahi. Andy., Negin, Yashmi.,2014)[8].The exploration of the psychological expectation image of seniors is quite limited.

In the research, we attempt to start with the correlation between anticipant images and shaping techniques. At the early stage of the research, we will discuss what are the product images preferred by the elderly by taking the products most frequently used by the elderly in their daily lives as an example. Next, we will collect the shaping techniques expressing a specific image, and shaping elements and treatment techniques of which the elderly have a consistent cognition and thereby prepare a design recommendation table that can be used as a reference in design practice.

Research Method and Process

In order to achieve the aforesaid purpose of the research, Methodology and procedures of the research are specified as follows respectively:

1.Survey on the Product Images Anticipated by the Elderly

A total of 52 vocabularies of product images are selected from literature and through interview with experts. The elderly respondents are required to select the images of the two products (“glasses and blood pressure meter”) that they should have as anticipated or expected by the respondents.

According to the Golden Age Theory put forward by Lin (1995), the degree of human ageing is divided into Golden Age I- III. Respondents group proposed in the research is within Golden Age I, referring to 65-74-years-old people who are healthy, energetic and are capable of independently managing their daily lives. A total of 50 elderly respondents are enrolled in the test at this stage.

2.Survey on the Products Meeting the Anticipant Images

Pictures used in the test derive from the yearbooks of excellent products over the years [9,10]. A total of 75 products are selected and presented on A4 color pictures, as stimulus in the test.

The elderly are required to find out the pictures of products that best meet the images from the 75 pictures of products presented randomly based on the vocabularies of the top three anticipant images selected at the preceding stage of the research, and are encouraged to explain the reasons for their choices, to be used as a reference in the subsequent correspondence analysis between images and shaping elements. A total of 50 elderly respondents are enrolled in the test at this stage.

3. Discussion on Morphological Analysis of Product Shapes

Prominent shaping elements on products have to be identified if the correspondence between images and shaping elements is to be determined and summarized. Pictures used in the test at this stage are the 10 most representative pictures selected based on the top 3 three adjectives (“Practical”, “Safe”, and “Light”) as a result of the test at the second stage. Three designers with 5 years of experience in design are invited to conduct analysis on product shapes, so as to summarize the constitution of 30 shapes, including 5 major elements, such as constitution elements, treatment techniques, surface treatment, selection of materials and color matching, and to prepare shaping treatment technique evaluation table.

Subsequently, the evaluation table and aforesaid product pictures will be provided to another 3 experts with more than 10 years of experience in design practice. Experts are required to carefully observe each product picture and evaluate according to each item as listed in the table.

Evaluation results will be organized to establish a product shape feature matrix, as independent variables. And the degree value of representativeness (the relative frequency of being selected as representative images) of the top 3 images are dependent variables. Through computation based on multiple linear regression, a regression equation corresponding to the vocabularies of the three images can be obtained. The correspondence between images and shaping elements can be further explained and a design recommendation table is prepared by leveraging the components and correlation coefficient of the regression equation.

Description of research results

1. Presentation of the Research Results at the First Stage

Top 10 adjectives corresponding to the preferred product images selected by the elderly are as shown in Table 1.

TABLE 1.

Results of the choices by the participating seniors.

Rank	Adjectives (anticipant image)	Frequency
1	Practical	65
2	Safe	58
3	Light	51
4.5.6	Comfortable, durable, effective	49
7	Convenient	42
8	Efficient	39
9	Solid	37
10	Graceful	27

The research results at the first stage show that:

1) “Practical” of products is the most important feature to the elderly, followed by “Safe” and “Light” (“Light” of products refers to both the “Light” in actual dimensions and the “Light” in shape). We further find that most adjectives are in relation to the overall using experience of products. there are not a single feature or one-time using experience of products but a comprehensive experience feedback after a period of using. It can be seen therefrom that the elderly are more concerned about the overall practical experience of products other than a single feature of products

2) For the elderly, in terms of operation, products must be comfortable, convenient and safe; in terms of long-term using, products must be durable, solid and efficient. After all, a considerable problem will be caused to the elderly if products are damaged.

3) Requirements of the elderly on the shape of products are minor. Although the top three adjectives are in relation to “Light”, through interview in the process of questionnaire, we understand that the concept of “Light” is selected mainly due to the requirements for products in using and operation, and even the consideration of storage, other than the preference in appearance. The adjective most frequently selected for the sole purpose of shape is “Graceful”.

Overall, in the selection of daily necessities by the elderly, the most important consideration is using experience, followed by using and operation related factors, and subsequently shape related factors.

2. Presentation of the Research Results at the Second Stage

In the test at this stage, the top five pictures selected by the elderly based on specific vocabularies of images are as shown in figure 2. Test results at the second stage show that:

1) In terms of the selection of pictures, the images of “Practical” and “Light” are among the top five, with a consensus on selection of 60%, in particular, a higher consensus is observed in the pictures for the image of “Practical”.

2) In terms of the image of “Practical”, the color of products is dominated by achromatic color, while the shape of products is dominated by physical morphology. In terms of the image of “Safe”, the shape of products is also dominated by physical morphology, with the presentation of many shaping details and the emphasis on the application of texture. In terms of the image of “Light”, the shape of products is also dominated by physical morphology, presented in frames, hollow-out and flake and other forms, expressing a strong visual penetration.

3. Presentation of the Research Results at the Third Stage

After the regression analysis on the information evaluated by experts at the third stage, 3 linear regression equations between anticipant images and shaping elements or shaping techniques are obtained and can be used as the basis for the explanation to the correspondence between images and shaping elements.

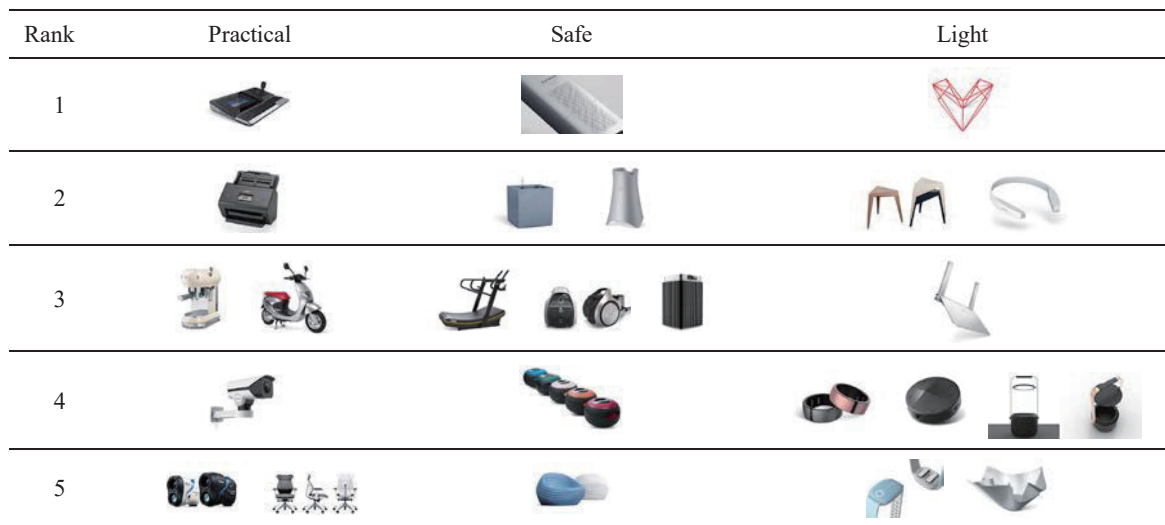


Figure 2. Product pictures selected by the elderly respondents based on the images of “Practical”, “Safe”, “Light”.

Table 2. sets out the results of regression analysis of the image of “Practical”. The results show that among the 30 shaping elements, 5 elements have significant effects ($p < 0.1$) and the value of β can be used for the determination of the direction and degree of their effects. A positive value represents positive effects. The adoption of such shaping elements will contribute to improving the image of “Practical”. On the contrary, a negative value represents negative effects. The presentation of such shaping elements will impair the image of “Practical” of products. The absolute value of β can be used as an indicator for the relative degree of effects.

TABLE 2.
 Results of regression analysis of the image of “Practical”.

Feature	Unstandardized Coefficients				
	B	Std.Error	β	t	Sig.
Constant	31.574	2.738		11.530	.000*
F3	-1.774	.341	-.695	-5.200	.000*
F11	-.981	.364	-.287	-2.694	.012*
F13	.903	.352	.242	2.563	.017*
F15	-1.500	.585	-.282	-2.565	.016*
F25	1.366	.312	.467	4.386	.000*
R2	0.847				

*. Reaching the significant level of 0.05

As shown in Table 2, the shaping elements corresponding to the positive values of β will contribute to improving the relative significance of the shaping elements or treatment techniques for the image of “Practical”, as listed below:

- 1) In respect of selection of product materials, different materials can be used to express different functional areas of products.
- 2) In respect of shaping treatment techniques of products, the difference between planes can be used.

In addition, it can be seen from negative β coefficients and its absolute values in Table 3 that in order to maintain the image of “Practical”, the shaping elements and treatment techniques that shall be avoided and their effects are shown as follows in sequence:

- 1) Non-physical shaping treatment mode adopted in the overall structure of products, such as flake shape, ring-like

shape and hollow-out shape.

- 2) Deliberately emphasized or exaggerated style or size of keys and spin buttons on products.

- 3) Arrangement of shaping elements of products in a gradient manner, i.e., from big to small and from top to bottom, or diminishing gradually or magnifying gradually.

The image of “Practical” of products or design can be estimated based on the coefficient values (B) of influential shaping elements in Table 2. Estimated regression equation between the image of “Practical” (Y) and shaping elements (F3, etc.) is as follows:

$$Y = 31.574 - 1.774 (F3) - 0.981 (F11) + 0.903 (F13) - 1.500 (F15) + 1.366 (F25)$$

At last, shaping elements corresponding to the 3 images are integrated to prepare a design recommendation table of the shapes for the anticipant product images of the elderly. Results are detailed in Table 3.

Conclusion

In the research, the product images anticipated by the elderly group are discussed, and a design recommendation table is prepared through selection of pictures, statistical regression analysis, etc. Relevant conclusions are specified as follows:

- 1) In respect daily necessities preferred by the elderly, the most important consideration is overall using experience, followed by operation related factors, and subsequently shape related factors. In respect of shape, “Graceful” shape is relatively preferred.
- 2) The elderly are broadly in agreement in respect of the correspondence between images and shapes.
- 3) A preliminary design recommendation table (Table 3) is prepared through statistical regression analysis, and can be used as a reference in design practice.

Research review and future recommendations

Product compositions are diversified. In respect of appearance, shape is only a part of it, while the selection of

materials, presentation of texture, selection of color, etc. are necessary steps in the process of design and development.

A design recommendation table is preliminarily prepared based on the research results, however, the selection of texture and color is limited. The follow-up research will focus on the discussion on texture and color in expectation of improving the operability of the design recommendation table in practice.

Further discussion will be conducted in follow-up research to identify the texture and color preferred by the elderly, the correlation with the vocabularies of images anticipated by the elderly, the difference in the adoption of composite materials in terms of matching, and the effects of different matching of areas.

TABLE 3.
 The form features to be adopted or should be avoided for enhancing expected images.

Form elements or treatments	image		
	Practical	Safe	Light
F1 Distinct geometrical shape is adopted in the overall shape			-
F2 Physical shape (block shape, globular shape, stair-like shape, etc.)			
F3 Non physical shape (flake shale, ringlike shape, hollow-out shape, etc.)	-		+
F4 Round corners			
F5 Chamfering treatment			
F6 Symmetrical and balanced shape			
F7 Asymmetry and unbalanced shape			
F8 Irregular shape		-	
F9 Plump cambered surface			
F10 Round holes, lines and other elements arranged in a specific shape or pattern			
F11 Deliberately emphasized or exaggerated style or size of keys and spin buttons	-		
F12 No decorative lines or patterns in appearance		-	
F13 Difference between planes	+		
F14 Prominent connections		-	
F15 Arrangement of shaping elements in a gradient manner, i.e., from big to small and from top to bottom, or diminishing gradually or magnifying gradually.	-		
F16 Specific and clear description text or indicative patterns			
F17 Exposed structural components, scarf parts or screw holes		+	-
F18 Mist finish			
F19 Rough texture			
F20 Leather texture			
F21 Composite surface treatment			
F22 Application of transparent materials		-	+
F23 Deliberately highlighted specific texture			
F24 Matching of different materials (wood, metal, glass, ceramics, stone, etc.)			
F25 Application of different materials, to express different functional areas of products	+		-
F26 Achromatic color			
F27 Low-chroma color			-
F28 Weak color contrast, with matching of colors in the same one color system			
F29 Strong color contrast, with matching of colors in different color system			
F30 Application of different colors, to express different functional areas of products			

+ improving (recommended), - restraining (to be avoided)

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