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# A Study of Rational and Emotional Product Properties

Chiu-Wei Chien [1], Chih-Long Lin[2,] Rung-Tai Lin[3]

[1] *Doctoral Program, Graduate School of Creative Industry Design, College of Design, National Taiwan University of Arts, Taiwan, chiewei@gmail.com*

[2] *Assistant Professor, Craft and Design Department National Taiwan University of Arts, Taiwan, cl.lin@ntua.edu.tw*

[3]*Professor, Graduate School of Creative Industry Design, College of Design, National Taiwan University of Arts, Taiwan, rtlin@ntua.edu.tw*

**Abstract:** This study is about understanding the factors affecting how designers recognize rational and emotional product properties based on variation of product properties. The target sample of this study is the electronic fan which is categorized into five different styles: Function, Friendly, Fun, Fancy, and Feeling. Two experiments have been carried out to examine the differences and relationship of the rational and emotional product properties. Experiment one is for the purpose of selecting the representative products of rationality, neutrality, and emotion. In experiment two, products which are most frequently selected in experiment one are regarded as reference indicators, and the remaining samples are arranged in the order of rationality, emotion, and impact factor. The expectation is to acquire different design inspirations from the result of this study based on different characteristics and control variables of these products of five different styles. The two main purposes of this study are: (1) to explore how these five kinds of product design styles affect the perception of rationality and emotion, and (2) to explore the differences in impact factors of five kinds of product design styles on the perception of rationality and emotion, and to infer future product design trend based on the found differences from the era of five product design styles. The distinction between the form characteristics of rationality and emotion has been found in this study, and the "Feeling" style has indicated the design trend beyond traditional fan structure. Another finding is that, there is the perception of rationality in the technological sense, and the perception of emotion will appear after the addition of "feeling".

**Keywords:** Product Property, Rationality and Emotion, Product Style, 5F

## 1. INTRODUCTION

Product personality (i.e., the set of human personality traits that are used to describe a product variant (Govers & Schoormans, 2005) can also explain the inferences about functional attributes that people draw from the appearance (Ruth Mugge, 2011). In this study the product properties of rationality and emotion will be investigated, together with their impacts on the five kinds of product

design styles based on the perceptions of experimental subjects (who have received professional design trainings) with respect to product rationality and emotion. In this study the five kinds of product design styles are the five English words starting with F representing the styles formed by product design characteristics developed in five different eras, which are Function, Friendly, Fun, Fancy, and Feeling. The two purposes of this study are as shown below:

1. Investigation of impacts of five kinds of product design styles on the perception of rationality and emotion. The perceptions of designers with respect to rational and emotional product properties will be understood through generalization of rational and emotional properties of these five styles such that the product design behavior can reach better balance between rationality and emotion, which shall lead to the perfection of product design.
2. Investigation of the differences in the impact factors of these five kinds of product design styles with respect to perceptions of rationality and emotion. The trend of future product design style will be inferred based on the changes discovered from the era evolution of these five kinds of product design styles.

## 2. LITERATURE REVIEW

### The evolution of product style

Product appearance is a major determinant of product personality and that people will get an idea about the personality of the product just by a casual glance of the product (Brunel & Kumar, 2007; Govers, Hekkert, & Schoormans, 2002; Mugge et al., 2009). The generation of different product styles in different era has been recorded in the history of design. In this study the styles generated in different eras are set to be the research objectives in order to investigate the impacts on perception of rational and emotional product properties.

Lin (2005) said that the five product style-5F could be defined based on features of different eras. In the 1930s, technology determined the trends of design and shape. At that period of time when functionalism was dominant; “form follows function” became the primary guiding principle in design. After World War II, people were getting tired of this kind of design. Therefore, in the 1950s, owing to the rise of ergonomics, “form follows friendly” was the mainstream of designing. Until the 1980s, design of “user friendly” replaced the style of its previous era thanks to the appearance of personal computers. Later, in pursuit of changes and new styles, “form follows fun” came to the stage. The personalized device was the next characteristics of design, so “form follows fancy” emerged. The 21$^{st}$ century is the time of digital technology. The key factor of design at this period is humanity. In other words, the design principle is shifted to “form of feeling.” 5F was short for the above descriptions.

The aforementioned five different styles generated in different eras have been listed in Table 1 based on the five English words starting with “F” together with the key descriptions of important events in the history of design.

**Table1**. The explanation of 5F style by Design History

| | | |
|---|---|---|
| **F1** | **F**unction | Simple geometric Machine Aesthetic. |
| **F2** | **F**riendly | Human Factors and Ergonomics, focusing on the interaction of people and equipment universal design. |
| **F3** | **F**un | Design will be centered on the individual and the postmodernism instead modernism. |
| **F4** | **F**ancy | In a globalized environment, product designers need to find out the identify ability for the unique personality of a product. |
| **F5** | **F**eeling | 21st century, smart technology products seemed to be everywhere in our lives, technological advancement affect the product design style which needs more pleasurable emotional design. |

## 3. RESEARCH METHOD

The design of this experiment is for investigating the impacts on the perceptions of rationality and emotion of five different product design styles. There will be two major experiments with the following purposes: Experiment 1 is for finding out the representative rational, neutral, and emotional samples of five kinds of product design styles, and for determination of impact factors of rationality, neutrality, and emotion. Experiment 2 will be carried out one week after Experiment 1, where the samples with high frequencies in Experiment 1 will be used as the reference indicators with fixed positions of rationality, neutrality, and emotion. And then the experimental subjects will arrange the remaining samples in the order of rationality, neutrality, and emotion based on the styles of reference indicator samples.

### 3.1. Experiment samples

The criteria for sample selection of electric fans and the control variables are as shown in Table 2. F1 (Function) is mainly about table fans with consistent functionality. F2 (Friendly) is mainly about stand fans with consistent functionality. F3 (Fun) is mainly about humorous, cute, and joyful products with style of fun. With the most control variables, F4 (Fancy) is only for the new style of "Tower Fan" with uncontrolled form. F5 (Feeling) is also an uncontrolled diversified style. In this study the five kinds of product styles are also known as "5F". Ten samples will be selected from existing products for each of the five styles, thus there will be a total of 50 experimental samples.

**Table2**.The samples selected of 5F and control variables

| 5F | Fan samples selected (all begin with home fans) | Control Variable |
|---|---|---|
| **F1:Function** | The general table fan appeared in the 1920 s to 1930s setting the most important and basic function and form in fan. | Function |
| **F2:Friendly** | The stand fan appeared In the 1950s. The high stand design because of desk fans needed to rely on a table or platform which is consistent with the desired height. | Function |
| **F3:Fun** | From the 1970s retro to the 1990s USB fan, as well as modern Japanese cartoon style, etc., funny products are a popular style. | None |
| **F4:Fancy** | The tower type electric fan was developed from the late 1990s until the 21st century. Because of its fashion type without fan blades and not occupying space it is chosen as the fancy representative. | function, material, color & era |
| **F5:Feeling** | For either the DYSON bladeless fan (airflow multiplier), or the wooden fan, 21st century fan design displays coexistence and common prosperity with technology and humanity as the sharing philosophy of cultural development and Earth Resources. | None |

### 3.2. Experiment I: indicator samples of rationality/neutrality/emotion and their impact factors

In experiment 1 the representative rational/neutral/emotional products will be selected as indicators. Three fans will be selected from pictures of each of the five product styles representing the most rational/neutral/emotion samples, thus there will be a total of 15 most representative sample pictures. The situation of this experiment is as shown in Figure 1.

**3.2.1. Experimental subjects**: the experimental subjects in this study are a total of 40 junior and senior students (20 male students and 20 female students) in the Department of Industrial Design of National United University.

**Figure 1.** The situation of experiment 1

**3.2.2. Materials:** the pictures of 50 samples will be printed out in colors as cards of A5 size.

**3.2.3. Steps:**

(1) These 50 product picture cards will be divided into 5 groups in accordance with 5 styles such that there will be 10 product picture cards in each group aligned on the table as shown on the left of Figure 2.

(2) The experimental subjects will then select the most representative rational, neutral, and emotional products in accordance with their own design experiences and product perceptions, and fill them in the questionnaires.

### 3.3. Experiment II: arranging the sequence of all samples from rational products to emotional products based on the styles of reference indicator samples

In order to avoid the learning effect, experiment 2 will be carried out one week after experiment 1, where the samples with high frequencies in experiment 1 will be selected as the reference indicators with their positions fixed, and then the remaining samples will be arranged in the sequence from rational (represented by the first position), neutral (represented by the fifth position), to emotional (represented by the tenth position) based on the positions of reference indicator samples.

**3.3.1. Experimental subjects:** the same 40 students in experiment 1 during the first week

**3.3.2. Materials:** the same color printed product picture cards used in the first week.

**3.3.3. Steps:**

(1) Among the 15 representative rational/neutral/emotion products obtained from experiment 1, there are one minimum two maximum samples in each of the 5 styles with statistic result N greater than 17, such that they can be selected as the reference samples with fixed position. They are: the rational F1-08(N19) and emotional F1-09(N17) of F1, the rational F2-04 and emotional F2-03(N18) of F2, the neutral F3-05(N17) of F3, the emotional F4-07(N30) of F4, and the emotional F5-03(N20) of F5.

(2) A total of 10x5 = 50 empty squares will be drawn on the table for the 5 kinds of product styles corresponding to rationality, neutrality, and emotion.

(3) The pictures of reference samples F1-08, F1-09, F2-04, F2-03, F3-05, F4-07, and F5-03 will be placed at the “fixed” positions.

(4) Except for these reference samples, all other samples are classified in accordance with 5 kinds of product styles, and the experimental subjects will place them into the empty squares corresponding to the properties of rationality, neutrality, and emotion in accordance with the reference samples. Their numbers will then be filled in the questionnaires. The experimental

situation is as shown in Figure 2.

**Figure 2 .**The situation of experiment 2

## 4. RESULTS AND DISCUSSIONS

### 4.1. Experiment I: representative rational/neutral/emotional products and their impact factors

This experiment is about the perceptions of experiment subjects with respect to the rational and emotional properties of five product design styles, and the commonalities and differences of representative rational/neutral/emotional products will then be compared in order to figure out the impacts of product styles on the perceptions of rationality and emotion. F1R represents the rational product of F1 (Function), F2N represents the neutral product of F2 (Friendly), and F3E represents the emotional product of F3 (Fun). Other codes can be determined based on this principle, and the results are as shown in Figure 3:

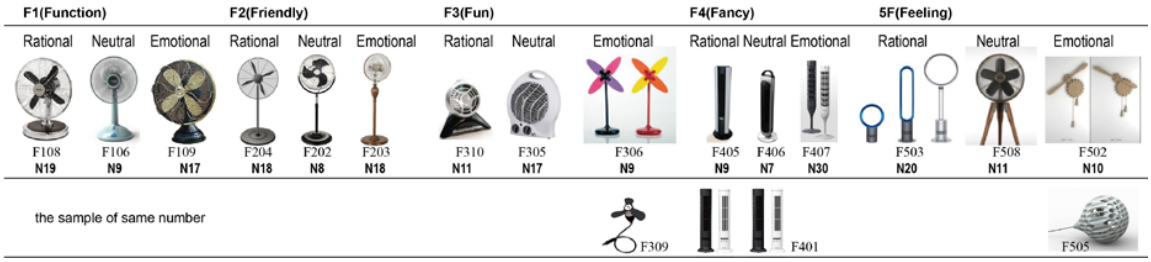


**Figure 3.** F5 representative rational/neutral/emotional samples selected in experiment 1, where those in the lower row are samples with the same number which were not selected.

**4.1.1. Commonality:** The commonalities of all 5 representative rational products are: straight-line design, with the color-material combinations of silver metal (cold color), blackish-grey plastic (colorless), and silver blue baking paint. The commonalities of all 5 representative emotional products are: curved-line design, with the color-material combinations of golden and copper metal (warm color), wood-color plastic, high-color plastic (warm color), and crude wood color and material. The commonalities of all 5 representative neutral products are: straight-line or curved-line design, with the color selection of either color-less, cold-color, or warm-color. The material selection is mainly based on plastics, followed by metal and wood. Therefore, the commonalities of

representative neutral products are weaker as compared to rational and emotional products.

**4.1.2. Difference:** there are some differences which can be found from the results of observation of each of the five product styles and the variables determined for experimental products, which can be compared with the ones with greater numbers in the second point. F1 and F2 are basic table fan and stand fan with identical control variables, so the ones with greater numbers are distributed among rational F1R, F2R and emotional F2E, F1E with similar numbers (17, 18, 19). The styles of F3, F4, and F5 are more diversified as compared to F1 and F2. F4 has the most control variables, with the form of line as the only uncontrolled variable. There are no control variables for F3 and F5. The result indicates that the representative product of F4E, F4-07, is the one with the greatest number (N=30) of all 15 samples. The reasons is that, as for the simple single variable of form of line, the cylindrical curved lines of F4-07 with waist line is the most representative emotional feature as compared to other forms of line. The one in F3 with the greatest number is the representative neutral sample of F3-05. This is different from other styles, where the greatest numbers usually fall within the rational or emotional samples. The preliminarily determined reason for this is that, the variation of overall style based on combination of form, material and color of the style of F3 (Fun) has led to decentralized selections by the experimental subjects such that the perceptions of rationality and emotion cannot be centralized on one particular product. However, as compared to other products, the form/material/color of F3-05 is more regular without any fancy feature such that it is selected as the representative neutral sample. Another style with significant variation and without any control variable is F5 (Feeling), with the greatest number falling on the rational F5-03. The preliminarily determined reason for this is that, it is the innovative product introduced by renowned brand with the sense of modern technology such that it has become the rational selection. The representative emotional products of this style are the two products (F5-02 and F5-05) with an identical number (N10), where there is significant difference in functionality and form/material/color. This is an interesting phenomenon, which probably indicates that the F5-Feeling style in the 21$^{st}$ century itself is a diversified style, and it can be even more diversified with changing emotional properties.

### 4.2. Experiment II: the sequence of all samples based on reference indicator

Based on the questionnaire results of experiment 2, the one with the highest distribution frequency will be obtained based on the modal number of SPSS statistic software as shown in Figure 4. The ones marked with bracket in the figure are reference samples with fixed positions, and the number N is shown below the sample number. The samples in the dotted line on the left are those without the greatest numbers which have been excluded. At this stage the samples with the greatest numbers in experiment 1 will be placed at the fixed reference positions of rationality or neutrality or emotion, and the sequence of the rest of samples will be arranged based on the degree of rationality and emotion. When there are reference samples of product properties available for main experimental subjects, their determination of product properties can be based on a kind of image commonality, which will generate the impacts as described below:

**The description of the results of five styles:**

F1-Function: F1-09 is the reference sample of emotional product. F1-10 is the GE antique fan which is ranked 9$^{th}$, and F1-03 is the Tatung classic fan which is ranked 8$^{th}$. Their common features are that they are both made of metal, with the form of large arcing blade cover with metal concentric protective frame, and the fan base in round shape with similar curvature. F1-08 is the reference sample of rational product, and the commonality of F1-05 (which is ranked 2$^{nd}$) is the narrower blade with the curve close to straight line, and the cold colors.

F2-Friendly: F2-03 is the reference sample of emotional product with sleek wooden touch. F2-01

is the GE antique stand fan which is ranked 9th, and F2-05 is the stand fan with warm color and smooth surface. The dark grey F2-04 with sharp tips of blades is the reference sample of rational product, and the ones ranked 2nd and 3rd are both F2-09 with square base and dark grey color. The ones ranked 4th and 5th are both F2-08 with light blue blades in round shape, and the fan bases in criss-cross pattern.

F3-Fun: there are no reference samples for rational or emotional products. The integrally molded F3-05 with curved surface is the reference sample for neutral product. The ones ranked 8th, 9th, and 10th in the emotional category are all F3-08 with pink flower appearance, while the one ranked 1st in the rational category is the USB fan of F3-09, which is also the representative neutral sample rank 6th. The ones ranked 2nd and 3rd are both blue F3-03 in airplane shape. The penguin-shaped F3-02, pressure bell-shape F3-04, and the most emotional sample F3-06 and the most rational sample F3-10 are all excluded from the selection.

F4-Fancy: F4-07 with arc curve is the reference sample for emotional product. The one which is ranked 9th is the F4-02 with the same curved waist line. F4-02, F4-03, and F4-08 are all ranked 8th. The one selected as the rational reference sample is the most rational product in experiment 1, which is F4-05 with slim side and flat front surface.

F5-Feeling: Dyson blade-less electric fan F5-03 is the reference sample for rational product. F5-10 made of pure metal strips is ranked 2nd with the greatest number in experiment 2 (N27). The ones ranked 8th and 7th are 507 and F5-09 with compact ratio with bionic shapes. The one ranked 10th in the emotional category is F5-02, which is also the most emotional product in experiment 1. The one ranked 9th is F5-06 made of white ceramic cone-like objects. The one ranked 8th is F5-04 made of metal and leather based on the image of flower. The ones ranked 5th and 6th are the neutral samples F5-08 and F5-01 which are both based on the combinations of thick wooden structures

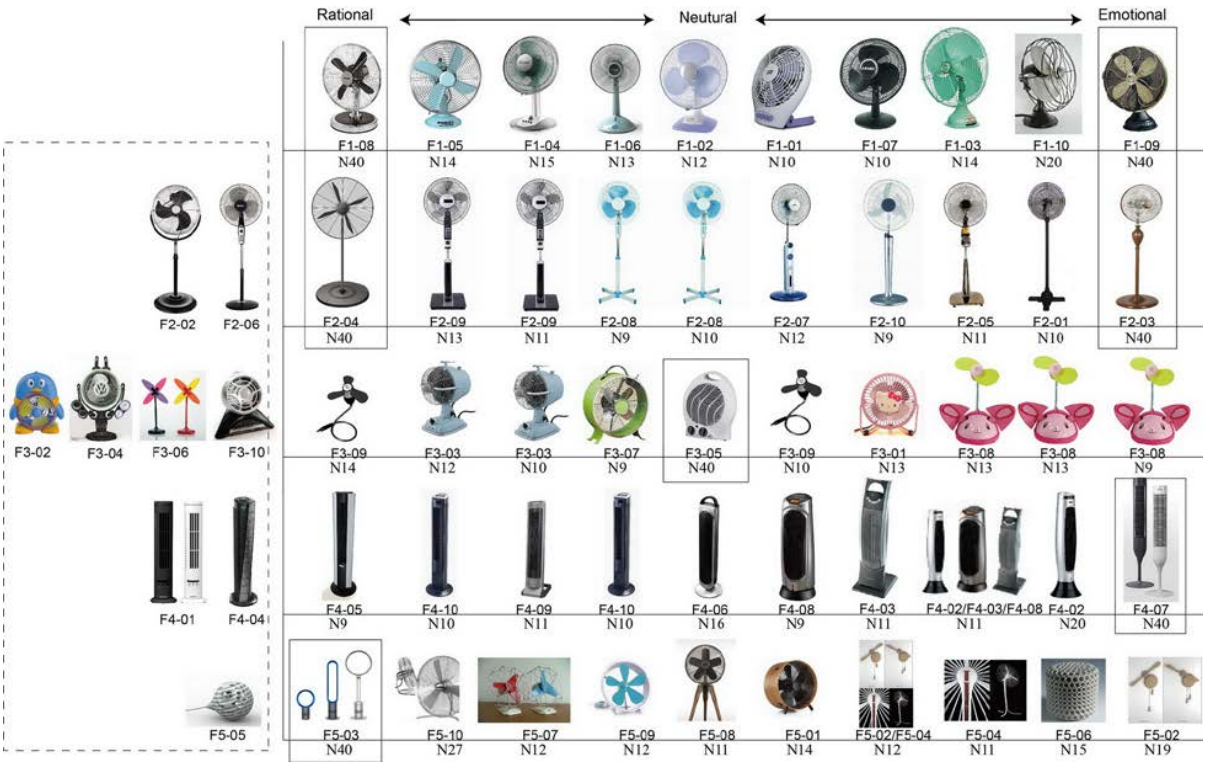


**Figure 4.** The results of experiment 2 (The sample number and the number N are listed below the picture. The ones circled by the frames are indicator samples, and the ones on the left circled by dotted line are those excluded.

balloon shape, which is listed as the most emotional sample in experiment 1 along with F5-02.

## 5. CONCLUSION

This study is about investigating the rational and emotional properties of 5 product styles in order to find out the impacts of product style on the perceptions of rationality and emotion. In experiment 1 the representative rational/neutral/emotional samples are selected, and in experiment 2 the samples with high frequencies in experiment 1 are selected as the indicator samples with fixed positions, and then the sequence of the remaining samples (from rational to neutral to emotional) will be arranged in accordance with the positions of those indicator samples. The cross-analysis will be conducted based on the reference factors for judgment in order to confirm the impacts on perceptions. The conclusion is as shown below:

The conclusion of this study is as shown in Table 3. Each of the five product styles is equipped with the three major elements of basic functionality and basic form of product—form, material, and color. However, from the perspectives of Function, Friendly, Fun, Fancy, and Feeling, it can gradually be found out that the impact factors of rationality and emotion will also vary. The changes in the impacts of three major style elements, the emphasized features of style, the details of 3D shape, and the impacts of technology and feeling have been clearly shown in this study.

**Table 3.** Summary of rational and emotional properties of 5 styles

| | Rational | Emotional |
|---|---|---|
| F1 Function<br>F2 Friendly | 1.Straight line design with material-color combinations of silver-metal (cold color), dark grey-plastic (colorless), and silver blue baking paint.<br>2. Characteristics of rational properties are more consistent, making them easier for judgment. | 1. Curved line design with material-color combinations of golden/tan-metal (warm color), wooden color plastic, high color plastic (warm color), and crude wood color and material.<br>2.Characteristics of emotional properties are less consistent, making them more difficult for judgment.<br>3.Antique fan is in the category of emotional property. |
| F3 Fun | 4.Among all five styles, it is the most difficult to figure out the consistency of rationality and emotion in this style. | 5. The emotional style is leaning toward femininity. |
| F4 Fancy | 6. This is the one with the most control variables, and the representative rational/neutral/emotional samples in both experiments are consistent.<br>7. Cylinder based on straight line design which is the categories of both neutral and rational properties. | 7. Cylinder based on curved line which is in the category of emotional property. |
| F5 Feeling | 8. The consistency of rational property is very high, which is composed of three characteristics of geometric form, delicate metal touch, and metallic color.<br>9. F5-03 is the most rational representative sample based on blade-less design due to technology evolvement. | 8. The specific form has gone beyond the traditional basic fan structures of blades and stand. The design concept is based on creating a sense of “wind”.<br>9. F5-02 is the most emotional representative sample with almost zero airflow generation. It is only for creating a sense of wind. |

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## BIOGRAPHY

**Short biography of author 1**

Chiu Wei Chien is a senior industrial designer and part-time lecturer of department of industrial design, National United University. She is also a doctoral program of graduate school of creative industry design at National Taiwan University of Arts. Her articles on product design and emotional design are about 8 publications. She has presented at 5 international and national conferences. Her recent research is about the cognition of product properties of rational and emotional.

**Short biography of author 2**

Chih-Long Lin is an assistant professor in the department of crafts and design, National Taiwan University of Arts. His research and teaching activities focus on issues of user cognition and product ergonomics. His research themes include product usability, curatorial communicability, haptic motivation, and discomfort model for long-term walking task and repetitive arm reaching and holding task.

**Short biography of author 3**

Rungtai Lin Ph.D. is a professor of graduate school of creative industry design at National Taiwan University of Arts. His articles on aesthetics, and cultural creative design are in more than 20 publications. He has presented at more than 10 international and national conferences. He has been granted NSC (National Science Council) research fellow since 2009. His recent publications include "Transforming Taiwan Aboriginal Cultural Features into Modern Product Design: A Case Study of a Cross-cultural Product" (International Journal of Design), "Designing Friendship into Modern Products. In: Friendships: Types, Cultural, Psychological and Social, Editor: Joan C. Toller, NY: Nova Science Publishers, Inc. (ISBN: 978-1-61668-008-4)".