

# An Exploration on Tactile Styles of Products

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**Abstract.** As an exploratory phase of the continuous study regarding tactile style of products, this paper employed semi-structured focus interview as the method to investigate and summarize whether people had more feelings towards products with vivid and obvious style for future reference. Therefore, this study intended to 1. identify the design styles that provoked strong feelings for the reference of tactile style in the future; 2. file the representative products and major form features of the design styles; 3. construct a set of vocabulary for the further images evaluation on design and tactile style in the future. In this research, 11 design experts were interviewed. All of them had long-term experience in design and profound understanding of design style. All of the interviews were videotaped and edited for a comprehensive analysis to yield results as follows: 1. In accordance with the frequency mentioned by the experts, 7 design styles for products that stimulate strong feelings were identified; 2. Summarizing the contents and forms of design styles, it was discovered that evolution of design style progressed incessantly like following a spiral path; 3. The representative products and their form features (shapes, materials, and colors) of each design style were classified; 4. The representative feeling images of each of the design style were obtained and summarized to derive a set of 28 paired image words for further image evaluation.

**Keywords:** design style, tactile style, product feature, image, semi-structured interview.

## 1 Introduction

Current researches regarding the issue of tactility are mostly focused either on the study of the relations between tactility and the materials, or on exploration of the image and cognition of the materials and textures, in terms of tactility, vision, combination of tactile and vision [5,6,10,11]. There are a few researches examine the discrimination of materials and textures from the perspectives of tactility only, or vision and tactility together [1,7,13]. However, there are limited and insufficient studies exploring the integrated feeling of tactile style. Therefore, how to effectively and explicitly probe into the relationship between tactile, styles, and their corresponding images becomes important issue. This topic has also been the researcher's long-term engagement. Regards as the exploratory phase of the long-term research, this study investigated and summarized the design styles of products that communicate strong

and salient feelings in relation to the forms, styles, and images of the corresponding products.

Generally speaking, people acquire environmental information with five senses, which operate both independently and interactively. Moreover, each of these senses influences the operation of the other senses [12]. These feelings are regarded as synesthesia, i.e. the stimuli of one particular sensory response may lead to other sensory responses [3]. Vision and tactility are interrelated regarding the evaluation of product image, i.e. synesthesia exists in the evaluation. The identification of the form of an object often depends on the information acquired through both vision and tactility. Therefore, this research aims to investigate products with explicit and vivid design (visual) styles for the reference of the study of tactile style of products in the future.

In general, most studies investigate design style through two approaches. For example, multidimensional scaling (MDS) is employed to construct people's perceptual space of the stimuli, based on the data of differences among stimuli. With reference to the groupings pattern among stimuli in this space, perceptual (design) styles can be identified [4,9]. Second, it emphasizes the analysis of stimuli' images to examine the similarities and differences of the feelings stimulated by the stimuli; stimuli with similar feeling are classified into same style. This approach focuses on the construction of a set of adjectives to evaluate the style images. With these adjectives, the images of the stimuli can be evaluated with semantic differential (SD) survey. Likewise, it is possible to group stimuli, according to their closeness of locations in this image space, into the same style [2,7].

From above, one is able to understand that if we intend to investigate styles and their corresponding feelings, we need to identify the appropriate styles for evaluation, to construct a set of image vocabulary as evaluation scale, and screen out proper the stimuli as the representatives for each style. Therefore, in order to start a complete investigation on tactile style and image, the goals of this study include the following: 1. Identify the design styles that provoke strong feelings as reference for the study of tactile style in the future; 2. Categorize the representative products for each design styles and conduct morphological analysis to these products; and 3. Construct a set of image vocabulary for the further SD evaluation. These research findings will be applied to the study of tactile style and image of products in the future.

## 2 Method

In order to collect and summarize the salient design styles of products that stimulate strong feelings for studying tactile style in the future, this study conducts interview on 11 design experts who have a master or doctoral degree, and more than 5 years of design teaching or practical design experience. During the interview, the design experts are required to list the product design styles resulting in deep and clear perception as many as possible, and also to describe the features, such as the sensory perception, image and association of each style. At the meantime, the experts are also asked to list the shape, type and common material of the representative products for each style. The interview lasts for 1~2 hours or so. The entire interview process is

recorded in video, and the interview content is sorted in script after the expert interview. Moreover, the interview content is integrated and summarized based on the question items.

### 3 Results

#### 3.1 Identification of Salient Design Styles

First, the items of style proposed by the expert interviewees were counted and compared to facilitate choosing salient design styles for future analysis. Summarizing the design styles proposed by the 11 expert interviewees, 22 design styles were derived, as shown in Table 1.

**Table 1.** Design styles proposed by the experts

|                         |                         |                        |                   |                  |              |               |
|-------------------------|-------------------------|------------------------|-------------------|------------------|--------------|---------------|
| Scandinavian modern (4) | Trans High Tech (5)     | Modernism (4)          | Minimalism (7)    | Archetype (5)    | Memphis (5)  | High Tech (8) |
| Ready-made(5)           | Green design (6)        |                        |                   |                  |              |               |
| Japanese Zen (3)        | Thai design (3)         | Streamline (2)         | Bio mimicry (3)   | Bauhaus (2)      | Pop art (2)  | Retro (1)     |
| Art Nouveau-Glasgow (1) | International style (2) | Art Nouveau design (2) | Postmodernism (3) | Design humor (1) | Alchimia (1) |               |

\* No particular reference for the style; ( ) the frequency of the item mentioned

This table shows that the styles that were mentioned four times or more (mentioned by at least 4 experts) included: Trans High Tech, Scandinavian modern, High Tech, Archetype, Memphis, Modernism, Minimalism, Ready-made, and Green design. These 9 items are design styles that people are highly familiar with and well-known. After further examination of these 9 design styles, it was discovered that the contents and expressive means of Ready-made and Green design did not fit the purpose of this study. Therefore, these 2 design styles were excluded from this research. Finally, only 7 of the 9 styles listed in the upper row of Table 1 were explored in this study.

#### 3.2 Connotations of the Design Styles

This research summarized the connotations of the 7 design styles in accordance with the contents of descriptions about the styles provided by the experts. For example, four experts have mentioned the characteristic and special features about the style of Modernism. Therefore, the described contents of Modernism style by these experts were adopted for analysis with the KJ method. First, the keywords of the contents were extracted and written on index cards. Then, these cards were further classified in accordance with their similarity of meanings. The same process was applied to the analyses of the remaining styles until all 7 styles were analyzed and summarized.

As can be noticed from the resulted affinity diagrams, the major constituting factors of each style consisted of: 1. The contents and context of the style; i.e. the experts' insight of the particular styles which explicates the spirit and thinking of the

style; 2. Design core to indicate the concepts and features of the styles; 3. Constituting features; i.e. the performance and application of forms, colors, and materials referred to manifest the styles; and 4. Perceptual image; including images with physical (feelings provoked through tactility and vision) and psychological (preferences, emotions, and applications brought to users through styles) dimensions. In Table 2, the overall concepts of each style are summarized briefly.

**Table 2.** Framework and concepts of the design styles

| Design styles              | Constituting items    | Contents  |
|----------------------------|-----------------------|---|
| <b>Modernism</b>           | Contents & context    | “Long-lasting”, “Sustainable and inherited spirit”, “Thinking of traditional industrial design”, “Utopian thinking”   |
|                            | Design core           | “Simple and concise (the lesser the better)”, “Practicality”, “Purposeful design”   |
|                            | Constituting features | “Geometric and primitive form”, “Simple and plain color”, “Emphasis on the proper use of material and texture”  |
|                            | Perceptual image      | “Psychological feeling (such as clean, boring, and more)”, “Visual feeling (such as form, features, and more)”, “Tactile feeling”, “Physicality (such as usages, and more)”, “Sociability”  |
| <b>Scandinavian modern</b> | Content & Context     | “Heritage of modernistic style”, “Timeless”, “Balance among technological, naturalistic, and humanistic concern”  |
|                            | Design core           | “Interaction between human and products”, “Correspondence of demand and function”   |
|                            | Constituting factor   | “Application of both organic curves and clear-cut line”, “Utilization of local materials”, “Vivid and bright colors”  |
|                            | Perceptual image      | “Psychological feeling (affinity to people, practical, and more)”, “Visual feeling (such as form and color)”, “Tactile feeling (such as cold, practical, or physical)”  |
| <b>High Tech</b>           | Content & context     | “Similar to Modernism”, “Pro technological thinking”, “Conveying the thinking of the times”   |
|                            | Design core           | “Mass production for industrial purpose”, “Creation with technology”  |
|                            | Constituting features | “Geometrical and modular configuration”, “Fine processing”, “Limited but vivid and bright colors”, “Use of industrial materials”  |
|                            | Perceptual image      | “Psychological feeling (positive feeling and perspective)”, “Visual feeling (such as special form feature)”, “Tactile feeling (such as practicality and physicality)”   |
| <b>Minimalism</b>          | Content & context     | “Complies with Modernism”, “Anti-Post Modernism (Memphis)”  |
|                            | Design core           | “Insists on simple forms”, “Depends on technological presentation”, “Ultra-simple and keep on basic functions (but thoughtful functions)”, “No excess thinking”, “Emphasis on visual representation (form and constitutive style)”, “Less design” |
|                            | Constituting features | “Geometrical and simple forms”, “Use of hue-less color (black, white and grey)”, “Use of industrial materials”, “Expression of the materials’ texture”  |
|                            | Perceptual feeling    | “Psychological feeling (indifference, practicality, Zen, and more)”, “Visual feeling (such as features of materials and forms)”, “Tactile feeling (such as physicality and practicality)”, “Other (sociability)”                                  |

**Table 2.** (Continued)

|                        |                       |  |
|------------------------|-----------------------|--|
| <b>Archetype</b>       | Content & context     | “Anti- Post Modernism”, “Similar to Minimalism”, “Recalls the ideas of Oswald Mathias Ungers”, “The ideas of Aldo Rossi”, “The ideas of Philippe Starck” |
|                        | Design core           | “Collage of geometrical forms”, “Use of meaningful form”, “Use objects’ primitive shapes”  |
|                        | Constitutive features | “Simple form”, “Mild colors, the materials’ original colors”, “No particular restriction on using materials”   |
|                        | Perceptual image      | “Psychological feeling (such as familiarity)”, “Visual feeling (such as features of forms)”, “Tactile feeling (such as physicality)”                     |
| <b>Trans High Tech</b> | Content & context     | “Anti High Tech’s style”, “Presents the thinking of the time this style developed (pessimistic, anti-war)”, “Expresses distrust towards technology”      |
|                        | Design core           | “Emphasis on designer’s sentiments and purpose”, “Non-mass production”, “Symbolic”   |
|                        | Constituting features | “Incomplete and irregular forms”, “Dull colors”, “The use of multiple materials”   |
|                        | Perceptual image      | “Psychological feeling (negative viewpoint and feeling)”, “Visual feeling (such as form and materiality)”, “Tactile feeling (materiality)”               |
| <b>Memphis</b>         | Content & context     | “Anti-Modernism”, “Retro style”, “Challenge to conventional thinking”  |
|                        | Design core           | “Expression of conflict”, “Feature of contrast”, “Characteristics of Hippies”  |
|                        | Constituting features | “Diverse forms”, “Emphasis on decoration”, “Rich in using colors”, “Combination of various textures”   |
|                        | Perceptual image      | “Psychological feeling (funny)”, “Visual feeling (such as decorative, colorful, and more)”   |

In Table 2 shows that each style has its own thinking, ideas, meanings, and considerations in design; therefore, they are different in form and constitution. In addition, it was discovered from the experts’ descriptions in the interviews that there was certain developing pattern between these styles. From their interrelationship, it was clear that the changes and development in styles moved along a continuous line. They were repetitive and fluctuating. In other words, the transformation in design styles likes a continuous spiral. Indeed, styles progressed in endless cycles (from complexity to simplicity and vice versa). With the progression in time, styles demonstrates their unique features; sometimes they may display similar contents but without overlapping. As a result, design styles are becoming more diverse and interesting.

### 3.3 Representative Products of the Mentioned Styles and Their Design Features

The research then continues to analyze the contents of the “constituting features” of the mentioned styles and their corresponding designs from the description collected in the interviews. The KJ method was employed again for this analysis; the concluded constituting features and contents of each style is summarize in Table 3.

From Table 3, we can observe the slight differences in form constitution among some styles, such as Modernism, Scandinavian modern, High Tech, Minimalism, and

Archetype. Although all these styles inherited simplicity and plainness in form, forms of Modernism were developed in accordance with the rule of “Form follows function,” whereas the simple and concise forms of Scandinavian modernism were accompanied by organic forms. Regarding High Tech, it employed the features of production aided by technology, which was manifested through the exposition of structures to display the beauty of structure and production with technology. In addition, its geometric form was the reflection of the features of the modular structure. In an opposite manner, the salient feature of Minimalism was completely decoration free, trying to conceal all sorts of structure. It also demanded less in terms of form, color, and materials. Finally, Archetype, manifesting as another kind of ultra-simplistic form, was a response to people’s longing for genre and meaningful forms with simple geometric forms. For Trans High Tech, it worked contrary to the features of High Tech. It demonstrated features of non-mass production, such as irregular, unsmooth, unsteady, and imperfect feature in form and texture. Memphis emphasized visual effects. It focused on decorative features, diverse colors, and more, demonstrating form with strong visual effects.

**Table 3.** Constituting features and contents of the design styles

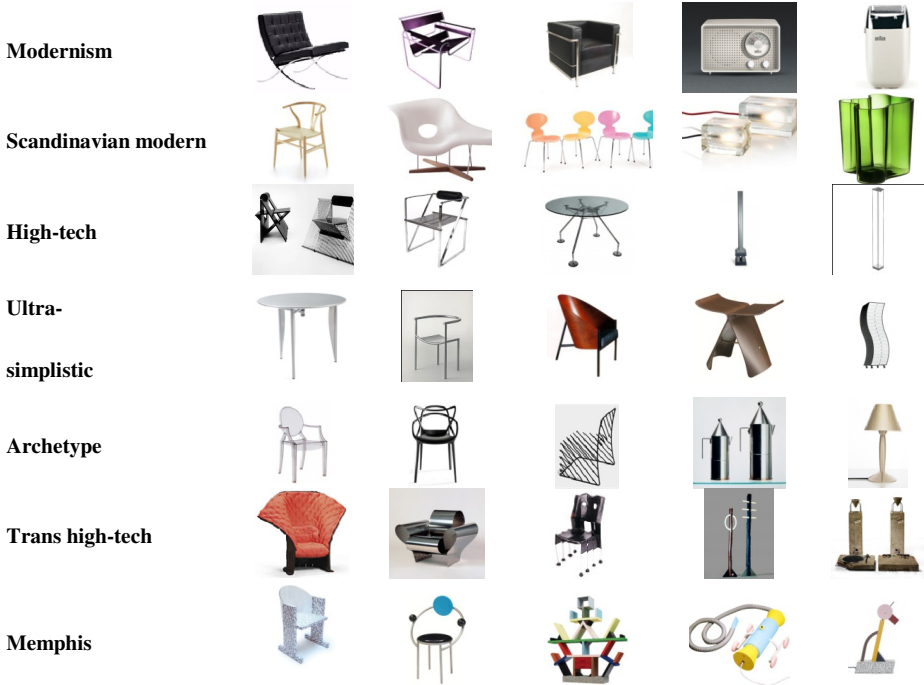
| Design styles              | Constituting features                          | Contents  |
|----------------------------|--|---|
| <b>Modernism</b>           | Geometric and primitive form                   | “Simple forms and simple lines”, “No excess decorations, Form follows function”, “Simple structure design”, “Configured by circle, square, or lines”                            |
|                            | Simple colors                                  | “Simple colors”, “Frequent use of black, grey and white”, “Metallic color (materials’ original colors)”   |
|                            | Emphasis on the choice of material and texture | “No limitation in adopting materials”, “Mainly use new and mass produced materials”, Use mainly metal, such as steel, stainless steel, steel pipes, curved pipes, with leather” |
| <b>Scandinavian modern</b> | Organic curves and clear-cut lines             | “Transformation and extract from natural and bionic forms”, “Use both organic curves and clear-cut lines”, “Simple and primitive surface finishing ”                            |
|                            | The use of local materials                     | “Local feel; use local materials”, “Use natural materials (wood) ”, “No limitation in adopting materials”   |
|                            | Vivid and bright colors                        | “Use bright and vivid colors to cheer up the mood casted by cold climate”, “No limitation on using color scheme”, “Use materials’ original colors”                              |
| <b>High Tech</b>           | Constituted by geometric forms and modules     | “Mainly geometric lines”, “Exposed structures (displayed through glasses)”, “Modular assemblage”, “Geometric configurations (circles and squares)”                              |
|                            | Processing                                     | “Emphasized on forms made with technology (by bending, fretwork, perforation, stamping) ”, “Accurately calculated with the computer ”   |
|                            | Few but strong colors                          | “Use materials’ original colors(metallic color) ”, “Simple colors”, “Bright colors  |
|                            | The use of industrial materials                | “Industrial materials for mass production (plastic, fill-seal board, cement, inflated sandbag, alloy, steel parts, stainless steel, steel plates, aluminum)”                    |

**Table 3.** (Continued)

|                        |   |   |
|------------------------|---|---|
| <b>Minimalism</b>      | Geometric forms, simple forms             | “Regular and systematic formation”, “Hidden design”, “Geometric forms, simple, concise”, “Shrinking of form volumes, simple structures”, “Application of primitive forms”, “Design-free, decoration-free” |
|                        | Use no color                              | “Very simple color”, “Use cold colors, such as black, white, and grey”, “Retain materials’ original colors”, “Avoid using warm colors”  |
|                        | Application of industrial materials       | “Application of industrial materials (with little limitation)”, “Few materials, simple texture”, “Use very few composite materials”   |
|                        | Representation of materials’ quality      | “Smooth or matted surface”, “Mainly represent the materials’ features”  |
| <b>Archetype</b>       | Simple forms and compositions             | “No decoration, simple forms”, “Application of meaningful forms”, “Assembled with very basic geometric forms”, “Use the very genre form of the objects”   |
|                        | Mild color, display the materials’ colors | “Use of mild colors”, “Use pale colors”, “Display materials’ original colors”, “No color coating, or electroplating”  |
|                        | No limitation in adopting materials       | “No limitation in adopting materials”, “Use of special materials”   |
| <b>Trans High Tech</b> | Incomplete and irregular forms            | “Irregular forms”, “Organic curves”, “Irregular surfaces”, “Symbolic form”  |
|                        | Dark and dull color                       | “Use of dark and dull colors”, “Rusty brown”, “Massive use of vivid red as the key color”   |
|                        | Use of multiple materials                 | “Use of industrial materials (similar to High Tech)”, “Natural materials (such as cement, rotten wood, leather)”  |
| <b>Memphis</b>         | Diverse forms                             | “Bionic form (animals)”, “Organic forms”, “Classical forms”, “Irregular forms”  |
|                        | Emphasis on decoration                    | “Use special patterns”, “Diverse patterns”, “Imitation of different materials’ textures (imitation of plastic)”, “Diverse, conflict, exaggerated and excessive visual decorations”                        |
|                        | Rich colors                               | “Rather strong in color scheme (contrast colors)”, “Rather bright in color”, “Diversified color scheme (with many colors)”  |
|                        | Little variations in using materials      | “Infrequently using of special materials”, “Frequently using of Melamine sheets”  |

Considering the adoption of materials, some styles had preference for particular kinds of materials. Modernism, for example, preferred using metal or curved pipes of stainless steel. Scandinavian modern tended to use wood, and Memphis, decorative melamine sheets. Overall, for practical purposes, industrial materials were mainly adopted. Although there were certain degrees of overlapping in their choices of materials among some styles, it was still possible for us to distinguish the design styles into two major categories: ones with emphasis on materials’ original properties (Modernism, Scandinavian modern, High Tech, Minimalism, and Archetype) and the ones without emphasis on materials’ original properties (Trans High Tech and Memphis).

The representative designs corresponding to each design style identified by the expert interviewees then were summarized in this stage. Experts raised many examples of buildings as representative designs. Since this study aimed to investigate the design



**Fig. 1.** Representative products of the design styles

styles of products, therefore, examples regarding architecture were not discussed in this paper. As for the descriptions and information of the products, products' names, forms, styles, and brand names mentioned by the experts were recorded and summarized. The representative products, the most frequently mentioned and clearly described products, of each style were summarized in Figure 1.

### 3.4 Perceptual Image

Finally, the perceptual feelings of each design style raised by the experts were summarized. The vocabularies of the feelings (in physical and psychological dimensions) proposed by the experts for each style were identified and integrated in accordance with the similarities of meaning. Psychological feeling, visual feeling, and tactile feeling are the three major aspects of feeling on design style. They either co-exist or overlap. Thus, these adjectives were then classified into categories of psychological, visual, tactile dimension, or the other, if they don't fit into these categories. Consequentially, the related perceptual feelings and images of each style were derived, as shown in Table 4.



**Table 4.** Perceptual image of the design styles

| Design styles              | Feelings      | Details of feelings   |
|----------------------------|---------------|---|
| <b>Modernism</b>           | Psychological | Humanistic, clean, dull, technological, monotonous, efficient   |
|                            | Visual        | Simple, clear-cut, non-decorative, non-colorful, simple, modest, pure, meek   |
|                            | Tactile       | Functional, purposeful, unobvious, smooth, sharp, hard,   |
|                            | Other         | Long-lasting, always in-fashion   |
| <b>Scandinavian modern</b> | Psychological | Home-style, vivid, interesting, pure, transparent, harmonious, simple, clean, low profile, convenient, considerate, tender, warm, closeness, concordant |
|                            | Visual        | Rich in color, bright, not icy, not hard, warm, daring color, organic   |
|                            | Tactile       | Soft, tactile oriented, usable  |
| <b>High-tech</b>           | Psychological | Rough, technological, cold, coarse, lofty, inapproachable   |
|                            | Visual        | Accurate, transparent, bright, simple lines, meek, module, bright, shiny, loyal, steady, conflict, calm   |
|                            | Tactile       | Cold, infrequent interaction, solid, stable   |
| <b>Minimalism</b>          | Psychological | Plain, cold, clean, silent, non-humanistic, monastic, remote from people  |
|                            | Visual        | Hard, simple, good looking, not handy, cold tone, cold, plain   |
|                            | Tactile       | Limited tactile, not strong, not obvious, low profile, not warm, angular, hard, flat, sharp   |
|                            | Others        | Long-lasting, always in fashion   |
| <b>Archetype</b>           | Psychological | Steady, not dangerous, warm, familiar, surprising, stunning, conflict, attractive   |
|                            | Visual        | Light colors, mild, no decorations, simple, pastiche, meek  |
|                            | Tactile       | Conflicted, rough, not strong   |
| <b>Trans high-tech</b>     | Psychological | Fancy, strong feeling, repressive, ironic, interesting, messy, lively, decadent, scared, dangerous, unstable, conflicted, passive, disgusting           |
|                            | Visual        | Incomplete, broken, wrecked, decadent, rusty, weird, paradoxical, deranged, complicated, not safe, cold, dark   |
|                            | Tactile       | Not handy, hesitant to use  |
| <b>Memphis</b>             | Psychological | Interesting, hippies, typical, retro style, contrast, strong  |
|                            | Visual        | Decorative, bright colors, organic, contrast, conflict, exaggerating, morphing patterns   |

It can be found from this table that, indeed, there are particular feelings for different styles. In other words, different styles may stimulate different feelings. However, at the same time, different design styles share some common feelings in visual, tactile, and psychological dimension. In general, form features and colors, mainly appealing to vision, are the major source stimulating the feelings corresponding to styles, first. Psychological and tactile feelings come later. Moreover, the materials' properties will simultaneously affect tactile and visual feelings. Then, they will further stimulate psychological feelings. Some feelings in different dimension overlap and are interrelated; for instance, if an object looked cold, it gave people the feeling of coldness and then, it further made people feel tranquil and cold. Therefore, this research integrated similar feelings in visual, tactile, and psychological dimension. Then similar or opposite words of feeling in different style were further combined and coupled into opposite adjective pairs. Finally, 28 opposite adjective pairs were summarized, as shown in Table 5, for further SD evaluation on styles.

**Table 5.** Vocabulary for feelings

|                     |                              |   |                        |                 |                        |             |
|---------------------|------------------------------|---|------------------------|-----------------|------------------------|-------------|
| Ironic-praiseworthy | Long-lasting outdated        | - | Steady-unstable        | Funny-boring    | Lively-dull            | Hard-soft   |
| Simple-complicated  | Conflict-harmonious          |   | Geometric-organic      | Smooth-coarse   | Clean-messy            | Pure-fancy  |
| Decorative-plain    | Pessimistic-optimistic       |   | High-class-cheap       | Safe-dangerous  | Close-alienated        | Bright-dark |
| Daring-conservative | Humanistic-non-humanistic    |   | Calm-passionate        | vivid-colorless | Rough-delicate         | Cold-warm   |
| Diverse-monotonous  | Low tactile-tactile oriented |   | Technological-handmade |                 | Good looking-loathsome |             |

## 4 Conclusion

The results of this research are summarized as follows: 1.The experts identified 7 salient design styles which were used frequently in daily life, including Modernism, Scandinavian modern, High Tech, Minimalism, Archetype, Trans High Tech, and Memphis. 2.From the descriptions of the styles, it was discovered that styles had a strong legacy. The changes in the form and content of the styles tended to be a transformation from complicated to simple, and the other way round. Overall, it constituted a progressive spiral. 3.Regarding the styles, there were fixed relations between perceptual images and experiences. There were also obvious differences in expressing tactile feeling and visual feeling. 4.Regarding the descriptions of perceptual experiences, the description of form and color received more attention. Meanwhile, the tactile feeling was derived from the contact with texture of products. However, vocabulary and adjectives were used commonly in both areas. Furthermore, psychological feelings were furthered provoked by vision and tactility. 5.Consequentially, a set of common feeling vocabulary was summarized from the design styles discussed in this research. There are 28 pairs of image vocabulary that could be used in the further SD evaluation on design styles. In conclusion, the findings of this research can be treated as worthy references for academic studies of tactile styles of products. The feeling vocabulary regarding the styles can be used as references by researchers in conducting similar semantic evaluations. For the designers, these adjectives can also be applied in their design of the product form.

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