Studies on the Self-Expression Behaviors of Users of Mobile Devices
Focusing on the differences of impressions by color and texture

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Abstract: This study will provide a theoretical background for which elements are influenced and effective for the actions of self expression and furthermore provide the scientific foundations for which elements to use in inducing specific sensibilities. The results of this study will become the background of self expression designs for various mobile devices which are to be embodied in the future and is the study in search of methods of communication with others and embodying methods of self expression through products. If that were to happen, just by simply changing the desktop of the computer, the user will be able to change the external form, color or texture to suit their situation at anytime as if to change their mood.

Key words: Interaction, Visual Haptics, Mobile Device, Self-Expression

1. Introduction
The desire of humans craving to express themselves differently from others has been continued in various directions from the past until now. Desires of wanting be similar to others occur in accordance to situations but as the atmosphere of society pursues diversity rather than sameness, the desires for wanting to express distinct characters of their own has been growing stronger. Even for products, small types of mass production had been the mainstream in the past times of mass production and in those times, only the ones with the same products as others were able to form a social bond. However, as the products in the form of small quantity batch production and order made have increased in the recent, productions suitable for the sensibility of the consumers have been on the rise. As for the actual state of digital contents, what started with the passive forms of information services, in the recent, contents in the forms such as UCC(User Created Contents) where the users participate are forming the mainstream. Hence, this study has executed a preceding investigation about the sensibility of users felt when possessing an identical product with another person. As a result of that study, it was found that the greatest emotional changes occurred when possessing an identical mobile product as a stranger. Users who had reinterpreted their own creative products for the identical subjects through tunings or decorations had existed in great amounts since the past. However the decorations were either accessories of objet forms or stickers that were vexatious of exchange when applied or had a tactile sensation. Lately, while the exterior forms of telecommunication instruments have been getting simpler compared to the past, many
functions in digital forms that can vary the user interfaces or as suitable to the use of the user have appeared. The magnitudes of displays have also been doubling since the past and as a result, along with the designs of the front sides, users who care for the designs of the reverse side which is the side exhibited to strangers when using the devices have been expanding. For example, the skin used for the protection of mobile phones or mp3s are used for the primary purpose of the shock resistant or pollution control of the equipment but as the secondary purpose, it predicates various significances such as the differentiation or feeling of identity with others. An indepth investigation was held on the methods of users expressing themselves in telecommunication devices, the methods of differentiating for those definite factors and the elements of feeling the sense of identity. In other words, this study is to investigate the methods used often on mobile devices that the individuals use as a form self expression and to find its distinct features. This study will provide a theoretical background for which elements are influenced and effective for the actions of self expression and furthermore provide the scientific foundations for which elements to use in inducing specific sensibilities. This study will become the background of self expression designs for various mobile devices which are to be embodied in the future and is the study in search of methods of communication with others and embodying methods of self expression through products.

2. Research Experiment

2.1 Research Aim

Digital Self-holics who express themselves through IT are on the rise. Self-holics are people who attach importance to the fact that they have different susceptibilities from other people and who actively reveal their existence and thoughts. Digital self-holics pursue IT products and services that satisfy their desires for self-expression by reflecting their thoughts and feelings. Recently, the IT industry targets these people by introducing IT products and services that help reveal the user’s individuality. The younger generation, who are naturally familiar with digital culture, have a bigger demand for expressing themselves through digital media or devices and tend to want to show their self-expression with other people. The sharing of these kinds of experiences can be said to be one of self-expression behaviors in which the users wish to inform others of their individual expression. Until recently, cell phone designs were hard to alter or exchange once after purchase. Products that make up for this weakness are being developed and sold, however, those which fully satisfy users’ sensibilities are still lacking. That is why this research focused on the sensibilities by which the users want to express their individuality in the products that they are daily using and carrying around. This research analyzed the influence colors and patterns have on self-expression behavior and furthermore, aimed at revealing scientific evidence about what elements should be used to bring out users’ self expression sensibilities.

Figure.1 examples of different colors and patterns of the same product
2.2 Self-expression and Emotions

The change in environment represented by the digital has brought change to the subjectivity of design. The advent of the information era has played a role in lowering the space, time barrier between designers and consumers, and by keeping up with the new paradigm of ‘user-centered design’, it has developed the so-called ‘user participating design’. However, the recent ‘user participating design’ concept doesn’t end at just the designer accommodating the opinions of the consumer and reflecting it in the product. The user personally enhances the product, can make new uses for it, and letting the user able to continuously have influence in the product and designing those material or immaterial products that have this possibility is the ultimate meaning of ‘consumer participating design’ and can be called self-expression activities. Possibility for change mentioned above is exactly what possibility of design means. That is, the consumer completes the final product by compounding the module. Also continuous upgrades are possible by replacing the module, and the consumer can feel like always having a new product. The characteristic of the modern consumer is that he or she has continuous and changing needs. Design must now serve as a tool by which the consumer can directly satisfy those needs and make a design which he or she can be satisfied.
**Users do the things needed for themselves**

In order to draw out user participation, users must feel compelled to participate and have fun producing the contents. At social photo service, www.flickr.com users upload their photographs to share them with other users. Also users' huge photograph data enables relationships between users and technological support like tagging and bookmarking help easy and convenient use.

**Users try to reveal themselves in relationships with others**

Many people are seen actively participating by uploading reviews at internet communities or business dealing websites and also uploading many other different postings. Users have a desire to express themselves. They want to reveal and express themselves in the internet system by creating work or posting activities which contain their individuality and values. Users earn satisfaction when through these activities they are able to meet and have a relationship with other users.

### 2.3 Research Methods

Color and pattern are one of the most influential elements to sensuous impression and emotional experience of a product and surroundings. Color and pattern play an important role in letting consumers decide on a product and are the motivation for causing various impressions like excitement, liveliness, peacefulness. This research examined the difference of impression of color and pattern in mobile devices and supposed these were users’ sensibilities for self-expression.

The research process was as below.

#### 1) Research Process

The research was conducted by following the below steps

1. Consider the theoretical background of self-expressive behavior
2. Research the current use of mobile device by survey
3. Evaluate mobile device patterns designed by students (20 persons) for self-expression and those designed by professional users
4. Measure the difference of impression according to color and pattern using IPOD touch

   **Using SD(Semantic Differential) Method:** Its relation to attitude can be traced from Osgood's "representational-mediational" hypothesis of meaning and his concept of "semantic space." Semantic space can be thought of as Euclidian, and is describable by a number of dimensions. Factor analytic studies, concentrating upon the connotative rather than the denotative aspects of meaning, have isolated three dimensions of semantic space.

#### 2) Research Methods

1. Survey

Research was done on 20 male and female subjects about whether or not they had experience in self-expression through a mobile device, the types of mobile devices owned, and the relationship with others and how each person expressed their individuality.
The results of Table 1 reveal that in the case of mobile devices users owning the same product felt fellowship and favorable feelings, but in the more personal area of fashion, they felt aversion. Users of mobile digital products used accessories and stickers to express themselves and stickers were mostly attached to the backside of the product.

Table 1 Survey results

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Special details</th>
</tr>
</thead>
<tbody>
<tr>
<td>When wearing the same outfit</td>
<td>18 expressed dislike</td>
<td>They did not want to be in the same area</td>
</tr>
<tr>
<td>When using the same product</td>
<td>15 expressed favorability</td>
<td>Thought that it was popular</td>
</tr>
<tr>
<td>Whether or not the product expresses themselves</td>
<td>15 answered that it did</td>
<td>Used stickers or accessories</td>
</tr>
<tr>
<td>What they felt when meeting another person using the same product</td>
<td>14 felt good about it and felt a sense of fellowship, 4 did not feel good about it.</td>
<td>Many perceived that the product was popular and wanted to know why the other persons chose the product</td>
</tr>
<tr>
<td>Behavior when meeting someone using the same product.</td>
<td>Emphasized fellowship, and tried to establish sympathy (12 persons)</td>
<td>Observed how the other persons used the product. Tried to hide their product.</td>
</tr>
<tr>
<td>Methods used to distinguish themselves from others</td>
<td>Used stickers or accessories</td>
<td>Used character items.</td>
</tr>
<tr>
<td>Reason for using cases or skins in mobile devices</td>
<td>Design &gt; product protection &gt; expression of individuality (13 persons are currently using them)</td>
<td>Purpose for using the product and the standard held when purchasing the product are almost the same.</td>
</tr>
<tr>
<td>Main focus when selecting a case for the mobile device</td>
<td>Color &gt; shape &gt; texture &gt; material</td>
<td>Hoped for redesign potential</td>
</tr>
</tbody>
</table>

The purpose of using skins and the point of focus when choosing one were in the order of design, product protection, and expression of individuality and the standard held when purchasing the product were the same. Special details included that when using cases or skins users considered color > shape > texture > material and hoped that redesign was later possible. That’s why, as a basis for self-expressive behavior in mobile digital devices, this research examined how the impression of the product changed when the backside of the IPOD touch was redesigned.

②preliminary experiment

As a way of practicing self-expression, 20 design major subjects were told to make a backside case for an IPOD touch which revealed their individuality. 5 design professionals then evaluated the results and by choosing 3 patterns conducted the experiment. The evaluation standards of the professionals were aesthetic, compatibility, and so forth criteria, and were chosen according to the 3 standards which received the highest points.
3. Analysis

In analyzing the relationship between the visual characteristics of color or color patterns and sensibility, sensibility structure models constructed with adjective image scales are mainly used. Although most research about adjective image scales uses Kobayashi’s which lays out a single color or a color arrangement and then enables exploring the color arrangement that matches the sensibility adjective, Soen allows the subjects to evaluate through a 7 scale index 30 random color patterns in relation to 13 adjective image scales, and by using this data can get the correlation result. This research conducted an analysis based on the data evaluated from the 20 subjects who were measured by the 14 samples earned from the 7 scale index of the preliminary experiment which used the 13 adjective image scales, Like-Dislike, Beautiful-Ugly, Natural-Unnatural, Dynamic-Static, Warm-Cold, Gay-Sober, Cheerful-Dismal, Unstable-Stable, Light-Dark, Strong-Weak, Gaudy-Plain, Hard-Soft, Heavy-Light from the preceding research of Seon to find out compatible color and pattern composites.

1) Evaluation sample

Evaluation was conducted by using the 3 patterns chosen in the preliminary experiment and by using the IPOD touch backside as a sample. 15 samples were made by applying Munsell’s basic 5 colors (5R 4/14(Red), 5Y 8/14(Yellow), 5G 5/10(Green), 5B 5/10(Blue), 5P 4/10(Purple)) to the patterns, and including the IPOD touch backside a total 16 samples were prepared. Samples are the same as the pictures.

Figure 4 Colors used in the sensibility evaluation and the pattern arrangement sample
Table 2: The average of the impression the subjects received from each pattern

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Like</th>
<th>Beautiful</th>
<th>Natural</th>
<th>Dynamic</th>
<th>Warm</th>
<th>Gay</th>
<th>Cheerful</th>
<th>Unstable</th>
<th>Light</th>
<th>Strong</th>
<th>Gaudy</th>
<th>Hard</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPOD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1-1</td>
<td>1.9</td>
<td>1.35</td>
<td>0.95</td>
<td>-0.3</td>
<td>-1.55</td>
<td>-1.4</td>
<td>-0.3</td>
<td>-1.95</td>
<td>0.9</td>
<td>0.85</td>
<td>0.82</td>
<td>0.4</td>
<td>0.1</td>
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<tr>
<td>P1-2</td>
<td>-0.4</td>
<td>0.05</td>
<td>-0.35</td>
<td>-0.2</td>
<td>0.9</td>
<td>0.8</td>
<td>0.9</td>
<td>0.15</td>
<td>1.45</td>
<td>-1.15</td>
<td>-0.8</td>
<td>-1.25</td>
<td>-2.0</td>
</tr>
<tr>
<td>P1-3</td>
<td>-0.3</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.5</td>
<td>0.9</td>
<td>0.4</td>
<td>0.9</td>
<td>0.05</td>
<td>1.1</td>
<td>-0.2</td>
<td>0.6</td>
<td>-0.45</td>
<td>-0.3</td>
</tr>
<tr>
<td>P1-4</td>
<td>-0.45</td>
<td>-0.05</td>
<td>0.15</td>
<td>-0.15</td>
<td>0.9</td>
<td>0.6</td>
<td>0.7</td>
<td>-0.35</td>
<td>0.45</td>
<td>0.6</td>
<td>0.35</td>
<td>-0.15</td>
<td>-0.2</td>
</tr>
<tr>
<td>P1-5</td>
<td>-0.2</td>
<td>-0.2</td>
<td>-0.8</td>
<td>-0.3</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>-0.5</td>
<td>-0.3</td>
<td>0.6</td>
<td>-0.4</td>
<td>-0.1</td>
<td>-0.05</td>
</tr>
<tr>
<td>P2-1</td>
<td>0.15</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
<td>0.3</td>
<td>0.6</td>
<td>0.75</td>
<td>0.55</td>
<td>1.35</td>
<td>0.6</td>
<td>0.35</td>
<td>0.25</td>
<td>0.1</td>
</tr>
<tr>
<td>P2-2</td>
<td>-0.7</td>
<td>0.4</td>
<td>0.2</td>
<td>-1.2</td>
<td>-0.8</td>
<td>0.6</td>
<td>0.75</td>
<td>-0.3</td>
<td>-0.3</td>
<td>0.6</td>
<td>0.6</td>
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<td>0.6</td>
<td>0.35</td>
<td>0.2</td>
<td>0.05</td>
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<td>0.35</td>
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</tbody>
</table>

Subjects evaluate the 16 samples using the SD (Semantic Differential) method which uses 13 adjectives and a 7 scale index. The averages of the evaluation results are in the table 2. Those figures (Figure 5) made into a graph is the picture below. The IPOD in the picture is the original backside of the IPOD touch model and P1-1–1-5, P2-1–2-5, P3-1–3-5 are the sample results made by applying one pattern with 5 different colors.
4. Result

The impression of each pattern on the 20 subjects made into an average is the results below.

1) Comparing impressions between each pattern

Results were derived by dividing the impressions the 20 participants received from the 16 patterns into each sensibility adjective. The adjectives, like, beautiful, natural, strong, gaudy were high in the IPOD touch original backside, whereas gay, cheerful, light were strong in P1-1. P2-2 received evaluations like dynamic, gay, unstable, strong, p2-2 received unstable, light, p2-3 and 2-5 were said to be hard and heavy, and p3-1 and p3-2 were described as warm, gay, and cheerful.

2) Original backside of IPOD touch

Adjectives like, beautiful, stable were the most strongly attached, and cold sober, light strong were also strongly attached. The stainless texture gave a feeling of cold and heavy, and many thought that this feeling that the original gave off was good and beautiful.

3) pattern 1 (thin line shaped pattern like a butterfly

In the case of p1-1, evaluation stating lightness and brightness were more conspicuous than other patterns with the same color. P1-2 was more easily connected to the butterfly associated color yellow than other patterns with the same color, while green colored P1-3 associated with coldness and calm.
Blue colored P-14 was thought of as cold, and purple colored p1-5 were mainly associated with coldness and calm.

4) pattern2 (repeated circular rectangle pattern)
Compared to other patterns, because there were many wide sides, the impression each color gave varied widely. P2-1 evoked negative impressions, dislike, unnatural, and dynamic. Conversely P2-2 was associated with the positive impressions, warmth, restlessness, lightness, and liveliness. Although green colored, P2-3 evoked hard and heaviness due to its wide sides, and p2-4 brought up a cold impression. Purple and wide sided P2-5 evoked hard, heavy, and strong impressions.

5) pattern3 (pattern with character figures and varied size changes)
These samples had both characteristics of the two patterns preceding and possessed the symbolic meaning of a character figure and were composed not of lines but sides, from which there was a bigger difference between colors than the two preceding patterns. P3-1 had an overall positive impression and was described as dynamic, warm, cheerful, and light, as well as having a more level and soft impression than other patterns. P3-2 had many similarities with p3-1 but was described more as light, natural, and soft. P3-3 had no strong impression overall. P3-4 appeared cool, strong, dynamic, and heavy but when compared to different patterns with the same color it was weaker. P3-5 had an impression of dark, strong, and heavy, but purple patterns did not have a big difference between patterns.

Green, blue, and purple did not have big difference in impression between patterns, whereas red and yellow had a big difference between patterns. Also single color patterns which could give a deep impression or patterns with large sides had a strong influence in product self-expression.

5. Conclusion
Different patterns with same colors or patterns with large sides displayed a big difference from things like character association effects. Even products with the same shape can achieve different impressions through slight changes and this can prolong the life of the product or offer various experiences and emotions to the user.

Although this research only evaluated impressions of color applied samples to patterns manufactured by other people, if expressing your own characteristics by personally making or mixing samples becomes more common we expect a new cultural trend where many users of a same product use it diversely and widely. As products shapes became simpler stickers, cases, and character accessories were used only to simply distinguish from one another until now, but in the future we believe that user participation will become more active and diverse. Also currently the front sides of mobile digital devices are changeable anytime by changing the wallpaper but the backside still has difficulty. If devices in the future become transparent screened with more developed technology or if the backside is also able to express digital images like the front side, then we expect that self-expression through the product perceiving the user’s circumstance will be possible.
6. References


