Cultural Design Method on Multi-sensor Technology Design: A Case of Interactive Lamp Design

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Abstract. Emotion has inalienable relationship with culture. Nowadays, there is an increasing tread in designers to integrate culture elements in product designs. Based on previous emotional design theory, we made a thorough analysis from three levels respectively: visceral level, behavior level and reflective level and tried to work out a cultural design method with the purpose of integrating culture with technologically industrial design. Subsequently, to validate this method, we developed an interactive lamp design with multi-sensor technology, which called “Light ceremony”, inspired by a special cultural element, tea ceremony.

Introduction

Culture can be defined as a system of meaning that a group of people share; it is a kind of emotion, some ways [1]. Over the last few years, culture context has been an essential and indispensable design resource for it can spark user’s particular emotions. Although designers realize its unimaginable power on social innovation as Tim Brown (2009) explains [2], they fail to have access to the approach to consciously integrate it with technology design.

As Norman has said, there are three levels during emotional design: Visceral, Behavior and Reflective [3]. Our present study aims to develop a basic cultural design method from these three levels. Furthermore, under such theoretical understanding of cultural design, we adopt multi-sensor technology to design an interactive lamp to validate this developed cultural design method.

Related Works

Encyclopedia Britannica (1990) originally defined “culture” as cultivation of a land or some plants, but changed to cultivation of a human being’s body and spirit afterwards. “Cultural awareness” is defined in Webster’s Dictionary (2002) as a human being’s psychological process of understanding his survival, lifestyle, and various activities of spiritual and physical realms [4]. Nowadays, there is an increasing emphasis on the role of culture in design field. More and more products are inspired by cultural elements and more and more studies focus on cultural element in product design. ‘Shutters’, inspired by traditional window and designed by Marcelo Coelho for precise control of ventilation, daylight incidence and information display [5], is an example. Wen-chih is another example, who concentrates on figuring out “how to use design elements with cultural meanings” [6]. Nevertheless, rarely does a cultural design method exist to concern itself with the cultural influence in technology design.

Cultural Design Method Research

As Papanek (1971) said, it is very important that design sets the direction for underdeveloped regions [7]. In Asian countries, there is an emerging trend to adopt cultural elements in electronics products and a desperate need to enhance and enlarge the scope and depth of cultural design.
After long-term accumulation, culture develops a simple, genuine aesthetics consistent with the nature and habitats of Eastern people. The traditional handicrafts and folk artworks will be beneficial to refining the design elements. As a consequence, large quantities of traditional research seem indispensable.

Additionally, culture and emotion are inextricably related. A combination of these two elements is conducive to innovation. Culture emotion, like a national symbol, can arouse the memory and association. Realizing this, most of designers will apply these two elements in product appearances and functions.

Consequently, we created a new method on the basis of traditional emotional design method. As emotional design has been defined into three levels: Visceral, Behavior and Reflective in the book of Norman [8], this method was established through analysis on the three levels.

**Visceral: Observing nature principles.**

First of all, the basic principle originates from human instinct which is identical among different people and cultures. This is the primary step of cultural design. Only those products in accordance with human instinctive reaction can go far. Whichever design method we choose, we will encounter with challenges from visceral level. As culture is a cumulatively national habit, a cultural design method should have a deep understanding of national habits and ascertain product position.

Besides, different people in each age may have diverse reflection over the same things. This phenomenon is particularly apparent among oriental countries, due to the rapid development in last decades.

Product appearance is the most straightforward way to stimulate cultural awareness. A great example is Beijing Olympic torch, which was surrounded by “auspicious cloud”, a representative of Chinese culture mark. Seeing this pattern, audience may generate a strong Chinese flavor instantly.

**Behavioral: Observe ordinary lives and find out suitable cultural elements.**

Faced with human behavioral level in emotional design, we should observe our daily lives to find out people's cultural habits to make the design integrated with human environment easier.

In culture, the effects of ancient thoughts on modern people may be lasting. Master Zhuang (the earliest thinkers contributed to the philosophy that has come to be known as Daojiao) thought, opus that are similar to the familiar issues bring users Euphoria feelings. Similar words have been also mentioned in ‘Spring and Autumn of Lui Family’ (lui Shi Chun Qiu) and ‘History of the Han Dynasty’ (Han Shu). From this prospective, those things which can touch human’s hearts are much more popular.

It is very important to gain inspirations from traditional products in daily lives, because we know how precious these traditional things are. But before we collect interesting ancient things and analyze them, we should obviously know what kind of emotion the design wants to deliver. And then seek out several cultural elements which may be suitable for our design concept.

**Reflective: Combine product modalities with cultural emotions**

The highest level in emotional design is reflective level, the embodiment of culture. It can influence people deepest. In this level, cultural design lays more stress in connotation of culture. As (the meaning of things) Mihaly Csikszentmihalyi & Eugene Rochberg-halton said in their book [9]: What makes the special things unusual is the particular memory or association they convey.

The skin of juice——Tetra Pak of fruit juice——designed by Naoto Fukasawa (b.1956, one of the best-known Japanese product designers) is a good example. He made good use of the appearance, feel, shape of the product to imitate the real fruits to stimulate people’s emotion to these fruits.

However, cultural design is purposed on moving people. As a result, it needs more consideration on how to combine the selected cultural element with our design work. We fitted these points together as a new measure to do design work: first is product positioning, second is cultural theme determination and survey implementation on ordinary lives of urban people to find out the existing problems. Finally is to find inspirations in traditional arts, followed by imitation.
Cultural Design Method Procedure

This cultural design method was drawn from previous studies on emotional design levels. Figure 1 is a flow chart of cultural design method indicating the procedure of this study. And we will practice this method on a lamp design.

Fig.1 Flow chart of design procedure

1. **Product position.** It is the first step and lays solid foundation for cultural design projects. A lot of ways can be adopted in this step, such as survey, questionnaire on Internet or data collection.

2. **Cultural theme and elements evaluation.** It has a decisive impact on the determining the targeted emotion delivered to customers. We could define it with the following two steps.

3. **Feelings in Expectations.** Determine what feelings conveyed to users through products, which requires designers referred to project position (such as the targeted group, the traits of users).

4. **Cultural elements adapting to these feelings.** Adopt enumerating method and brainstorm to collect enough culture elements from all worthy historical resources, such as ancient poems and calligraphy.

5. **Try to imitate the emotion.** Imitating the shape of a cultural element may be the most direct way to bring a popular chord to client, but it can only continue for a short time without in-deep moving factors. In order to touch people’s hearts deeply, we are supposed to do more work to imitate the significance of cultural elements.

6. **Final: product modality project.** Finally, this step is a crucial part on determining whether the product successful or not. Then, we should link product and cultural emotion together in harmony.

A Design Case: Light Ceremony

To illustrate the cultural design method, we try to use this method to do a lamp design, following the cultural design method procedure. The process can roughly be described as three stages: 1. Product position, which is primarily preparation work of this lamp design. Simultaneously, we have to work out the Characteristics of the crowd to help our design process. 2. Clarify culture theme and collect relevant cultural elements, followed by selecting the most appropriate one through evaluation; 3. Imitate and decide the product modality (appearance, function, technology, etc.). This case aims to design a lamp embodied with culture elements and convey warmthness to users.

**Cultural theme and elements evaluation**

1. **Cultural theme**

As research indicates, we tend to design a lamp with peaceful emotion, with the purpose to help urban people have a relaxing feeling when they use this lamp at home. A lot of cultural heritage can be the new resource of lamp design. So we do a collection about the cultural things which can bring peaceful emotion.

2. **Collection work and evaluation**

The collection work is the beginning of our design; we have searched about ten kinds of cultural elements. After we evaluate the ten elements with a Comprehensive evaluation, we can clearly realize which one is better. We number the ten elements from No.1 to No.10 as shown in Table.1:
Table.1 Selection guidelines

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lantern</td>
<td>Bamboo branches</td>
<td>Tea ceremony</td>
<td>Kongming light</td>
<td>Sedan chair</td>
<td>Moon</td>
<td>Tile</td>
<td>White and blue Porcelain</td>
<td>Origami</td>
<td>Qipao (Chinese style long gown)</td>
</tr>
</tbody>
</table>

As figure 2 shown, we find 5 persons from different fields to do the trial. And we evaluate those elements by using a honeycomb chart which follows the six selection guidelines as design principles: feasibility, interest, research difficulty, uniqueness and cultural significance.

![Selection Guidelines](image)

Fig. 2 Selection Guidelines

As a result, no. 3 Tea ceremony is final outcome after evaluation.

**Imitate and define final product modality.** As one of the oriental ancient civilized countries, China has a splendid culture and a long history. The art of drinking and serving tea is an important element penetrated into China culture. The qualities of tea inspired lot of scholars and artists to do wonderful creations of art and poetry related to this ceremony.

We also call the tea ceremony ‘Kung Fu Cha’ for making tea costs a lot of time. The Kung Fu Cha is special for tasting, enjoyment and leisure. We mainly imitate the motion of tea ceremony to reach the goal of spirit imitated. We expect to give light the qualities of water. Light flows as running water, and can be transformed from different containers. The concept of such lamp inspired from tea ceremony would describe a story about nature, culture, light and water.

**Final lamp design.** Finally, we produce a new lamp named Light ceremony. It is a light that creates a usage full of peace and elegance. It riffs off the proverbial tea ceremony by adding and removing light to a bowl via scoop. The two objects communicate wirelessly to seamlessly transfer light based on motion and gesture. It also simulates the feature of separating and fusion, making light things that can be taken away. As shown in Figure 3, we make a prototype by bamboo material, for it is a natural material and suitable for delivering cultural concept. And we use angle sensor, ultrasonic wave sensor and a smart chip to realize the interaction.

As the view of figure 4, the light can be used alone when needed.

1. When the little spoon act along arc downward and it will be bright.
2. When the little spoon acts downward at a 90 degree angle, it will be dark slowly while the big bowl will be bright.
3. When the little spoon acts downward at a 90 degree angle outside the big bowl, it will be dark.

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Conclusion

This case yields culture commendably. Light ceremony applies the spirits of tea ceremony in lamp design. Light ceremony speaks volumes of how fantastic culture is. Additionally, the graceful motions generate peaceful or even lovable feeling, which satisfies the needs of urban people to relax their pressure.

Cultural design will be an essential part of industrial design in the near future for a better communication and interaction. When facing cultural design, we are supposed to pay attention to its characteristics of nationalities in ordinary life. On the whole, a combination of emotion and the spirit of cultural elements holds the key in the process of cultural design. The case of a lamp design, Light ceremony, is a good illustration of cultural design method practice.

To facilitate generation of a cultural design system, a long term study is needed, which is beneficial to deeper understanding of how emotional design supports design process and examines feasibility of this design system. Additionally, we need to understand more about user-center design to make the design method more user-friendly.

References


