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DESIGN METHOD OF APPLYING THE ASSOCIATION OF SCIENCE FICTION TO EMOTIONAL AROUSAL

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ABSTRACT

Scenario Building has been widely used in conceptual visualization design methods. It enables the designers to envision the variable user scenarios, so that they can design products closer to the "make real" user experiences. In recent years, the consumers have been paying more attention to the emotional side of the products. Therefore, how to impart emotional expression in the products has become a major subject of development among designers. This research proposes an emotional arousal method with replaceable imagination, and uses a design project of vacuum cleaner themed upon associations of science fictions to demonstrate the application of this method to more deeply explore the designers' originality for developing products with emotional attributes. The scenario operation and association procedure implemented in this research include the following four elements: deciding scenario types, behavioral observation, scenario building, and constructing a creative thinking matrix for form development with emotional arousal. Through the conceptualization and development processes of the vacuum cleaner design project, the adopted scenario of science fiction were presented to show how it was incorporated in developing a emotional product with flavor of science fiction. The advantages and potential problems of applying this design method were discussed in the last section of this paper.

Keywords: *scenario building, emotional arousal, design method, science fiction, association.*

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1. INTRODUCTION

A designer must consider the needs of users, collect and analyze relevant data before engaging in the creative process. Kelly & Littman (2008) indicated that, in the process of product design, user' product experiences often go beyond the given functions, and in an even deeper layer, users' apparent and hidden needs are linked together. Through behavioral observation of users, we can see how products are experienced and accordingly find out the potential needs of users.

Elements of emotion are highly valued in the contemporary products, and thus developed the concept of emotional design. Emotional design emphasizes the connection of the products to human emotions, especially the sense of pleasantness conveyed by the products (Norman, 2004). In the past, Archer (1964) has proposed that only with the support of a "brief" and "experience" in the analysis stage, can one better control and explore the from development in the following creative stage. The proposed "brief" and "experience" more or less contain connotations of affection. Based on this view, in an emotional design, a designer must predict users' pleasant reactions in an even earlier stage. In response to the development trend, in which users' emotions are placed with higher and higher values and products are becoming more affectionate, the scenario method has been often used as a guide to establish links in between the designer and the product, the users and the design process. The advantage of implementing the scenario method is the ability to effectively establish an experience connection between the product and the user (Battarbee, Mattelmaki & Makela, 2001). When a designer engages in a design process, can systematically consider the emotional reactions of the future users, in beforehand, he will substantially reinforce the psychological connections between the effects of his design and the users. The concept of "scenario building" developed by the IDEO Design Group enriched the application of ergonomic engineering, expanding it from its original role of statistical analysis to the discovery and application of "user experience" design (Suri & Marsh, 2000). Teng & Chuang (2008a) proposed the creative thinking matrix of "emotional form arousal", which integrated methods of psychological arousal such as scenarios and form association and provided the designers an opportunity for overall scenario imagination. The advantage of scenario building is to turn the past design orientation, which leaned more towards technology and functions, into high focus on user experience and scenario building. However, several potential problems may also arise in scenario building, including overoptimistic (idealism) stories, cliché characters, monotonous scenarios, unclear focus, and unidentifiable details of concept. Thus, though scenario building can be applied to the design and development of daily living ware, in general, it is also likely to overlook the effect of "surprise" for creating the emotion of "pleasantness" in utility objects. Scenario building enables systematic evaluation on various simulated user possibilities, but it in is not advantageous to the designer in terms of proposing original and creative concepts. If the emotions intended for the design are pre-conceptualized before the "feel" intended for a product is imparted, the special emotional needs will become easier to pinpoint. Therefore, this research imparted science fictions as a design association on the basis of scenario scripting to create products with a fun imagery of adventure for attracting the certain targeted user groups. The application is illustrated by a design project of vacuum cleaner, that is, we intend to propose a feasible method that enriches scenario building through the angle of emotional arousal and illustration of actual project design. Finally, the advantages and disadvantages of the proposed design method were discussed.

2. LITERATURE REVIEW

Designer was always considered the user experiences that not yet happen. For product design and development, search of design opportunities may be achieved through the creation and sharing of scenario method to track the scenario occurred in the "past" or to present a virtue experience of the "future" (Battarbee etc., 2001). Through the descriptive method of user experience, the designers are provided with the opportunity to explore the content and motive of certain activities and map out the values in users' social interactivities, dreams, and new experiences. This research thinks that the scenarios of science fiction can be used to project even more diversified imagination for the future. The following is a literature review in regard to scenario and emotional arousal.

2.1. Molding the Future by Scenarios

The scenario method has been widely used in the development of high-tech products. As most high-tech products are point to the future, the specification of the products must be set to meet users' potential needs which can not be identified from the past experience, but may be derived by using scenario method. The products developed in this method will be easily accepted in a pleasant mode and satisfies the potential and wants of a user. Based on the "scenario building," Suri & Marsh (2000) developed a model of creating characters, events, products, and environments, with a series of replaceable virtue characters and stories concept, which allowed the design team to explore the concepts of products or discuss related issues in the 'realistic' scenario of the future. The method proposes that scenario building can be used as a tool for exploration of prototype and communication and helps in the description and evaluation of the design process at the initial stage of product conceptualization. But more importantly, it increases opportunities for conceptual visualization, which upgrades the quality of user interactive experiences to the potential products and systems and supports cross-disciplinary teams to understand the use situation and overall context of a product in a "make real" scenario before a development direction is confirmed. This method creates a series of casts of characters in different age groups to describe the progress of actual events and allows the designers to easily visualize how users face the prospect of future technologies and to design the products accordingly.

The scenario method used in Nordic design student workshop explores the possibilities of designing for experience for different groups of future users. That emphasizes "storytelling" and focuses on creating and sharing of stories, which often consists four steps: 1) Create overview; 2) Map social contexts; 3) Identify opportunities; 4) Design the experience. It enables the designers to design user experiences of an even wider scope of age groups (Battarbee etc., 2001). The design teams tried to use different methods to simulate users and, through which, made attempts to break through the limitations of their own experiences for an expanded space of imagination. What designers face is always an imaginary future; therefore, it is necessary that they begin the process from imagination or establish a platform for imagination in front-end of the process, that is, making some progress in the development before consulting the opinions of their peers or users.

2.2. Stimulate Imagination of Interest from Science Fictions

Science fiction is one kind of novels developed in 20th century. In Science fictions, novelists narrate science discoveries, development of industrial technology, the effect of crucial events and resulted social changes to mankind (Wikipedia, 2009). Description of the effects may be conjectures based on scientific facts or theories, or wild imaginations of contradictions found in the realities expanded from the scientific facts or theories. In 1961, US President Kennedy announced

that the US was to activate a space adventure program, in which men were to be landed on the moon and transported back to earth. Expanding on this concept, Vogue Magazine launched a series of conceptual fashion which integrated time, space, and travel, and in 1968 Director, Kubric, launched the movie 2100: Space Odyssey. Bhaskaran (2005) claimed that the space imaginations from architecture, furniture, fashion, and mainstream media pioneered the style of the "space age". In the later years, US film producer George Lucas, launched the series movies of Star Wars (1977-2005), featuring science fiction of justice, evil, romance, and hatred. From the "TIE Fighter" jet in Star Wars (Figure 1), we found certain frequently used science fiction structures such as hexagon and radiation shapes. The "Chair-one" designed by German designer Konstantin Grcic for MAGIS in 2003, with reinforced casting aluminum frame of hexagon shape to express the style of machine and science fiction (Figure 2) seems to be inspired by these science fiction structures. On the other hand, Fukazawa designed the Nanocare hairdryer for Panasonic in 2007, which integrated "negative ions" and hot air to be released from the same air outlet, simulating the strong turbo thrust of a spaceship and offering the thrill of launching a jet engine into the sky, as shown in Figure 3. These cases testify to how elements of sci-fi imagination influence product design. Such designs have even proliferated into the daily lives of users worldwide. For example, in current pop culture, viewers are often empathy with the scenarios of novels, manga, videogames, TV episodes, or movies and enter the scenarios and engage in role-play freely. The viewers take the place of the characters and feel the imaginary affection in the scenario. The Japanese "Doujinshi" may well depict this trend. According to Wikipedia, "Doujin" literally means "same persons" in Japanese, but with the extended meaning of "persons with same hobby," especially in anime. "Doujinshi" is the inside circle activities among "Doujin." For instance, the author, director, readers, and audiences of anime or sci-fi often have gatherings and shows conducted in the form of cosplay (role-play). Such phenomenon brings a massive amount of derivative products and subculture influences, and such influences may even drive the mainstream culture to change. The purpose of "Doujinshi" is to enrich and satisfy the consumers' or users' needs for scenario imagination. From this, we can see that sci-fi fantasies have the effect of elevating beyond reality and stimulating the imagination experience of certain users. Therefore, it is a possibility that science-fiction scenarios can be added into the design process and provides an opportunity for observation of the visual impact thus generated.

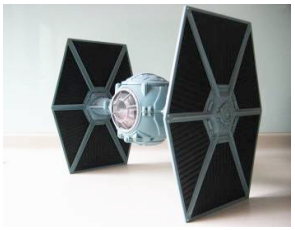

Figure1: TIE Fighter

Figure 2: Chair-one

Figure 3: Nanocare hairdryer

3. METHOD AND PROCESS OF DEVELOPING FORM FOR EMOTIONAL AROUSAL

A profession designer may stimulate the experience memories of the users through a series of changes in details or configuration to generate the effect of user emotional arousal. Russell (1980) proposed the concept of “core affect" formed by horizontal and vertical axes. The horizontal axis presents the valence of emotional value descending from "pleasant" to "unpleasant", and the vertical axis represents the level of emotional arousal ranked from "low arousal (calm)" to "high stimulation (activated)", and the intersection of the two axes includes the emotional experience activated by the interaction between the user and the product. Stimulation of arousal may be controlled to activate different experience processes to design product experiences that emphasize emotional dimensions. To solve the potential problem of monotonous designs in scenario building, this research will apply sci-fi associations to design products with the basis of “the matrix of form development for emotional arousal” developed by Teng & Chuang (2008). In application, designers may read the process of this model first, then carry out imagine type selection, behavior observation, brief of scenarios building, and finally use the form development matrix to gradually transform the scenarios into design results. The process is briefly stated in the following sections.

3.1. Decide scenario types

Think about what kind of emotions or feeling are wanted by the target users to experience and then select the appropriate theme and characteristics for the product to be developed. According to the selected theme, the proper type of scenario with relevant stories can be decided. Examples of scenario types include themes like science fiction, fairytales, love stories, and thrillers, etc. For example, this research focused on stimulating high arousal of users’ surprise emotions; as a result, scenario of science fiction was adopted for design development. In this research, the vacuum cleaner was chosen as the target in design project. Get rid of the standard of traditional household appliances, due to the designer anticipated use sci-fi scenario for the scenario type to make housework as interesting as a game player. Furthermore it’s a simulated ways that easier to be understood.

3.2. Behavioral observation

After the scenario type is decided, plan several user behavior observations, accordingly, to link between the actual product use and stories to be developed. In these observations, record the process of contact between the products and the users in three stages: direct observation stage, interactive stage, and long-term experienced stage. The direct observation stage entails observations of how user needs are created and in what context and spaces users use the product. The interactive stage observes how users use the products and their habits in the usage. And long-term experience entails users’ memories and associations to the products.

3.3. Build brief of scenario

Draft the story outlines of the scenarios. Brainstorm for the plots, characters, actions, techniques, and possible endings related to product. Of course, such scenarios can also be changed according to different scenario types adopted, i.e. romance, fairytales, or thrillers.

3.4. Apply the matrix of form development for emotional arousal

Continue from the above process, we used the matrix of form development for emotional arousal proposed by Teng & Chuang (2008) for further development. This matrix includes two components, contexts of emotional arousal and process of form association. The component of contexts of emotional arousal contains three parts, including establishing design language, highlighting distinctive features, and linking to inspiring image. Emotional stimulation can be provided through considering the above context. Simultaneously, it connects the visual imagery with the emotional arousal to provide as a reference for the process of form association to develop the design. The process of form association contains four steps: build design scenario, clarify the design features, implement relevant technology, and strengthen tension of design. These four steps can be illustrated as follows:

1. Build design scenario: Establish the scenario according to the brief plotted and with the consideration of the above mentioned scenario context. From this scenario identify the positive and negative associations for further idea stimulation.

2. Clarify the design features: From the established scenario, identify the corresponding social context which will inspire some design features. Then gradually clarify these design features with the process of design development.

3. Implement relevant technology: Search the available science and technology for relevant ones to realize the design features.

4. Strengthen the tension of design: Polish and refine the developed product design (with better looking or better textural quality) to make it more distinctive and attractive.

The process depicted in the above four sections forms the method of form development for emotional arousal with science fiction associations. The operational procedure of this method is illustrated in Figure 4. This form development method based on emotional arousal is expected to stimulate designers to generate activated imaginations and consequently promote creative design by integrating association of fictional stories and behavior of actual operations.

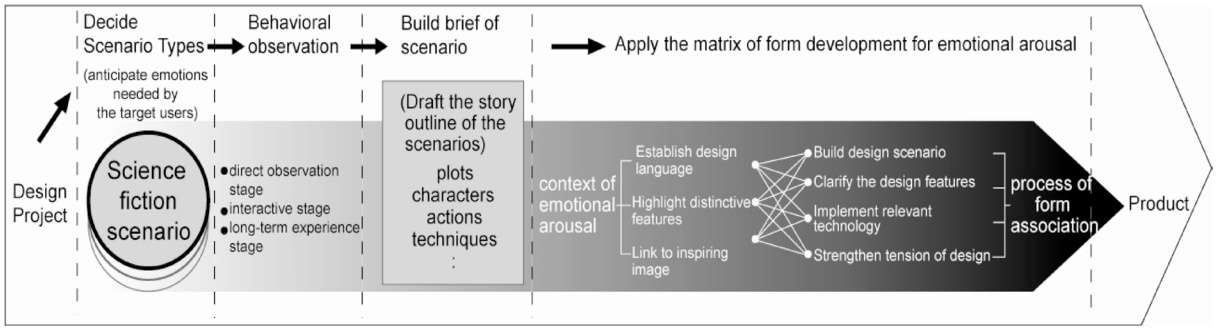

Figure 4: **Steps of the design method**

4. APPLICATIONS AND RESULT ANALYSIS OF THE DESIGN PROJECTS

The method of form development for emotional arousal with science fiction associations then was implemented in a design project of vacuum cleaner by junior college students for fulfilling a design studio course, under the coach of the authors. The design project took eight weeks to finish and the

rough concept model was proposed in the third week. After discussion and modification, the final model and presentation board (including descriptions of the major mechanisms) was completed at the end of the eighth week. The following is a summary of the design process and results of one design project achieved in this practice.

4.1. Design Project--Code J

By considering the relationship between the users and a vacuum cleaner, this project began from defining a sci-fi scenario as the scenario type, which was targeted on arousing the emotion of "active thrill" and "surprising." Vertical type vacuum cleaners were chosen as the basis for expressing an exaggerated presentation of "cool." The designer then carried out user behavior observation in the full mission execution steps, including contacting the product, using the product, user habits, versatile use of the products and completion of product use. Form the observation, the designer discovered that the cleaning action carries the attribute of having an initiation and completion plots, just like that in a space combat mission. Through association, the general scenario of daily cleaning was transformed to the special theme of an Angel of Justice using a perfect weapon to execute a space combat mission. The following sections further illustrate the design process which the designer consolidated the concept into actual products in different design stages.

4.2. Context of Emotional Arousal

What associations did science fiction provide in emotional dimension in this scenario of space combat mission? Maybe when a hero defeated a villain, the viewers will create a positive acknowledgement towards the character. Emotion of excitement was stimulated through the following exploration of emotional arousal context.

(1) Establishing design language: The design language with analogue to the joystick of video game players and interface of handheld products was established.

(2) Highlighting distinctive features: Feature of psychological connection between super hero and invincible weapon was strengthened.

(3) Linking to inspiring image: The exciting image of combat elements in science fiction was linked.

4.3. Process of Form Association

(1) Build design scenario: The story written for the scenario is as follow: The room is piling up with more and more dust like enemies lurking around for an opportunity to strike a revenge on Mr. J. As a draft of wind blows through, bacteria are picked up and rush towards Mr. J., but he has been aware. He jumps up with a groan and grabs the Vacuum Terminator by the side. He turns it on and a transformation took place. At this moment, the vacuum cleaner is switched to the "Destruction Mode" and releases killer light waves to sweep away the dust, bacteria, and mites, which concludes an exciting battle. The positive association in this story is: the excitement, adventure, and gratification created by science fiction; whereas the negative association is: the situation that we now live in a world full of pollution; cleaning is like going through a battle. Links between the positive and negative associations: creation of a combat weapon that can activate the light and suck all the enemies.

(2) Clarify the design features: The exaggerated form of a combat weapon with special sound and light effects were found to be the distinctive design features corresponding to the created scenario. A user grabbing the end of this weapon with ease in a standing posture vividly forms a fantastic image overlapping with the sphere of reality.

(3) Implement relevant technology: The designer implemented the technology of UV disinfection light waves to echo the story plot and the functions. Special mechanism was designed to let the body of vacuum cleaner function like a switch; when the unit is idled, the light is switched off, and when the unit is tilted for use, the UV light is activated. A cardboard model was used to simulate this switch operation.

(4) Strengthen the tension of design: The design feature that when the cleaning is completed, the vacuum cleaner stands alone without support of a base or other means was added to strengthen the tension of design. This projects the "readiness" in the space. Another tension enhancing feature is that when the user begins to use the vacuum cleaner, the light in the T-shape head is activated and beams out strong UV disinfection rays to create the intensity of "mission completed".

4.4. Consolidated Design Concepts

This design transformed a concept of science fiction into a vertical type vacuum cleaner, as illustrated in Figure 5 and Figure 6. With the created sci-fi features, a hero (user) operates this terminator weapon (designed vacuum cleaner) to create the thrill of adventure. Military element of an armored helicopter, which is presented with several geometric panels, was further added. When the vacuum cleaner is activated, the LED dusting light at the cleaning head section is also switched on to light up the cleaning areas. This design is expected to satisfy users' psychological satisfaction in addition to provide users experiencing with the added light and sound effects of fun.

Figure5: CODE J Final design

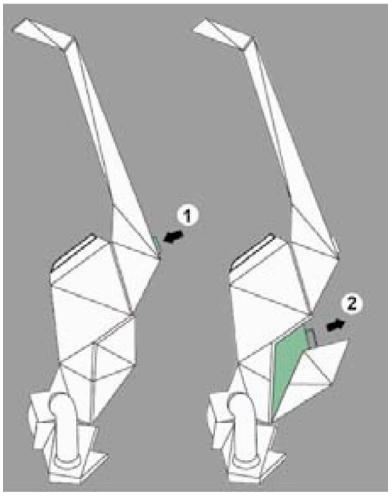

Figure 6: CODE J Diagram of the dust gathering mechanism

In this design case, we found that the designer first observed the process of using a cleaning tool from storage, to switch on for operation, to task completion and storage again. From this, the designer perceived the analogs of the process to that of a hero's weapon; the retrieval and storage of both processes are perfectly executed. From the concepts, the designer developed the character association: Tool→User vs. Weapon→Hero.

The designer further divided the vacuum cleaner into the suction head, body, and extension parts in the final design stage and added a dusting light at the suction head to intensify the theatricality of the vacuum cleaner. The body is designed with many parts of aviation elements, including the cockpit (motor), the evacuation cabin (dust box), machine gun revolvers (connection point for the

soft tube), and the jet exhaust hole (air outlet). An eject button was designed on the extension handle; pushing of this button ejects the dust box (Figure 6). In this way, the detailed operations were designed to be compatible with the whole concept of design theme.

5. CONCLUSION

Form development through association is a complex process because a designer must modify the user experiences step by step to generate convincing effects, as well as to create a sense of novelty and uniqueness to attract the attention of users before it can be accepted as a useful product. When the focuses of products are different, the results of imagination will also be different. Therefore, selecting a good scenario for theme development according to the focus at the very beginning is critical. Intensifying tension of design is also very important. It can elevate users' perceptions to the products and creates a sense of "surprise" and "attractiveness" to the users. This research proposed a form development method for emotional arousal with replaceable scenarios. A design project of vacuum cleaner based on the theme of science fiction was implemented to demonstrate the application of this method. The procedure of the proposed method includes four main steps: decide the scenario type, behavioral observation, build brief of scenario, and form development for emotional arousal. Through association of the high-tech elements in science fictions incorporated in this method, the designers are enabled to withdraw from the limitations of stereotypes and enter into a larger space of imagination and fun. Furthermore, this method provides a psychological association framework for product design activities, which enables the creation of design tension while keeping good balance between function and form. Finally several concluding notes are summarized:

1. The Science Fiction Scenario proposed in this study helps the designer to extend into diversified imagination and enables the designer to structure product personalities in a more versatile way, as well as enabling the designer to fine-tune the expression of the design into aggressive invasion or warm friendliness. For example, in the design project Code J, the tool is formed to express an image of a combat weapon for arousing the emotion of thrill.

2. This design is targeting on users with specific emotional needs. It also enables the designers to leap from the limitations of imagination. Under the same given conditions, designers may develop different designs from selecting different type of scenarios based on considering the different use habits and preferences among users. When engaging in scenario building, designers should take the preferences of the target user group into consideration in order to avoid provocation of negative emotions in the viewers or users.

3. The form development method for emotional arousal with scenario of science fiction enables a designer to immerse him/herself into the stories and take the place of the characters, which helps the designers control the direction of detail conceptualization. A design project completed through the four, main steps, should be added with other design considerations, such as ergonomic, manufacturing, and marketing considerations, to make the products more complete and create more expectation for satisfaction.

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