VII

CONCLUSIONS AND FURTHER PROSPECTS

7-1. Conclusions

7-2. Further Prospects of the Study
7. Conclusions and Further Prospects

This chapter summarizes the findings and implications found so far in all the previous chapters to draw conclusions and further prospects. At first, overall synthetic conclusions are drawn and, then, findings and implications of each previous chapter are reviewed. Then, further prospects for this study are outlined with the emphasis on the respects to need further studies and improvements.

7-1. Conclusions

The overall goal of the study was defined in the chapter I as ‘to understand comprehensive cultural effects on human interaction with design through development of the computer aided tool and to explore its application for design process.’ The conclusions are drawn based on the goal of the study. The goal can be divided into two main sub-goals: cultural effects on human interaction with design, and exploring the application for design process. Conclusions are drawn for each sub-goal as follows:

- What is the cultural effects on human interaction with different design attributes?

Different specific characteristics of human interaction with three types of design attributes (functional, aesthetic, and symbolic) were found out to get influences from three different categories of cultural value respectively as shown in Figure 7-1.

At first human interaction with functional design attributes (usability) were found to get effects from cultural variables of sequential vs. synchronic, universalism vs. particularism, subjugate vs. control, and specific vs. diffuse: how user interact with user-interface design. Users do multi-tasking at the same time (for example, performing tasks while frequently reading user’s manual) can be said to have synchronic cultural value whereas users from sequential cultural background do one thing at a time.
Figure 7-1: Model of Cultural Effects on Human Interaction with Design

In addition, users with universal cultural value were shown to try to understand the overall structure or principle of interface at first and try the function later but users from particular cultural value they adopt the strategy of learning by doing. Similarly, subjugate cultural people were appeared to blame themselves for their errors in the interaction of user-interface design and easily give up and meanwhile control culture were found to blame the bad interface design for their errors and try as long as they can and time permits.

Secondly, users interaction behavior with aesthetic design attribute were found to be able to be accounted for cultural values of such as subjugate vs. control, and affective vs. neutral. Users who prefer harmonious design among design elements and its surroundings were shown to get effects from subjugate cultural value while users with
control cultural background were less sensitive to harmony. Similarly, people with neutral cultural value who tended to hide their emotions showed the tendency to prefer design of less notable and more modest design whereas people with affective cultural value preferred more expressive and distinguishable design.

Finally, human interaction with symbolic attributes were found to be explained by cultural variables such as ascribing vs. achieving, individual vs. collective, and past, present, vs. future. People with ascribing, collective, and past or future cultural value were shown to put more emphasis on the formal or nominal aspect of design such as brand, status, price, and newness. However, people with achieving, individual, and present cultural value were appeared to put high value on actual value like performance and be less sensitive for other’s view.

- **How the relationship between culture and human interaction with design can be applied for model of design process?**

Findings from cultural effects over human interaction with different design attributes can be applied to set up overall design process as shown Figure 6-27.

At first, design process is started overall social basic assumptions by investigating various socially shared implicit values in macro environment. Cultural variables can be effectively used to understand social basic assumptions. Then, design process is moved on to understand users’ Kansei value in situational level. In this stage various Kansei engineering method can be applied. As the third stage, users’ behavior with artifact and artifact itself are investigated in more detail level and tried to understand users behavior with basic assumptions, and value and norm understood at previous stages.
Up to this stage, design process is analytic and converging from macro-society to artifact.

After having understood overall culture, now it is time to generate new design. By synthesizing overall findings from previous three stages of design process, designer establishes overall function structure of design: what functions the design consists of? Within the established function of design, aesthetic concept of design is generated: what images the design should have? Finally design process is ended by generating new symbolic value, experience, and behavior. Nowadays it is widely advocated that design should not be ended in the level of product itself but should be extended to the level of design of new experience. These later three stages can be categorized synthesizing process, diverging from function to symbolic value.
Reverse process can be started again starting from symbolic value all the way to basic assumptions. But this time the process becomes ‘culture-formation process’, which means that designed object again becomes culture.

Of course, design process should not always follow the above model. Design process should be customized depending on the types of design problem. If design problem is very short-term, improving design, the design process does not have to start from the stage of social basic assumption. The process may start directly from artifact level ending in aesthetic level.

Conclusive findings from each chapter are summarized in detail as follows:

7-1-1. Needs and Scope of Study for Cultural Effects on Design

Since the emergence of the Second World War, the world has been increasingly closer than ever and ‘globalization’ has come into being. In turn, the globalization makes the culture one of the most important assets to work with. The reasons for that are two folds: Externally, countries should understand other cultures where they should extend their economic markets; Internally, local industries for protecting their domestic markets from ever-coming foreign trade waves should use their cultural identities as strong competitive advantages over foreign competitors.

As culture becomes critical issues, designers are no exception from this paradigm. With culture assigned as designer’s task, it gives opportunities and threats as well. At first, as an opportunity, culture strengthens the myriad of influences which are prompting a growing number of companies to stop treating designers as mere stylists, and instead to start exploiting their potentials to the full. However, as threats, even with these opportunities given to designers, major topics in cultural design are still limited
only around identifying aesthetic stereotypes such as national shape or color preferences. The design in culture should be extended beyond material and phenomenal culture. Equally, perhaps more important issue is culture’s invisible and intangible aspect in design such as users’ interaction with product. However, with the some few exception of HCI (Human Computer Interaction) field, there have been almost no trials to integrate invisible aspects of culture into design. Furthermore, major methods of cultural design were limited only in designer’s personal intuition or pencil and paper survey that requires time and effort. These conventional methods cannot effectively used for identifying cultural characteristics and applying them for design for two major reasons: culture is not something that people can easily and explicitly talk out; cultural survey, even small scale of survey, takes tremendous amount of time and expense because it needs to sample different cultural subjects who are living in far remote locations.

Considering background and needs of the study stated so far, the study of cultural effects on design should include five elements into scope of the study: what is culture; how to study culture with what frameworks; what design attributes should be compared with culture in what methods; how to conduct actual experiment; and what are the results of the experiment. At first, it needs to understand the general nature of culture including definition, diverse theoretical perspectives on culture, and methodologies of cultural study. Secondly, the study needs to define culture-free frameworks to identify and compare cultural characteristics, and interpret backgrounds of explicit cultural behaviors. Thirdly, the study requires identifying the structure of design with design attributes and design methods to study them. Fourthly, the study should develop actual tools to understand the cultural effects on design and conduct a pilot experiment to see if it is appropriate or not. At last, the development tool should be applied for finding out
cultural effects on design.

7-1-2. The Nature of Culture

In the second chapter, the nature of culture was understood in terms of ‘definition’, ‘domain’, ‘characteristics’, ‘methodologies’, and ‘academic fields in studying culture.’

The culture has been through many different meanings starting from ‘cultivation’, ‘civilization’, ‘way of life’, ‘high arts’ and contemporary meaning of ‘a whole way of life that are explicit (behavior and material), and implicit (meaning and value), including symbolic behavior in a community’s everyday life.’

Many scholars related with cultural study agreed upon that culture consists of elements that differ from each other in the degree of observability, concreteness, and consciousness. Top layer consists of observable objective artifacts, middle layer include people’s value and norm which cannot be explicitly elaborated, and bottom layer consists of basic assumptions in human being’s unconsciousness.

The characteristics of culture lies in that culture is ‘learned’ or ‘acquired’ by a man, and ‘shared’ by members of society, and it makes up an ‘interrelated’ whole. And it is ‘cumulative’ throughout the history of man, and it is ‘diverse’.

The characteristics of methodological approaches in the study of culture includes ‘field work’, ‘holistic’, ‘comparative’, and ‘interpretive.’ First, researchers should go out to field to observe directly people’s behavior and participate in their everyday life. Second, another basic characteristic of the approaches to cultural study is a ‘total’ qualitative assessment. Total assessment means holistic approach to human life to generalize whole aspects of culture. Third, Another approach to study culture is a ‘comparative’ method. It is needed to figure out characteristics of a culture and to figure
out similarity and dissimilarity among cultures. In the last, what anthropologist is doing is sorting out the patterns and principles behind the meaning. This effort is what we call interpretation.

In terms of academic fields, there are various academic fields to study culture and, within only anthropology, there are diverse sub-fields including cognitive anthropology, urban anthropology, applied anthropology, and so on which again have their own different viewpoints and methodologies. In the mean time, design has interests mainly in adopting cognitive and behavioral approaches to understand how people give meanings to the designed object, and to observe human behavior for identifying users' potential needs.

7-1-3. The Cultural Variables of Development of Model of Culture

In chapter 3, as means to understand implicit cultural characteristics and interpret the backgrounds of explicit cultural behavior, the concept of cultural variables were introduced and defined. And how those cultural variables can be applied for developing cultural models is also discussed. The findings are as follows:

Cultural variables are set of culture-free universal frameworks by which a culture can be profiled and modeled, and cultures can be compared in terms of similarities and differences between cultures. They also can be applied for explaining the backgrounds of explicit layer of cultural behavior.

There are eight common cultural variables found from summarizing the existing models of cultural variables: 'Conception of nature', 'Temporal perception', 'Relationship with human', 'Authority conception', 'Expression of emotion', Message contexting', 'Nonverbal communication', and 'Adherence to Rules.'
Cultural models with the application of cultural variables can bridge (interpret) behavior toward design with cognitive, implicit cultural value. And particularly cultural variables can be implemented for understanding characteristics of cognitive cultural value.

7-1-4. The Structure of Design and Design Methods

The fourth chapter explored design methods for different attributes of design. More specifically, in chapter four it was tried to answer three questions: “how design is structured and what are basic attributes of design?”; “What are design methods appropriate for each attributes of design?”; “What is the sample case for demonstrating design method developed for specific attribute of design?” The conclusive findings from the chapter four are described in the following.

Design consists of design attributes referring to multiple aspects of design that can be used to analyze design and compare different design alternatives. Three fundamental design attributes identified include ‘functional’, ‘aesthetic’, and ‘symbolic.’ Three design attributes of ‘functional’, ‘aesthetic’, and ‘symbolic’ are related each other as means-ends relationships. In modern design paradigm, they are concentrated respectively on ‘usability’, ‘Kansei’, and ‘user-observation.’

Usability testing, conjoint analysis, and user-observation were found to be effective design methods for studying three design attributes: functional (usability), aesthetic (Kansei), and symbolic (user-observation)

Case studies demonstrated the effectiveness of computer application for design methods.
7-1-5. Developments of System for Understanding Cultural Effects on Design

In chapter five, the focus was placed on the development of actual system to identify cultural effects on design, and on conducting the pilot experiment to see if the developed system is appropriate for understanding cultural effects on design. The conclusive findings from chapter five are as follows:

Based on theoretical rationale, the structure of experiment was defined to include six modules: ‘demographics’ for understanding general background of participating subjects; ‘general attitudes toward product’ for understanding subjects’ product experience, frequency of use, major purposes of use; ‘cultural variables’ for understanding characteristics of subject’s implicit cultural value; ‘population stereotypes’ for understanding subjects’ typical expectation of the result of operations and their mental models, ‘conjoint analysis’ for identifying relative importance of product features on subjective preference; ‘usability testing’ for understanding major factors influencing on user’s usability of product and user’s interaction style.

Internet was used as a major tool to conduct survey. However, even with its strong advantages of surveying tool for cross-cultural study, there were many serious problems found for this study. At first, there was a problem related with long-delayed time, sudden crashes in the middle of conducting survey. This problem of unstable time is particularly serious for this study because time is critical element in usability testing.

Second, the use of Internet also seriously limited the range of participating subjects. Major participants were turned out to be academic scholars related to this cultural topic, students, and other people who can freely access to Internet without any difficulties. General users and real target group (in case of microwave oven, housewives) were not able to access to this survey because it requires some specific
computer knowledge.

Third, the images of microwave ovens for experiment were displayed far too small to read the labels on microwave ovens. This problem was caused because the real size of microwave oven is bigger than general size of computer monitors the subjects had.

Finally, questions of cultural variables were found to be too abstract to find link with subjects' design behaviors and perceptions. In additions, some of cultural variables played more important roles than expected while others played less important roles.

7-1-6. Cultural Effects on Design

The chapter six, final chapter among main chapters revised the pilot experiment based on problems found, and conducted a new final experiment. The results from the experiment were implemented to understand the cultural effects on design. These conclusive findings of chapter six are described as follows:

The new experiment was developed through the revision of old pilot experiment. Four major respects were revised: in order to overcome the problems caused by Internet, 'off-line' study is conducted; Korean and Japanese house wives, real target users of microwave oven are invited to closed laboratory for participating the survey; the image of microwave oven is projected on the screen for having life-size of microwave oven through the LCD projector; The questions of cultural variables are changed into more concrete, homogeneous, and product-oriented questions.

The results from the final experiments were analyzed and there were some important findings related to cultural effects on design. At first, categories of cultural variables showing relatively clear differences between Korean and Japanese subjects included 'temporal perception', 'conception of nature', 'individualism and collectivism',

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'ascription and achievement' and 'expression of emotion.'

Second, in the module of population stereotypes, Japanese people showed strong tendency to perceive a thing in the relation with context and order things from outside-in while the Korean showed slightly weaker tendency of these categories of population stereotypes compared with the Japanese subjects.

Third, in the subjective preference, the Korean subjects were shown to put relatively higher value on 'name' of product, prefer strong apparent visual elements whereas the Japanese subjects valued less on 'name' of product and preferred 'modest' design.

Fourth, in the module of usability testing, visual features such as 'color' and 'layout' made most significant effects on usability in case of the Korean subjects but the Japanese usability was most significantly influenced by non-visual feature like 'the structure of interface.'

Fifth, there were also big differences in interaction style. The Korean people tended to try first and then read user's manual, simultaneously while performing tasks. On the other hand, the Japanese subjects read user's manual first before performing task, and, once task is started, they rarely read user's manual. The Korean people also showed tendencies to click 'help' and 'skip the task' button far more frequently than the Japanese subjects.

Sixth, results from cultural variables could interpret the backgrounds of differences in the Korean and Japanese interaction with design. Characteristics of subjective preference are appeared to have some relationship with 'ascription vs. achievement', 'past, present, vs. future', 'subjugate, harmony, vs. control', 'affective vs. neutral', and 'individualism vs. collectivism.' The cultural variable of 'specific and diffuse' was found out to explain the differences in usability testing between the Korean and
Japanese subjects. The cultural variables of 'sequentialism vs. synchronism' and 'harmony vs. control' were shown to play the definite role in the characteristics in interaction style. Finally, in the population stereotypes, the characteristics of perceiving the thing contextually were turned out to have relationship with the cultural variable of 'contexting.'

Finally, there were clear differences in the relationship between subjective preference and usability from both countries. The Korean subjects showed better performance of usability in aesthetically satisfactory product. In the mean time, the feature with highest relative importance in subjective preference was shown to be different in usability testing in case of Japanese subjects: Subjectively preferred one is not necessarily performed better in usability testing.

7-2. Further Prospects of the Study

For the more complete research, the present study still needs some further works in several respects. At first, in this study microwave oven was used for evaluating subjective preferences and usability testing. However, microwave oven is not only one representative product for conducting cross-cultural study. More diverse types of products should be considered to identify relationships between cultural characteristics and their effects on design. Cultural characteristics on software or furniture may have different meaningful implications.

Second, cultural effects on different design attributes should be further analyzed through different methods. In the present study, usability testing and population stereotypes were mainly used for understanding user behavior. However, for real sense of observing user behavior requires some direct user-observation in open space: e.g.
direct observation of users working in kitchen. In addition, the current study used 'conjoint analysis' as major means to evaluate subjective preferences but the study should further explore other methods for understanding subject's Kansei: there are various methods on development in Kansei engineering field.

Third, further studies should be conducted with more various cultures rather than just Korea and Japan. The findings from cross-cultural study between only two neighboring countries may be too narrow and specific. Comparison with Western cultures such as Europe and America may have very insightful findings.

Finally, the study should be extended to development of systematic process for cultural design and database for cultural design. The present study only focused on the development of tools to understand the cultural effects on design. But there were already many meaningful findings that can be used to develop cultural design process. They should be further elaborated and developed to fit in the holistic cultural design process. The study also should not be stopped in one case study. As pointed out in the nature of culture, culture becomes meaningful only when it is accumulated in whole integrated context. The result of further studies should be continuously accumulated to create 'the ultimate database for cultural design.' With recent, rapidly developing technologies, there should not be any big problems to create database.