RELATIONSHIP BETWEEN USABILITY AND SUBJECTIVE PREFERENCE: CROSS-CULTURAL STUDY BETWEEN KOREA AND JAPAN

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Abstract

The paper sets the goal as understanding relationship between usability and subjective preference with the cross-cultural comparison between Korea and Japan. Total 42 Korean and Japanese housewives participated in the experiment where subjects evaluated their subjective preferences on 16 different variations of computer-simulated microwave ovens. In additions, subjects also performed usability testing over 9 different microwave ovens with 6 different tasks given to users. Subjective preferences and usability were analyzed by Conjoint analysis to identify relative importance of features. The results showed that, in case of Korean subjects, subjective preference has positive relationship with usability (i.e. aesthetically good product also showed better performance in usability testing). However, Japanese subjects showed the tendency that subjectively preferred products are not necessarily evaluated good in usability testing (i.e. good aesthetic is one thing and high usability is another). This difference leads the speculation that culture plays a role in balancing the relationship between aesthetic and functionality.

Keyword: Culture, Interface design, Subjective preference, Usability

1. Introduction

With the demolition of ideological barriers and the rapid development of technology, nations are increasingly becoming globalized, which, in turn, makes the cultural factors very important.

People with different backgrounds show different values toward attributes of products, particularly aesthetics and functionality. Certain cultures may be more aesthetic oriented while others may show functional tendencies. Besides, they may have different dispositions in relationships between aesthetic preference and functional usability. This paper sets the goal to understand the role of culture in perceptional relationship between subjective preference and usability by comparing Korea and Japan. More specific objectives are as follows:

- To understand the relative importance of product attributes in subjective preferences and usability.
- To understand the relationship between subjective preferences and usability in product.
- To understand the cultural role in subjective preferences and usability by comparing Korean and Japanese subjects on above issues.

2. Design of Experiment

Total 42 housewives (20 Korean and 22 Japanese)

with more than 5-year experience of using microwave oven participated in the experiment. About 40 minutes for each subject were taken completing the experiment. All the process of experiment was conducted in computer where subjects used mouse to answer questions. Subjects were brought to closed laboratory and computer screens were projected on the wall for better visibility with bigger scale. (Figure 1) Experiment consists of 5 different modules: 1) demographic module for understanding subjects basic demographic backgrounds and classifying data 2) cultural variable[1] module for comprehending subjects' cultural values on cultural dimensions 3) population stereotype module for understanding respondents' expectations on product operation which they have been acquired from everyday experiences and training [2] 4) subjective preference module for identifying relative importance of product features in subjective preference 5) usability testing module for measuring relative importance of product features in usability.

Figure 1: Japanese subject participating in the experiment.

2.1 Subjective Preference

To identify subjective preferences, 16 microwave ovens with different product features and levels were generated by orthogonal array methods. Then, subjects evaluated their preferences on them over 7 point Likert scale. Features of microwave ovens included color, layout of control buttons, interface structure, label, brand, year of production, and lock function. Each features has different levels: white, colored and wooden for color; dynamic and grid for layout; deep and shallow for interface structure; verbal and pictogram for label; having Good design mark or not for brand; 1998, 1999 and 2000 for year of production; having 'lock function' or not for lock function. 16 alternative microwave ovens were graphically simulated by computer and verbal description of levels were provided for clear understanding of product attributes. Sample screen are shown in Figure 2.

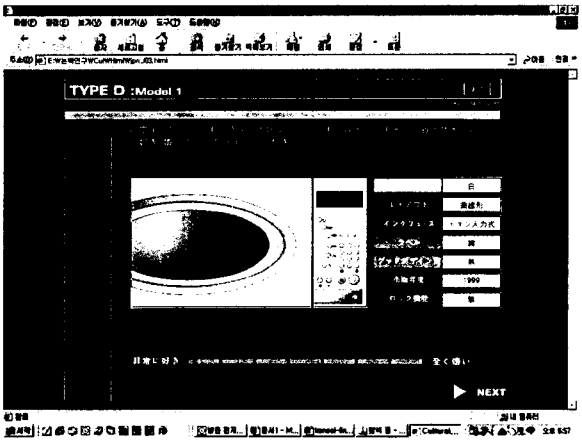

Figure 2: Sample screen evaluating subjective preferences.

2.2 Usability Testing

Usability testing of computer-simulated microwave ovens was conducted to understand users' interaction pattern with products. 9 different types of microwave ovens with different product features and levels were again generated by orthogonal array methods. Three features of 'year of manufacturing', 'brand', and 'lock function' which were used for subjective preferences were eliminated, resulting only four kinds of features of microwave ovens: color, layout of control buttons, interface structure, and label. Levels of features are same as ones used for subjective preferences.

The screen for usability testing is consisted of computer-simulated microwave oven itself, and buttons

of task command, manual, help, listening music, and skipping task. (Figure 3) If users successfully perform the task given to users, the light of microwave oven window and signal music are turned on with the text message of "task was successfully performed". If user finds difficulty to finish a task, he or she can either give up task by pressing 'skip button', refer to manual or get help by pressing 'help' button. While performing tasks users can also listen to music by pressing 'music' button. This music button was prepared to know if users do 'multi-tasking': i.e. perform task while they also engage in other task. In order to give more clear and legible image, small zoom window was prepared.

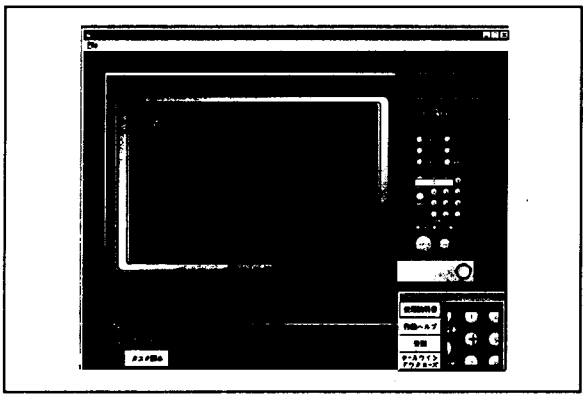

Figure 3: Sample screen testing Usability.

Total number of 6 different tasks were given to users: Tasks given to subjects include 'heating food 30 seconds', 'heating food 1 minute and 25 seconds', 'cooking 2 cups of soup', 'defrosting 110g of meat', 'cooking 250g of beef', and 'reserved cooking of 100 g of meat on 10:30'. Before actual usability testing, some small task to set up the electronic clock was given to users to give users opportunities to familiarize with how to operate mouse-buttons. Even though coordinator is in the laboratory while user performs task, he never gives any help unless users ask some.

3. Result and Discussion

At first, preference data rated against 16 different microwave ovens was analyzed by Conjoint Analysis to understand how much influences each feature of microwave oven exerts on subjects' preferences and what preferences they have in different levels of product. Relative importance of features of microwave ovens were calculated and compared.

From the result of the conjoint analysis, Japanese subjects were found to put highest importance on the color of microwave oven (34.02%) while Korean subjects valued highest the layout of control buttons (30.43%). Layout was also found out to be highly influential in Japanese subjects' preference (30.43%). Korean and Japanese subjects seem to be in common to put high value in aesthetic factors such as color and layout but Japanese showed this tendency much more strongly. In case of color, Korean subjects were turned out to perceive far less importance (16.67%) than Japanese. Korean subjects were shown to perceive the year of production as the second most important (18.84%) whereas Japanese valued as the third most important (14.36%). This result implies that Korean subjects are more sensitive to 'newness' of product than Japanese. Structure of interface were found out to be fairly influential to Korean subjects' preferences (18.84%) while less influential in Japanese preference (11.28%). Korean subjects were also shown to put relatively high importance on good design mark (10.14%) whereas Japanese relative importance is only 4.4%. Again this result shows that Korean subjects tend to think symbolic or nominal value (e.g. brand) rather important. Both cultures were found to think availability of lock function as relatively unimportant: Korean 3.62% and Japanese 4.79%. This feature was prepared for knowing whether people keep microwave oven only in their private or individual usage or not. According to the result they were shown not to care other peoples' usages. Type of label was shown to be the least important in both of Korean (1.45%) and Japanese

(0.68%). These results are graphically summarized in Figure 4.

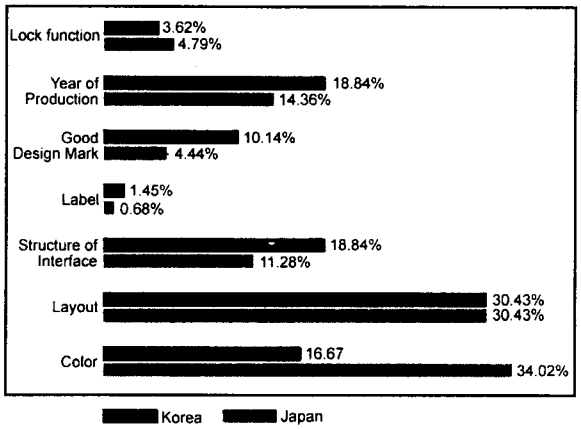

Figure4: Relative importance of features on subjective preferences of microwave oven.

After having understood subjective preferences, relative importance of features influencing usability was attempted to figure out. Time taken in conducting tasks were used as input data for calculating relative importance by conjoint analysis.

For Korean subjects, the feature of 'layout of control buttons (48.43%)' were turned out to be the most important contributing factor for usability and followed by 'skin color (39.27%)', 'structure of interface (8.34%)', and 'label (3.96%)' respectively. In the mean time, Japanese were found out to be most sensitive to 'structure of interface (35.60%)' in their usability testing and followed by 'skin color (31.95%)', 'layout of control buttons (24.07%)', and 'label (8.38%)'. This result implies that Japanese subjects are more sensitive to functional factor like 'structure of interface' while usability of Korean counterparts are influenced more by aesthetic factors such as 'layout of control buttons', and 'skin color'. Korean and Japanese were found out to be in common in relative important feature for usability as 'skin color' and least important feature as 'label'. However, there are clear difference in the gap of relative importance of features between the most important one and the remaining others. In case of Korea there is a big gap between most important feature and remaining ones whereas there are not so big differences among relative importance of features except 'label' in case of Japanese. (Figure 5)

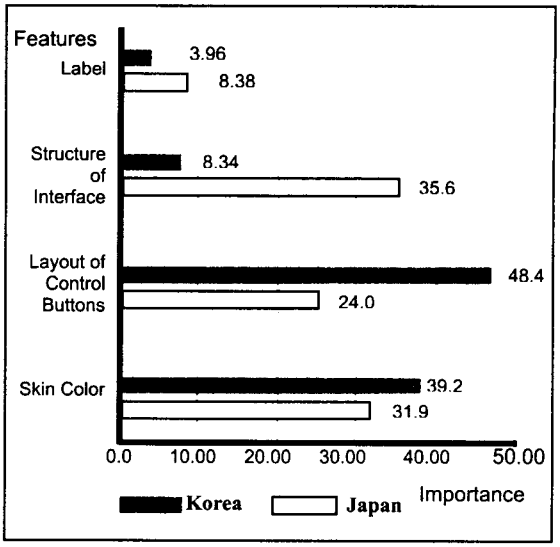

Figure 5: Relative Importance of Features on usability of microwave oven.

4. Comparison between Subjective Preference and Usability

Results from subjective preference and usability are compared to understand the relationship between them. Korea and Japan showed different dispostion in relationships between subjective preference and usability. In case of Korean subjects, feature of 'layout of control buttons' were turned out to be the most important factor in both of subjevtive preference and usabilty. Except skin color, preferred levels of features in subjective preference were identical with positively effective levels of features in usability test. Levels of 'dynamic', 'deep', 'verbal' & 'color' were preferred in the subjective preference test, and levels of 'dynamic', 'deep', 'verbal' & 'wood' were shown to have positive effect on better usability. In other words, Korean subjects showed better performance of usability in aesthetically satisfacory product. The consitency is also shown in the least important feature. The feature of 'label' was found out to be the least important in subjevtive preference and usability.

However, Japanese subjects showed quite different tendency from Korean subjects. While Korean subjects showed no difference of relative importance and level of features between subjective preference and usability, Japanese showed a clear difference between them. For instance, the feature of 'skin color' was shown to be the most important feature in subjective preference but the second most important feature in usability. Additionally, the feature of 'structure of interface' was turned out to be the most important feature in usability but the third most important feature in subjective preference. Furthermore, preferred levels of features in subjective preference were different from positively effective levels of features in usability. Levels of 'grid', 'deep', 'verbal' & 'White' were preferred in the subjective preference test, and levels of 'dynamic', 'shallow', 'graphic' & 'wood' were shown to have positive effect on better usability. This result implies that, in case of Japanese subjects' aesthetically preferred one is not necessarily to be good in usability. This finding leads to the speculative justification of general findings of 'cultural contexting'. [3] In this theory, Japanese are known to be most 'highly contextual culture', which means most of the real meaning is deeply hidden in the context and very little is shown on the surface. The comparative results are summarized in Table 1.

Table 1: Comparison of relative importance of features between Korea and Japan

	Features	Subjective Preference	Usability
Korea	Layout	30.4 %(1st)	48.43%(1st)
	Interface Structure	18.84%(2nd)	8.34%(3rd)
	Skin Color	16.67%(3rd)	39.27%(2nd)
	Label	1.45%(4th)	3.96%(4th)
Japan	Layout	30.43%(2nd)	24.07%(3rd)
	Interface Structure	11.28%(3rd)	35.60%(1st)
	Skin Color	34.02% (1st)	31.95%(2nd)
	Label	0.68%(4th)	8.38%(4th)

5. Conclusion and Further Prospects

The study focused on finding the role of culture in perceptual relationship between subjective preference and usability by comparing Korea and Japan. The result shows that Korea and Japan are different from each other in the relationship between subjective preference and usability. Whereas Korean subjects show no big difference in the rank of important features between subjective preference and usability, Japanese subjects show a clear difference between them. This difference leads to the implication that culture plays the role in relationship between aesthetic preference and functionality.

However, this study needs further works for more complete validation of above findings. At first, more countries other than Korea and Japan should be included in the sample of subjects. For example, comparison with Western cultures like America or European cultures should yield more comprehensive results. Next, other type of products other than home appliance should be included for further validation of findings. Furniture or jewelry may generate different results.

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