Ethnic Impression Structure in Car Seat Fabric Narumi TAKESHITA*, Julaila ABDUL RAHMAN*, Akira KIJIMA**, Shigeru FURUYA***, Masahito TAKIZAWA**

*Graduate School of Engineering, Takushoku University, Japan **Takushoku University, Japan, *** Shibaura Institute of Technology, Japan

Abstract: Trends have been broadly transferred throughout the world, especially in the recent globalization era. In order to grasp the way in which trend transitions happen, the ethnic impression of one trend needs to be observed in advance. Through ethnic impression studies, the factors that influence car trend transitions between countries can be determined as well. In order to obtain this study aim, a survey on the impression evaluation of one element, car seat fabric, was performed in Japan and Malaysia. Data collected were analysed by factor analysis. As a result, four kinds of factors were obtained: [comfortableness], [fanciness], [brightness], and [heaviness]. Samples were then grouped, via a cluster analysis that measures distance scores, based on comfortableness and colour brightness. The resulting groups were A [soft and bright], B [hard and dark], C [moderately soft and dark], and D [moderately soft and bright]. Most of the same samples from both countries were categorized into the same groups. In other words, even though the car seat fabric designs appear in two different countries, Japan and Malaysia, there is a kind of similarity in people's impressions of those designs, such as in their [comfortableness] and colour [brightness]. Moreover, it can be assumed that this study shows that there are car design elements that undergo slow changes that contribute to the slow car trend changes between countries.

Keywords: Ethnic impression, car seat fabric design, trend transition

1. Introduction

Trend changes in various areas have a big impact on social transitions, and vice versa. Trend change duration can be divided into three categories: short, intermediate, and long [1]. Trends that change slowly over a long period best relate to automotive design. Automotive design has a long development history, and its trend transitions have happened throughout the world.

Various factors contribute to car design changes, including social transitions [2]. However, the factors that influence car trend transitions are still being examined. It is believed that factors that significantly influence car trend changes between countries can be grasped by observing ethnic impressions. In doing so, it is believed that this study can be used as an initial idea for companies to re-strategize their design transitions for other countries.

2. Research Background

2.1 Trend Transition in Car Design

Japanese car designs are popular throughout the world. In Asian countries, such as Malaysia, many local car factories collaborate with Japan in order to support local automotive industries [3]. It can therefore be said that Japanese car trends in both exterior and interior designs have been transferred to other countries. However, the way in which trends in automotive design elements change is still an open question.





 Table 1
 Sample Characteristics

2.2 Car Seat Fabric Design in Development Process

Car interior spaces have a high frequency in terms of user contact. A good interior design leads to the comfort and convenience of users. It also cannot be denied that car seats comprise the biggest area with which users come in contact. Thus, one of the common strategies to attract users is seat fabric design because it is easy to change. Seat fabric trends change from time to time, but the changes are limited due to car specification requirements in terms of fabric colours, patterns, and textures.

Normally, the car seat fabric design development process begins with a planning stage, during which

Sample Pattern type Colour Pattern size Texture Construction 1 or 31 bluish grey plain bolster small soft 2 or 32 black, grey abstract hard woven big 3 or 33 black, grey geometry small hard knit 4 or 34 medium hard woven medium grey geometry 5 or 35 blusih grey geometry big soft bolster moderately soft 6 or 36 black, grey abstract big woven 7 or 37 reddish grey geometry small hard woven dark grey 8 or 38 small moderately soft bolster geometry 9 or 39 vellowish grev medium soft geometry woven 10 or 40 bluish black geometry small moderately soft knit 11 or 41 medium beige small moderately soft knit geometry 12 or 42 black geometry medium hard woven 13 or 43 grey, black, blue moderately soft geometry medium woven 14 or 44 vellowish beige soft geometry big woven 15 or 45 grey, black medium hard geometry woven 16 or 46 grey, black moderately soft geometry big woven 17 or 47 reddish beige geometry big soft woven 18 or 48 grey, black geometry big soft woven 19 or 49 yellowish grey, black soft natural big woven 20 or 50 beige moderately soft geometry medium woven 21 or 51 yellowish beige natural big moderately soft woven 22 or 52 black, grey hard abstract big woven 23 or 53 beige plain small moderately soft woven knit 24 or 54 grey, black soft natural big 25 or 55 black, white, grey geometry medium hard woven 26 or 56 black medium soft woven geometry 27 or 57 yellowish beige p lain small soft knit 28 or 58 black, grey, red geometry big hard knit 29 or 59 beige natural big moderately soft woven 30 or 60 medium grey natural big moderately soft woven

research is conducted for design positioning and a sample mock-up is made. Several stages of design evaluation take place in order to reach the potential final design. Design elements that fit with a particular culture, such as fabric, are one of the most important criteria in selecting the designs, especially when trying to sell cars to other countries. A number of studies have discussed the comfort of car seat fabric [4-5]. However, few studies have examined ways to understand which elements significantly influence the car seat trend impression evaluation differences between countries [Figure 1].

3. Research Objective

This research aims to observe the ethnic impressions of car seat fabric design trends between countries. Thus, the ethnic impression structure is observed in advance in order to ascertain which element has the main



Sample Numbers: 1-30 for Japanese, 31-60 for Malaysian

Figure 2 Sample Fabric Patterns

impact on car trend transitions that happen between countries. By observing the factors that influence these trend transitions, it is believed that this study can provide information for other kinds of product trend transition studies. To achieve this research objective, Japan and Malaysia are taken as country examples and the survey method is used, as discussed in the following section.

4. Research Method

4.1 Sample Selection

Thirty kinds of car seat fabric samples were selected from average kinds of design [Figure 2] in terms of colour, pattern type and size, texture, and construction [Table 1]. Physical characteristics of samples also were checked by a Wavelet Test in terms of its L*a*b* colour scale [6]. The a* and b* showed very little difference in their cycle/image, so only L* will be discussed further in this study. The L* average shows the lightness average for each frequency. In other words, at a certain frequency of colour, a certain contrast level that exists in one colour for a sample will be determined [Figure 3]. A frequency of one cycle per image is only the first condition of light and dark, and a frequency of 256 cycles per image is the 256th condition of light and dark. The L* standard deviation graph shows that there is a scattering of colour contrast levels among all of the samples [Figure 4].

4.2 Research Outline

Twenty-two respondents aged 20 to 30 years old were selected from two groups, Japanese and Malaysians. Data



collected for the evaluation of Japanese and Malaysian respondents were mixed together. Thirty samples were used; the Japanese samples were numbered 1 to 30 and the Malaysian samples 31-60 [Figure 2]. With this kind of sample arrangement, it is believed that the result has a higher potential not only to show the difference between both countries, but also to show the changes in impression evaluation from Japan to Malaysia. In relation to this, 12 paired evaluation terms for a questionnaire [Table 2] on a five-point Likert scale were chosen. For example, in the evaluation of one sample with evaluation term 'A-B', only one answer needs to be selected: [highly A], [moderately A], [neither A or B], [moderately B] and [highly B].

5. Result

5.1 Extraction of Potential Factors

The collected data was analysed by factor analysis. The principle component method and a varimax rotation were employed. The number of factors extracted was determined by the eigenvalue before rotation. Only factors with an eigenvalue greater than 1.0 were accepted. In total, four factors were extracted. The cumulative contribution for the four factors was 76.15%. Table 3 shows the structure for the factor matrix.

Variable	Comfortableness	Fanciness	Brightness	Heaviness
Discomfort-comfort	0.9180	-0.2630	-0.0462	-0.2931
Unrefined-refined	0.7472	0.1349	0.0232	0.0255
Hard-soft	0.6199	-0.2761	0.1913	-0.3887
Plain-showy	-0.0133	0.8957	-0.0397	0.1466
Simple-decorative	-0.1583	0.6708	-0.1109	0.3403
Unclear-clear	-0.0220	0.6579	-0.1354	-0.0318
Cheap-expensive	0.5506	0.5801	0.0270	0.2504
Dark-bright	0.2987	0.1891	0.8769	-0.3256
Cold-hot	0.3145	-0.2860	0.5216	0.1915
Classic-modern	0.0944	0.1794	-0.4803	0.0693
Intellectual-emotional	-0.3402	-0.0220	0.4002	0.0708
Light-heavy	-0.1585	0.2489	-0.0861	0.9516
Eigenvalue	3.6153	2.6199	1.7522	1.1503
Contribution rate (%)	30.03	21.83	14.60	66.56
Cumulative contribution rate (%)	30.03	51.96	66.56	76.15

Table 3 Structure of Factors

Notes: Factor loadings with absolute values less than .3 are omitted.

Factor 1 includes the variables [comfortable], [refined], [warm] and [soft]. Factor 1 is categorized overall as [comfortableness]. This factor relates to fabric comfort, particularly regarding texture. The length of fabric pile contributes to the softness or roughness of the texture: the longer the pile, the softer the fabric.

Factor 2 includes the variables [showy], [decorative], [clear] and [expensive]. This group relates to the relative quality, or [fanciness], of the fabric. Most of the samples involved high-quality finishes such as embossing or shine effects.

Factor 3 includes the variables [bright], [warm], [traditional], and [emotional]. Factor 3 is categorized as [brightness]. Both Japanese and Malaysian respondents evaluated the brightness or darkness and warmth or coldness of the colour categorization of each fabric sample.

Factor 4 is known as [heaviness] and relates to the overall appearance of the fabric, which has strong contrasts in its combinations of pattern size.

5.2 Sample Score Maps of Factor Analysis

Sample scores from the factor analysis were plotted into several maps in order to clearly observe the relation between samples and factors. Then, a cluster analysis was performed in order to group the samples. In this stage, only sample maps for Factors 1-2, 1-3, 1-4 and 2-4 were discussed. Other sample maps did not show the potential results [Figure 5].

The axis of the map of Factor 1-2 is [fanciness - comfortableness]. There is also a direction for [soft luxury] and [soft simple]. [Soft luxury] is for samples that have a decorative pattern and a soft texture. [Soft simple] is for samples that have a small or basic pattern with a soft texture.

The axis of the map of Factor 1-3 is [comfortableness - brightness]. There are also directions for [warm soft] and [cool soft], which show the direction of colour groups with soft textures. The axis of the map of Factor 1-4 is [comfortableness - heaviness]. There are also directions for [soft contrast] and [hard contrast]. The axis of the map of Factor 2-4 is [fanciness - heaviness]. There are also directions for [hard decorative] and [soft decorative], which have a hard or soft texture and a decorative pattern in terms of its size and shine effect.

5.3 Different Impression Evaluation between Japanese and Malaysia by Factor Score

The factor score maps for the samples were further discussed. Japanese sample scores numbered from 1 to 30 were mostly positioned in a kind of outer area on the map. In contrast, the Malaysian sample scores, numbered



Figure 5 Score Maps for Factors 1-2, 1-3, 1-4 and 2-4

31 to 60, were mostly positioned in a kind of inner area on the map. Hence, it can be said that the Japanese respondents had a wider evaluation of the samples. On the other hand, the Malaysian respondents had a smaller evaluation of the samples and their understanding is more similar to each other [Figure 6].

One of the reasons for this is that Japanese people are outstanding in design ideas and they have detailed preferences in that area because Japan is a highly developed country. In contrast, the understanding of design among Malaysians is lower than it is in Japan. Malaysians may evaluate the details of design images in a similar way because they have less information about design than do people in a highly developed country such as Japan. **5.4 Cluster analysis to show the fabric impression score between Japanese and Malaysian**.

A cluster analysis was performed in order to obtain the relative distance between samples. The nearest distance between samples shows a kind of similarity in its elements, and vice versa. The collected data was then analysed by cluster analysis and yielded four groups: A, B, C, and D. Group A is categorized as [soft and bright], B is [hard and dark], C is [moderately soft and dark] and D is [moderately soft and bright]. The groups were categorized based on fabric texture and colour. In this analysis, the sample evaluation scores were numbered 1-30 for the Japanese group and 31-60 for the Malaysian group. In this way, the difference in impression evaluation of trends between both countries can be studied [Figure 7].

Almost all of the samples showed that the evaluation score of one sample between Japanese and Malaysian respondents is positioned in one group. In other words, the distance is near the evaluation score of both respondent groups. The three sets of samples with the closest evaluation scores were [27 and 57], [21 and 51] and [29 and 59]. The three sets of samples with the most different impression scores were [26 and 56], [2 and 32] and



Figure 6 Evaluation Difference between Japan and Malaysia



Figure 7 Distance Scores of Samples for Evaluation between Japanese and Malaysia

[20 and 50]. This result shows that there is almost no difference in the impression of fabric images between the Japanese and Malaysian respondent groups.

Moreover, an analysis of variance by repetition of a two-way Anova was performed for the paired evaluation terms. The two-way test represents the respondents and samples. The evaluation terms showed a 0% significance difference, while the significance difference of the Japanese and Malaysian groups was 47%, which showed there is no difference in the impressions of the Japanese and Malaysian groups.

Sample groups A, B, C, and D were analysed by L*std (lightness standard deviation) in cycle/image. The graphs represent the contrast level of the samples. Larger pattern size and different colour brightness in the fabrics might lead to higher levels of contrast in the graph. Graph A shows the highest contrast in the sample. The graphs are arranged by decreasing contrast level: B, C, A, and D [Figure 12]. Samples that have similar impression evaluation scores for both countries mostly occur in groups A, B, and C, which relate to consideration of colour



Figure 8 Lightness Standard Deviation (L*std) in cycle/image

[brightness] in terms of contrast level in sample pattern and colour combinations.

6. Conclusion and Future Study

The four kinds of factors which best explain the impression evaluation of car seat fabric by Japanese and Malaysian respondents are [comfortableness], [fanciness], [brightness], and [heaviness]. All of these factors have a relation with the total image of the samples in terms of pattern, colour, and texture. Nonetheless, based on the cluster analysis results, it can be said that the impression of fabric design images is almost the same between the two countries based on two kinds of elements, which are mostly included in the factors [comfortableness] and [brightness].

Car seat fabric design trends change from time to time, but those changes are very limited due to considerations of various automotive requirements. Almost similar considerations of [comfortableness] and [brightness] by respondents from both countries showed that Malaysians might be able to accept outstanding Japanese fabric trends as they are offered on the market. However, some adjustment of the fabric in terms of its [fanciness] and [heaviness] may be required with Malaysian local preference. It is believed that fabric design trends undergo very small, limited changes between countries. This study thereby supports the existing evidence for long, slow car trend changes between countries.

However, the detail preference of people from each country in selecting car seat design fabric is still in question. In future research, Japanese and Malaysian preferences in car seat fabric should be observed separately and a comparative study between both countries should be discussed further.

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