Cultural preferences for hair colour

Y. Kato, T.L.V. Cheung*, S. Kitaguchi**, S. Westland*, H. Yasunaga***, and T. Sato
Division of Design Engineering and Management, Kyoto Institute of Technology
Goshokaido-cho, Matsugasaki, Sakyo-ku, Kyoto 606-8585 (Japan)
*Centre for Colour Design Technology, University of Leeds (UK)
**Colour Imaging Group, University of Leeds (UK)
***Division of Chemistry and Materials Technology, Kyoto Institute of Technology
Corresponding author: T. Sato (tsato@kit.ac.jp)

Abstract

In order to compare colour preference between Japanese and British people who have a different culture, we examined hair colour preference by questionnaire[1-4], visual assessment[5,6] and SD method[7]. We found several key differences between two countries. They were 'beauty' and 'fashion'. British students want hair colour beautiful, in contrast Japanese students want hair colour fashionable. From the factor analysis, we found that 'fashion' a Japanese student thinks about was affected by the first factor and the second factor. We named the first factor 'refinement' and the second one 'velvet'. In addition, we found that the first and second factors were mainly described by chroma and by lightness respectively.

1. Introduction

Previous studies[1,2] of colour preference showed which colours were generally preferred or not preferred. Also influences of cultural backgrounds for the colour preference have been studied[1,2]. However, it assumes that the colour preference and the cultural influences for it are depending on a target such as hair, eye and skin colour. Therefore, in this study, we focused on hair colour. Recently, it becomes very common to dye our hair for the fashion, especially for young people. It is because that we can be easily dyed our hair not only by a hairdresser but also by ourselves at home, since the improvement of the hair dye and the dyeing technologies. In this study, we carried out the comparison and the verification of hair colour preference between British who have various original hair colours and Japanese people who have black hair. In addition, we investigated the relationship between the hair colour preference and gender or the original hair colour.

2. Method

At the first, we investigated the preference of hair colour by questionnaires to 50 Japanese students (25 males and 25 females) and 30 British students (7 males and 23 females). The names of favourite hair colours were asked to them as well as their original hair colour and the experience of dyeing hair. Secondly, visual assessment was carried out to scale the preference of the hair colour using artificial hair samples by asking the question that was "If you dyed your hair like the sample, how much do you like that hair colour?". Twenty-four Japanese students (12 males and 12 females) and twenty-six British students (12 males and 14 females) with the normal colour vision; their colour vision were tested using Ishihara colour-blindness test, participated in the experiment. A set of 132 hair samples with a variety of colours were collected from a Japanese hair-colorant company (Figure 1). Each sample was mounted onto a 3cm × 5cm grey card (with CIELAB L^* value of 58.63). The spectral reflectance factors were measured for each of the hair samples at 10nm intervals in the 400nm to 700nm range of the visible spectrum to allow the calculation of CIE tristimulus values. The samples were viewed by observers in a viewing cabinet illuminated by a light source approximating the D_{65} illuminant (Figure 2). The experiment was based upon the Magnitude Estimation method; observers were asked to assign a number to each of the hair samples according to their preference for the sample colour. The preference scores were in an open-ended scale from positive numbers (preferable colours)

to negative numbers (unfavourable colours) whereby zero refers to as neutral. Arithmetic mean of each observer's score was used as a measure of the preference for each sample. Then, the correlations between the preference and the factors such as nationality, gender and original hair colour were examined. Finally, we asked thirty Japanese students (15 males and 15 females) to evaluate each sample by the Semantic Differential method that used both following 12 word pairs and 20 samples (Best 10 + Worst 10) by questionnaire and visual assessment. We presented the samples at random in the viewing cabinet under the D_{65} light source and observers evaluated each sample.

Table 1: Word pairs used for visual assessments carried out in this study

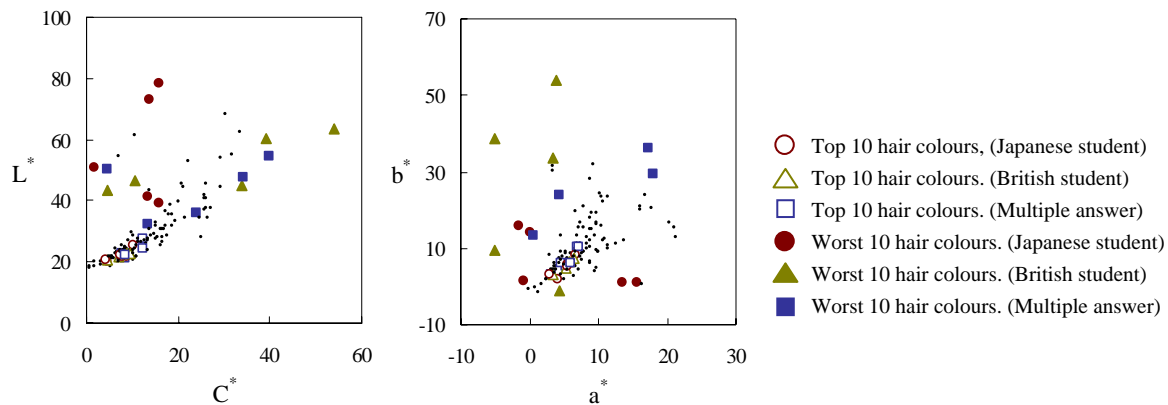| Symbol	Word pairs used in Japan	English translation
HS	Katai – Yawarakai	Hard – Smooth
NU	Shizenna – Fushizenna	Natural – Unnatural
MG	Kitanai – Kireina	Matt – Glossy
FU	Kakkoii - Dasai	Fashionable - Unfashionable
SR	Tuyayaka – Tuyayakadenai	Shiny – Rough
HL	Omoi – Karui	Heavy – Light
CU	Ochitukanai – Ochituita	Comfortable - Uncomfortable
WM	Joseitekina – Danseitekina	Womanly – Manly
LD	Suki – Kirai	Like – Dislike
BD	Akarui – Kurai	Bright – Dull
BS	JImina – Hadena	Boring – Showy
CA	Kodomoppoi – Otonappoi	Childish – Adult

Figure 1: Hair Samples (artificial)
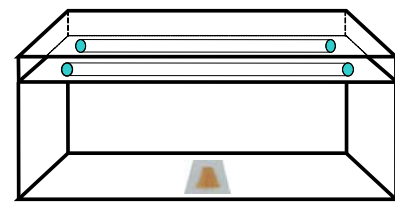
**Figure 2**: Illustration of samples prepared for the visual experiment

3. Result

From the result of the questionnaire, it was found that Japanese students liked dark hair colours (dark brown and black), while British students liked bright one (light brown and blonde). In addition, British student's favourite hair colours were only four samples. Moreover, the British students tended to like blonde that Japanese students gave as an unfavourable colour. British student tended to dislike warm-colour (red brown, pink, and red). Figure 3 shows the colour distribution of the hair samples in CIELAB space together with the preference of Japanese and British students obtained from the visual assessment. There were 4 samples that both of Japanese and British students selected as their top 10 favourite colours out of 132 hair samples. And 5 samples were selected by both students as their worst 10 colours. This indicates that the hair colour preference of Japanese students is similar to that of British students when both observers saw the actual hair sample.

Top 10 hair colours, (Japanese student)
Top 10 hair colours. (British student)
Top 10 hair colours. (Multiple answer)
Worst 10 hair colours. (Japanese student)
Worst 10 hair colours. (British student)
Worst 10 hair colours. (Multiple answer)

Figure 3: CIELAB co-ordinates of 132 hair samples plotted on L^* vs C^* (left), a^* vs b^* (right) diagrams and hair colour ranking (Japanese student and British student

Figure 4 shows the relationship between lightness values of the hair samples and the results of the visual assessment obtained from the British and Japanese students. The visual results were classified into 3 types according to the observers' original hair colours (blonde, brown and black hair). Comparison of 3 types shows that observers who have brown or black hair preferred the low lightness value's hair samples (dark brown and black) rather than the high-lightness value's one. Furthermore, it was a black sample that the observers who have black hair marked an extremely high value. On the other hand, the observers who have blonde hair preferred the high-lightness value's hair samples (blonde) rather than the low-lightness value's one. British students preferred the colours close to their original hair colours rather than other colours.
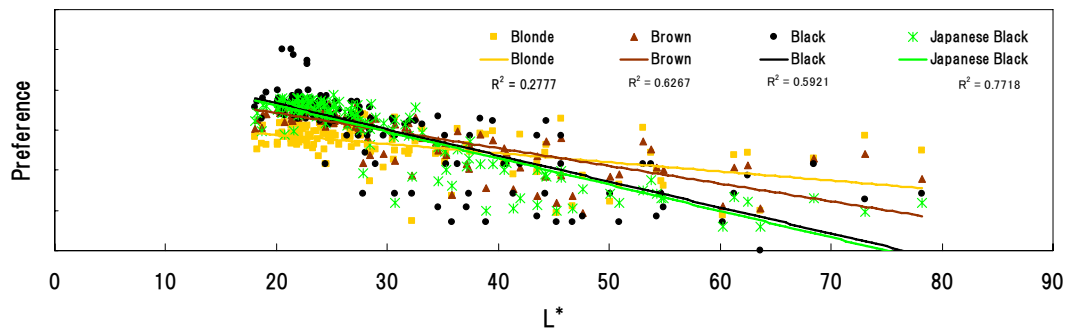
Figure 4: The score of preference according to original hair colour are plotted against lightness

From the results of the Japanese students, we found that Japanese students want to change own hair colour a little for fashion, because of they like fancy hair colour, although they preferred black hair as an Asian symbol. Figure 5 shows the top and worst 10 hair colour samples. Finally, we tried the factor analysis based on the evaluation data by the Semantic Differential method. Factor analysis of the colour emotion word pair data was also carried out in order to categorise the word pairs. The results of factor analysis are shown in Table 2 and three factors were obtained for the visual assessment data. The three factors obtained accounted for 89.32% of the total variance in the data set. The factor loadings were obtained by varimax rotation and are summarised in Table 2.

Table 2: Eigenvalues and percents of variance explained after varimax rotation

	Eigenvalue	% of variance explained	Cumulative % of variance explained
First factor	5.908	49.231	49.231
Second factor	3.726	31.046	80.277
Third factor	1.085	9.039	89.317

Figure 5: Samples colour (Top 10 + Worst 10)

Table 3: Factor loadings after varimax rotation

Symbol	factor 1	factor 2	factor 3
MG	0.959	-0.056	-0.106
CA	0.826	-0.401	0.048
CU	0.820	-0.564	-0.090
SR	-0.695	0.268	0.424
NU	-0.791	0.565	0.145
LD	-0.878	0.413	0.229
FU	-0.928	0.293	0.199
HL	-0.418	0.862	0.117
HS	-0.039	0.783	-0.411
BS	-0.685	0.706	-0.044
BD	0.473	-0.852	0.032
WM	-0.151	-0.124	0.765
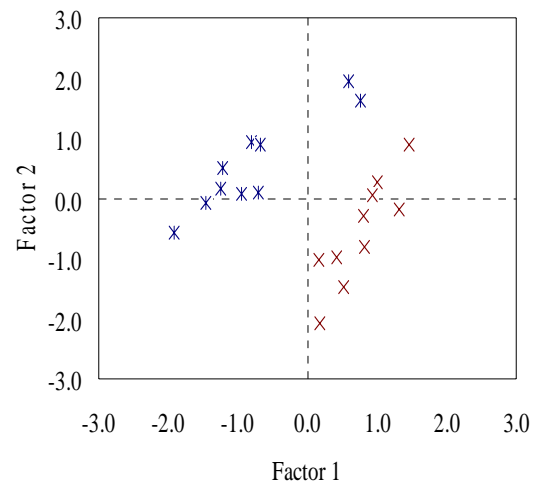
Figure 6: Relationships between the 20 hair samples used in this study (× is top 10 hair colours and ✳ is the worst 10 hair colours)

Factor analysis provided evidence that for the majority of visual assessments using 12 word pairs, only 2 factors were needed. We named the first factor 'refinement' while named the second 'velvet'. We found that 'Matt - Glossy', 'Childish - Adult', 'Comfortable - Uncomfortable', 'Shiny - Rough', 'Natural - Unnatural', 'Like - Dislike' and 'Fashionable - Unfashionable' belonged to the first 'refinement' group. 'Heavy - Light', 'Hard - Smooth', 'Boring - Showy' and 'Bright - Dull' were determined to belong to the second 'velvety' group. The word pair for 'Womanly - Manly' did not belong to either of the 2 factor groups and this suggests that WM has some different characteristics from the other 11 colour emotions used in this study. This may be due to the fact that WM is strongly influenced by hue while all the other word pairs are more influenced by chroma and lightness.

Figure 6 shows relationships between the 20 hair samples used in this study. All samples of the preference hair colour top 10 were included in plus side of the factor 1. 8 hair samples out of worst 10 hair samples was included in minus side of the factor 1. Moreover, 7 out of 9 hair samples were included in minus side of the factor 2. The similarities and differences between the 12 colour emotion word pairs were determined using colour emotion formulae[7], correlation coefficients and factor analysis. Results from each of these 3 analysis methods are found to be consistent. These results indicate that the 12 word pairs are classified into 3 categories. The first category is an 'refinement' group which contains the word pairs having a major contribution from chroma. The second category is a 'velvety' group which contains word pairs having a major contribution from lightness. A third category consists of 'Womanly - Manly' alone which is strongly influenced by hue.

4. Conclusion

Summarizing the results, we found the hair colour preference of Japanese students was not so different from that of British students. However, British students think that their own original hair colour is the best, and they want hair colour beautifully, not change the colour when they dye hair. On the other hand, Japanese students tend to like not only own original hair colour but also eccentricity hair colour for fashionable. Moreover, we found that Japanese fashion for hair colour concerned correlation between 'refinement' (like a 'Childish - Adult') and 'velvet' (like a 'Hard – Smooth').

Acknowledgement

References

1. Epps. H and N. Kaya, A study of color memory and preference, *Proceedings of the 10th Congress of the International Color Association*, 321-324, Granada, Spain (2005)
2. T. Hanari and S. Takahashi, Relationship between cognition/attitude on colors and color preference style, *Proceedings of the 10th Congress of the International Color Association*, 329-332, Granada, Spain (2005)
3. Holmes CB and Buchanan JA, Color preference as a function of the object described, *Bulletin of the Psychonomic Society*, **22** (5), 423-425 (1984)
4. Saito M, A comparative study of color preference in Japan, China and Indonesia, with emphasis on the preference for white, *Perceptual and Motor Skill*, **83** (1), 115-128 (1996)
5. Ou LC, Luo MR, Woodcock and Wright A, A study of colour emotion and colour preference Part 3: Colour preference modeling, *Color Research and Application*, **29** (5), 381-389 (2005)
6. Lee WY and Luo MR, A colour preference model for three-dimensional colour-form combinations, *Proceedings of the 10th Congress of the International Color Association*, 321-324, Granada, Spain (2005)
7. T.Nakamura, M.Iwase, T.Sato, M.Lis, J.Valldeperas, Season Reminded from Colour in Spain and Japan, *Proceeding of the 10th Congress of the International Color Association,* 1445-1448, Granada, Spain (2005)