

Japanese and Korean Elderly People's Evaluation of Clothing Colors for Elderly People

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Abstract This study evaluated the clothing colors in the elderly. We took photos using the elderly as models, displayed them on a computer screen, and produced 75 colors of the clothing in the elderly using computer graphics. The 75 colors were evaluated by Japanese and Korean elderly women. We compared the ideal colors for and the colors actually worn by elderly people in Japan and Korea. Japanese and Korean elderly women differed concerning their ideal clothing color and their most often worn color. The images concerning clothing colors also differed between the two groups, suggesting differences in their views related to clothing. Japanese elderly women tended to view clothing as a means of expressing their individuality, while Korean elderly women tended to view clothing as a means of expressing their character. *J Physiol Anthropol*, 20 (1): 15-28, 2001 <http://www.jstage.jst.go.jp/en/>

Keywords: elderly people, clothing colors, Japanese elderly women, Korean elderly women, computer graphics

Introduction

In Japan, there has been an increase in the percentage of elderly people in the total population, and efforts have been made to prepare elder-friendly living environments, in anticipation of the predominantly elderly society expected to exist in the 21st century. Our previous study (Shoyama and Tochiwara, 1999), involving the evaluation of the colors of elderly people's clothing by young Japanese people and the elderly people themselves, revealed marked differences in the perception of clothing colors between the young and elderly generations, and suggested that these differences need to be considered when planning product development. Since the economic bubbles broke, consumption has been sluggish in Japan, and the apparel industry is now facing the

necessity of taking measures to stimulate consumption. There has been growing awareness of the necessity for global strategies with international insights. To help devise such global strategies, focused on Asian markets, in a previous study (Shoyama et al. 2000) we attempted to compare Japanese and Korean female students' evaluations of clothing colors appropriate for wear by elderly people. In that study it was found that Japanese students tended to attach importance to bright colors and functionality when evaluating clothing colors appropriate for elderly people, and to be moving away from the negative and socially regressive images once held concerning elderly people. Korean students, on the other hand, attached importance to commonness and quietness. Prior to that study, we had not anticipated that there would be any differences between Japanese and Korean young people in their evaluations of appropriate choices of clothing colors for elderly people, on the grounds that Japan and Korea are geographically close and there has been close cultural exchange between these two countries. Our study revealed, however, marked differences between Japanese and Korean female students in their ideas about appropriate clothing colors for elderly people. We undertook the present study to follow up on those previous findings, especially considering the reported recent trend of an increasing percentage of elderly people in the total Korean population (Statistical Bureau of the General Affairs Agency, 1999), resembling the tendency observed in Japan. We decided to compare Japanese and Korean elderly people's own evaluations of appropriate clothing colors for seniors, to provide data which will be useful for making the future a friendly time for older people to live through. We also hope to contribute to: (1) promoting cooperation of Japanese business people with their Korean counterparts, while sharing ideas with Korea (our geographically closest neighboring country) and (2) energizing the apparel industry in both countries.

Table 1 Color samples used for the survey

	Hue										neutral
	RED	ORANGE	YELLOW	YELLOW GREEN	GREEN	BLUE GREEN	BLUE	VIOLET	PURPLE	RED PURPLE	
Tone	1	2	3	4	5	6	7	8	9	10	w 71
pale	(3.4R 8.0/5.0)	(8.3YR 8.2/2.3)	(5.7Y 8.9/3.4)	(2.8GY 8.7/3.3)	(4.7G 8.4/3.3)	(6.5BG 7.9/1.4)	(3.4PB 7.9/4.4)	(0.2P 7.5/4.4)	(5.2P 7.7/4.5)	(7.6RP 7.5/5.3)	(9.4YR 9.0/0.2)
light grayish	11	12	13	14	15	16	17	18	19	20	ltGy 72
	(4.9R 6.5/3.8)	(6.6YR 6.4/3.6)	(6.1Y 7.0/2.1)	(5.2GY 6.9/2.6)	(8.6G 6.4/3.2)	(3.7B 5.6/2.5)	(3.4PB 5.9/3.4)	(7.0PB 5.5/3.6)	(5.0P 5.9/3.6)	(7.4RP 6.0/3.1)	(0.4PB 7.3/0.4)
dull	21	22	23	24	25	26	27	28	29	30	mGy 73
	(4.5R 5.0/7.5)	(4.3YR 6.3/8.1)	(4.5Y 6.4/6.4)	(5.1GY 6.0/5.0)	(5.2G 5.0/4.6)	(0.3B 4.3/5.7)	(3.5PB 4.0/6.8)	(8.9PB 4.1/6.4)	(5.7P 4.2/5.9)	(7.1RP 4.5/6.1)	(1.0PB 5.4/0.5)
light	31	32	33	34	35	36	37	38	39	40	dkGy 74
	(6.9R 6.7/9.2)	(4.5YR 7.8/6.4)	(5.4Y 8.6/7.1)	(4.7GY 8.2/7.6)	(4.9G 7.7/5.9)	(1.0B 6.6/7.5)	(3.5PB 6.1/8.1)	(0.2P 6.1/8.4)	(6.4P 6.1/7.6)	(1.6R 7.0/9.0)	(1.9PB 3.6/0.7)
vivid	41	42	43	44	45	46	47	48	49	50	Bk 75
	(4.6R 4.2/13.7)	(2.0YR 6.2/12.6)	(3.2Y 7.7/13.6)	(4.6GY 6.6/10.7)	(3.8G 5.3/9.8)	(2.2B 3.9/7.7)	(4.8PB 3.5/10.4)	(9.6PB 3.4/10.0)	(5.1P 3.5/9.9)	(7.3RP 4.0/13.1)	(1.7PB 1.3/0.6)
deep	51	52	53	54	55	56	57	58	59	60	
	(3.7R 3.2/9.6)	(3.2YR 3.3/6.2)	(4.8Y 5.6/7.9)	(4.6GY 4.8/6.9)	(3.5G 4.0/7.4)	(0.5B 2.8/6.1)	(5.2PB 2.5/9.3)	(9.4PB 2.5/9.0)	(5.4P 2.7/8.0)	(6.7RP 3.1/8.2)	
dark	61	62	63	64	65	66	67	68	69	70	
	(7.6R 4.6/2.3)	(4.2YR 2.5/3.7)	(4.9Y 3.9/4.0)	(5.5GY 3.4/4.3)	(5.6G 3.2/3.4)	(0.9B 2.1/4.5)	(5.1PB 2.0/5.1)	(9.2PB 2.2/6.0)	(5.4P 2.5/3.2)	(5.9RP 2.6/4.4)	

(): Munsell system's Hue, Value, Chroma.

Methods

Materials

An elderly (65 years old) Japanese woman served as the photographic model. Whether the color of a dress matches its design or its wearer is a very important point. In this study, therefore, we had the model wear a plain, basic two-piece outfit considered to fit her so that the design of the clothes would not affect the color survey. A picture of the model wearing the basic garments was scanned into a computer, and the color of the clothing was changed by computer graphics manipulation using Adobe Photoshop. Seventy-five colors were tested. These 75 colors are the same as those used in extensive surveys that have been conducted every year since 1981 by the Japan Color Research Institute. Table 1 shows the tested colors (10 hues \times 7 tones = 70 chromatic colors, and 5 achromatic colors). The numbers shown in this table indicate the color sample numbers. Seventy-five pictures of the female model wearing clothing of different colors (Fig. 1) were arranged against an N6 gray background, in the order of the color sample numbers. Each sample picture was 9 \times 4 cm in size.

Places of investigation

Japan: Fukuoka, Dazaifu and Chikugo cities

Korea: Taegu City

Subjects

Japan: 103 elderly women (over 60 years of age)

Korea: 103 elderly women (over 60 years of age)

Survey period

Japan: June to July 1998

Korea: June to July 1999

Survey methods

Interviews were in a questionnaire form, conducted in a room with a window to the north and under daylight illumination, supplemented by a standard light source, at



Fig. 1 Picture of the model

a luminescence level of about 1000 lx.

Material queries

1) Color distinction test (the 40-hue test): We thought it would be essential to select individuals with normal or better color discriminating ability, so that we would obtain a more precise understanding of older people's perceptions and ideas about clothing colors. Although there is a 100-hue test that would be good for testing this kind of capability, we chose a simpler 40-hue test (Nihon Shikiken Jigyo Co., Ltd.). We did this to avoid exposing the subjects to excessive testing stress caused by the fact that they would have to take all of the experimental tests in the same session as this subject-screening color discrimination test.

2) The subject was asked to make a global assessment of each of the 75 colors on a five-point scale: (5) very good, (4) good, (3) neutral, (2) bad, or (1) very bad.

3) Ideal clothing color: The subject was asked to select the 3 most ideal colors for clothing for the elderly after examining the pictures of the model wearing clothing in the 75 colors.

4) Clothing color often worn by elderly people: The

subject was asked to select the 3 colors she thought are most frequently worn by elderly people in her country after examining the pictures of the model wearing clothing in the 75 colors.

5) The images the subject had in mind about her No.1 ideal color and the color she thought is most frequently worn by elderly people were investigated on a five-point scale, using the SD (semantic difference) method involving 20 pairs of adjectives. The 20 pairs of adjectives used in this investigation can be divided into four categories, according to the theory of emotions about clothing emotions reported by Kato *et al.* (The Textile Machinery Society of Japan (ed), 1990): “evaluation” category (harmonious-inharmonious, favorite-non-favorite, want to wear-don’t want to wear, elegant-vulgar, refined-unrefined, beautiful-ugly, modest-forward, common-unique, delicate-dynamic, conspicuous-inconspicuous), “activity” category (functional-decorative, active-quiet, easy-constrained, realistic-romantic), “power” category (soft-hard, new-old, light-heavy) and “warmth” category (warm-cold, showy-plain, bright-dark).

This questionnaire was produced in Japanese first and was translated into Korean by a Korean who is proficient in Japanese.

Methods of analysis

1) The total deviation of the subjects’ color discrimination was calculated using the deviation calculating method reported elsewhere (Nihon Shikiken Jigyo Co., Ltd.).

2) The mean score of the global evaluations for each of the 75 colors was compared between the Japanese and Korean elderly woman groups. The differences in the mean scores were tested between the two groups.

3) A simple analysis of the ideal color and the most frequently worn color, a factor analysis of the images held concerning each color (a principal component method based on mean scores), and a one-way layout analysis of variance to analyze hue- and tone-related differences in each factor were performed.

Results

The color discrimination ability

Tables 2 and 3 show the results of the 40-hue test given to 103 Japanese elderly women and 103 Korean elderly women. The numerals in these tables indicate total deviations. According to the 40-hue test criteria, total deviations between 0 and 6 are regarded as indicating excellent discriminating ability, deviations between 7 and 25 indicate normal ability, and deviations of 26 and over reveal poor discrimination. For the Japanese female group (n=103), color discrimination was rated as excellent for 45 women (43.7%), normal for 43 women (41.8%) and poor for 15 women (14.5%). For the Korean

Table 2 Color discriminating ability of Japanese elderly women

Deviation	No. of women	%	Judgment
0	22	21.4	A
2	1	1.0	A
3	8	7.8	A
4	11	10.7	A
6	3	2.9	A
7	6	5.8	B
8	7	6.8	B
9	1	1.0	B
10	3	2.9	B
11	1	1.0	B
12	9	8.7	B
14	1	1.0	B
15	2	1.9	B
16	4	3.9	B
20	2	1.9	B
21	1	1.0	B
22	3	2.9	B
23	1	1.0	B
24	1	1.0	B
25	1	1.0	B
30	1	1.0	C
35	1	1.0	C
36	2	1.9	C
39	1	1.0	C
41	1	1.0	C
42	1	1.0	C
45	1	1.0	C
62	1	1.0	C
64	1	1.0	C
67	1	1.0	C
81	1	1.0	C
109	1	1.0	C
127	1	1.0	C
283	1	1.0	C

A: Excellent, B: Normal, C: Poor.

female group (n=103), discrimination was rated as excellent for 18 women (17.4%), normal for 60 women (58.3%) and poor for 25 women (24.2%). The average deviation was 16.97 (SD 34.03) for the Japanese female group and 22.40 (SD 22.88) for the Korean female group. Although the average deviation was smaller for Japanese women, the test of differences in mean scores (t-test) revealed no significant inter-group difference. Data from women rated as having excellent or normal color discrimination (88 Japanese and 78 Korean women) were subjected to further analyses.

Overall evaluation of 75 colors

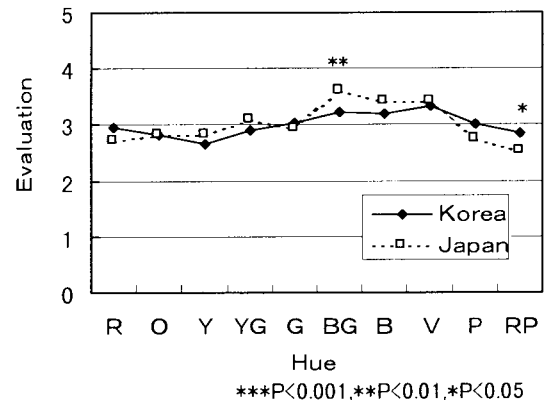
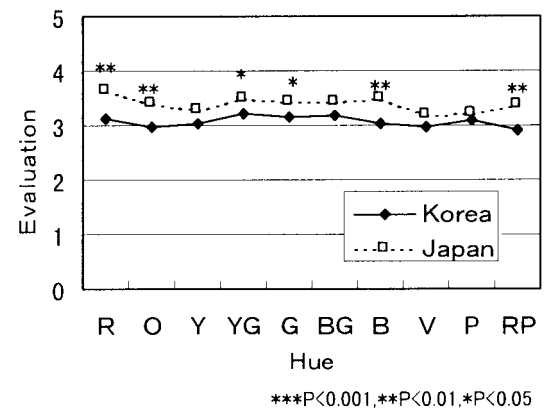
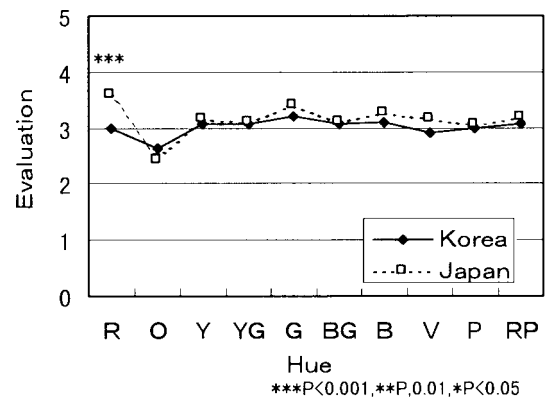
Japanese and Korean elderly women evaluated the same pictures of an elderly woman wearing clothing shown in 75 different colors. The evaluations of the Japanese woman group and the Korean woman group

Table 3 Color discriminating ability of Korean elderly women

Deviation	No. of women	%	Judgment
0	9	8.7	A
4	9	8.7	A
8	12	11.7	B
10	2	1.9	B
11	1	1.0	B
12	9	8.7	B
14	6	5.8	B
16	10	9.7	B
18	2	1.9	B
19	1	1.0	B
20	5	4.9	B
21	1	1.0	B
22	2	1.9	B
23	1	1.0	B
24	1	1.0	B
25	7	6.8	B
32	4	3.9	C
34	1	1.0	C
36	2	1.9	C
38	2	1.9	C
40	1	1.0	C
42	2	1.9	C
44	1	1.0	C
46	1	1.0	C
47	1	1.0	C
49	1	1.0	C
54	1	1.0	C
56	1	1.0	C
62	1	1.0	C
66	2	1.9	C
92	1	1.0	C
107	2	1.9	C
120	1	1.0	C

A: Excellent, B: Normal, C: Poor.

were compared. The comparison was based on the average of the score (full score = 5) for each of the 75 clothing colors. Figures 2 through 9 show the scores for each different tone of the 10 hues. In these figures, the average score (the Y axis) was plotted against the hue (the X axis). The asterisks in these figures indicate the level of significance employed for testing the statistical significance of the differences of the average scores between the Japanese woman group and the Korean woman group. Significant inter-group differences in average score were observed for 25 of the 75 colors tested. The scores of colors with light grayish or deep tones often differed significantly between the Japanese and Korean woman groups. Colors with light grayish or deep tones were evaluated more positively by the Japanese woman group than by the Korean woman group. Hue Red was evaluated more positively by the Japanese woman group. White was more positively evaluated by the Korean

**Fig. 2** Evaluation of pale tone (mean)**Fig. 3** Evaluation of light grayish tone (mean)**Fig. 4** Evaluation of dull tone (mean)

woman group. In our previous study of Japanese and Korean female students, significant inter-group differences in average score were observed for 33 of the 75 colors tested. These differences in the perception of colors between the Japanese and Korean female students

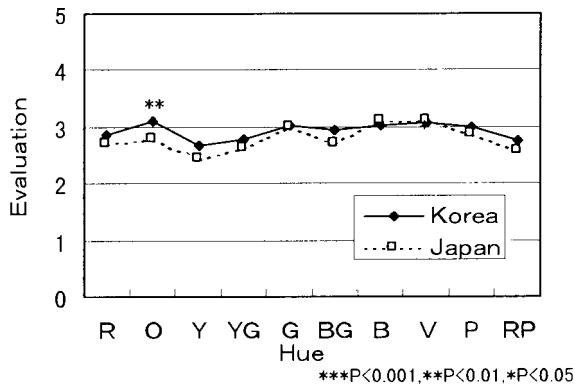


Fig. 5 Evaluation of light tone (mean)

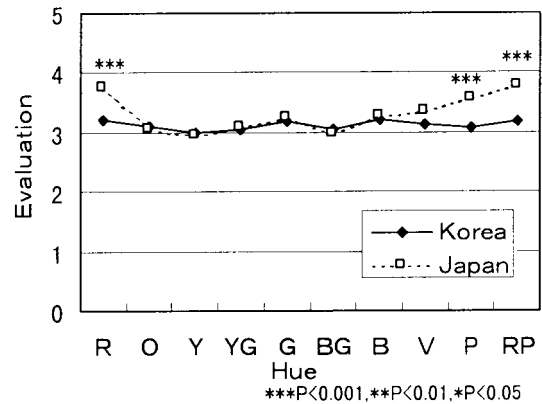


Fig. 8 Evaluation of dark tone (mean)

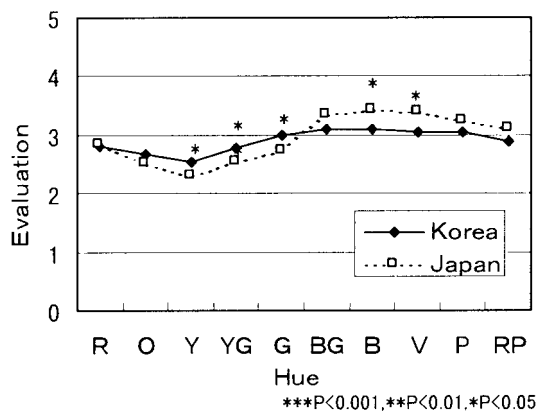


Fig. 6 Evaluation of vivid tone (mean)

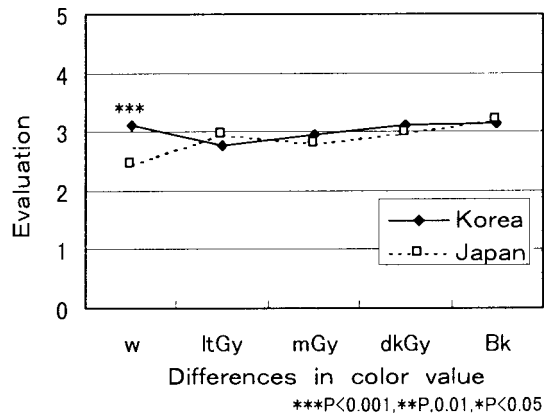


Fig. 9 Evaluation of neutral (mean)

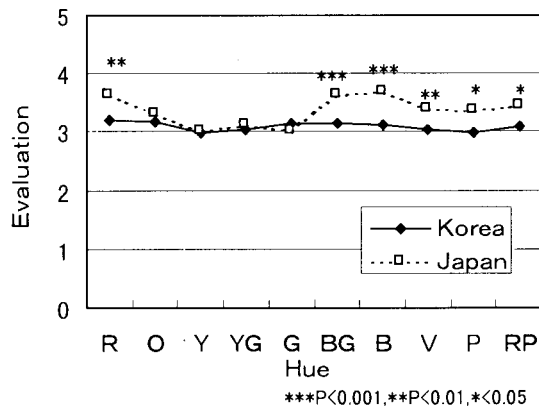


Fig. 7 Evaluation of deep tone (mean)

were associated more closely with the color value than with the chroma. Korean students tended to evaluate high value colors more positively, while Japanese students tended to evaluate low value colors more positively. A tendency resembling that observed in our previous study of female students was noted in the

present study, in which Japanese elderly women tended to evaluate low value colors more positively than did Korean elderly women, although this difference was not so marked as seen between Japanese and Korean students.

Ideal colors

The colors chosen by Japanese and Korean elderly women to be ideal for elderly people's clothing were analyzed by hue and tone. Fig. 10 plots the percentage of women who chose the given hue as ideal. Of all the Japanese women, 33.0% chose hue Red to be ideal and 12.5% chose hue Red Purple to be ideal. Hue Purple was ranked in the third place. Of all the Korean women, 17.9% (the highest percentage) chose hue Blue Green to be ideal. Hues Purple, Yellow and neutral were ranked in the second and third places respectively as the ideal color selected by Korean women. It is noteworthy that Japanese elderly women often chose hue Red to be ideal for clothing. Cross-analyzed data concerning 11 hues between the two woman groups were subjected to a chi-square of independence. This test revealed a significant

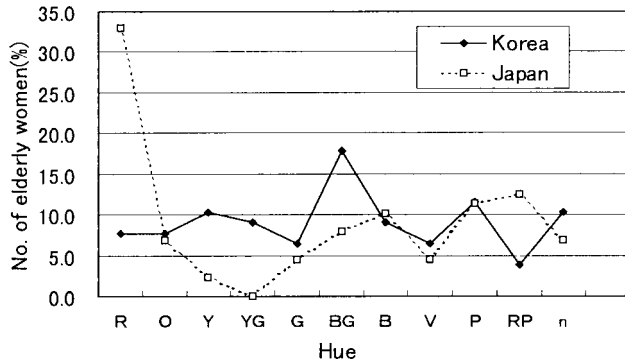


Fig. 10 Ideal clothing color chosen by No. of elderly women

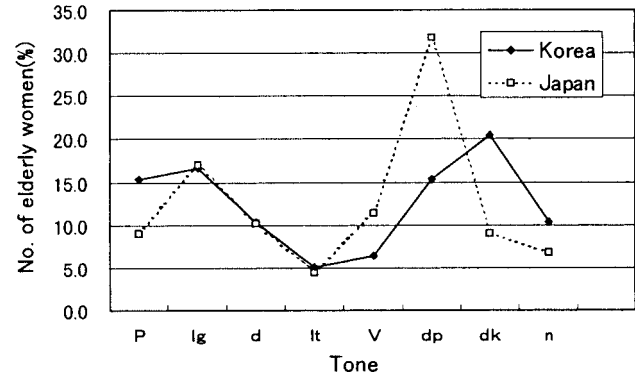


Fig. 11 Ideal clothing color chosen by No. of elderly women

inter-group difference ($\chi^2(10) = 39.06$, $P < 0.001$). Fig. 11 shows the results of tone analysis. Of all Japanese elderly women, 31.8% chose deep tone to be ideal and 17.4% chose light grayish tone to be ideal for elderly people. On the other hand, Korean elderly women most frequently selected dark tone to be ideal (20.5%) and second and third most frequently selected light grayish, pale and deep tones to be ideal. Cross-analyzed data concerning 8 tones between the two woman groups were subjected to a chi-square test of independence. This test revealed a significant inter-group difference ($\chi^2(7) = 14.44$, $P < 0.05$). Thus, differences between the two groups were observed in both the hue and tone of ideal colors.

Next, we plotted the average score for the most ideal color (rated on a five-point scale by the SD method, using 20 pairs of adjectives) in order to analyze the image the elderly women held concerning the most ideal color. Fig. 12 shows the image profile thus obtained. Testing the significance of differences of the mean scores revealed that Japanese elderly women tended more often to regard the ideal color to be “harmonious”, “favorite”, “want to wear”, “elegant”, “showy”, “beautiful”, “bright” and “warm”, while Korean elderly women tended to regard the ideal color to be “conspicuous” and “quiet”. The mean score differed significantly for 10 of the 20 adjective pairs between the two groups.

A factor analysis (varimax rotation) was then carried out using the principal component method, to determine the structure of the women’s images concerning the ideal clothing color. In this analysis, the number of components was determined on the basis of the eigenvalue (over 1) and the scree plot. Table 4 shows the loads of factors for the Japanese elderly women. Seven factors were extracted: factor 1 (refined, beautiful, new, elegant), factor 2 (common, inconspicuous, realistic, modest), factor 3 (bright, showy, light, soft, warm), factor 4 (favorite, want to wear, harmonious), factor 5 (active, dynamic), factor 6 (functional) and factor 7 (easy). Factors 1 through 7 were interpreted as representing beauty, commonness, brilliance, taste, strength,

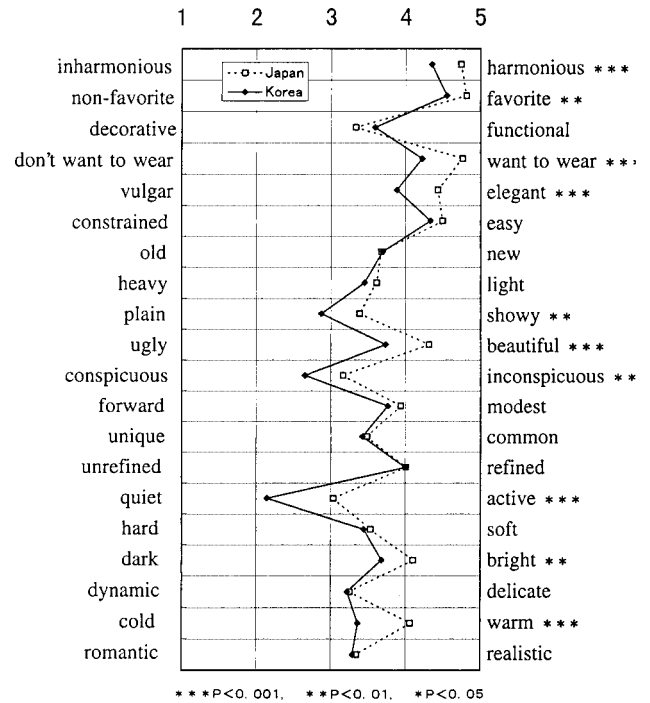


Fig. 12 Images held by elderly women concerning the ideal clothing color

functionality and comfort, respectively. The cumulative coefficient of determination was 67.3%.

A factor analysis was also performed on the images the elderly Korean elderly women held concerning the ideal color for elderly people. Six factors were extracted, representing individuality (factor 1), brightness (factor 2), taste (factor 3), functionality (factor 4), elegance (factor 5) and softness (factor 6). The cumulative coefficient of determination was 66.9%.

For each of these factors, average scores of each hue and tone were obtained, and a one-way layout analysis of variance was conducted, to explore differences between

Table 4 Factor analysis of the ideal clothing color chosen by elderly people (Responses by Japanese elderly women)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
refined	0.838	0.079	0.064	0.001	-0.088	-0.014	0.044
beautiful	0.724	-0.084	0.142	0.319	-0.026	-0.118	0.211
new	0.632	-0.027	0.388	0.001	0.114	0.153	-0.250
elegant	0.613	0.097	-0.049	0.391	-0.074	-0.026	0.176
common	0.116	0.748	0.016	-0.071	-0.009	0.085	-0.011
inconspicuous	-0.226	0.702	0.010	0.036	-0.129	-0.033	0.319
realistic	-0.074	0.696	-0.007	-0.038	0.426	-0.023	-0.003
modest	0.291	0.573	-0.153	0.217	-0.177	0.293	0.032
bright	0.071	0.048	0.791	-0.010	0.150	-0.047	-0.042
showy	-0.092	-0.380	0.735	0.247	0.054	0.096	0.065
light	0.245	0.339	0.580	-0.145	0.266	0.037	0.165
soft	0.209	0.233	0.539	-0.154	-0.243	-0.473	0.109
warm	0.323	-0.153	0.492	0.297	-0.145	-0.185	-0.069
favorite	0.054	-0.026	0.145	0.804	-0.019	-0.049	0.067
want to wear	0.335	0.040	-0.057	0.653	0.800	-0.020	0.271
harmonious	0.285	0.014	-0.078	0.508	0.408	-0.355	-0.223
active	-0.139	0.027	0.324	0.117	0.765	0.200	0.030
dynamic	0.023	0.470	0.182	0.349	-0.491	0.234	-0.382
functional	0.021	0.177	-0.024	-0.147	0.061	0.783	0.089
easy	0.189	0.171	0.071	0.249	0.044	0.133	0.766
Eigen value	3.865	2.669	2.124	1.517	1.210	1.074	1.004
Cum pct (%)	19.3%	32.7%	43.3%	50.9%	56.9%	62.3%	67.3%
Factor	beauty	commonness	brilliance	taste	strength	functionality	comfort

Table 5 Differences in scores of each factor for the hue of the color ideal for elderly people's clothing (Responses by Japanese elderly women)

	Factor 1 beauty	Factor 2 commonness	Factor 3 brilliance	Factor 4 taste	Factor 5 strength	Factor 6 functionality	Factor 7 comfort
R	-0.015	0.033	0.515	0.041	-0.034	0.015	-0.261
O	0.232	0.312	-0.137	-0.071	-0.176	0.555	0.211
Y	0.180	-0.108	0.463	0.820	-0.137	-0.054	0.606
G	0.547	-0.894	-0.317	-0.709	0.680	-0.796	0.628
BG	-0.044	0.620	-0.553	-0.566	0.092	-0.179	0.171
B	-0.343	-0.096	-0.870	0.351	0.157	0.306	0.067
V	-0.077	-0.020	0.304	-0.479	-1.191	0.669	0.213
P	0.037	0.327	0.387	0.245	0.341	-0.139	0.404
RP	-0.296	-0.915	-0.113	0.069	-0.026	-0.377	-0.409
neutral	0.515	1.055	-0.985	-0.009	-0.135	0.149	0.631
F ratio	0.557	3.672	3.577	0.931	1.042	1.017	0.936
P	0.820	0.001**	0.001**	0.512	0.415	0.433	0.499

*** P<0.001, ** P<0.01, * P<0.05.

different hues and tones. The results are shown in Tables 5 through 8.

When the responses of the Japanese elderly women were analyzed, significant differences in commonness (factor 2) and brilliance (factor 3) were observed between different hues and tones. The score of commonness was high for neutral and low for hue Green. The score of

brilliance was high for hue Red and low for neutral. This means that Japanese elderly women attached great importance to brilliance when selecting hue Red as an ideal color. In analysis of tones (including the neutral), the score of commonness was also high for neutral tone, similar to that observed in the analysis of hues. The score of commonness was low for light, dark and vivid tones. In

Table 6 Differences in scores of each factor for the tone of the color ideal for elderly people's clothing (Responses by Japanese elderly women)

	Factor 1 beauty	Factor 2 commonness	Factor 3 brilliance	Factor 4 taste	Factor 5 strength	Factor 6 functionality	Factor 7 comfort
P	-0.123	0.366	0.402	-0.009	-0.218	-0.111	0.524
lg	-0.337	0.398	-0.195	-0.253	-0.453	-0.045	0.299
d	0.055	0.315	0.022	-0.630	0.509	0.269	-0.455
lt	-0.176	-0.989	1.030	-0.601	-0.407	-0.821	0.509
V	0.083	-0.415	0.422	-0.005	0.707	-0.459	-0.424
dp	0.057	-0.226	0.125	0.275	0.038	0.338	-0.025
dk	0.094	-0.455	-0.805	0.543	-0.215	-0.416	-0.257
neutral	0.515	1.055	-0.985	-0.009	-0.135	0.149	0.063
F ratio	0.521	3.672	3.265	1.561	1.825	1.535	1.287
P	0.816	0.001**	0.004**	0.159	0.094	0.168	0.267

*** P<0.001, ** P<0.01, * P<0.05.

Table 7 Differences in scores of each factor for the hue of the color ideal for elderly people's clothing (Responses by Korean elderly women)

	Factor 1 individuality	Factor 2 brightness	Factor 3 taste	Factor 4 functionality	Factor 5 elegance	Factor 6 softness
R	0.071	0.211	-0.180	0.082	-0.679	0.116
O	0.059	-0.499	-0.186	0.357	0.099	0.484
Y	0.197	-0.544	-0.136	-0.546	0.225	-0.147
YG	-0.256	0.213	-0.368	-0.503	-0.152	0.077
G	-0.061	-0.704	0.428	0.020	0.053	-0.739
BG	0.313	0.201	-0.092	-0.024	-0.072	0.228
B	-0.829	0.112	0.103	0.209	0.322	-0.538
V	0.282	0.629	-0.070	0.041	0.697	-0.044
P	0.634	0.285	0.069	-0.190	-0.103	0.225
RP	0.520	-0.573	0.741	0.182	-0.419	0.007
neutral	-0.938	0.067	0.224	0.623	0.553	-0.064
F ratio	2.742	1.429	0.599	1.274	1.444	1.129
P	0.007**	0.187	0.809	0.263	0.181	0.355

*** P<0.001, ** P<0.01, * P<0.05.

Table 8 Differences in scores of each factor for the tone of the color ideal for elderly people's clothing (Responses by Korean elderly women)

	Factor 1 individuality	Factor 2 brightness	Factor 3 taste	Factor 4 functionality	Factor 5 elegance	Factor 6 softness
P	0.233	0.965	-0.043	-0.434	0.683	-0.001
lg	-0.255	0.030	-0.577	0.142	0.431	0.276
d	0.222	-0.111	0.817	-0.441	-0.300	-0.269
lt	0.402	0.624	-0.050	-0.018	0.167	0.290
V	0.598	0.023	-0.285	-0.508	-0.579	0.200
dp	0.622	-0.209	0.019	-0.180	-0.525	-0.016
dk	-0.363	-0.732	0.068	0.416	-0.456	-0.180
neutral	-0.938	0.067	0.224	0.623	0.553	-0.064
F ratio	3.858	5.188	2.253	2.672	5.585	0.525
P	0.001**	0.000***	0.040*	0.016*	0.000***	0.813

*** P<0.001, ** P<0.01, * P<0.05.

terms of brilliance, the score of light tone was high and that of neutral was low. Japanese elderly women laid emphasis on the factors of functionality and taste when selecting deep tone as the most ideal for elderly people, although the load of factor differed between these two factors.

An analysis of the responses of Korean elderly women revealed a significant difference in factor 1 (individuality) between different hues. For the factor of individuality, the scores of hues Purple and Red Purple were high and the scores of neutral and Blue were low. Korean elderly women thus tended to suppress individuality by selecting neutral as ideal colors. When compared with other hues, it was found that Korean elderly women attached slightly more importance to brightness and softness by selecting hue Blue Green. Comparison between different tones revealed significant differences in individuality (factor 1), brightness (factor 2), taste (factor 3), functionality (factor 4) and elegance (factor 5). For the factor brightness, the score of pale tone was highest, and that of light tone was second highest. For the factor elegance, the scores of pale and neutral were high. For the factor individuality, the scores of deep, vivid and light tones were high. For the factor taste, the score of dull tone was high. For the factor functionality, the score of neutral and dark tone were high. Thus, although the load of factors differed, Korean elderly women attached importance to functionality when selecting dark tone as the most ideal color. They attached importance to elegance and softness when selecting light grayish tone as the second most ideal color.

Often worn clothing colors

Japanese and Korean elderly women were asked to choose the color of clothing they thought elderly people often wore in their countries. The results were analyzed by hue and tone. Fig. 13 shows the analysis by hue. Of all the Japanese elderly women, 20.5% chose hue Red as being most frequently worn by elderly people and 13.6% chose hue Blue as the one most often worn by elderly people. Of all the Korean elderly women, 24.4% chose neutral and 17.9% chose hue Blue Green as being most frequently worn by elderly people. The chi-square test of independence for the data cross-analyzed for 11 hues between the two woman groups revealed a significant difference ($\chi^2(10) = 30.92$, $P < 0.001$).

Fig. 14 shows the analysis by tone. Of all the Japanese elderly women, 22.7% chose deep tone, 14.8% chose light grayish tone and 14.8% chose dark tone as being most frequently worn by elderly people. Of all the Korean elderly women, 24.4% and 16.7% chose neutral and light grayish tone as being most frequently worn by elderly people, respectively. The chi-square test of independence for the data cross-analyzed for 8 tones between the two women groups revealed a significant inter-group

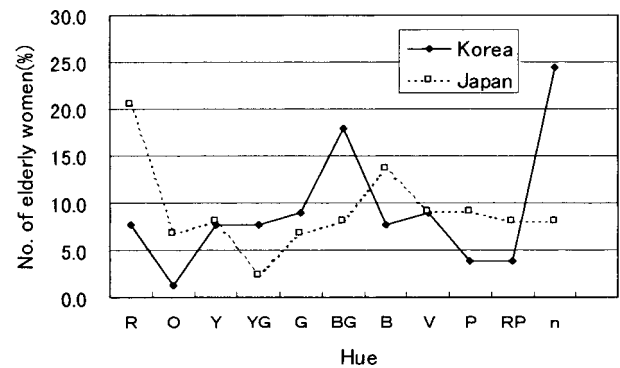


Fig. 13 Colors of clothing often worn by elderly people

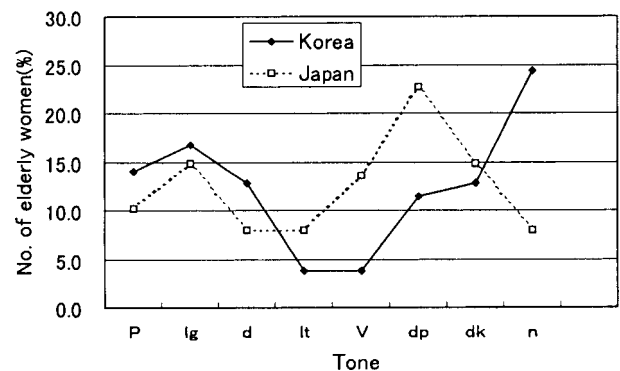


Fig. 14 Colors of clothing often worn by elderly people

difference ($\chi^2(7) = 20.47$, $P < 0.01$). Thus, both the hue and the tone of the color chosen as being most often worn differed between the two groups.

Fig. 15 shows the images the elderly women held concerning the color ranked in first place as the color most frequently worn by elderly people. The test of the significance of differences revealed significant inter-group differences in 15 of the 20 images. Japanese elderly women tended to view the color most frequently worn by elderly people to be “harmonious”, “favorite”, “want to wear”, “elegant”, “light”, “showy”, “beautiful”, “inconspicuous”, “modest”, “common”, “soft”, “bright”, “delicate” and “warm”. Korean elderly women tended to view the color to be “quiet”. Significant inter-group differences in mean scores were observed for 15 of the 20 adjective pairs.

We then analyzed the structure of the images held concerning the color most often worn by elderly people and examined how the adjectives used for the survey interacted with each other. The factor analysis allowed us to extract 5 factors from Japanese elderly women: factor 1 (taste), factor 2 (brilliance), factor 3 (commonness), factor 4 (comfort) and factor 5 (quietness). The cumulative coefficient of determination

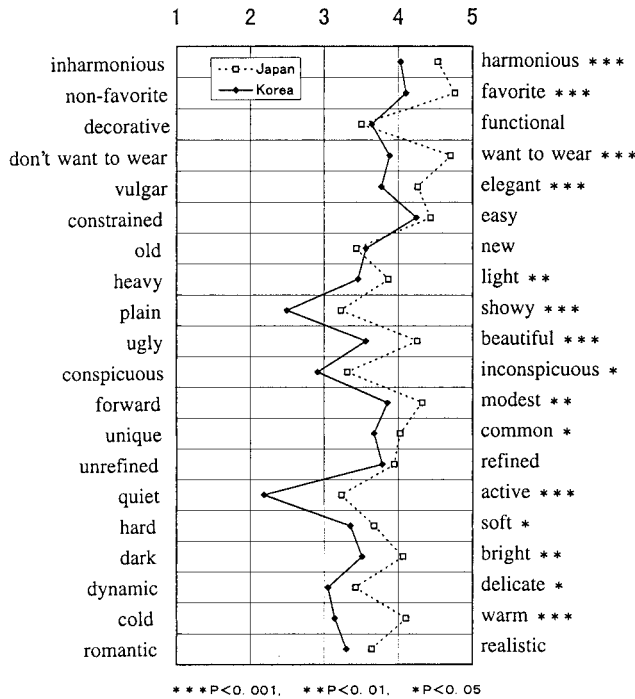


Fig. 15 Images the elderly women held concerning the clothing color often worn by elderly people

was 60.2%.

Six factors were extracted regarding the images held by the Korean elderly women: factor 1 (commonness), factor 2 (brightness), factor 3 (elegance), factor 4 (comfort), factor 5 (taste) and factor 6 (warmth). The cumulative coefficient of determination was 69.9%.

For each of these factors, differences between individual hues or tones were analyzed. The results are shown in Tables 9 through 12. When the significance of

differences in average scores was tested using a one-way layout analysis of variance, significant inter-hue differences in factor 1 (taste), factor 2 (brilliance) and factor 3 (commonness) were observed in the Japanese elderly woman group. For the factor of taste, the average score was high for hue Green and low for hue Yellow. For the factor of brilliance, the average score was high for hues Red Purple and Red and low for hue Blue. For the factor commonness, the average score was high for hues Orange and Blue Green and low for hue Red Purple. This suggests that importance was attached to the factor brilliance by the Japanese elderly women who chose hue Red as being often worn by elderly people. Significant differences between tones were observed for taste (factor 1) and brilliance (factor 2). For the factor of taste, the score was high for dark tone and low for light and dull tones. For the factor of brilliance, the score was high for vivid and pale tones and low for dark and neutral. These results suggest that Japanese elderly women attached slightly greater importance to taste when evaluating deep tone (the tone which they chose to be often worn by elderly people) than when evaluating the other tones, and that they are more concerned with conspicuous and active natures of colors.

In the Korean elderly woman group, significant differences between hues were observed for commonness (factor 1), elegance (factor 3), taste (factor 5) and warmth (factor 6). For the factor of commonness, the average score was highest for neutral and second highest for hue Orange. For the factor of elegance, the average score was highest for hue Violet, followed by hues Orange and Blue Green. For the factor of taste, the average score was highest for neutral and second highest for hue Red Purple. For the factor of warmth, the average score was highest for hue Yellow Green and second highest for hue Green.

Table 9 Differences in scores of each factor for the hue of the color often worn by elderly people (Responses by Japanese elderly women)

	Factor 1 taste	Factor 2 brilliance	Factor 3 commonness	Factor 4 comfort	Factor 5 quietness
R	0.096	0.598	0.018	-0.222	-0.209
O	0.278	0.025	0.656	0.259	-0.196
Y	-0.874	0.078	-0.026	-0.075	-0.174
YG	-2.015	0.172	0.566	0.449	-0.095
G	0.398	-0.155	-0.387	-0.279	-0.598
BG	0.309	0.433	0.620	0.509	0.142
B	0.274	-0.942	0.125	-0.314	0.797
V	0.029	-0.129	0.446	-0.299	-0.350
P	0.264	-0.135	-0.330	0.108	-0.297
RP	-0.079	0.648	-1.136	0.224	0.350
neutral	-0.411	-0.719	-0.242	0.560	0.300
F ratio	2.066	3.189	2.132	0.840	1.519
P	0.038*	0.002***	0.031*	0.592	0.149

*** P<0.001, ** p<0.01, * P<0.05.

Table 10 Differences in scores of each factor for the tone of the color often worn by elderly people (Responses by Japanese elderly women)

	Factor 1 taste	Factor 2 brilliance	Factor 3 commonness	Factor 4 comfort	Factor 5 quietness
P	0.352	0.551	-0.137	0.276	0.467
lg	0.081	0.362	0.588	-0.099	0.410
d	-0.753	-0.105	0.660	0.500	-0.189
lt	-0.887	0.302	-0.505	-0.741	-0.200
V	0.080	0.567	-0.260	-0.528	-0.017
dp	0.111	-0.063	-0.218	-0.066	-0.206
dk	0.534	-0.742	0.130	0.325	-0.354
neutral	-0.411	-0.719	-0.242	0.560	0.300
F ratio	2.552	3.241	1.808	2.082	1.125
P	0.020*	0.004**	0.097	0.055	0.356

*** P<0.001, ** P<0.01, * P<0.05

Table 11 Differences in scores of each factor for the hue of the color often worn by elderly people (Responses by Korean elderly women)

	Factor 1 commonness	Factor 2 brightness	Factor 3 elegance	Factor 4 comfort	Factor 5 taste	Factor 6 warmth
R	0.042	-0.342	-0.029	-0.413	-0.427	-0.401
O	0.345	0.670	0.659	-0.304	-0.531	-2.451
Y	-0.120	-0.969	-0.252	-0.568	0.072	0.327
YG	0.105	0.087	0.311	0.267	-0.387	0.549
G	-0.630	0.377	-0.243	0.701	-0.222	0.445
BG	-0.372	0.092	0.629	-0.120	-0.380	-0.029
B	0.013	0.133	-1.218	-0.126	-0.288	-0.975
V	-0.140	0.514	1.087	0.141	-0.030	-0.151
P	-0.747	0.074	0.167	-0.252	-0.343	0.124
RP	-1.308	-0.269	-0.594	1.323	0.452	0.149
neutral	0.852	-0.056	-0.367	-0.109	0.708	0.157
F ratio	3.974	1.272	6.052	1.897	2.442	2.919
P	0.000***	0.264	0.000***	0.061	0.015*	0.004**

*** P<0.001, ** P<0.01, * P<0.005.

Table 12 Differences in scores of each factor for the tone of the color often worn by elderly people (Responses by Korean elderly women)

	Factor 1 commonness	Factor 2 brightness	Factor 3 elegance	Factor 4 comfort	Factor 5 taste	Factor 6 warmth
P	-0.075	0.520	1.156	-0.043	-0.364	0.030
lg	0.218	0.107	0.203	0.314	-0.373	0.592
d	-0.476	0.123	0.126	-0.118	-0.374	-0.132
lt	-0.128	0.565	0.729	-0.072	-0.284	-0.960
V	-0.417	-0.183	-0.479	-0.285	-0.590	-0.928
dp	-0.647	-0.299	-0.383	-0.429	-0.148	-0.402
dk	-0.598	-0.574	-0.695	0.459	0.308	-0.040
neutral	0.852	-0.056	-0.367	-0.110	0.708	0.157
F ratio	5.539	1.532	7.976	1.068	3.956	2.679
P	0.000***	0.171	0.000***	0.393	0.001**	0.016*

*** P<0.001, ** P<0.01, * P<0.05.

Also in analysis of tones in the Korean elderly woman group, significant differences between tones were observed for commonness (factor 1), elegance (factor 3), taste (factor 5) and warmth (factor 6). For the factor of commonness, the average score was highest for neutral and second highest for light grayish tone. For the factor of elegance, the average score was highest for pale tone and second highest for light tone. For the factor of taste, the average score was highest for neutral and second highest for dark tone. For the factor of warmth, it was highest for light grayish tone and second highest for neutral.

Thus, in the Korean elderly woman group, the scores of the factors of commonness and taste were high for hue neutral (the hue which they chose to be often worn by elderly people), and the score of the factor of elegance was high for hue Blue Green (the hue worn second most frequently). The score of warmth was high for light grayish tone (the tone which Korean women chose to be second most frequently worn), and the scores of the factors of commonness and comfort were slightly high for the same tone.

Discussion

When conducting this study, we paid special attention to characteristics of elderly people's visual perception. In order to evaluate reactions to clothing colors accurately, we selected subjects for this evaluation from among Japanese and Korean elderly women who had shown normal or excellent color discrimination abilities on the 40-hue test. A number of reports have been published concerning the characteristics of elderly people's visual perception. Yoshida, et al. (1989, 1990, 1992, 1993) reported that aging-induced yellowing of the lens causes a yellow bias in visual perception, leading to mistakes in color discrimination. In our 40-hue test, as well, color discrimination ability was poor in 14.5% of the Japanese elderly women and 24.2% of the Korean elderly women. We think that assistance should be provided to elderly women with lower than normal color discrimination (e.g., providing fashion consultants to give adequate advice to these women when they purchase clothing).

Japanese and Korean elderly women were asked to evaluate the same pictures of an elderly woman wearing clothing of different colors. Their evaluations of some colors tended to be similar, but the two elderly women groups' evaluations of other colors differed significantly. Their evaluations of brightness differed, although not greatly. Korean elderly women tended to evaluate high value colors more positively, while Japanese elderly women tended to evaluate low value colors more positively. It is noteworthy that elderly Japanese women tended to prefer hue Red, while Korean elderly women tended to prefer White. The preference for hue Red by

Japanese elderly women seems to be associated with the tendency of Japanese elderly women to attach importance to brilliance as a feature of their ideal clothing color. The Korean elderly women's preference for White is identical to the finding obtained in our previous study of female Korean students. The results of this and previous studies suggest that Korean people favor white. Back and Suzuki (1999), who conducted comparative research on colors in Japan and Korea, state: "White is the color of mourning in Korea; it represents purity and grace. This color is greatly favored by Korean people. Historically, in the realm of Korean social customs related to clothing, high chroma colors were confined to use by the aristocracy, and white was primarily worn for plain clothes. Factors underlying the use of white clothes by the common people included: (1) economy, (2) the enactment of banned color laws, and (3) shortage of materials." Kim (1993) describes in his monograph, entitled *Word History and Culture - Korea*, that the preference for white on the part of Korean people was intensified by the fact that Confucians preferred wearing white clothing on the grounds that this color represented simplicity, cleanliness and prudence. In the present study, Korean elderly women often stated that the image they have about their ideal clothing color is that it should represent harmony, good taste and elegance. This suggests that at the present time Korean women prefer white because of the images they have about this color, rather than because of the historical background of clothing-related customs in Korea.

In a cross-cultural survey on color preferences in Asian countries, Saito (1992) report that the image of white is almost the same for Japanese and Korean people, and that this color is favored because people perceive this color to represent purity and cleanliness. Despite the findings of Saito et al., the present study revealed an inter-country difference about the use of this color in clothing worn by elderly people.

Korean and Japanese elderly women differed concerning both the hue and tone of their ideal clothing color and the color they most often wore. The results of this survey are summarized in Table 13. Japanese elderly women attached importance to brilliance, functionality and good taste as features of their ideal clothing color, and perceived the most often chosen color to be brillante, in good taste, conspicuousness and activity. On the other hand, Korean elderly people attached importance to functionality, brightness and elegance as features of their ideal clothing color, and perceived their most often worn color to be commonness, in good taste, elegance and comfort. Thus, the preferences concerning clothing colors for elderly people differed between Korean and Japanese elderly women. This suggests that although Korea is geographically close to Japan, the views held concerning clothing by Korean and Japanese elderly

Table 13 Summarized survey results

	Japanese elderly women	Korean elderly women
Ideal clothing colors for elderly people	briliance functionality taste	functionality brightness elegance
Colors of clothing often worn by elderly people	briliance taste conspicuousness activity	comonness taste elegance comfort

women differ. The fact that Japanese elderly women attached importance to brilliance as a feature of their ideal clothing color suggests that Japanese elderly women view clothing as a means of expressing their individuality. Kouyama says (1990), in his monograph entitled *The Psychology of Clothing and Accessories*: “Japanese culture is group-oriented, as represented by the spread of mini-skirts in the 1960s. In the 1970s, however, in the course of digesting Western culture (emphasizing self expression and self assertion), Japanese culture was modified and shifted to individualism, although still based on its traditional group-oriented nature. At the same time, people began to attach importance to expressing their individuality when selecting clothing.” Thus, Japanese elderly women tend to view clothing as a means of expressing their individuality, while Korean elderly women tend to view clothing as a means of expressing their character. They thus attach importance to elegance as a feature of their ideal clothing color. In other words, what it is expected that clothing expresses differs greatly between Japan (which values the expression of individuality) and Korea (which emphasizes character). Park et al. (1993) state in “The Process of Westernization: The Adoption of Western-Style Dress by Korean Women, 1945–1962” as follow: “Education and relative age are the most important factors affecting the adoption of Western style clothing by Korean women. Younger women and women with higher educational levels adapt themselves more smoothly to cultural modification. The finding that Korean women attached more importance to expressing character than to expressing individuality is probably because the subjects of this study were elderly people. Considering the increasing exchange between Japan and Korea in recent years, it is expected that Korean culture will be shifted to more individualism, as in the present Japanese culture, resulting in Korean people’s attaching more importance to the expression of individuality when selecting clothing. The authors hope that the expression of character, which Korean elderly people now deem important, will not disappear completely, even though their views concerning clothing change. We also hope that the results of this study will contribute to: (1) helping

elderly Japanese and Korean people lead rich lives in terms of their clothing, (2) promoting cooperation between Japanese business people and their Korean counterparts, while we share ideas with Korea (our geographically closest neighboring country), and (3) energizing the apparel industry in both countries.

Conclusion

An elderly woman, who served as a model, wore clothing shown in 75 different colors generated as computer graphics. These clothing colors were evaluated by elderly Japanese and Korean women. High value colors were slightly more preferred by Korean elderly women. Japanese and Korean elderly women differed concerning their ideal clothing color and their most often worn color. The images concerning clothing colors also differed between the two groups, suggesting differences in their views related to clothing. Japanese elderly women tended to view clothing as a means of expressing their individuality, while Korean elderly women tended to view clothing as a means of expressing their character.

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