The influence of public facilities color on landscape preference:A case study of telecommunication boxes in Taipei city

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The purpose of this research is to understand how the colors of public facilities under different background environments affect people's preference for landscape. This research took telecommunication facilities of Taipei city as a case study. A computer simulation experiment was conducted. The colors of the facilities and background environments were manipulated as the independent variables and the preference for landscape was the dependent variable. Forty colors were selected from the Natural Color System (NCS) by stratified random sampling and applied to the surface of the facilities. The facilities were then shown in three different environments (apartment, park and riverside) to the subjects in random order. Their preferences for landscape as well as background information were analyzed. Relationship between their preference of landscape, family background as well as prior education on color theory and aesthetic were also discussed. The results of the study may contribute to the design criteria of future urban planning.

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A COMPARISION BETWEEN TAIWANESE AND JAPANESE CATEGORICAL COLORS

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ABSTRACT

While humans are capable of discerning millions of colors, it is beyond our cognitive capacities to deal with every discriminable color as a single category. Previous studies have shown that people use a very limited number of names to classify and label all visible colors [1]. The number of basic color names, i.e. the cognitive/linguistic color categories, varies from language to language. It thus follows that the boundaries between adjacent color categories also vary with language [2]. We conducted a large survey on the frequency of color terms in use in Taiwanese Mandarin speakers. A systematic mapping of the CIE foci and boundaries of the twelve most commonly used color terms was performed on the CIE1931 space. The Taiwanese results were compared to the Japanese data [3]. We found that there are significant differences in the boundary between green and blue, and the area of grey between these two groups. Japanese grey is warmer than its Taiwanese counterpart.

INTRODUCTION

The purpose of this study is to investigate the current use of color names in Mandarin, including the number of basic color terms, the popularity and the referenced color appearances of frequently-used color names. A color lexicon survey and a series of constrained color naming tasks were conducted to answer questions like: (1) What are the most commonly used color terms by Mandarin-speaking Taiwanese? (2) How do Mandarin color terms differ from the reported English color terms in composition (e.g. the proportion of monolexemic vs. compound words). (3) What are the CIE foci and boundaries of the most commonly used Mandarin color terms? (4) How are the territories of Mandarin color terms in the CIE space compared to that of Japanese data [3]?

FREE-RECALL COLOR LEXICON SURVEY

To answer the above first two questions, a free-recall color lexicon survey was conducted to collect the most frequently used color terms in Mandarin. There were 189 informants in total that performed this free-recall task. The informants were provided with a blank sheet, and a pencil or pen. The task instruction was to “write down color terms/ vocabularies you frequently use, hear and read.” After the frequent terms recalling was done, the author encouraged the informant to freely recall color terms as many as he/she could and also write them down on the sheet.

The results of this survey, along with the comparable data from other studies [3],[4], are listed in Table 1.

Table 1: The Top 11 Color Terms Found in Three Studies

	Current	Japanese(1990s) [3]	Mandarin (1990s) [4]

	Mandarin	English	Japanese	English	Mandarin	English
1	藍 Lan	Blue	Shiro	White	桃 Tao	(deep) pink
2	紅 Hong	red	Aka	Red	灰 Hui	Grey
3	綠 Lu	Green	Kuro	Black	黑 Hei	Black
4	紫 Zi	Purple	Ao	Blue	褐 He	Brown/tan
5	橘 Ju	tangerine /orange	Ki-iro	Yellow	白 Bai	White
6	黃 Huang	Yellow	Midori	Green	橙 Cheng	
7	粉紅 Fenhong	(light) pink	Cha-iro	Brown	黃 Huang	Yellow
8	灰 hui	Gray/ash	Murasaki	Purple	紫 Zi	Purple
9	咖啡 ka-fei	Brown/cof fee	Pinku	Pink	紅 Hong	Red
10	桃紅 Taohong	(dark)pink	Orenji	Orange	綠 Lu	Green
11	橙 Cheng	orange	Kon	Dark blue	藍 Lan	Blue

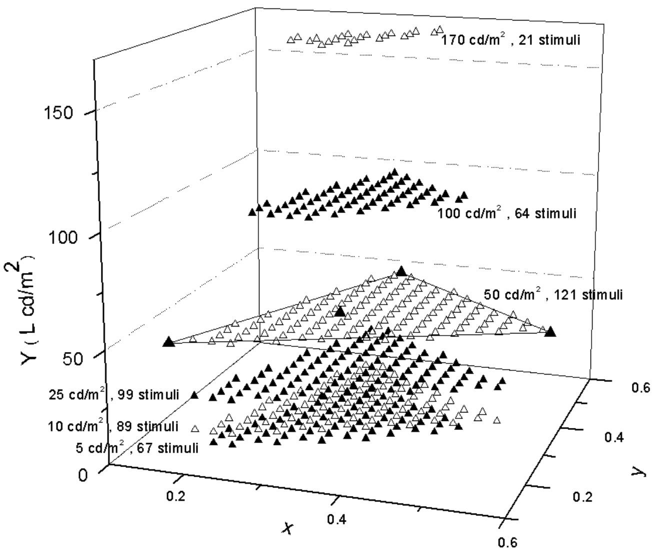

Figure 1. All color stimuli used in sorting experiment as sampled at six different L levels.

TWELVE-COLOR-TERM SORTING EXPERIMENT

From the results of free-recall survey, we picked the first 12 most frequently used color names. The participants of this experiment were asked to label color stimuli with these 12 color names, i.e. to

sort all stimuli into 12 categories. Six sets of color stimuli were generated, corresponding to six different L levels: 5, 10, 25, 50, 100 and 170cd/m2. Stimuli of the same L surface were evenly sampled along x- and y-axes in the CIE1931 x-y diagram. At each L surface, the sampling interval is 0.025 units, sweeping along the x- and y-axes to produce a regular and equal sampling of points within the gamut of display media. Six stimulus sets contain unequal amounts of colors—67, 89, 99, 121, 64, and 21, respectively—and these amounts depend on the availability of LCD colors at different L levels. There are 461 distinct stimuli in total. The complete set of color stimuli on the CIE1931 x-y diagram can be seen in Figure 1.
Stimuli were presented and controlled by an ASUS F6E 13.3" laptop. Each stimulus was displayed in the exact center of the monitor. The output uniformity stability check of the LCD was carried out according to a standardised procedure. A well-calibrated PhotoResearchTM PR-650 SpectraScan spectroradiometer was used to repeatedly measure the center output of the LCD. The measuring distance was 355mm, and the sample size was 10cm2, covering the whole field of the spectroradiometer lens. The measuring geometry followed the recommendations of PhotoResearch, Inc. The adopted standard observer model was CIE1931, and the reference white selected was D65. The mean output intensity was 235.8cd/m2 (STD=3.28, maximum value=241 cd/m2 (+2.11%), with a minimum value of 229cd/m2 (-2.96%)). A look-up table was generated by the standard measuring procedure, and the Matlab interpolation function was used to produce all color stimuli. The results of sorting at each of the six L levels are shown in Figure 2, where the boundaries are demarcated by 75% and 50% votes ratio, which are marked with color fills and color lines, respectively. These two threshold levels partition the x-y surface into mutually distinct zones without significant overlapping.

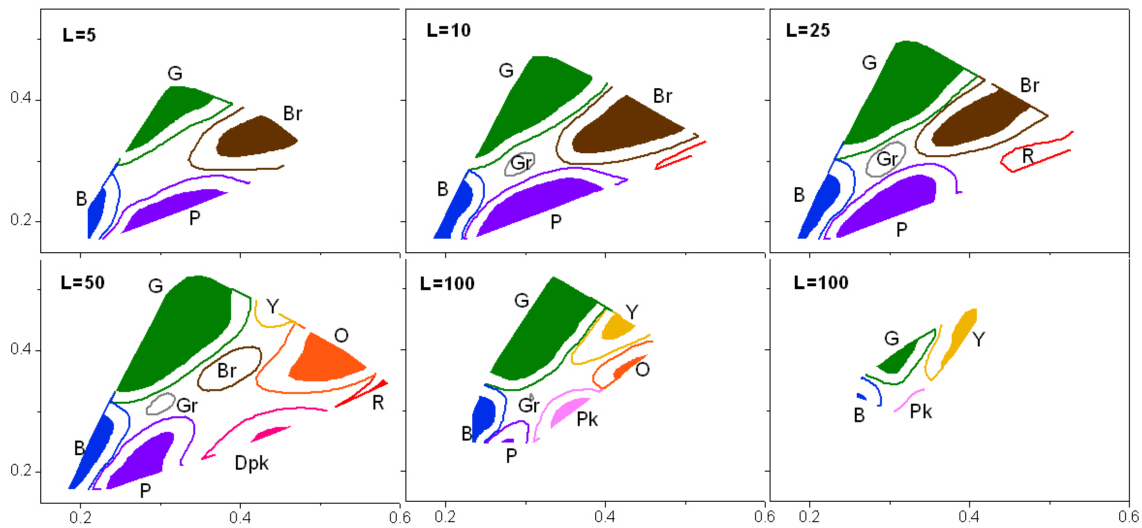

Figure 2. Zones of color categories in six luminance conditions.

The left panel of Figure 3 shows the collapsed results across all L levels which can then be easily compared with the Japanese data reported in [3] (right panel). A marked difference can be found in the boundary between green and blue. The territory of green in Mandarin speakers' mind is larger than that in Japanese mind. Furthermore, the Japanese gray zone is roughly centered around the standard white, while the area around white is split into two 'gray' and 'brown' zones in Mandarin space.

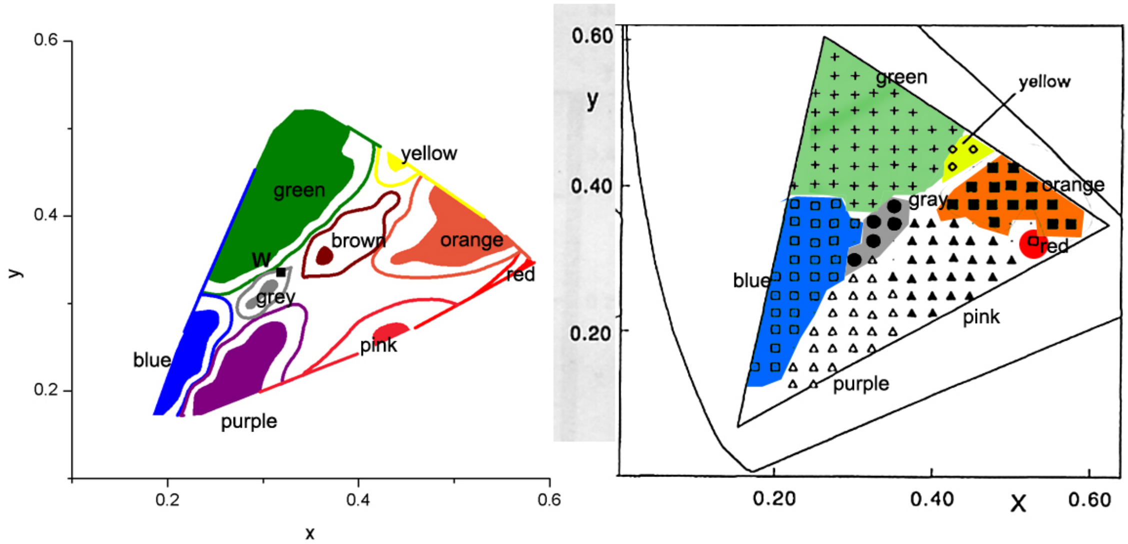

Figure 3. Left: Results of color sorting by Mandarin speakers. Right: Color naming results by Japanese speakers [3].

CONCLUSION

Our results show that (1) The top 12 basic Mandarin color terns match well with the 11 basic color categories coined by Berlin & Kay [1]. (2) The foci and boundaries of blue and grey in Mandarin speakers' eyes are markedly different from the Japanese results.

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