COLOR PREFERENCE AND FAMILIARITY IN PERFORMANCE ON BRAND LOGO RECALL

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Summary.—Two experiments assessed effects of color preference and brand-logo familiarity on recall performance. Exp. 1 explored the color preferences, using a forced-choice technique, of 189 women and 63 men, Taiwanese college students ages 18 to 20 years (M= 19.4, SD= 1.5). The sequence of the three most preferred colors was white, light blue, and black and of the three least preferred colors was light orange, dark violet, and dark brown. Exp. 2 investigated the effects of color preference based on the results of Exp. 1 and brand-logo familiarity on recall. A total of 27 women and 21 men, Taiwanese college students ages 18 to 20 years (M= 19.2, SD= 1.2) participated. They memorized a list of 24 logos (four logos shown in six colors) and then performed sequential recall. Analyses showed color preference significantly affected recall accuracy. Accuracy for high color preference was significantly greater than that for low preferences. Results showed no significant effects of brand-logo familiarity or sex on accuracy. In addition, the interactive effect of color preference and brand-logo familiarity on accuracy was significant. These results have implications for the design of brand logos to create and sustain memory of brand images.

Logo creation is a basic element of branding and has the potential to express organizational characteristics (Van Riel, Van den Ban, & Heijmans, 2001). It can be an important company asset which companies spend enormous amounts of time and money promoting (Rubel, 1994), and provides plenty of scope for differentiating the company from competitors (Argenti & Druckenmiller, 2003). Therefore, logos should be recognized as familiar, elicit a consensually held meaning in the target market, and evoke positive effects (Robertson, 1989). Despite the importance and widespread use of logos, many evoke negative evaluations, are unrecognizable, and hurt the corporate image (Bird, 1992). Part of the reason for this poor performance might lie in the initial poor selection of logos (Henderson & Cote, 1998).

Logo recognition, of great interest in the document and shape-matching domain (Chen, Leung, & Gao, 2003), occurs at two levels. First, consumers must remember seeing the logo. Second, logos must remind consumers of...
the brand or company name. The former depends largely on design (Henderson & Cote, 1998). Given exposure time, a more memorable design will be recognized more easily than a less memorable one. Enhancing recognition of logos might start with selecting a design easily recognized. Moreover, consumers primarily examine the sensory features of a logo such as color, shape, and size; they decipher the stimulus into categorical codes such as brand and select certain elements of the stimulus over others (Pieters & Warlop, 1999).

Colors attract attention, influence moods, and clarify and accentuate features of the environment (Teller & Bornstein, 1987) but also affect participant’s short-term color memory (Bynum, Epps, & Kaya, 2006). Color plays an important role in marketing since it influences the creation of brand image (Tavassoli, 2001). Moreover, when people knew how brands were attempting to manipulate impression, people considered colors congruent with those impressions to be more appropriate (Bottomley & Doyle, 2006). A consistent use of print color can contribute to the maintenance of positive brand equity; especially for Chinese brand names can print color become an effective retrieval cue for meaning which may influence repetition of purchases (Tavassoli, 2001).

A classic study of color preference was by Eysenck (1941), who asked 30 college students to rank 10 colored papers using 12 rankings in order of preference. Analysis showed as much agreement among color preferences of people as among intelligence tests and their relation to a general factor of aesthetic appreciation. This general factor of preference for colors is bipolar and divides those who prefer saturated colors from those who prefer unsaturated colors. Also there is high agreement between the sexes as regards color preference.

Finally, color preference has discriminative power in identifying global psychopathology (French, 1996). Differences in color preferences and in color meanings across nationalities and cultures might clarify image perceptions of different brands or companies (Madden, Hewett, & Roth, 2000). Deep blue green, vivid green, and black were the most preferred colors in Japan, China, and Indonesia, whereas olive, dark gray, and gold were the least preferred colors for people of these nations (Saito, 1996). Black was the predominant choice in Senegal (D'Hondt & Vandewiele, 1983), whereas red was in the Netherlands (Wiegersma & de Kierck, 1984). In the USA, blue was the predominant choice (Silver, McCulley, Chambliss, Charles, Smith, Waddell, & Winfield, 1988).

Familiarity is an important factor in logo recognition. Familiar advertisements attract the greatest attention to a brand, which promotes brand memory (Pieters, Warlop, & Wedel, 2002). Previous research (Arnell, Shapiro, & Sorensen, 1999; Buttle & Raymond, 2003) demonstrated that high familiarity
promotes faster or more efficient processing. Several studies of familiarity in visual processing suggested that familiarity increased naming speed (Bar & Biederman, 1998) and enhanced preference (Monahan, Murphy, & Zajonc, 2000). Thus, the question of what exposure a consumer requires to associate a logo with its brand name is important in understanding and use of visual representations of brands (Buttle & Westoby, 2006). Shapiro (1999) indicated that incidental exposure to an advertisement increased the likelihood that a product would subsequently be judged acceptable for inclusion in a set. Perfect and Heatherley (1997) showed there was no over-all preference for previously seen items, but there was an interaction for ratings. Post hoc testing indicated for memorability and distinctiveness, two statistically non-significant but interesting differences for logos in favour of previously seen items.

To summarize, color preference and logo familiarity are two factors which affect logo recall or recognition but have previously been studied separately. Here effects of these factors were investigated for simultaneous recall. The aim was to explore color preferences of Taiwanese college students and examine whether color preference and familiarity with a logo affect recall.

**Experiment 1**

The purpose of Exp. 1 was to ascertain which three colors were most and least preferred. The two sets of color preferences were used as an independent variable in Exp. 2.

**Method**

*Subjects.*—A total of 189 women and 63 men, college students in the Department of Product Design of Ming Chuan University and ages 18 to 20 years ($M=19.4$, $SD=1.5$), were participants. All reported 16/20 corrected visual acuity or better and were tested for color vision with the Ishihara Color Test. None showed color deficiencies. Participants received a reward of 100 new Taiwan dollars for their participation.

*Stimulus material and design.*—Based on the studies of Oota and Kawahara (1989), 21 colors were chosen for presentation. The CIELAB coordinates ($L$, $a^*$, $b^*$, $\Delta E$) of the colors appears in Table 1. The 21 colors were printed on A3 paper in three rows of seven columns. The interrow and intercolumn space was 2 cm. Each color was numbered and occupied $4 \times 4$ cm. For each participant, the order (i.e., location) in which the colors were printed was randomized to balance order effects.

*Task specification.*—Groups of 20 participants were tested at one time in a quiet classroom in which the light level was approximately 320 lux. Material and one response paper were placed on each desk, then participants were greeted and given general instructions for the test. They were instructed first to scan all 21 colors so they could compare the test colors.
TABLE 1
CIELAB COORDINATES (L, a*, b*, ΔE) OF 21 COLORS USED IN EXP. 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Color</th>
<th>L</th>
<th>a*</th>
<th>b*</th>
<th>ΔE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Light yellow</td>
<td>88.0</td>
<td>-11.1</td>
<td>57.1</td>
<td>71.0</td>
</tr>
<tr>
<td>2</td>
<td>Bright yellow</td>
<td>86.9</td>
<td>-11.3</td>
<td>85.8</td>
<td>99.7</td>
</tr>
<tr>
<td>3</td>
<td>Soil yellow</td>
<td>54.1</td>
<td>42.8</td>
<td>48.4</td>
<td>82.0</td>
</tr>
<tr>
<td>4</td>
<td>Light orange</td>
<td>71.3</td>
<td>16.2</td>
<td>29.1</td>
<td>48.3</td>
</tr>
<tr>
<td>5</td>
<td>Orange</td>
<td>53.2</td>
<td>44.6</td>
<td>38.1</td>
<td>76.2</td>
</tr>
<tr>
<td>6</td>
<td>Red brown</td>
<td>40.0</td>
<td>45.2</td>
<td>12.5</td>
<td>71.8</td>
</tr>
<tr>
<td>7</td>
<td>Light red</td>
<td>64.8</td>
<td>35.4</td>
<td>-4.6</td>
<td>43.3</td>
</tr>
<tr>
<td>8</td>
<td>Red</td>
<td>45.6</td>
<td>57.2</td>
<td>30.3</td>
<td>83.3</td>
</tr>
<tr>
<td>9</td>
<td>Dark brown</td>
<td>27.6</td>
<td>20.2</td>
<td>4.7</td>
<td>69.1</td>
</tr>
<tr>
<td>10</td>
<td>Light violet</td>
<td>68.8</td>
<td>14.7</td>
<td>-24.4</td>
<td>29.0</td>
</tr>
<tr>
<td>11</td>
<td>Violet</td>
<td>32.8</td>
<td>29.0</td>
<td>-31.8</td>
<td>67.9</td>
</tr>
<tr>
<td>12</td>
<td>Dark violet</td>
<td>28.5</td>
<td>27.8</td>
<td>-8.2</td>
<td>68.7</td>
</tr>
<tr>
<td>13</td>
<td>Light blue</td>
<td>80.9</td>
<td>-7.8</td>
<td>-23.1</td>
<td>19.1</td>
</tr>
<tr>
<td>14</td>
<td>Blue</td>
<td>55.1</td>
<td>-28.2</td>
<td>-36.7</td>
<td>55.8</td>
</tr>
<tr>
<td>15</td>
<td>Cyan</td>
<td>35.8</td>
<td>4.9</td>
<td>-42.8</td>
<td>64.3</td>
</tr>
<tr>
<td>16</td>
<td>Light green</td>
<td>79.2</td>
<td>-21.8</td>
<td>46.2</td>
<td>64.7</td>
</tr>
<tr>
<td>17</td>
<td>Green</td>
<td>63.6</td>
<td>-38.8</td>
<td>46.7</td>
<td>77.7</td>
</tr>
<tr>
<td>18</td>
<td>Dark green</td>
<td>48.5</td>
<td>-56.3</td>
<td>24.4</td>
<td>82.2</td>
</tr>
<tr>
<td>19</td>
<td>White</td>
<td>92.3</td>
<td>2.8</td>
<td>-12.3</td>
<td>0.0</td>
</tr>
<tr>
<td>20</td>
<td>Gray</td>
<td>53.2</td>
<td>-1.9</td>
<td>-5.3</td>
<td>40.1</td>
</tr>
<tr>
<td>21</td>
<td>Black</td>
<td>18.7</td>
<td>0.6</td>
<td>-1.1</td>
<td>74.5</td>
</tr>
</tbody>
</table>

Then they wrote down five numbers of colors in order of greatest personal preference and five numbers of colors in order of least personal preference. These two preferences from first to fifth were coded from 5 to 1, respectively. Test colors were coded zero if not selected. Each participant spent approximately 10 min. on the test.

**Performance measure.**—Two groups of subjective color preferences were collected from each participant, most and least preferable. Means and standard deviations of colors were calculated.

**Results and Discussion**

The three most preferred colors were white (M=4.8, SD=.6), light blue (M=4.1, SD=1.0), and black (M=3.6, SD=1.4); the three least preferred were light orange (M=4.3, SD=1.0), dark violet (M=4.3, SD=1.3), and dark brown (M=4.0, SD=1.5). The former three colors were coded as of high preference, and the latter three as of low preference.

**Experiment 2**

Exp. 1 yielded two groups of color preferences used to address the magnitude of the interactive effect of color preference and the brand-logo familiarity on recall. The method of McCabe, Robertson, and Smith’s study (2005), in which participants were asked to remember the color of each of a short series of Stroop color-words of varying set size (two through six) was
used. Recall of the colors of the words in serial order allowed assessment of the effect of age on Stroop interference.

Method

Subjects.—College students, 27 women and 21 men ages 18 to 20 years ($M=19.2$, $SD=1.2$), were recruited via an advertisement posted at the university. Participants had normal or corrected-to-normal vision and were tested for color vision using the Ishihara Color Test. None had color deficiencies. A reward for their participation depended upon the number of accurate responses.

Stimulus material and design.—Independent variables were color preference and brand-logo familiarity, chosen from Exp. 1. High and low color preferences at each level were three colors. The high level contained white, light blue, and black; the low level contained light orange, dark violet, and dark brown. Levels of brand-logo familiarity were also high and low. In the high level, the two logos were McDonald's and Coca-Cola (Fig. 1), which are familiar to Taiwanese teenagers and young adults. In the low level, the two logos were Geng-E Company (GEST) and Shan-Yi Company (SYGM; Fig. 1), which had not yet been registered in the Intellectual Property Office, Ministry of Economic Affairs, R.O.C.

FIG. 1. Some examples of colors and familiarity of logos for Exp. 2. The two levels of familiarity of logos were (a) and (b) lower familiarity, and (c) and (d) higher familiarity.

A $2 \times 2$ (two levels of color preference multiplied by three colors for each level of color preference) $\times 2$ (two levels of brand-logo familiarity multiplied by two logos for each level of brand-logo familiarity) repeated-measures design was used. These 24 stimuli (logos) were printed in a list as two columns. A number was placed at the top left for each logo. Each logo was printed at a size of $6 \times 6$ cm. For each participant, the order in which the logos were presented was randomized to balance out order effects.

Participants were asked to memorize all 24 logos and their numbers in the list so they could write their answers on a response card. Twenty-four response cards (see Fig. 2), each printed with four logos, one number, and six colored squares at the bottom of each card, were designed for each participant. Each response card was a square of $6 \times 6$ cm. Each participant was rewarded with 20 new Taiwan dollars for each correct response, which provided motivation for participation.
Fig. 2. An example of #1 response card. The locations of these four logos were random. The six colorful squares were fixed, their colors from left to right were light blue, white, black, dark brown, light orange, and dark violet, respectively.

Task specification.—Each group of 16 participants was tested in a quiet classroom in which the light level was about 320 lux. Before the test, materials and 24 response cards were placed on each participant’s desk. They were told they would first memorize the list containing the 24 stimulus logos and their corresponding numbers in a 10-min. period. Once the memorization task was completed, they turned the list over and put it on the desk. They then were asked to respond to each card as quickly and accurately as possible, regardless of the order of cards. In responding, participants made a cross on the logo and its color (a square), respectively, on each response card, depending upon their memories of the stimulus materials. Participants’ responses were coded as accurate when the brand logo and its color were both correct; otherwise, they were coded as errors. Participants took approximately 20 min. to complete the procedure.

Performance measure.—The accuracy was recorded as the percent of correct responses for the 24 response cards and evaluated using analysis of variance in the SPSS software.

Results and Discussion

The data were analyzed using a 2 (color preference) × 2 (brand-logo familiarity) mixed-model analysis of variance. The main effect of color preference on recall accuracy was significant ($F_{1,16} = 26.9, p < .001, \eta_p^2 = 0.37$; Table 2). Accuracy for high color preference was significantly greater than for low color preference; however, there was no significant effect of brand-logo fa-
BRAND LOGO RECALL

TABLE 2
MEANS AND STANDARD ERRORS OF ACCURACY (%) FOR PARTICIPANTS’ RESPONSES (n = 48)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Color Preference</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>43.9</td>
</tr>
<tr>
<td>Low</td>
<td>30.7</td>
</tr>
<tr>
<td>Brand-logo Familiarity</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>35.4</td>
</tr>
<tr>
<td>Low</td>
<td>39.2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>38.7</td>
</tr>
<tr>
<td>Women</td>
<td>36.3</td>
</tr>
</tbody>
</table>

miliarity on accuracy of recall ($F_{1,46} = 1.3$, $p = .26$, $\eta_p^2 = 0.03$), and neither significant effect was associated with the sex of participants ($F_{1,46} = 0.3$, $p = .59$, $\eta_p^2 = 0.01$). The interaction of color preference and brand-logo familiarity on recall accuracy was significant ($F_{1,46} = 20.3$, $p < .001$, $\eta_p^2 = 0.31$; Fig. 3). Percent of recall accuracy was significantly higher for the high color-preference condition ($M = 52.1$) than for the low color-preference condition ($M = 26.4$) under the low brand-logo familiarity ($F_{1,47} = 43.0$, $p < .001$, $\eta_p^2 = 0.48$). No difference in recall accuracy was significant between the high color-preference condition ($M = 35.8$) and the low color-preference condition ($M = 35.0$) if there was high brand-logo familiarity ($F_{1,47} = 0.1$, $p = .83$, $\eta_p^2 = 0.01$).

![Accuracy vs Familiarity](image)

**Fig. 3.** Accuracy as a function of color preference ( ■ low, □ high) and familiarity of brand logo

**Conclusions**

The results of Exp. 1 provided the three most preferred colors for Taiwanese college students (white, light blue, and black) and the three least pre-
ferred colors (light orange, dark violet, and dark brown). These results are similar to the conclusions of Dittmar (2001), who suggested that adults prefer the color blue over red, green, and yellow. However, results were inconsistent with the studies of Saito (1996), who indicated that vivid green and dark gray were the most and least preferred colors for Chinese nationals, respectively. One possibility is that cultural factors and age might be associated with differences in color preference. Another possibility is participants’ background. Those in Exp. 1 had all been trained in design, so it is possible they preferred white and black because it is easier to develop an infinite number of incremental shades and tints through the mixing of one hue with black or white. That is, white and black colors go easily together with other colors in graphic design.

The results of Exp. 2 indicated that color preference affected recall accuracy; however, there was no significant effect of familiarity or sex on accuracy of logo recall. Color can attract attention; thus, the stimulus logo designed with preferred colors might attract participants’ attention. This means that the duration of participants’ visual processing for logos designed using preferred colors is longer than that for logos designed using less preferred colors and may explain why logos designed using preferred colors showed increase in accuracy of recall and vice versa. Although results of Exp. 2 did not confirm the findings of Bynum, et al. (2006), hue categories of stimuli were different indicating orange might be a less correctly remembered color for both studies.

Exp. 2 yielded no significant effect of familiarity on accuracy of logo recall. This result was inconsistent with the findings of Arnell, et al. (1999), Pieters, et al. (2002), and Buttle and Raymond (2003), who reported familiarity with an advertisement might promote brand memory directly and made processing more efficient. One possible reason for the inconsistency is the differences in task characteristics between Exp. 2 and the previous studies. For example, Pieters, et al. (2002) used infrared eye tracking to collect eye-fixation data in assessing memory for advertised brands, whereas Buttle and Raymond (2003) presented stimulus brands using the rapid serial visual presentation method and asked participants to report brands they had seen. In Exp. 2, participants were first asked to memorize a list of 24 stimulus brand logos and then to recall the brand logos and colors. Therefore, participants had a longer delay for many material brand logos in Exp. 2 than in the two previous studies, implying that participants’ memory traces of material logos might have decayed. Moreover, participants memorized 24 brand logos and their colors, a task which exceeds the limitations of short-term memory. Similar reasons supported McCabe, et al. (2005), who suggested that disproportionate increase in incongruent color-word errors resulted from memory load producing an increase in the overall number of operations required to main-
tain the representation of the to-be-remembered colors. In Exp. 2, delayed recall and the capacity limitations of participants’ short-term memory might have led to the finding that brand-logo familiarity did not significantly affect recall accuracy. Although the reason sex did not affect brand-logo recall is unclear, this finding implies designers might be able to neglect sex as a factor when designing brand logos to enhance recall.

Although brand-logo familiarity did not affect recall accuracy, there was a significant interaction of color preference with brand-logo familiarity. A simple effects analysis indicated that brand logos with high familiarity designed using a more or less preferred color did not affect accuracy of recall. However, brand logos of low familiarity designed using preferred colors enhanced participants’ accuracy of recall, and brand logos with low familiarity designed using less preferred colors reduced that accuracy. This implies that the brand logo might be designed using preferred colors to promote recall if participants were not familiar with the brand logo. In cases in which participants are familiar with the brand logo, however, use of color would not necessarily affect recall.

These results have implications for graphics-based interface design. First, findings can be applied to the design of memorable brand logos by clearly distinguishing the roles of color preference and brand-logo familiarity. Second, brand logos can help observers recall their product during purchase or consumption and can enhance the formation of strong, favorable, and distinct brand associations. Such results may help designers be aware of the characteristics likely to be effective in design of a memorable brand logo. In addition, researchers have indicated that characteristics of brand logos possibly affect evaluation of product or service qualities. Therefore, effects of logo design on the evaluation of products and services in different industries, including, for example, assessments of quality and price, yet need study.

REFERENCES


Accepted August 19, 2008.