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Mizutani, Y. et al. COLOUR INFLUENCE OF INPUT BUTTON ON USER'S PRESSING MOTIVATION, VISUAL ATTRACTION, AND PREFERENCE - ANALYSIS USING PAIRED COMPARISON-

Colour Influence of Input Button on User's Pressing Motivation, Visual Attraction, and Preference - Analysis Using Paired Comparison -

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ABSTRACT

The aim of this study is to reconfirm the colour influence on user's motivation to press an input button on touch screen equipment, and to know the differences among the pressing motivation, visibility, attraction and preference. In order to understand the colour influence and the differences clearer, paired comparison method was used in this study as well as our previous study [1]. The results indicated that the colour of the most pressed button was yellowish. The button colours which also gave a high motivation to press were orangish, greenish and white. The results of this study and previous study were similar on pressing motivation colour. The colours for higher pressing motivation are similar to the colours of high visibility and attraction, however it was different from colour preference. Correlations between colorimetric values and the scale values of each button for motivation, visibility, attraction and preference were analysed. The scale values for pressing motivation, visibility and attraction were highly correlated with lightness (V and L*) and colour difference from the background colour

KEYWORDS: *input button colour, user's pressing motivation, visual attraction*

INTRODUCTION

A touchscreen is now one of the most popular input interfaces. There are many input buttons on a touchscreen such as of mobile phones. We press the buttons on a screen to control devices. Various designs of the input buttons can be found on a screen and we experienced usability differences depending on the design of the buttons.

In our previous studies [1-2], colour influence of touchscreen buttons were studied from viewpoints of users' motivation to press the input bottoms on mobile phone screens. A questionnaire survey and visual evaluations were contacted in the previous study and the influence of colours was observed. Some coloured buttons, particularly yellowish and reddish colours, were easily pressed comparing with other coloured buttons. The influence of the background colours of the buttons were also observed that the combinations of yellowish and reddish buttons with grey background were found to motivate people to press the buttons. In this study, the visual evaluation were conducted using a mobile phone to compare the results with the previous study to verify the influences the colours on users' motivation to press the buttons. Moreover, the visual attraction and colour preference were also investigated.

EXPERIMENTAL

The experiment was conducted using the same method and instruments as our previous study [1]. A mobile phone *iPhone 6 (Apple Inc.)* was used. The size of the phone was 67.0×138.1 mm, and the resolution of the screen was 1334×750 pixel, 326 ppi. The experiment was conducted in a room under the lighting of fluorescent light.

Twenty Japanese university students (ten male and ten female students, nineteen to twenty-four years old) participated in the experiment. The colour vision of the subjects was tested by the Ishihara test [2] with subjects' agreement and under the rule of the Ethics Committee in Kyoto Institute of Technology. All the subjects had no colour vision deficiencies.

A paired comparison method was used. As shown in Figures 1 and 2 [1], two input buttons with different colours were presented on the screen of the mobile phone. The subjects were then asked to press one of the buttons intuitively of which gave higher motivation to press. Figure 3 shows the colours used for the buttons. There were twenty-eight button colours consisting of twelve hues: Red (R), Orange (O), Yellow (Y), Green (G), Blue (B) and Purple (P). Each hue had four colour tones: light (lt), bright (b), vivid (v), dark (dk), and four neutral colours (N) based on the PCCS (Practical Colour Co-ordinate System). The colorimetric values of these colours were obtained by measuring by a spectroradiometer *CS-1000 (Konica Minolta Inc.)*. The CIELAB values of the twenty-eight button colours were calculated [4]. The background colour of the buttons was grey (N5) and the shape of the button was circle. The number of the colours used for the button was less than the previous study.

The paired comparison is a simple sensory test and it gives a result with high-precision. However, if the number of stimulus increases, the number of the observations is also increases. Therefore, the colours were divided into six groups and the pair of the colours were made with the groups in order to reduce the number of the total observations. The colour groups are given in Figure 4. The coloured buttons were presented to the subjects in random order.
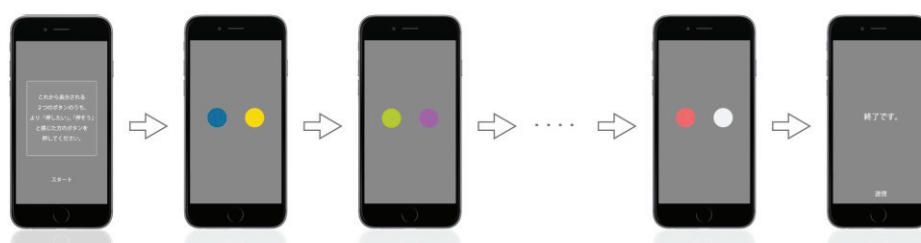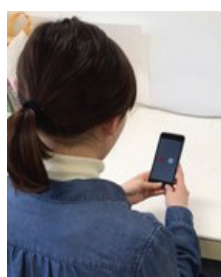

Figure 1: Experiment image [1].

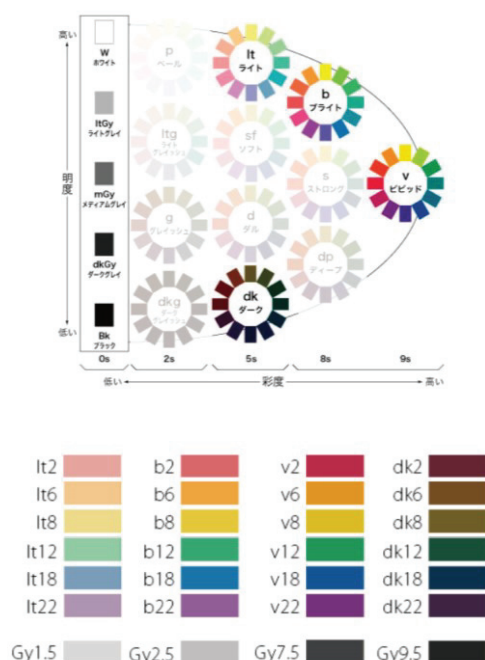Figure 2: The example of the experimental procedure [1].
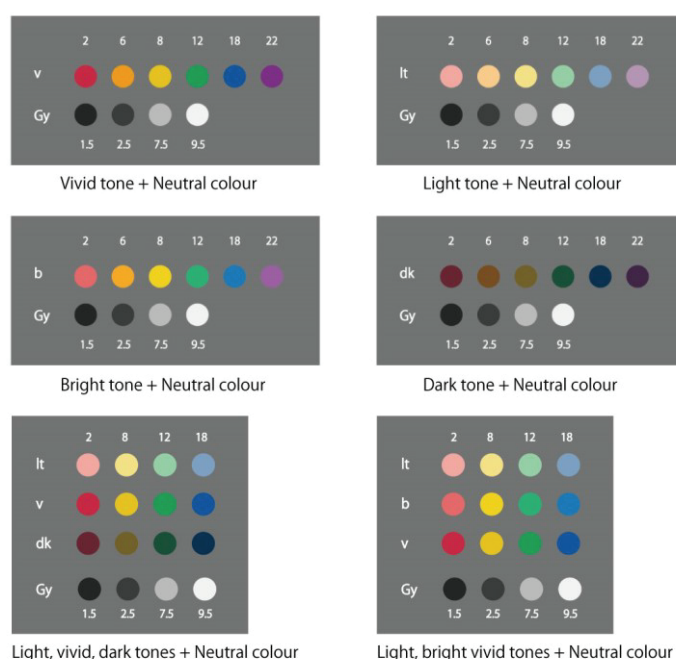

Figure 3: The colours used for the buttons.

Figure 4: The six groups of the button colours.

RESULTS

Experimental results were automatically recorded in the spreadsheet of online storage by an online server as well as the previous study [1]. Frequency of pressing of each colour button was defined as the level of pressing motivation, visibility, attraction and preference. The colours of frequently pressed/chosen buttons were considered as the colours which have high motivation to press, high visibility, high attraction and high preference. In addition, the scale values of each input button were calculated.

The scale values of vivid tone and neutral colour group for pressing motivation, visibility, attraction and preference were as shown in Figure 5. The most pressed button colours for pressing motivation were shown in Figure 6. Yellowish, orangish, greenish and white colours had higher scale values for pressing motivation. Comparing with the result of a previous study shown in Figure 7, higher pressed colours were the same as yellowish colours, but orangish colours were more than greenish colours in this study. Besides, on the pressing motivation, light, bright and vivid tone colours relatively had higher order. Especially, yellow, orange and green colours of the tones had the highest level motivation. This result on the pressing motivation was similar to that of the previous study.

As shown in Figure 5, the colours of high visibility and attraction were yellow, orange and white. The colours of higher preference were blue, green and white. The colours for higher pressing motivation were similar to the colours of high visibility and attraction, however it was different from colour preference.
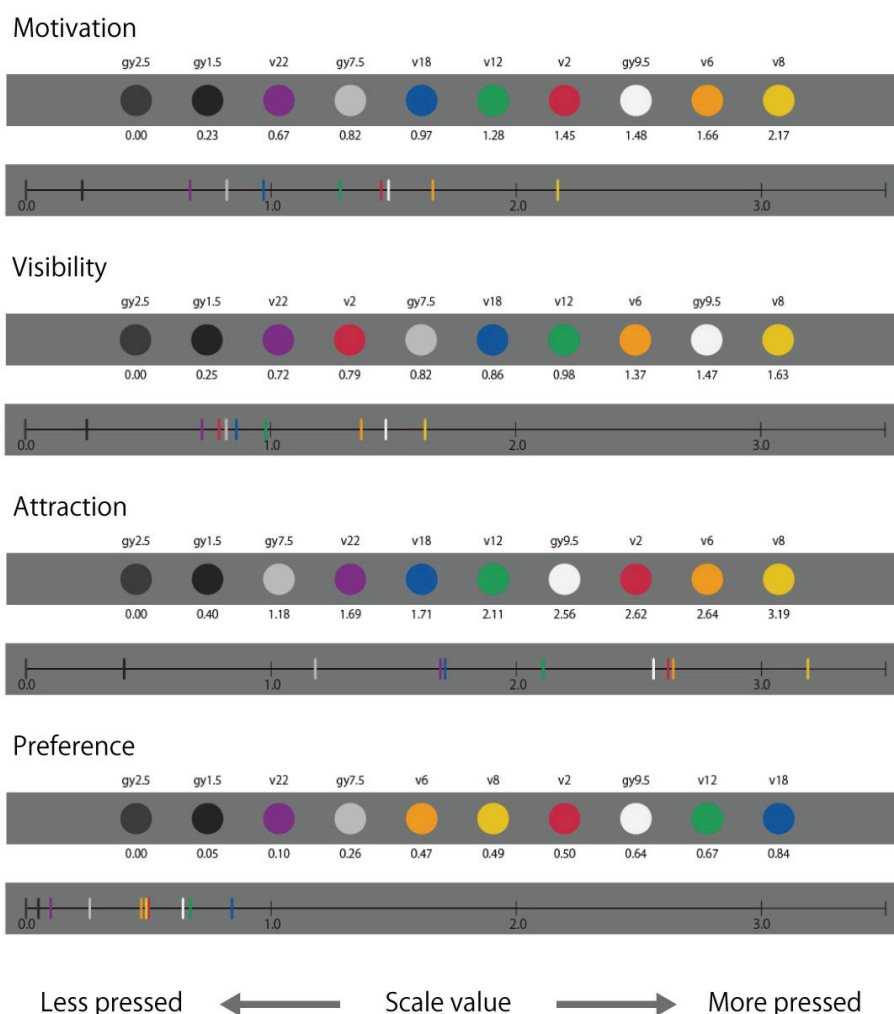

Figure 5: The scale values of vivid and neutral button colours.

Figure 6: The most pressed input button colours. Right side colours are higher pressed colours.

Figure 7: The most pressed input button colours obtained in the previous study.
Right side colours are higher pressed colours.

Table 1. Correlation coefficient between colorimetric value and scale value.
Red: 5% significant level, Red bold:1% significant level

	H	S	V	R	G	B	L*	a*	b*	C*	⊿E*ab
Motivation	0.130	0.639	**0.914**	0.630	0.643	-0.151	**0.774**	-0.063	0.672	0.681	**0.817**
Visibility	-0.030	0.500	**0.922**	0.640	**0.794**	0.057	**0.876**	-0.139	0.545	0.533	**0.709**
Attraction	0.303	0.665	**0.912**	0.617	0.550	-0.064	0.715	0.083	0.547	0.723	**0.839**
Preference	0.249	0.612	0.666	0.046	0.481	0.258	0.513	-0.192	0.124	0.422	0.423

Correlations between colorimetric values and scale values of each button colour were analysed to know the relationship between colour properties and the level of pressing motivation, visibility, attraction and preference. There was a strong direct correlation between lightness (V, L*) and the scale value for pressing motivation, visibility and attraction as shown in Table 1. Colour difference between the button colour and back ground colour grey has high correlation with the scale values as well. Colour preference wasn't correlated with colorimetric values.

CONCLUSION

This study tried to understand the colour effects on human practical response through pressing colour buttons on touch screen equipment and the relationships among the colour effects for pressing motivation, visibility, attraction and preference.

The obtained results suggested the large influence of the colour on user's motivation to press input buttons. The colour which had the highest scale value was yellowish. Orangish, greenish and white colours also had higher scale values. The results of this study and previous studies were similar. The colours for higher pressing motivation are similar to the colours of high visibility and attraction, however it was different from colour preference.

Correlations between colorimetric values and the pressed/chosen rate of each button were analysed. The scale values for pressing motivation, visibility and attraction were highly correlated with lightness (V and L*) and colour difference from the background colour, but not with other colorimetric values.

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