TEXT-BACKGROUND COLOR COMBINATION OF DIGITAL MEDIA FOR LEGIBILITY AND VISUAL QUALITY

Suchapa Netpradit [1]* and Isares Sooksenee [2]

[1]Department of Printing and Packaging Technology, Faculty of Industrial Education and technology, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand.
[2]Department of Thai and Oriental Languages, Faculty of Humanities and Social Sciences, Mahasarakham University, Mahasarakham 44150, Thailand.

*Corresponding author: Suchapa Netpradit, e-mail: suchapa.net@kmutt.ac.th

ABSTRACT

The purposes of this study were to find out the popular colors for using as text and background of digital media on the computer screen and to determine the text-background color combination affecting the legibility and visual quality. The popular colors were chosen by graphic designers and the optimum text-background color combinations were selected from the sampling group of undergraduate students. The samples of 55 colors included of 10 hues with 5 values each and neutral color with 5 values, referring to Munsell color system. The results revealed that 10 favorite colors applied for text and background design were yellow, red, reddish purple, black, blue, light reddish purple, greenish yellow, orange, bluish green and white, respectively. Male and female had slightly different satisfaction on the background colors of red, reddish purple and blue. The black texts on the light background or the white texts on the dark background were the best in legibility but not attractive. The warm color of texts; yellow, red, and reddish purple, on the contrast background were better in legibility and vision quality than did the cool color of texts on the warm color of background.

INTRODUCTION

Today, all new media in the form of digital media is accessed by the computer or electronic display devices. It is popularly created to distribute the information, present the slide, entertain the users, and other purposes of communication. The digital media is also easily approached by using internet, electronic storage medium and other information technologies on computer, laptop or smart phone. The design of media content on the screen is important to motivate the target group of users [1]. The simple method is to create optimum text and background color combinations that enhance the legibility and visual quality of the media. This means that the text content should be understandable or recognizable based on appearance, relate to the ability to distinguish one letter from the other in entire words, sentences, and paragraphs. It is generally true that a strong contrast leads to more readable texts [2] however the text-background color combinations of media should be designed for aesthetic enhancement and visual quality concern. The researchers then studied the impact of text-background color combination on the legibility and visual quality of readers for further design application.

METHODOLOGY

The target group for popular color choosing was 40 graphic designers, sampling from 10 graphic houses with 4 persons each. The target group of observers for text-background color combination was 80 undergraduate students in the Department of Printing and Packaging Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi. The color

vision of target groups was prior tested using the Ishihara test to select the observers who have normal color vision or no color blindness.

The color samples were created using the Munsell color system with 5 principal hues; red (R), purple (P), blue (B), green (G) and yellow (Y), and 5 intermediate hues between principal hues (RP, PB, BG, GY and YR). Ten chromatic hues at step of 5 in Munsell model were then used as main hues in the middle; 5R, 5P, 5B, 5G, 5Y, 5RP, 5PB, 5BG, 5GY, 5YR, and the other hues were obtained by varying to 2 levels of lighter and 2 levels of darker, as shown in Fig. 1.
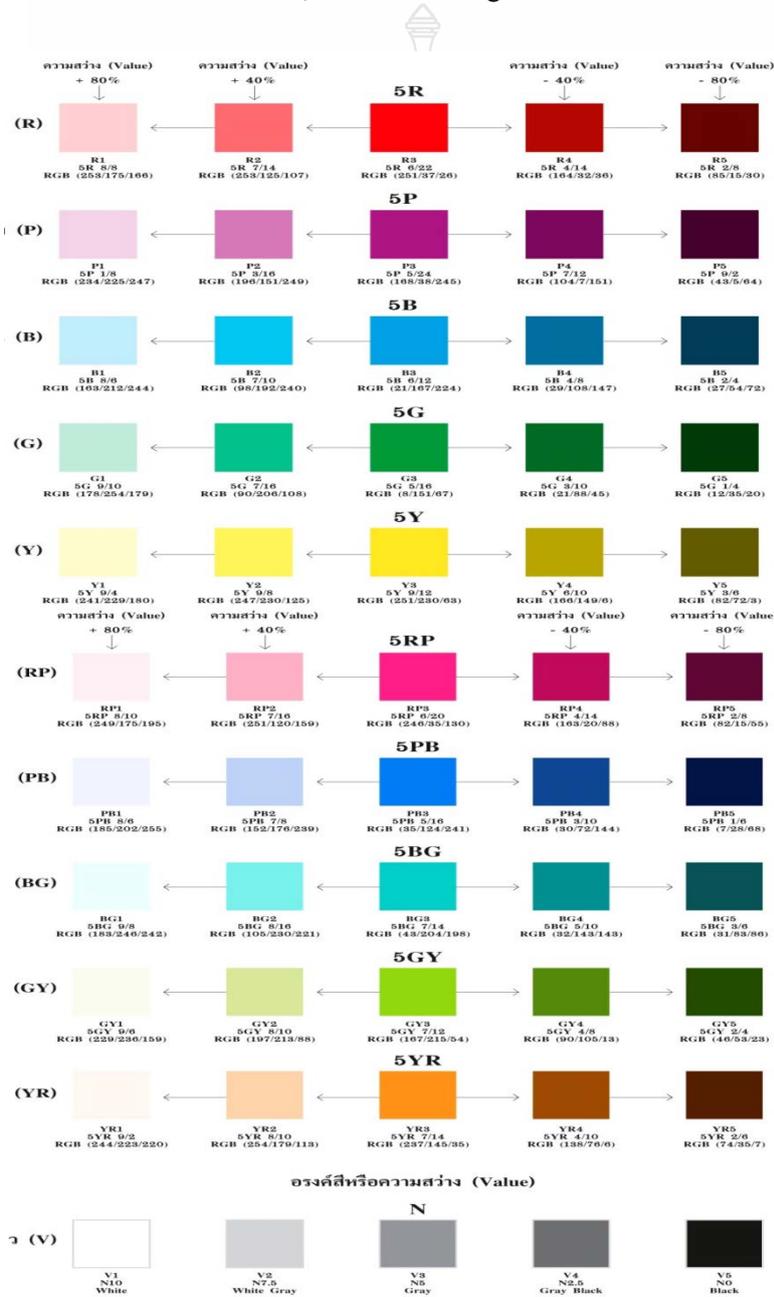
Figure 1. Principal hues, intermediate hues and achromatic hue with 5 lightness levels

The neutral colors (N) varied with 5 values were also used for this testing. Total 55 color samples were then converted to the color space of Adobe RGB (1998) by using a graphic design program of Virtual Colour Systems, Ltd. The color samples were displayed on the computer monitor using a file format which embeds the color profile of Adobe RGB (1998). Each graphic designer chose 10 color samples in priority by marking the list of satisfied colors in a questionnaire. The score of the first priority was set at 10 and the score of the last priority was set at 1. The top 10 colors in order of the high scores were selected to be created for text color and background color. The test form was designed by using 10 text colors on a background color and there were 10 sets of background colors. The text of Thai phrase was designed in 2 sizes; 36-points and 16-point, using TH Sarabun font as Thai standard font in the frame of colored background. There were 90 text-background color combinations for evaluation in next study. The samples of test form for text-background color combinations were shown in Figure 2.

Figure 2. Samples of test form for evaluation of text-background color combinations

The Macintosh version iMac with 21.5-inch 16:9 LED Backlit display was used for this evaluation. The resolution of screen display was set at 1920 x 1080 pixels and the color value was set by Display Calibrator. The test form was prepared in the software file to show the images with a color profile on the display using a program. Each student sat in front of the monitor at a distance around 0.5 metres. The period for looking at a set of test form was around 2 minutes. An observer evaluated each set and marked the list in the questionnaire for the priority (1-10) of satisfaction in term of legibility and visual quality. After that, the score of the first priority was set at 10 and the score of the last priority was set at 1. Total score of each text-background color combination was then calculated and the top 3 in order of high scores were present.

RESULTS AND DISCUSSION

Almost designers were 31-40 years old and have working experience about 5-10 years. After the designers see the color samples from the program, they chose 10 popular colors by their own opinion. The researchers calculated the scores of each color and showed the total scores of top 10 colors in order of high scores. Almost graphic designers like the colors in the middle level of lightness or bright color due to their good attraction and motivation. In addition, saturation or lightness of these colors could be easily adjusted when apply for the digital media design. However, the popular colors may be changed by the trend, event and personal opinion. The colors with very low scores were light purple, dark purple, light greenish yellow and dark greenish yellow. The students of 38 males and 42 females selected their favorite colors of texts on background in term of legibility and visual quality and the score was calculated to get the highest score of 1st, 2nd and 3rd, as shown in Fig. 3. The results indicated that the optimum text color should be black, white, yellow, red and reddish purple, respectively. The black texts were the best for all background colors while the white texts were not

appropriated on yellow background. The yellow texts were good for visual quality but not good on greenish yellow background. The red texts were suitable for the backgrounds of yellow, black and greenish yellow while the reddish purple texts were suitable on yellow background. Male and female had slightly different satisfaction for the background colors of red, reddish purple and blue.

Figure 3. The optimum text colors of 1ˢᵗ, 2ⁿᵈ and 3ʳᵈ on 10 popular background colors

CONCLUSION

In fact, the black texts on light background colors and the white texts on dark background colors were the most popular for application in design because of their best readability or legibility [3]. However, the colorful texts on the colorful background had a high trend to be applied. The popular colors in this study were the bright colors without lighter or darker. The texts of warm color such as yellow, red, and reddish purple enhanced legibility and visual quality on the contrast background. The cool-color texts on the warm-color background were not suitable because this reduced visual quality and made vision blur or fatigue after looking for a short period [4]. Since the background area is generally much more than the area of texts, the cool-color background should be applied to preserve the users' eyes. Therefore, texts of warm-color on background of cool-color should be applied for the digital media.

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