

DISTINGUISHED COLOR GRAPHIC SIGNS FOR THE ELDERLY UNDER DIFFERENT ILLUMINANCE LEVELS

Narirat Sungvorawongphana¹, Pontawee Punggrassamee², Rarcharneeporn Subgranon³
and Tomoko Obama⁴

(Affiliation and addresses), Faculty of Nursing, Burapha University, 169 Long-Hard Bangsaen Road,
Saen Sook Sub-district, Mueang District, Chonburi 20131

^{1,3} Faculty of Nursing Burapha University, Thailand

^{2,4} Faculty of Science, Department of Imaging and printing technology, Chulalongkorn University,
Thailand.

*Corresponding author: N.Sungvorawongphana, e-mail narirat2007@gmail.com

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ABSTRACT

The objective of this study was to examine the color vision of elderly for color graphic signs under different illuminance. The subjects of 50 elderly age 60 years and over, lived in Bangsaen Community, Chonburi province. A caution school sign, consist of a man and a child, was selected as the stimuli. They were designed in two styles. One was color figure on white background in a frame of the same color. Another was white figure on color background. Red, green, blue, cyan, magenta orange and yellow colors were used. Only the yellow color was designed in combination with black. The experiment was conducted under the ambient light with 2 conditions. High illuminance was above 3000 lx and lower one was below 300 lx. The size of the test charts were 27 X 27 cm². The distance between the stimuli and the observer was 10 meters. All 14 stimuli presented to an elderly at one time. She/he was asked to choose the most outstanding one. Under the high illuminance 24 % chose the reverse cyan sign and at lower light, 20% selected the reverse red as the most distinguished sign.

INTRODUCTION

Aging societies seem to be developing all over the world. By the year 2020, more than one billion people worldwide will be age 60 years and over. At the present, Thailand aging has become a global phenomenon. The increasing rate of elderly affects the health problem and life style of themselves. Age-related changes of the biological are affect to physiological function, such as, changes in structure and function of vision. Nowadays most of information is from the visual media. Thus visual impairment might reduce the quality of life of the elderly. To make the proper environment in such a way that the elderly be able to spend their life by themselves is the most economical way. This research is aim to investigate the color vision of the elderly under different illuminance. We chose the below 300 lx for low illuminance because from the previous survey we found that most of private residents the lighting is much lower than 300lx. And above 3000 lx employed as high illuminance, because we concerned the safety of the subjects avoid to experiment under strong sun light. The experiment was designed to conduct under the real situation. A caution school sign, consist of graphic figure of a man and a child was selected as the stimulus [1]. Eight basic colors used for traffic and safety sign were applied to the graphic figures [2]. The 50 local elderly living in Bangsaen community were employed as the observers to evaluate the color graphic signs.

EXPERIMENT PROCEDURE.

Stimuli preparation: The school sign was selected as graphic figure for the test stimuli. It composes of figure of a man and a girl hold hands. I chose this sign because there were two sizes figures together in one sign which gave more details than others. The colors were chosen according to those used for traffic sign and safety sign regulation [2]. These are red, green, blue, yellow, black, cyan and white. Magenta and orange were also added to provide more

alternative colors. All colors were designed to fill the figure of the school sign as the solid color on white background, with the same color frame, except yellow and black. The yellow figure was designed on black background. Another set of color stimuli were designed as reverse color figures as shown in figure 1. The size of the sign was 27 X 27.cm². Altogether there were 14 stimuli.

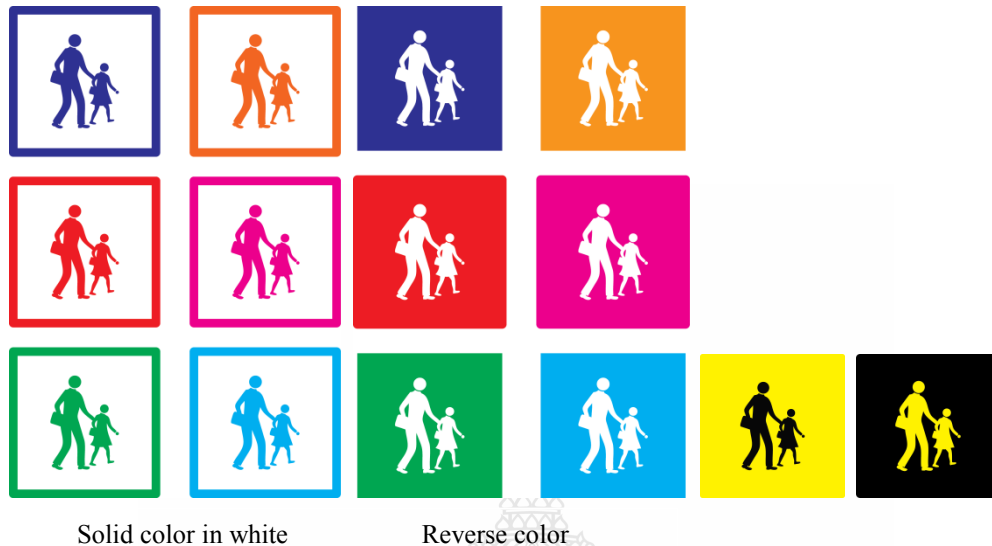


Figure 1. The school sign design in two styles solid color and reverse color.

Fifty elderly aged 60 up, living in Bangsaen community, Chonburi Province were the subjects. The experiment was taken place at the building and large open area nearby where the elderly came to exercise every morning. And another place was at the dormitory in the Faculty of Nursing, Burapha University. The experiment was conducted under the ambient light. There were 2 conditions, inside a building where the illuminance was under 300 lx and outside the building, above 3000 lx.

All 14 test stimuli were randomly hung in two rows on the athletes nest. The test set was carefully placed so that every stimulus was similarly illuminated. They were presented to the elderly inside the building illuminance was measured in front of the stimuli horizontally. And in case of outside the building the setting was the same. The distance between the stimuli and the subject was 10 meters. Thus the visual angle was 1.5 degrees. This visual angle was employed to make sure that most of elderly was able to see the color correctly [3]. In open area the stimuli was carefully placed in the direction that no direct light shine toward the subjects to avoid glare. Each subject was asked to tell the number of the stimuli which appeared the most distinguished to her/him. The test was done one by one.

RESULTS AND DISCUSSIONS

The results are shown in figure 2. The histograms show the number of elderly who selected the color stimulus under low illuminance and high illuminance in percentage. Under low illuminance the reverse red sign has the highest percentage 20 and under high illuminance the reverse cyan sign employs the highest percentage 24. The second rank is black figure on yellow background and reverse cyan have the same 14% under the lower illuminance. For high illuminance second rank is yellow figure on black background 16 %. In figure 3 the reverse color signs have the higher percentage compare to the same solid colors on white background under low light surrounding. The yellow and black combinations, under high illuminance the yellow on black background and the reverse design are small difference, 16% and 14%. In the low lighting, the yellow figure is only 2% but the black figure is 14%. No one chose red, magenta and orange signs. In contrary reverse magenta sign is 12% under high and low light. But the orange reverse is very low in both conditions 0 and 2%.

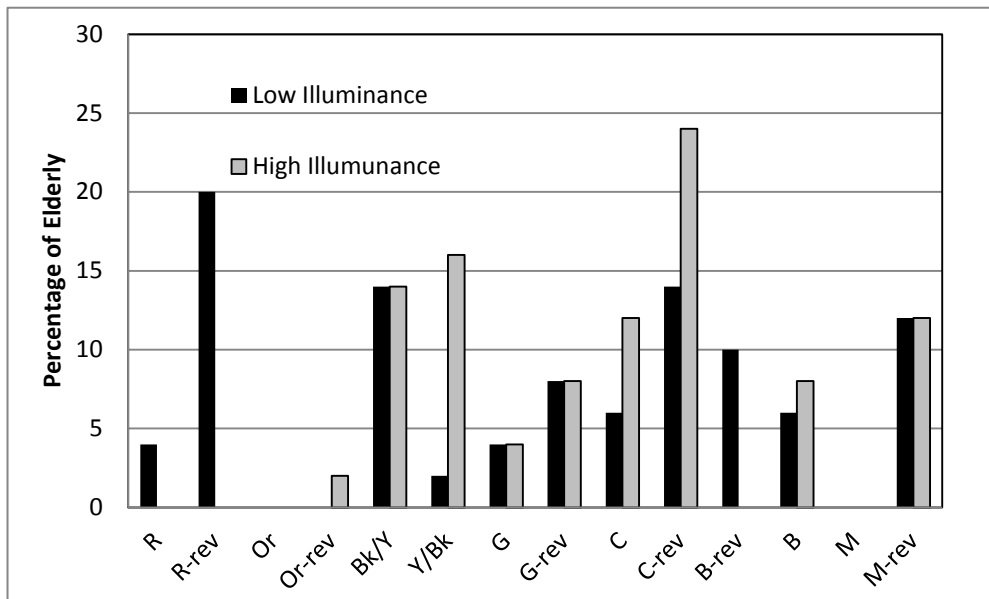


Figure 2 Histograms show the percentage of elderly selected the clearest color graphic signs under high and low illuminance.

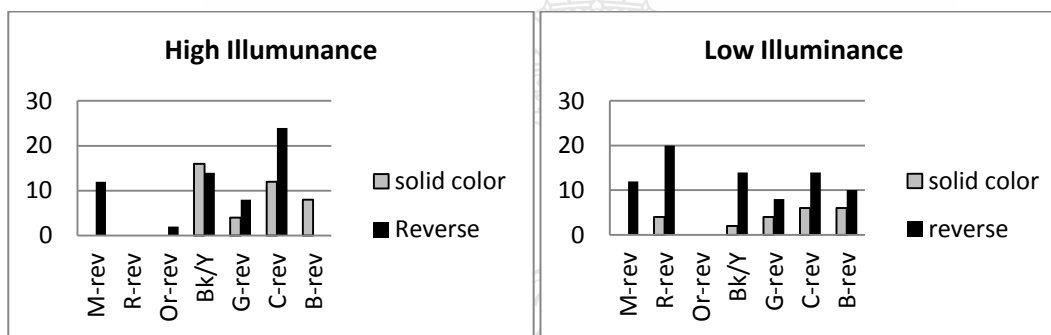


Figure 3 Comparison of solid color and reverse color styles.

The color graphic sign with white figure in cyan background appears the most distinguished to the elderly in the open area. But in lower illuminance, inside the building the white figure in red background is the most distinguished one. The graphic sign with more color area, reverse color sign is easier to see than the solid color in white background. This can be explained that the white background might have glare in bright surrounding, which causes desaturate color of the figure. This effect much more pronounced for the elderly with cataract eyes[4], [5], [6].

The color stimuli which being selected with the same percentages, under both conditions, are black figure in yellow background 14%, reverse magenta 12%, green reverse 8% and white in green 4%. The level of illuminance does not affect these color graphic signs.

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