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Boundary of acceptable blue color in Thai traffic sign for elderly

N. Keawpilab and K. Rattanakasamsuk[*]

Color Research Center, Faculty of Mass Communication Technology,

Rajamangala University of Technology Thanyaburi

ABSTRACT

Recently, blue traffic sign was officially introduced as a mandatory sign in Thailand where the elderly population increasing. Since the elderly have difficulty seeing blue color, we investigated the elderly vision on blue color in traffic sign. This research aimed to locate the region of blue color which is suitable for the young and the elderly. The subjects were divided into two groups: a group of young subjects aged between 18-23 years old, and a group of young subjects wearing a cataract experiencing goggle to simulate the elderly vision. Ten mandatory signs were used in this experiment. The background color of these mandatory signs was modified from the original blue color and varied to other 51 colors around this point. In each judgement, one mandatory sign was randomly selected from the set of 18 mandatory signs. The background color of the selected sign was filled with a color which was randomly selected from 52 colors. For the first task, subject was asked to judge whether the stimuli was a blue mandatory sign or not. And the second task, subject was asked to categorize the background color based on eleven basic color terms. Our results exhibited that the boundary of the acceptable blue color in mandatory sign for the elderly was larger than the boundary of the acceptable blue color for the young.

Keywords: Elderly vision, traffic sign, memory color

1. INTRODUCTION

Blue color has been generally used in traffic sign for a long time in Europe or USA. It was used as a background color for traveler service information sign (in US), mandatory sign (in Sweden) or regulatory sign (in UK). Recently in Thailand, the blue traffic sign was officially introduced as a mandatory sign which is a white figure or symbol on a blue background as shown in Figure 1. Besides, the elderly population in Thailand is expectedly growing to be larger than 15% by 2025.[1] It is well known that the color perception of the elderly is quite different from color perception of the young. The elderly seem to perceive color with less saturation and have difficulty seeing blue color.[2] We, therefore, studied the elderly vision on blue color in traffic sign. This research investigated how different the young and the elderly see the blue traffic sign and aimed to locate the region of blue color which is optimal for both the young and the elderly vision.

Figure 1. Examples of mandatory sign in Thailand.

2. METHODOLOGY

2.1 Apparatus

The dimensions of the experimental room were 180×360×200 cm (W×L×H). This room was covered by a black curtain. An LED monitor (EIZO ColorEdge CX271) was placed inside the experimental room. The subject sat on a chair which was placed 285 cm far from the monitor.

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[*] Corresponding author: Kitirochna Rattanakasamsuk ., kitirochna@rmutt.ac.th, kitirochna@gmail.com

cataract experiencing goggle. They reported that some greenish or purplish color look almost identical to blue when they viewed through cataract experiencing goggle. Therefore, they categorized those greenish or purplish colors as blue. Unlike viewing with cataract experiencing goggle, they can properly discriminate between blue and those greenish or purplish colors. This result was consistent with previous research that some elderly people failed to discriminate between the combination of blue and green color due to the yellowing of their crystalline lens.[5]
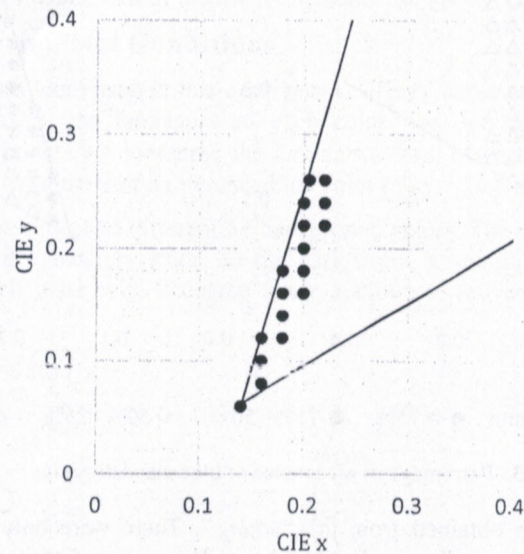

Figure 5. Acceptable blue color for both the young and the elderly

To specify the acceptable blue color for both the *"young"* and the *"elderly"*, two criteria were set. Firstly, we selected the background colors which more than 50% of both the *"young"* and the *"elderly"* responded as blue in the mandatory sign. Secondly, from 11 basic color term, the background color which both the *"young"* and the *"elderly"* categorized as blue color was selected. The acceptable blue color which passed these two criteria were shown in Figure 5. These colors were suitable for background color in blue mandatory sign. However, we found the limitations of our work since the LED monitor cannot presented other colors located outside monitor gamut. Therefore, some of out-of-gamut colors located near blue region were also necessary to investigate in the future.

4. CONCLUSION

Our results indicated that the elderly did not have difficulty viewing the blue mandatory sign. However, they may perceive some greenish and purplish color as blue. Therefore, the boundary of the acceptable blue color in mandatory sign for the *"elderly"* is larger than the boundary of the acceptable blue color for the *"young"*.

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