CHAPTER I

INTRODUCTION

We live in environment where illumination changes from time to time and from place to place. At the daytime the sunlight has a color temperature of about 6500K as it is represented by the CIE standard illumination of D65. In the evening its color temperature becomes lower. We move from outdoor to indoor, when the illumination may change from that of D65 to the incandescent lamp of which color temperature is much lower. If our visual system perceives the color of the object based on the light coming from the object, the color should change with the change of the illumination. So, a white paper appears more reddish when we see it in the evening compared to the daytime or when we see it in a room lit with an incandescent lamp and it appears white only when we see it under a white light. Our normal daily activity cannot be assured because we cannot recognize the real state of any object. We cannot tell only by seeing a mango whether it is ripe or not if the illumination is yellow. But our visual system can see the real color of the object without being affected by the illumination. This phenomenon that we see the original color of the object under any illumination is called the color constancy.

In order to have the color constancy property, we should understand and get the knowledge of illumination whenever we come to a new environment and then we take off the effect of the illumination from the light coming from objects. This action of our brain to understand about the illumination is called constructing the recognized visual space of illumination RVSI in our brain. In other words, the basic idea of the RVSI is that we can understand the illumination in the space and adapt instantly to the illumination so that the color constancy takes place. To construct the RVSI we should look at the objects around the room and see how they appear to us. The objects we see first in the room are called initial visual information. That is to say, we first get the initial visual information about the space, and construct the RVSI for the space, and then we can perceive the real color of objects in the space.

In this experiment we will gradually increase the initial visual information of the space by increasing a window size through which a subject sees the space beyond the

window. We can expect that the color appearance of the test patch will return to its original color when the initial visual information of the space beyond the window is enough to understand the existence of a space over the window so that the subject can construct a new RVSI for the test room.

1.1 Objective

In the experiment conducted by Pungrassamee et al.(1) the color appearance of a test patch placed in a test room was measured by a subject who looked at the test patch through a window opened between the subject room and the test room. In their case the subject room was illuminated by a colored light, while the test room was illuminated by daylight type lamps. They found that when the window was small so that the subject could only see the test patch its color appearance was determined by the RVSI for the subject room but when the window was large enough to see any objects in the test room beside the test patch the color appearance returned to its original color. That is the color constancy took place.

In this experiment we will reverse the color of the subject room and the test room. That is the subject room is always illuminated by daylight type of illumination, and the test room by a colored light such as red. Then we like to investigate the color appearance of the test patch will return to its original color if the window is large enough to see objects in the test room. It is natural to expect that result because of the color constancy and we like to confirm the expectation.

1.2 Scope of the Thesis

In this experiment, a subject will observe a test patch placed in a test room through windows of various sizes and judges the color of the test patch by using the elementary color naming method. Two colored illuminations, red and yellow, were

employed for the test room. By combining one of these colored illuminations with the daylight type illumination in different intensities we prepare four illuminations of different saturation for each color.

1.3 Keywords

Color constancy, Space recognition, Illumination, Color Appearance, Recognized Visual Space of Illumination (RVSI)

1.4 Content of the Thesis

Chapter 2 deals with the overview of the theoretical considerations and literature reviews. Chapter 3 is about the description on the experimental apparatus, experimental conditions, subjects, and the procedure of experiment. Chapter 4 contains the results on the effect of window size on the color appearance of the test patches under colored illumination. Chapter 5 is the conclusion of the experiment and discussion.