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THE EFFECTS OF COLOR TO IMPROVE ACCESSIBILITY FOR PEOPLE WITH COLOR VISION DEFICIENCES

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Chapter 1
INTRODUCTION

Color is a fundamental element of the human experience, influencing our emotions, perceptions, and interactions with the world around us. However, for approximately 8% of the world's population, color is not always perceived as intended due to color vision deficiencies, commonly known as color blindness. People with color vision deficiencies face challenges in various aspects of their daily lives, ranging from difficulties in distinguishing traffic signals to limitations in accessing information presented in color-coded formats. This study aims to explore the transformative potential of color to enhance accessibility and improve the quality of life for individuals with color vision deficiencies.

Color vision deficiencies are often categorized into different types, with the most common being red-green color blindness and blue-yellow color blindness. These conditions result from genetic factors and primarily affect the perception of specific hues. In the past, the design community has predominantly focused on accommodating the needs of individuals with normal color vision, inadvertently neglecting the unique challenges faced by those with color vision deficiencies. Consequently, this underrepresentation has led to barriers in accessing a wide range of information and services, from graphic design to digital interfaces, and even outdoor environments.

Recognizing the importance of inclusivity and universal access, designers, researchers, and organizations have begun to explore innovative ways to address these challenges. One promising avenue is the deliberate use of color to enhance accessibility for individuals with color vision deficiencies. This study seeks to shed light on the potential benefits of adopting color strategies that prioritize inclusivity and investigate how such strategies can be harnessed to create a more accessible and equitable world.

In this research, we will examine a range of factors that influence the effectiveness of color-based accessibility solutions for people with color vision deficiencies. These factors include color selection, contrast enhancement, and the use of alternative design elements that do not rely solely on color to convey information. Additionally, we will assess the psychological and practical implications of these design choices, considering how they impact the user experience and the overall quality of life for individuals with color vision deficiencies.

By conducting empirical research, including surveys and usability testing, and by drawing from existing literature on color vision deficiencies and design accessibility, this study aims

to provide practical insights and recommendations for designers, organizations, and policymakers seeking to make the world more inclusive for individuals with color vision deficiencies. Ultimately, this research contributes to the broader conversation on universal design and accessibility, advancing the notion that color can be a powerful tool in breaking down barriers and fostering a more inclusive society.

Statement of the Problem:

According to Color Blind Awareness 4.5% of the population are color-blind. If your audience is mostly male this increases to 8%. Designing for color-blind people can be easily forgotten because most designers aren't color-blind. In this article I provide 13 tips to improve the experience for color-blind people – something which can often benefit people with normal vision too. There are many types of color blindness but it comes down to not seeing color clearly, getting colors mixed up, or not being able to differentiate between certain colors. https://www.smashingmagazine.com/2016/06/improving-ux-for-color-blind-users/

Purpose of the Study:

The purpose of this study is to investigate the effects of color to improve accessibility for people with CVDs. The study will focus on the following questions:
What color combinations are most effective in improving accessibility for people with CVDs?
How can color be used to design more accessible products and environments?
Significance of the Study
The findings of this study could be used to develop new guidelines for designing color-accessible products and environments. This could improve the quality of life for people with CVDs and make the world a more inclusive place.

Scope and Limitations:

People with color vision deficiencies (CVD) have difficulty distinguishing between certain colors. The most common type of CVD is red-green colorblindness, which affects about 1 in 12 men and 1 in 200 women worldwide. Other types of CVD include

blue-yellow colorblindness and tritanopia, which is a complete lack of color vision. CVD can affect people's ability to perform many activities of daily life, including driving, reading traffic signals, and using appliances and electronics. It can also make it difficult to distinguish between food items and medication labels.

Chapter Summary:

This chapter has provided an introduction to CVDs, the purpose of the study, and the significance of the study. The next chapter will review the existing literature on the effects of color on accessibility for people with CVDs. People with CVD may have difficulty seeing traffic lights and other road signs, especially in low-light conditions. They may also have difficulty distinguishing between different shades of green and brown, which can make it difficult to see pedestrians and cyclists. People with CVD may have difficulty reading text that is printed in certain colors, such as red or green. They may also have difficulty distinguishing between different shades of the same color, which can make it difficult to read small print or complex text. Using appliances and electronics: People with CVD may have difficulty using appliances and electronics that have color-coded controls. For example, they may have difficulty distinguishing between the on/off switch and the volume control on a TV remote. People with CVD may have difficulty working in certain professions that require good color vision, such as electricians, pilots, and firefighter

CHAPTER 2

REVIEW OF RELATED LITERATURE

Color represents a powerful tool for conveying information and leverages both the sensitivity of the human visual system to color (Chaparro, Stromeyer, Huang, Kronauer, & Eskew, 1993) and the rich and complex set of learned associations. Nevertheless, using color to encode information poses a number of challenges, including that (a) it lacks an ordered perceptual sequence, limiting its applicability when coding ordered data (Ware, 2013); (b) pseudocolor coding schemes, such as the rainbow-colored maps used to depict weather, terrain, and other information, can obscure data and lead to misinterpretation (Borland & Taylor, 2007; Rogowitz & Treinish, 1998); and (c) approximately 8% of men and 0.5% of women are color vision deficient (abbreviated CVD hereafter). CVD users do not experience the full array of hues seen by people with normal color vision and consequently face difficulty when colors they cannot discriminate between are used to encode information. This latter issue is the focus of this article.