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COLOR IDENTIFYING SYSTEM FOR COLOR BLIND PEOPLE

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ABSTRACT

In the most developed States colorblindness affects 10% of the male population. This handicap incurs limitations as well as uncomfortable personal and social situations for those afflicted that depend on others to choose products in which color is a predominant factor, such as pieces of apparel and decoration.

A sample group of colorblind people showed in a recent study found relevant the development of a system which would allow them to identify colors. The development of a graphic color identification system was the answer to this need, its concept and structure make it universal, easy to communicate and memorize.

This system can be used in a variety of products and allow the colorblind to reduce or even eliminate their dependence on others.

Key-words – Graphic design, color identifying system, color blind

1 INTRODUCTION TO THE COLORBLINDNESS PROBLEM

Color blindness is the common denomination to a congenital alteration related to the incapability to distinguish several colors of the spectrum due to a visual deficiency. There are several types of colorblindness. The rarest of which is Monochromacy, which affects the perception of every color, resulting in a black and white or grey shaded vision. The most common type of color blindness is Trichromacy which results in skewed interpretation of different shades of color.

The vast majority of color blind people have a normal vision relatively to the other characteristics which compose it, even though the deficiency hampers, or even makes it impossible for those afflicted to perform certain everyday social and professional tasks. Color blindness affects approximately 10% of the world's population and it's a handicap usually genetic in origin associated to a flaw in the X chromosome. Because of this, 98% of color blind people are male. Women can be born color blind only if both parents are similarly afflicted.

The first symptoms of color blindness are detected at school age due to the difficulty in interpreting drawings, maps and identifying colored pencils. Later in life a color blind person is prohibited of performing certain jobs completely, while some professions will bring added difficulties. Similarly, managing daily routine poses problems, buying and choosing wardrobe as well as using maps and signs to provide orientation. Even while accessing the internet some text can become illegible due to the use of certain colors.

Some companies have started creating web pages which can be seen correctly and easily by all. This has been possible due to the rising awareness that color blind people represent a high percentage of the population.

2 OBJECTIVES AND METHODOLOGIES

Once the problem had been identified its extent and impact on the subjects was evaluated. On a first phase of the study a sample of color blind people was identified and presented with a questionnaire, its purpose was to identify the main difficulties of the respondents concerning their color blindness and the processes and methods used by them to lessen and overcome these obstacles.

Of the 146 individuals identified and contacted, 77 completed the questionnaire, of these 41 were validated, which corresponds to 28% of the sample. The collected information was treated and analyzed. Based on these results a conceptual basis was defined, one capable of constituting a universal method of graphic color identification, easy to comprehend and memorize.

3 ASSUMPTION OF THE COLOR IDENTIFICATION SYSTEM

Color and form allow universal communication through codes which are easy to read and interpret. In this case, the form should constitute the basis and support for the construction of the representation of color and its subsets. As can be seen in road signs, although color is a key element of the road sign which imposes vehicle immobilization (i.e. stop), this message is also conveyed through form, without margin for misinterpretation (Fig. 1 and 2). The message read by a color blind person, who will see it monochromatically, is as clear as if he wasn't.



Figure 1 – Stop sign - color



Figure 2 – Stop sign - black and white

The development of the color identification system should obey a set of principles which guarantee universal and easy coding and decoding. Considering that the additive primaries are taught in basic education, communicated through pigment-color, all color blind children acquire a concept of the primary colors and their mixing in grade school. Given the universality of this concept, it was adopted as the basis of the system.

4 THE COLOR IDENTIFICATION SYSTEM

Using primary colors, represented through simple symbols, the system was constructed through a process of logical association and direct comprehension, allowing its rapid inclusion in the “visual vocabulary” of the user. This concept makes additive color a mental game, which lets the color blind relate the symbols amongst each other and with the colors they represent, without having to memorize them individually.

The system proposed is based on the search of the pigment color, using as basis the primary colors – blue (cyan), red (magenta) and yellow its additive secondary colors (Figure 3) and not the light color (RGB, composed by three beams of color – R, red; G, green and B, Blue),

because the color blind person does not possess the correct vision of the colors, nor a tangible knowledge of how their addition works.



Figure 3 – Primary color addition – pigment colors

Each primary color of the code is associated to three forms (Figure 4) which represent red, yellow and blue, from these three that the code is developed. Two additional forms were added representing black and white (Figure 5), in conjunction with the other elements they represent lighter or darker tons of the colors.



Figure 4 – Graphic symbols representing the three primary pigment-colors



Figure 5 – Graphic symbols for white and black

The secondary colors can be formed using the basic forms as if “mixing” the primary pigments themselves (Figure 6), making their perception and subsequently the composition of a color pallet easy.

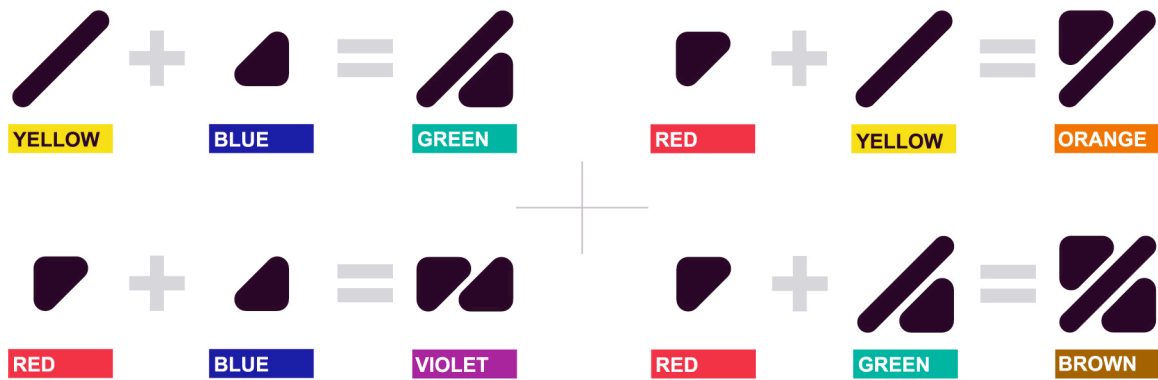


Figure 6 – Graphic symbols – three primary colors and their addition

By associating the icons representing white and black to define darker and lighter tones to the three basic forms and their additions, a wide palette is constructed as observed in Figure 7.

Conventional color designations were attributed to the additions and other combinations of colors, especially those used in apparel.



Figure 7 – Graphic representation of color addition with dark and light

Grey, a tone of “color” used frequently in articles of clothing, was divided into two tonalities: light grey and dark grey (Figure 8).

The importance of gold and silver in clothes implies the creation of a specific icon. Considering the logic of the codes’ construction, these colors are represented by the combination of the golden-yellow and the element representing shine to define gold; light grey combined with the same element identifies silver (Figure 9).



Figure 8 – Graphic symbols – tons of grey



Figure 9 - Graphic symbols – gold and silver

The totality of the code, represented in Figure 10, covers a considerable number of colors and can be easily conveyed through information posted at the sales point, on web sites, or the product itself.

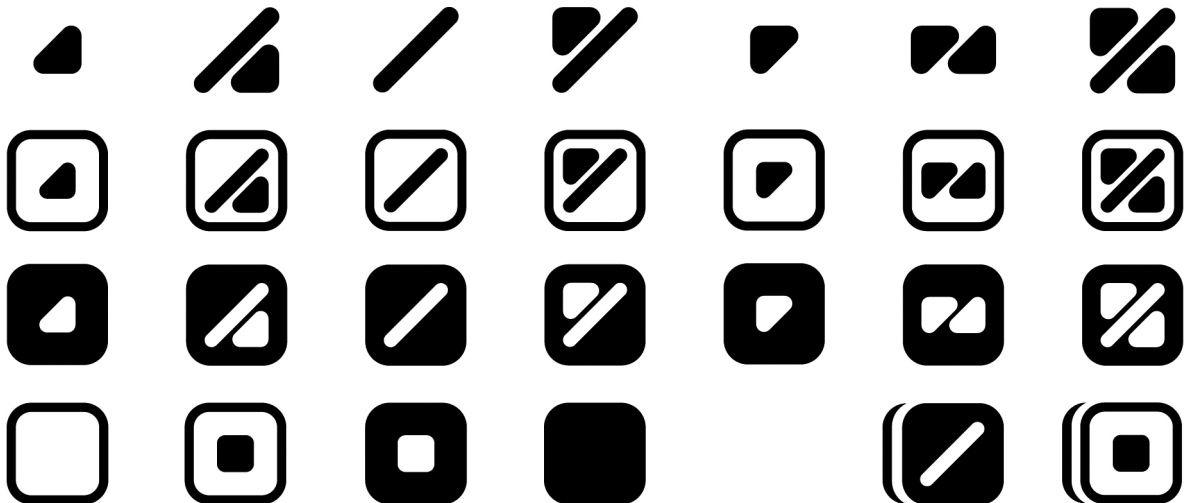


Figure 10 – Monochromatic graphic code

The different fashion trend proposals dictated the need to add to the icons developed an element which, placed in different positions, can identify some of the color characteristics of the clothes: if its glossy or matte (Figure 11), if it's a mesh of tones with a dominant color or a mesh of tones or several different colors with a dominant one (Figure 12).

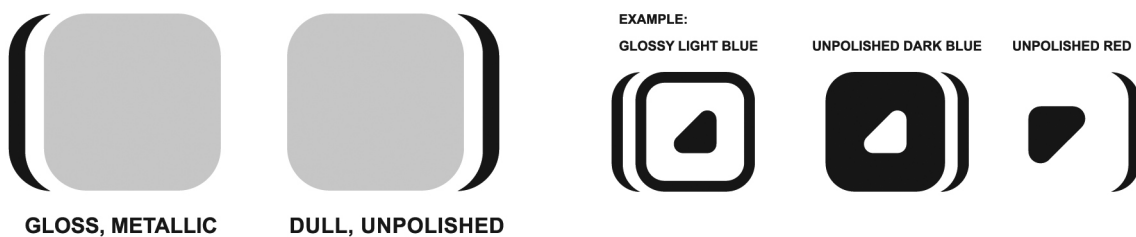


Figure 11 - Graphic symbols representing gloss and matte

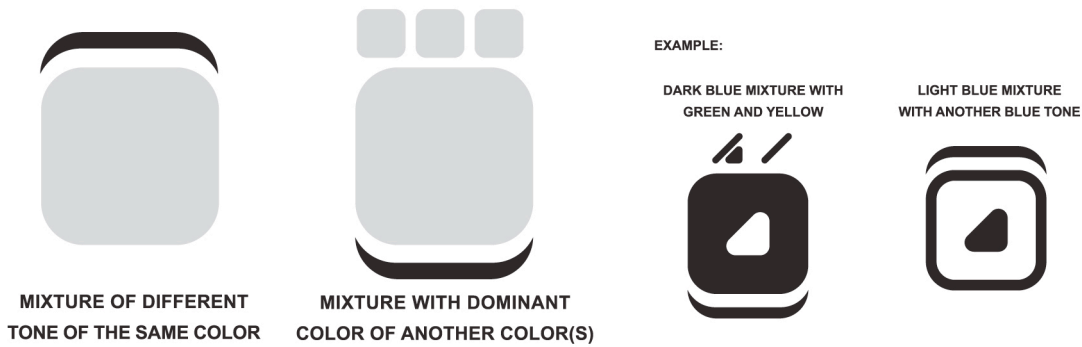


Figure 12 – Graphic symbols which represent – mesh of the same color or different colors
5 COLOR IDENTIFICATION SYSTEM APPLICATIONS

The developed code can be applied in multiple contexts in which color is important. One of the most relevant fields of application is in apparel and the color identification symbols can be applied to tags or integrated into the clothes themselves, similarly to maintenance and care information. The simple and stylized graphics and its monochromatic nature reduce the production cost of the labels in paper or cardboard, textile or stamp (Figure 13).



Figure 13 – Simulations – Application on tags on the fabric and cards added to the clothing

The Metro system maps are a different context but equally valid use of the color identification code, used in this case to individualize the different transit lines (Figure 14).



Figure n.14 – Simulation – Metro map

5 CONCLUSION

Each day society grows more individual centric. Each person, sometimes, becomes totally dependant on itself and asking for another person’s help, besides creating some frustration and feelings of dependence, is not even always possible.

The “wrong” interpretation of colors can harbor insecurity in social integration of the individual whenever the projected personal “image” is a key factor in rendering judgment. The color identification system, aimed at color blind, can be greatly beneficial to a group which represents such a significant percentage of the population. Its use, given the characteristics of the system, means a practically insignificant cost and its adoption by the industry and society can improve the satisfaction and wellbeing of a group of individuals whose particular vision characteristics deprive them of a fully independent and tranquil every day experience of picking their clothes.

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