The Roles of Colours in the Multimedia Presentation Building

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***Abstract* – This paper desribes concept of colours and their usage in the multimedia and Web presentation. Given is explanation of the influence of light on the human eye. Also describes the spectar of colours and the meaning of colours in creating the new Web presentation of High school of electrical engineering in Belgrade.**

***Keywords* – Human eye, light, colour, presentations, meaning of colours, colour scheme.**

I. Introduction

The eye has two main component: the lens and the image sensor. The lens contains part of the light refelected from some objects and polarizes it on the image sensor. The image sensor then changes the light sample into a nerve signal [1].

The eye has two lenses. One of them is the meniscus of the eye which is called the Cornea and the other lens is an adjustable one inside the eye. The cornea does most of the refraction of light [1,2].

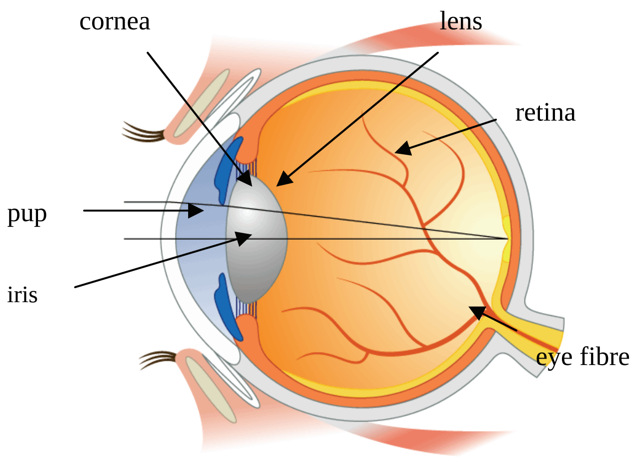

Fig. 1. Human eye

The surface sensitive to light which covers the inner surface of the back of the eye is called the retina. As seen in Fig. 1. the retina can be devided into three main layers of specialized nerve cells: one for changing light into nerv signals, one for processing images and one for transmitting information to the optical nerve found in the brain.

There are two kinds of cells which detect light: wands and cones so called because of the physical shape when seen under the microscope.

The receptor "corks" – Fig. 2. are specialized in colour distinction, but can work only when there is enough light.

There are three kinds of "corks" in the eye: sensitive to red, sensitive to green and sensitive to blue. This sensitivity to different colours occures because they contain different photopigments that is chemicals which absorbe different wavelenghts of (colour) light [3].

Fig. 3. shows wavelenghts of the light which trigger all three kinds of receptors.This is called RGB coordinating and it shows how the colour information leaves the eye through the optic nerve. Human perception of colour is more complex because of the nerve`s processing at the lower levels of the brain.

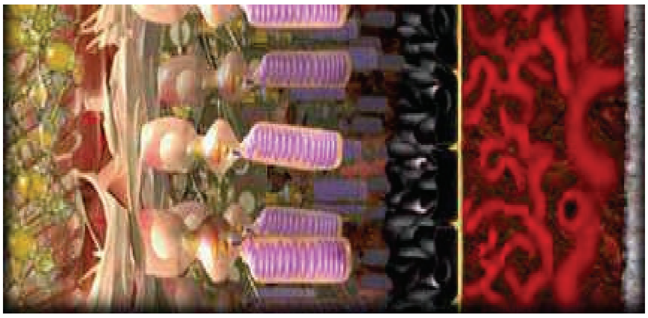

Fig. 2. The receptor "corks".

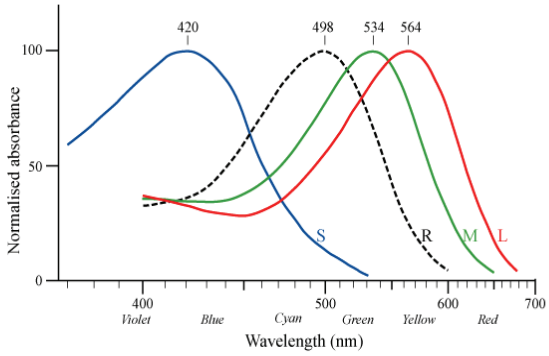

Fig. 3. Wavelength of the light which trigger all three kinds of receptors.

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RGB coordinating is converted into a different coding scheme where colours are classified as: red or green, blue or yellow, light or dark.

RGB coding is an important limit of human eyesight: wavelenghts which exisist in the environment are grouped into only three wide categories.

Visible light consists of seven groups of wavelenghts. Those are colours seen in the rainbow: red, orange, yellow, blue, indigo blue and purple. The lights represents one form of the electromagnetic spectar.

The electromagnetic spectar represents a collection of all energies organised into different categories established on wavelenghts for all types of energy.

II. COLOURS

The human eye can recognize only visible light. When we look at the sun it seems colourless or white. White light is not a light that consists of only one colour or frequency, but is made up of many colour frequencies.

The combination of any different colours in the visible spectar produces a light which is coloured or white. For us to be able to see the red colour of an object there must be a source of light for example the sun.

When an object receives a light wave it emmits a light wave red in colour, or it absorbs a spectar of blue or green colour but it reflects a spectar of red colour which we recognise with our eyes.

Red, blue and yellow are called basic colours because together they produce white light. This model of forming colour is called the adaptive model in physics. White and black are not colours because in the absense of any kind of light white becomes black and that is reason why we cannot see anything in the dark.

Our eye registers light and all its components (red, gree and blue) as white. The absense of any source of light the eye registers as black. An the intervalues of light of equal intesity of the basic components is registred as gray.

As we can see from combining these three colours will give us any colour from the colour spectar. So where blue and green overlap we got cyan, red and blue become magenta, red and green become yellow.

III. COLOUR SCHEMES FOR MULTIMEDIA PRESENTATION

The first step in making colour schemes for multimedia presentations is defining the target group that watches your presentations.

If they are young , use bright colours. If you are marketing for sales purposes use natural colours like green and blue.

You need to choose a one colour tone to accentuate page allocation. Next choose a colour to complement the first colour to use for titles and subtitles.

Mostly commonly used colour scheme:

- **Warm colours** – Fig. 4. : from red – purple to yellow. Those colours make excellent contrast.
- **Cold colours** – Fig. 5. : from purple to green – yellow.Those colours are excellent for texts.

Figure 4. Warm colours.

Figure 5. Cold colours.

A. Complementary colours

Complementary colours are directly opposite each other on the colour wheel. These colours should be used carefully as they are in direct opposition but providean excellent contrast. For example red is complementary to green on the colour wheel.

When using complementary colours next to each other, vibrations that give a very pleasent feeling and really attract attention, are created. (Fig. 6.)

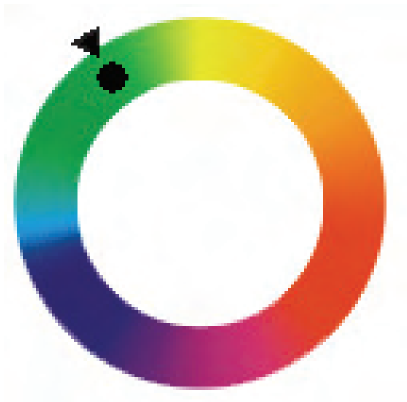

Fig. 6. Colour wheel.

B. Analogue colours

Analogue colours are any three successive colours segments on the colour wheel. These colours produce enough differentiation of elements without stepping away from the union of elements.

C. Monochromatic colours

Monochromatic colour are all variations of the colour segments on the colour wheel (Fig. 6.). You can use these colours without any fear because the represent a variation of one colour but the contrast is weak. They provide harmony because all elements have something in common.

D. Traditional colours

Traditional colours are any three colours found at an angle of 120^0 one is respect to the other . If the Colour Wheel were a clock the blue would be at 12 o`clock, green at 4 o `clock and red at 8 o` clock. This colour scheme gives presentation a good colour balance.

IV. The Meaning of Colours

Colours have a direct and intesive influence on humans. To a wide degree, our actions and rections depend on colours. Lighter colours for example produce emotional responces. When the Blackfriar Bridge, in London, was painted green, the number of suaside jumps was lowered by 34%.

The human eye can see about seven million colours. When our eyes move from one colour to the other it adapts to the change in colour.

Depending on that adaptation we register the so called visual effect. Lighter colours reflect more light which stimulates our eyes [4]..

The human eye first registers light colours. The colour first noticed is yellow. Big contracts between colours blind the human eye so they are hard to look at.

The meaning of colours mainly depends on the culture we were brought up in; for example red does not have the same meaning in U.S.A and in China. Just guess why. The meaning also changes because of our age and gender.

For examply women prefer colours from red to blue while men prefer colours that are their opposites. Older people prefer darker colour to light ones [4,5].

The meaning of colours is also very important in creating a Web sites.

The colour scheme of the Web site of High school of electrical engineering in Belgrade (new version which is in creating) is based on three different colours (Fig. 7.)

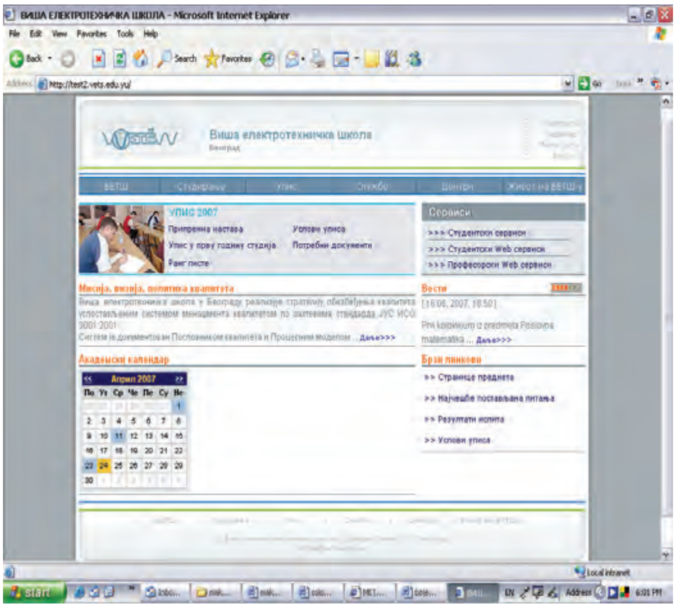

Fig. 7. Web site of High school of electrical engineering in Belgrade.

On the Fig. 8. above, is given the colour scheme into Web site of High school of electrical engineering in Belgrade.

HTML Color Name	**Sample**		**Hex triplet**
	(rendered by name)	(rendered by hex triplet)	
lightgrey			#D3D3D3
gray			#808080
darkgray			#A9A9A9
dimgray			#696969
lightslategray			#778899
slategray			#708090
darkslategray			#2F4F4F

Fig. 8. Colour scheme.

V. The Explaination of Colour Scheme

A. Blue

Blue is one of most popular colours for presentation. It mirrors quite, harmony, trust and stability. Blue is often a colour used to symbolize honesty and trustworthiness. Blue is associated with water; on coloured maps, oceans, lakes, and streams usually appear blue. This colour agrees with other pastel colours and is perfect with natural colours like green and gray [4,5].

B. Green

Green shows care. It makes positive negative feelings.. Green presents loyalty and intelligence. Green takes up a large portion of the CIE chromaticity diagram because it is in the central area of human color perception[4,5].

C. Grey

Grey looks like a shadow but it represents practicality, safety and credibility when used with cold tones of blue or magenta. Grey symbolizes mediocrity, the background noise. A "grey person" is someone who goes unnoticed, a wallflower [4,5].

D. Orange

Orange is contrasting to blue and highy visible against a clear sky. Therefore, orange is often used for safety. The colour is often used to enhance visibility [4,5].

VI. Conclusion

Web colors are colors used in designing web pages, and the methods for describing and specifying those colors. Authors of web pages have a variety of options available for specifying colors for elements of web documents.

Web colors have an unambiguous colorimetric definition, sRGB, which relates the chromaticities of a particular phosphor set, a given transfer curve, adaptive whitepoint, and viewing conditions. These have been chosen to be similar to many real-world monitors and viewing conditions, so that even without color management rendering is fairly close to the specified values. However, user agents vary in the fidelity with which they represent the specified colors. More advanced user agents use color management to provide better color fidelity; this is particularly important for Web to print applications.

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