RGB COLOR WHEEL INTENDED TO CREATE COLOR HARMONY COMPOSITIONS IN MODERN ART AND DESIGN

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Abstract:-

The existing RYB color wheel widely used to create harmonic color compositions is not applicable in modern digital art and design. The reason is that colors formed by light, "additive colors", and those formed by pigments, "subtractive colors" did in fact operate by different rules, and had different primary and complementary colors. So new color wheel is proposed - "RGB color wheel" suitable .to work with colors in digital environment.

The RGB color wheel is based on the primary colors R, G, B, defined by sRGB color space, create by additive mixing 3 secondary and 6 tertiary harmonic colors with which many different types of harmonic color compositions can be realized.

An analogue RGB color wheel is proposed with pastel colors suitable for print.

New definitions for Hue, Saturation and Lightness color-making attributes are formulated which correspond to the contemporary high level of computer technologies.

There are some recommendations how the new RGB color wheel can be used with the HSB model to create attractive and pleasant images with color harmony in digital design.

INTRODUCTION

Color theory encompasses a multitude of definitions, concepts and design applications - enough to fill several encyclopedias. However, there are three basic categories of color theory that are logical and useful: The color wheel, color harmony, and the context of how colors are used.

Subjects of Investigation

To **devise a model** intended to work with colors and to create harmonic color compositions in paintings and design projects where computers are used.

To create in the HSL model, new definitions for Hue, Brightness, Lightness, Saturation and Chroma, corresponding to the contemporary level of computer technology applied in digital arts and design.

How can we use successfully the RGB color wheel model and the HSB model to create harmonic colors in graphic design projects.

Motivation

In order to motivate our intentions and achievements, have been analyzed the theory and practical implementation of the idea of color harmony as well as the creation and development of color wheels as models for working with colors and creating harmonic color compositions.

Color harmony

Color harmony is essential in our life, in art and design. The visual perception of color harmony is a very complex process [34].

Despite this, as a result of many years of scientific research and experiments, formulas, definitions, **methods and models** for evaluation and creation a color harmony in the real life and in art and design, were invented [34].

Color wheel

In 1704 Isaac Newton created a color circle, which was accepted by artists as a very useful model for their creative works. Today there is a variety of color wheels which are applied in different areas of human activity [4].

Complementary colors and color harmony

Goethe's theory of color harmony created on the basis of "**opposed**" colors (later called complementary colors), in the color wheel became the foundation of the theory of colors in the following centuries [5][6].

Complementary colors which existed opposite each other in the color wheel produce strong contrast and a visual perception for "color harmony" [3].

A variety of harmonic colors and harmonic color combinations were invented later to create different successful harmonic color compositions in art and design - split-complementary colors, analogous colors, triadic and tetraedic color schemes and others [32].

Between 1919 and 1922, **Johannes Itten** proposed a "color sphere" based on "contrast by hue". It seems that the Itten's "color sphere" is the first color wheel with harmonic colors [14][15][16][25].

The Itten's "harmonic color wheel" was recognized by artists and designers as very useful for their creative work. Developed further to satisfy the specific requirements for practical use, the Itten's color wheel became a real model for creating harmonic color compositions in arts and design.

Color wheels RYB and RGB

When Thomas Young (1773–1829) showed by experiments that colors can be created by combining the light of just three colors; red, green, and blue, the additive color theory and the RGB color model were invented [33].

At the same time, David Brewster (1781–1868), proposed a competing theory that the true primary colors were red, yellow, and blue, and that the true complementary pairs were red– green, blue–orange, and yellow–purple [33].

This brought to confusion between the behaviour of light mixtures and the behaviour of paint, ink, dye, or pigment mixtures. A German scientist, Hermann von Helmholtz, (1821–1894), resolved the problem. He called colors formed by emitted light, additive colors, and those formed by pigments, subtractive colors. Additive and subtractive colors, **in fact operate by different rules, and have different primary and complementary colors** [33].

In the 18 century, observing different paintings or pigments used by the artists, a color wheel has been established with primary colors red, yellow and blue as being an useful model for working with colors. The corresponding secondary

colors are green, orange and violet or purple. The tertiary colors are green-yellow, yellow-orange, orange-red, red-violet, violet-blue and bluegreen (fig 1)[19].

Fig 1. RYB color wheel

Variety of the RYB color wheel and its application existed today [29][30].

Conclusions
The RYB color wheel intended for arts and design where colors are formed by reflected light is not appropriate for arts and design based on new digital technologies where colors are formed by emitted light.
In the place of the color wheel with red, yellow and blue primary colors (RYB) we invented a color wheel with red, green and blue primary colors (RGB).
The use of complementary colors is an important aspect of aesthetically pleasing art and graphic design. This also extends to other fields such as contrasting colors in logos.

We propose RGB Color Wheel intended to work with colors and to create harmonic color compositions in paintings and design projects in digital environment

The RGB Color Wheel
RGB color wheel with harmonic colors (fig 2).

Fig 2. RGB color wheel

The RGB color wheel primary colors and structure
The RGB color wheel primary colors
For primary colors in the RGB color wheel are accepted **red (R), green (G) and blue (B)** with values defined by the Photoshop sRGB color space. **The RGB color wheel structure The** RGB color structure is as follows:
The three primary colors are positioned at equal distances, occupying each of them a space of 30^0. Each of any two adjacent primary colors are mixed creating secondary colors **yellow (Y), violet (V) and cyan (C),** occupying each of them a space of 30^0. Every adjacent primary and secondary colors are mixed creating tertiary colors **red-violet (RV), blue-violet (BV), blue-cyan (BC), green-cyan (GC) and green-yellow (GY),** occupying each a space of 30^0.
RGB color wheel consists of the following harmonic colors:
    red, red-violet, violet, blue-violet, blue, blue-cyan, cyan, green-cyan, green, green-yellow, yellow, orange
with their designation and values in hexadecimal form (Table 1).

Table 1

R	# FF 00 00	C	# 01 FF FF
RV	# D205E2	CG	# 00 CC 99
V	# FF 00 FF	G	# 00 FF 00
VB	# 8A 2A E3	GY	# AD FF 30
B	# 00 00 FF	Y	# FF FF 00
BC	# 01 8B 8D	O	# EE A5 00

The matrix (fig 3a) and the method (fig 3b) used to create the RGB color wheel.

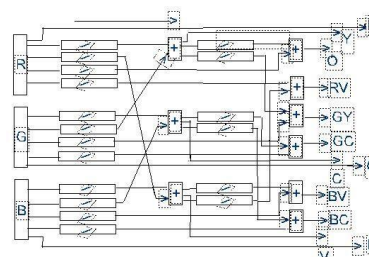|		
R	254 0 0	
RV	210 5 226	
V	255 39 255	R
BV	138 42 227	
B	0 0 255	
BC	1 139 141	
C	0 255 255	G
GC	0 204 123	
G	0 255 0	
GY	173 255 48	
Y	255 255 0	B
O	254 165 0	

fig 3a   **fig 3b**

Complementary colors in RGB color wheel and RYB color wheel

The complementary colors in the RGB color wheel and the complementary colors in the RYB color wheel are different. (Fig 4)(Table 2).
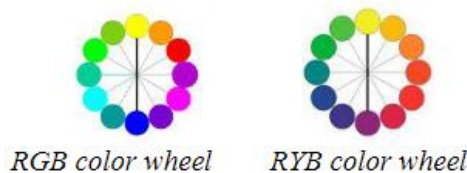

RGB color wheel   RYB color wheel

fig 4

Table 2

Complementary colors in RGB color wheel	Complementary colors in RYB color wheel
Yellow and Blue	Yellow and Violet
Orange and Blue-Cyan	Orange and Blue
Red and Cyan	Red and Green
Red-Violet and Green Cyan	Red-Violet and Yellow Green
Violet and Green	Violet and Yellow
Violet–Blue and Green Yellow	Violet- Blue and Orange Yellow

Harmonic compositions with the colors in the RGB color wheel

Different kinds of harmonic color compositions using the seven color schemes can be created with the RGB color wheel (fig 5).
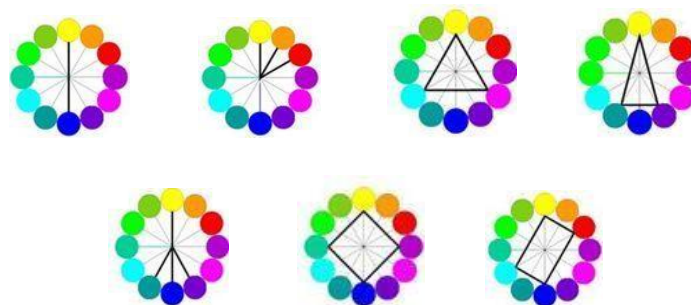

Fig 5

All harmonic color compositions can be accomplished by rotating the geometric figures in the illustration (fig 5)

RGB color wheel for print

RGB color wheel for print is illustrated (fig. 6).

Fig. 6 RGB color wheel for print

RGB color wheel for print consists of the following harmonic colors with their designations and values in hexadecimal form (Table 3).

Table 3

R	#F0 1E 1F	C	# 51 C8 C4
RV	# C9 00 8C	CG	# 08 B0 97
V	# AB 27 95	G	# 3B 99 5A
VB	# 8A 3 19A	CY	# 97 C9 70
B	# 34 52 AA	Y	# F1 E9 64
BC	# 01 8B 8D	O	# F2 9B 65

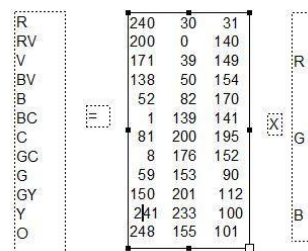**The matrix (fig 7) used to create the RGB color wheel for print.**

Fig 7

Conclusions

The invented RGB color wheel, based on Red, Green and Blue primary colors, is a useful model to work with colors in digital arts and design.

With RGB color wheel colors, compositions in computer generated images and paintings can be created easily and efficiently. On the base of the original RGB color wheel, is devised a RGB color wheel with pastel colors suitable for print.

New definitions for Hue, Brightness, Lightness, Saturation and Chroma, corresponding to the contemporary level of computer technology applied in digital arts and design.

The HSL model

HSL (Hue, Saturation, Lightness) and HSV (Hue, Saturation, Value), two alternative representations of the RGB color model, were designed in the 1970s by computer graphics researchers with the scope to make more similar color-making attributes to human perception. The HSL model resembled the color models such as NCS or Munsell [11][20][21]26][27]. In 1979 Tektronix introduced graphics terms for color designation. Definitions for Hue, Brightness, Saturation and Chroma corresponding to the computer technologies and their applications at that time were devised [28].

Later, a new model, based on the projection of the RGB cube as a hexagon in the "chromaticity plane" was invented [28].

Our intention was

To invent:

•New definitions for Hue, Brightness, Saturation, Lightness and Chroma appropriate for today digital art and design;
•How can we work successfully with colors using the RGB color model and the HSB model.

Motivation

The existing definitions for Hue, Saturation and Brightness are invented in the 70s of the last century and were corresponding to the level of development and application of the computer technologies at that time. This circumstance provoked the necessity of the creation of new definitions for Hue, Saturation and Brightness, which are corresponding to the computer technology high level today.

Preliminary notes Colors in the RGB color model

A color in the RGB color model is described by indicating how much of each of the red, green, and blue is included. The color is expressed as a RGB triplet (r,g,b), represented in decimal and hexadecimal numbers. Each component can vary from zero to a defined maximum value. The component values are often stored as integer numbers in the range of 0 to 255.

New definitions for Hue, Brightness, Saturation, Lightness and Chroma corresponding to the contemporary level of the computer technology applied in digital arts and design Hue

The definition for Hue is "attribute of a visual sensation according to which an area appears to be similar to one of the primary colors: red, green, and blue, or to a secondary color which is formed by the sum of two primary colors of equal intensity".

Hue in the Photoshop Color Picker

Hue, marked with "H" in the Photoshop HSB model is measured with a number in degrees, showing its exact position in the light spectrum.

Hue is defined by the maximum color intensity with value of 255 of one or two R, G B color components. **Brightness**

The definition for Brightness is "attribute of a visual sensation according to which a perceived color area appears to be more or less light and colorful"

Colorful is the attribute of a visual perception according to which a perceived color area appears to be more or less chromatic

Brightness in the Photoshop Color Picker

Brightness, marked with "B" in the Photoshop HSB model. is measured with a number in percent.

Conclusions and recommendations:

1. Decreasing brightness (B) means to decrease the color lightness and the color chromacity (color intensity). (Fig 8).

B = 100%   B = 50%

fig 8
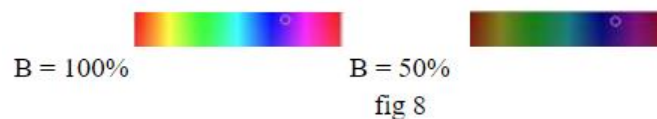
Therefore

a) If pre-selected colors are out of the printing gamut, it is enough to decrease their brightness (B), which will make them pastel colors;

b) If it is necessary to reduce the color intensity of a color pre-selected as a harmonic color in a harmonic color composition, it is sufficient to decrease its brightness (B).

2. A series of color nuances can be created by reducing the color brightness (fig 9).

B = 100%   B = 70%   B = 37%

Fig 9
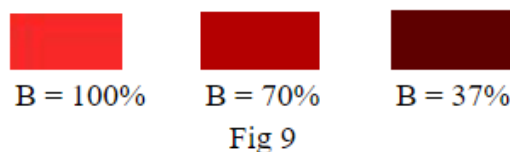
Therefore if we want to create different harmonic color nuances of a given color, it is enough to decrease its brightness (

B). Lightness

The definition for Lightness is "attribute of a visual sensation according to which a perceived color appears more or less light".

Lightness can be changed by changing brightness (B) (fig 10b) or saturation (S)(fig 10c) in the HSB model. (fig 10).

B=93%,S=56%   B=49%,S=56%   B=93%,S=6%
RGB(238,102,102)   RGB(124,53,53)   RGB(238,223,223)
Fig 10a   Fig 10b   Fig 10c
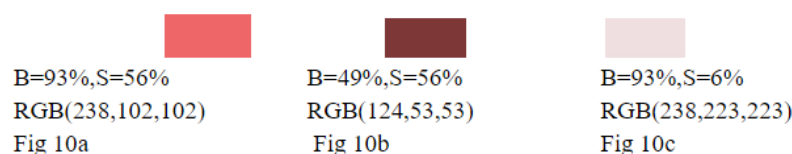
Lightness of a color can be expressed also as a "contrast", defined by the amount of "black" in the color.

In the Grayscale mode, **color lightness** can be measured with "K" (Photoshop Info window). For example the orange color **Orange** (fig 16a) has a contrast K = 51%.

Conclusions and recommendations:
A series of harmonic color nuances can be created when the **color** lightness is changed, (fig.10).

Saturation
The definition for saturation is "attribute of a visual sensation according to which a perceived color area appears more or less light and intense in an inverse proportionality".
Saturation in the Photoshop Color Picker
Saturation, marked with "S" in the Photoshop HSB model is measured with a number in percent. (fig 11).

S=100%,B=100%   S=23%,B=100%
RGB(0,255,0)   RGB(196,255,196)

Fig 11

As **pure colors** can be accepted all primary and secondary colors and colors mixed of every two of them or with the third color equal to zero.

Pure colors have saturation S = 100%. All other colors have saturation S < 100%.

Geometrically primary and secondary colors are placed on the RGB triangle outlines. All other colors are inside of the RGB triangle.

Recommendations
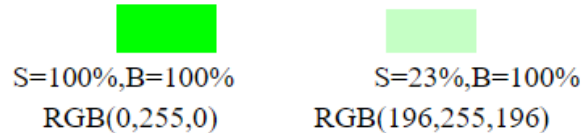If we want to create different harmonic color nuances of a given color, it is enough to change its saturation (S).

Example
Harmonic composition with two or three analogous colors, some of which with different lightness - from light to dark, makes the visual perception of the image pleasant and contrasting. (fig12).
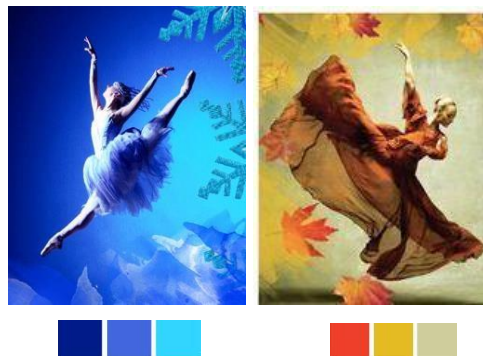
fig 12. Composition with analogous colors

The harmonic color compositions (fig 12) are created with analogous colors from the RGB color wheel with colors suitable for print (fig 3) and the corresponding areas with Saturation and Brightness values in Photoshop Color Picker. (fig 13).

-Blue, Blue-Cyan and Cyan harmonic analogues colors and the corresponding windows with Saturation and Brightness values:
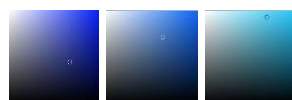
- Red, Orange and Yellow harmonic analogues colors and the corresponding windows with Saturation and Brightness values
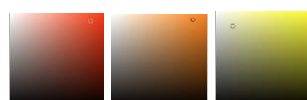
Fig 13

Chroma
The definition for Chroma
Chroma and Saturation are "attitudes of perceived color relating to its chromacity or color intensity".
Chroma defines how intense a perceived color is. Saturation defines how light a perceived color is.

How can we use successfully the RGB color wheel model and the HSB model to create harmonic colors in graphic design projects?
1. Appropriate colors must be determined according to the content and the images in the graphic design project.
2. We choose which color scheme (one of the 6 existing schemes) would be suitable for each case.
3. We select the colors from the RGB color wheel or from the RGB color wheel for print.
4. We create color nuances choosing different values of color saturation and brightness from the corresponding windows with Saturation and Brightness values.

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%D0%B4%D0%B8%D0%B7%D0%B0%D0%B9%D0%BD/%D0%BA%D0%B0%D0%BA%D0%B4%D0%B8
%D0%B7%D0%B0%D0%B9%D0%BD%D0%B5%D1 %82%D0%B5-
%D0%BA%D0%BE%D0%BC%D0%B1%D0%B8%D0%BD%D0%B8%D1%80%D0%B0%D
1%82-%D1%86%D0%B2%D0%B5%D1%82%D0%BE%D0%B2%D0%B5/

Application (The described theory background could serve as a prerequisite for knowledge extension of the corresponding color science areas)

A. Color harmony

It has been suggested that Colors seen together to produce a pleasing affective response are said to be in harmony. However, our visual perception of color harmony is a consequence of the influence of a range of different factors
The following conceptual model is the 21st century explanation of the phenomenon "color harmony":

$$\text{Color harmony} = f(\text{Col}1, 2, 3, \ldots, n) \cdot (ID + CE + CX + P + T)$$

Wherein color harmony is a function (*f*) of the interaction between color/s (Col 1, 2, 3, …, *n*) and the factors that influence positive aesthetic response to color: individual differences (*ID*) such as age, gender, personality and affective state; cultural experiences (*CE*), the prevailing context (*CX*) which includes setting and ambient lighting; intervening perceptual effects (*P*) and the effects of time (*T*) in terms of prevailing social trends [34].

Despite this, many color theorists have devised principles or guidelines for color combination with the aim being to predict or specify positive aesthetic response or "color harmony" [34].

B. Color wheel

Color wheel or colour circle is an abstract illustrative organization of color hues around a circle. In 1704 Isaac Newton devised a circle with seven spectral colors which was appreciated by artists as very comfortable for the color compositions in their paintings and design projects [4]. In the following centuries, scientists and artists developed and perfected further the Newton's color wheel (fig 1) [36].

Fig 1. Color wheels

In the early days of color theory, color wheel models have often been used as a basis for color combinations. Some theorists and artists believed that the positions of complementary colors in a color wheel will produce strong contrast causing visual sense of "color harmony".

C. Complementary colors and color harmony

The first systematic study of the physiological effects of colors was provided by Goethe in his Theory of Colours (1810). His observations on the effect of "opposed" colors led him to an arrangement of his color wheel - "the colours diametrically opposed to each other in the color wheel are those which reciprocally evoke other in the eye. Thus, yellow demand purple, orange – blue, red – green and vice versa, (the "opposed" colors were called later "complementary colors") [5] [6].

In 1828, the French chemist Eugene Chevreul, demonstrated scientifically that "**the arrangement of complementary colors is superior to any other harmony of contrasts**". His book on the subject (1839), showing how complementary colors can be used in everything from textiles to gardens, was widely read in Germany, France and England, and made complementary colors a popular concept. [3].

Inspired by the concept of "harmony", scientists developed color wheels based on different visions of color harmony: Ignaz Schiffermüller, Versuch eines Farbensystems (Vienna, 1772. "Color wheels can be used to create pleasing color schemes. **An analogous color** scheme is made up of colors next to each other on the wheel. For example, red, orange, and yellow are analogous colors" (fig 2)[35].

Moses Harris, in his book The Natural System of Colours (1776), presented a color palette with complementary colors []. "**Complementary colors** are two colors directly across from each other; for example, red and green are complementary colors" (fig 3) [35].

Fig 2 Analogous colors

Fig 3. Complementary

These color wheels have led to the idea of defining new kinds of harmonic colors and harmonic color combinations to extend the possibilities of creative use of the color harmony phenomenon [32]. They are:

Analogous colors
Analogous colors are every two adjacent colors in the color wheel. Color harmony with analogous colors is composed of two or more nearby colors and provides pleasant and soft color appearance.

Split-complementary colors
Split-complementary colors are like complementary colors, except that one of the complementary color is split into two nearby analogous colors.

Triadic and tetradic
Triadic and tetraedic color schemes use color polygons to create a stable, balance, with most colors harmonic color composition.
Tetradic color palettes use four colors, a pair of complementary color pairs. Tetradic colors can be found by putting a square or rectangle on the color wheel.

Johannes Itten was a Swiss painter, designer, teacher, writer and theorist. While teaching in Weimar between 1919 and 1923, he developed a universal doctrine of design and theorized seven types of color contrast, one of which was a "contrast by hue". He realized this idea as a "color sphere" with complementary harmonic colors (fig 4)[14][15][16]]25].

Fig 4. Farbkreis by Johannes Itten (1961)

Complementary colors in the color wheel are: Yellow and Purple (Violet), Orange and Blue Green, Red and Green.
The Itten's "harmonic color wheel" was recognized by artists and designers as very useful for their creative work. Developed further to satisfy the specific requirements for practical use, the Itten's color wheel became a real model for creating harmonic color compositions in arts and design.

D. Color wheels RYB and RGB
A British physicist, doctor and Egyptologist, Thomas Young (1773–1829), showed by experiments that it was not necessary to use all spectrum colors to create white light; it could be done by combining the light of just three colors; red, green, and blue. This discovery was the foundation of additive colors, and of the RGB color model. It led to the system used today to create colors in digital electronics, on a computer and color display [33].

When Young discovered additive colors, David Brewster (1781–1868), proposed a competing theory that the true primary colors were red, yellow, and blue, and that the true complementary pairs were red–green, blue–orange, and yellow–purple [33].

A confusion between the behavior of light mixtures, called additive colors, and the behavior of paint, ink, dye, or pigment mixtures, called subtractive colors arose.

Then a German scientist, Hermann von Helmholtz, (1821–1894), resolved the debate by showing that colors formed by light, additive colors, and those formed by pigments, subtractive colors, did **in fact operate by different rules, and had different primary and complementary colors** [33].

The additive mixing of two complementary colors gives a gray color, which was accepted as a scientifically explanation of the visual perception "color harmony" created by complementary colors

According to the typical paints or pigments, for primary colors in the color wheel blue, red, and yellow were confirmed. The corresponding secondary colors were green, orange, and violet or purple. The tertiary colors were green-yellow, yellow–orange, orange-red, red–violet, violet-blue and blue–green (fig. 5) [19].

Fig 5. Color wheel with Red, Yellow and Green primary colors

E. The HSL model Munsell's color system
"In the first decade of the 20th century, Professor Albert H. Munsell was the first to separate hue, value, and chroma into perceptually uniform and independent dimensions, and he was the first to illustrate systematically the colors in three-dimensional space. The system consists of three independent dimensions which can be represented cylindrically in three dimensions: *hue*, measured by degrees around horizontal circles; *chroma*, measured radially outward from the neutral (gray) vertical axis; and *value*, measured vertically from 0 (black) to 10 (white)(fig 6).

Munsell's system has outlasted its contemporary color models, and though it has been superseded for some uses by models such as CIELAB (*L*a*b**) and CIECAM02, it is still of wide use today". [11] [21[[26][28][29]
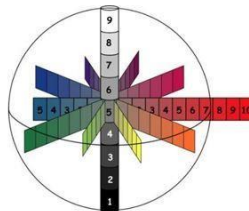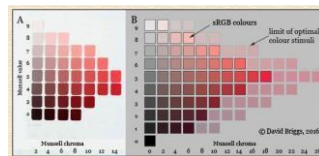

Fig 6. Munsell Color Wheel

The colors on the Munsell Color Wheel are: Red, Yellow-Red, Yellow, Green-Yellow, Green, Blue-Green, Blue, Purple-Blue, Purple, Red-Purple. In the vertical strip gray colors change from black to white.

Munsell's chroma
Fig 7.A &B

A. SR hue page from the Munsell's book of Color, Glosary Editon.
B. The page for Digital colors of a standard space (sRGB) color space and (shaded) limits of optimal color stimuli (theoretical limits of colors for light reflecting objects) [29]
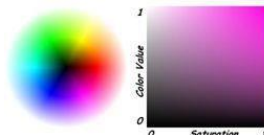   Munsell's color model (fig 8) and Photoshop color Picker "Saturation &Brightness" window (fig 9).

Fig 8.   **Fig 9**

The **HSL color model** was invented by Georges Valensi as a method to add color encoding signals to the black and white broadcast signal (without modification of the Luminance signal), allowing existing receivers to reproduce the new color broadcasts in black and white images. It has been used in all major analogue color broadcast TV systems - NTSC, PAL and SECAM and all major digital broadcast systems and is the basis for composite video [18].

Most mega Led screens, televisions, computer displays, and projectors produce colors by combining red, green, and blue light in varying intensities - the so-called RGB additive primary colors. **The resulting mixtures in RGB color gamut can reproduce a wide variety of colors. However, neither additive nor subtractive color models define color relationships the same way the human eye does** [33].

HSV and HSL models
In an attempt to accommodate more traditional and intuitive color mixing models, computer graphics pioneers developed the HSV model in the mid-1970s, formally described by Alvy Ray Smith in the August 1978 issue of Computer Graphics [24].

In the same issue, Joblove and Greenberg described the HSL model. [23].

These models were useful not only because they were more intuitive than raw RGB values, but also because the conversions to and from RGB were extremely fast to compute: they could run in real time on the hardware of the 1970s. Consequently, these models and similar ones have become ubiquitous throughout image editing and graphics software since then.

The following year, 1979, Tektronix introduced graphics terms using HSL for color designation, and the Computer Graphics Standards Committee recommended it in their annual status report. [30]

The definitions are as follows:

Hue
The "attribute of a visual sensation according to which an area appears to be similar to one of the perceived colors: red, yellow, green, and blue, or to a combination of two of them".

Radiance (Le,Ω)
The radiant power of light passing through a particular surface per unit solid angle per unit projected area, measured in SI units in watt per steradian per square metre (W·sr−1·m−2).

Luminance (Y or Lv,Ω)
The radiance weighted by the effect of each wavelength on a typical human observer, measured in SI units in candela per square meter (cd/m2). Often the term luminance is used for the relative luminance, Y/Yn, where Yn is the luminance of the reference white point.

Luma (Y′)
The weighted sum of gamma-corrected R′, G′, and B′ values, and used in Y′CbCr, for JPEG compression and video transmission.

Brightness
The "attribute of a visual sensation according to which an area appears to emit more or less light".

Lightness, value
The "brightness relative to the brightness of a similarly illuminated white"

Colourfulness
The "attribute of a visual sensation according to which the perceived color of an area appears to be more or less chromatic".

Chroma
The "colourfulness relative to the brightness of a similarly illuminated white"

Saturation
The "colourfulness of a stimulus relative to its own brightness".

Brightness and colourfulness are absolute measures, which usually describe the spectral distribution of light entering the eye, while lightness and chroma are measured relative to some white point, and are thus often used for descriptions of surface colors, remaining roughly constant even as brightness and colourfulness change with different illumination. Saturation can be defined as either the ratio of colourfulness to brightness or of chroma to lightness.

The HSL geometrical based model
The model invented by graphic researches published in the original Smith's paper (1978), was "based on the projection of the RGB cube (fig 10) onto a hexagon in the "chromaticity plane" (fig 10)[39].
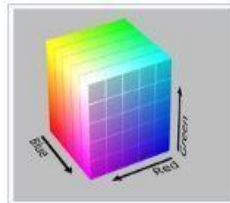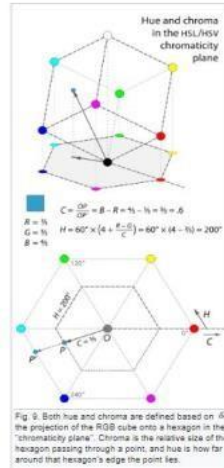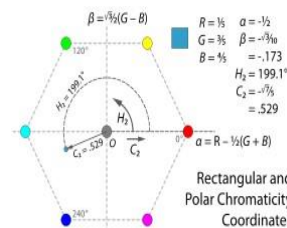
Fig 10 RGB gamut arranged in a cube

11a.Hue and chroma in a chromacity plane

11b. Chromacity coordinates Fig 11.

With this model Hue, Saturation, Chroma and Brightness are expressed in the chromacity plane and on the base of the devised definitions mathematical expressions were derived. [30]. The original purpose of HSL and HSV and similar models, and their most common current application, is in color selection tools"[31]. At their simplest, some such color pickers provide three sliders, one for each attribute. Most, however, show a two-dimensional slice through the model, along with a slider controlling which particular slice is shown.

The latter type of GUI exhibits great variety, because of the choice of cylinders, hexagonal prisms, or cones/bicones that the models suggest. Some more sophisticated variants are designed for choosing whole sets of colors, basing their suggestions of compatible colors on the HSL or HSV relationships between them.

Most web applications needing color selection also base their tools on HSL or HSV, and pre-packaged open source color choosers exist for most major web front-end frameworks. The CSS 3 specification allows web authors to specify colors for their pages directly with HSL coordinates.