

Color by interaction

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Approval Sheet

The project titled 'Color by interaction' by Sugandha Jain is approved for the partial fulfillment of the requirement for the degree of Master of Design in Product Design.

Guide:

Date:

Declaration

I declare that this written submission represents my ideas in my own words and where others ideas and words have been included ,I have adequately cited and referenced the original sources. I also declare that I have adhered to all the principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature:

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Preface

Color is everywhere and never do we see a color in isolation, it is always interacting with one color or other. Colors are very relative medium in art because in visual perception, it is never seen as the way it is physically. Color deceives continually, one and the same color can give different results.

I have chosen this project design research seminar on “Color by interaction” for two reasons.

1. My interest in this topic comes out of a realization that color is everywhere and in everything that we see, do and touch.

2. Better understanding in behavior of color will help in a controlled and better output.

This report, design research seminar will give some insights on how colors interact in different environment and how its effect can be varied by changing the surrounding of the same.

Objective

The aim of this project is to:-

- To develop an eye for color.
- To understand visually the manner in which color interact with the change in surrounding, form and intensity.
- Prepare a reference material for creating an awareness of color inter-dependability with form and placement, quality and quantity.

Introduction

In our day-to-day life we are surrounded with colors. Color is in everything that we touch or see, but then also we overlook the visual interaction of colors and how it is affected by different parameters like form, intensity and placement. This report discusses the various factors, which affect the visual perception of color. It briefly describes the various components of colors and its type.

Scope :

Scope of this project is to manifest how color reacts in different surrounding , form and intensity. It also states that to understand color one has to be sensitive and develop an eye for it. It will help people to understand the inter dependability of color with form and placement, quality and quantity.



color is everywhere, in everything we see.

<http://goo.gl/wJ9AVx> as on 12/02/2014

Color Basics

It is the visual perceptual property corresponding in humans to the categories called red, blue, yellow, green and others. Color derives from the spectrum of light (distribution of light power versus wavelength) interacting in the eye with the spectral sensitivities of the light receptors.

Dimensions of Color

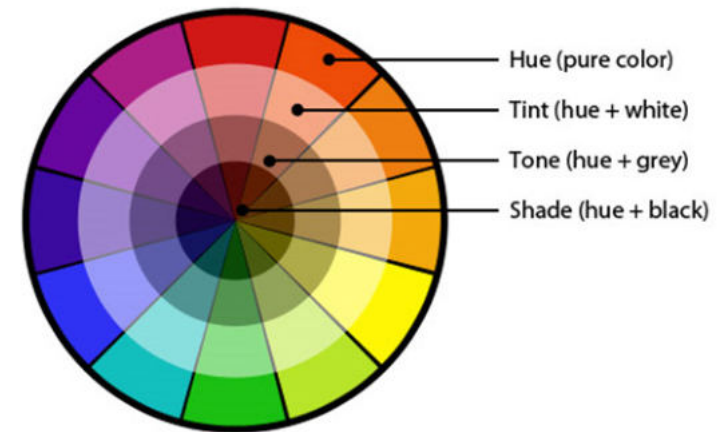
There are three dimensions of color:

- Hue - Is the name of a color. (red, blue, green, yellow)
- Value - The lightness and darkness of color.
- Intensity (Saturation, Chroma)- is the bright or dull quality of a color.

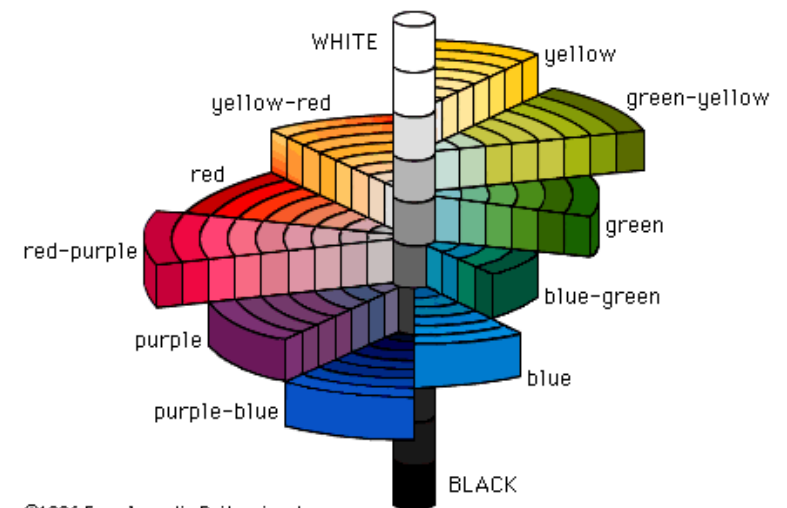
Attributes of Color

There are three attributes of color:

- Physical - impression
- Psychology/ emotional - expression
- Symbolic - construction



<http://goo.gl/BQlj6d> as on 12/02/2014



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<http://goo.gl/sD8Wa7> as on 12/02/2014

Hue:

Hue indicates the color's position in the spectrum and on the color wheel. It also indicates the warmth or coolness of a color.

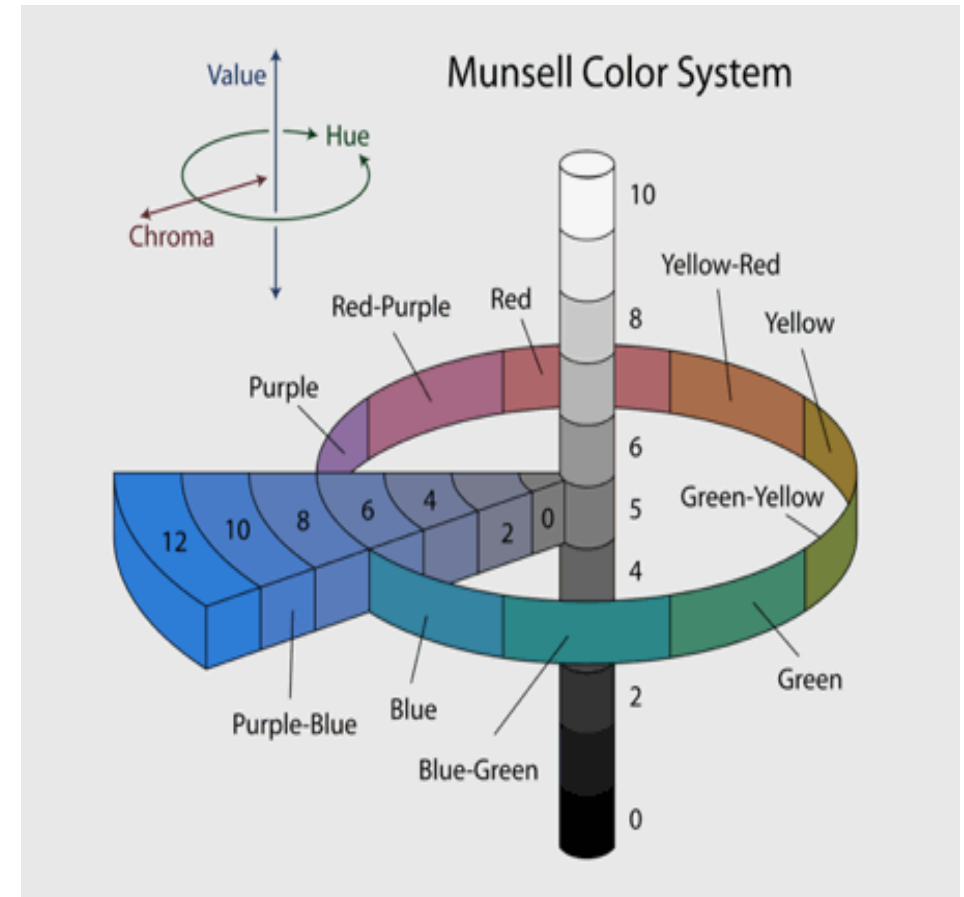
Value:

The term value refers to the dark or light quality of color. There can be a variety of values within any one hue:

- Tints: Light values (hue plus white). Red becomes pink
- Shades: Dark values (hue plus black) Red becomes maroon.
- Tones: Medium values (hue plus both black and white, or gray)

Intensity (Saturation, Chroma)

Intensity is the bright or dull quality of color. It indicates a color's degree of purity, strength, or saturation, which is determined by the quantity of the dominant hue.



<http://goo.gl/UxjNbQ> as on 12/02/2014

There are three basic categories of color theory .The color wheel, color harmony, and the context of how colors are used.

The Color Wheel

A Color Wheel or color circle is an abstract illustrative organization of color hues around a circle that shows relationships between primary colors, secondary colors, complementary colors.

Color Harmony

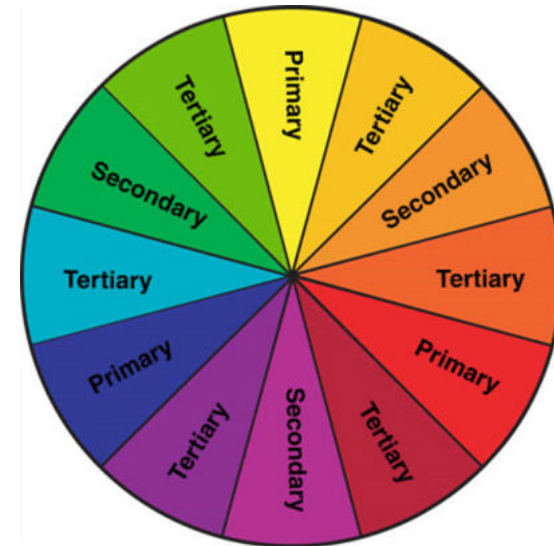
In visual experiences, harmony is something that is pleasing to the eye. It engages the viewer and it creates an inner sense of order, a balance in the visual experience.

Some Formulas for Color Harmony

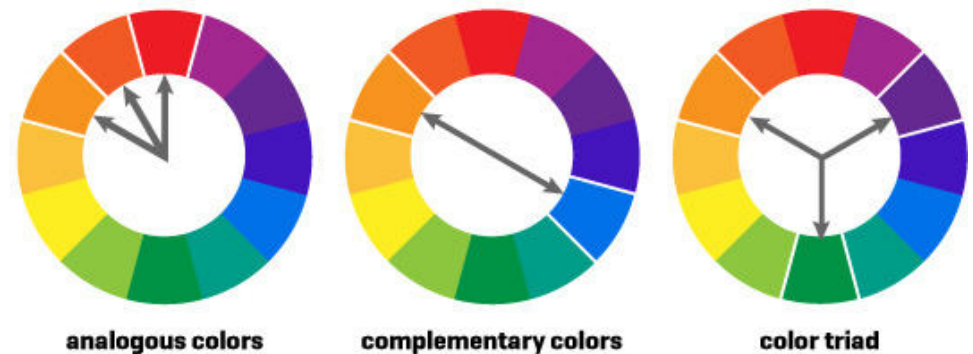
1. A color scheme based on analogous colors
Analogous colors are any three colors, which are side by side on a 12 part color wheel, such as yellow-green, yellow, and yellow-orange. Usually one of the three colors predominates.
2. A color scheme based on complementary colors
Complementary colors are any two colors, which are directly opposite each other, such as red and green and red-purple and yellow-green.

Color Context

How color behaves in relation to other colors and shapes is a complex area of color theory.



<http://goo.gl/xemX5p> as on 12/02/2014



<http://goo.gl/C2nWAT> as on 12/02/2014

Reality of colors

Color and design Industry

Color is the catalyst that can spark the sale, define the space and create the magic and the mood. When designing any product, knowing what colors to use is critical for success of a design industry. The state of color is always fluid, rushing forward and gathering influences from the world around us.

The current art movement influences the color trend of the industry. Interior décor and industrial products takes it cue from the clothing industry. And as the investment is high in this as compare to garments, the emphasis is likely to be on 'safe' colors. Despite the economic crunch, color ranges for all sorts of products should not be reduced. People tend to buy more than one piece of same kind of product if there is multiplicity of color.



<http://goo.gl/eqCwFA> as on 12/02/2014

Color at work

Color nomenclature is inadequate in response to the innumerable colors available.

In visual memory it is difficult to remember distinct colors. Color preference for a product depends a lot on cultural and climatic influences other than the complexion. For example white in western countries may represent brides, angels, peace etc., whereas white in some eastern culture may represent the color of mourning and funeral. It's very important for a designer to understand the cultural value of colors before designing the same. The darker the skin the brighter the color seems to be preferred by people.

Western

**excitement danger
love passion stop**

**brides angels purity
doctors peace**

Eastern

**good luck celebration
brides purity**

**funerals
death**



In India red is a symbol of wedding, celebration while to western world, it's a sign of danger.

Power of color

Color has power, it can cheer and depress, stimulate and tranquilize, provoke and antagonize. If appropriately used, it can enrich the environment, reduce boredom and prevent accidents and if not, it can cause strain and tension. The effects of color are immediately associated with emotions.

Color can have three major impact:

- Impression (visually)
- Expression (emotionally)
- Construction (symbolically)

Reddish browns, russet and ochres, the earthy colors are instinctively associated with warmth and cheer.

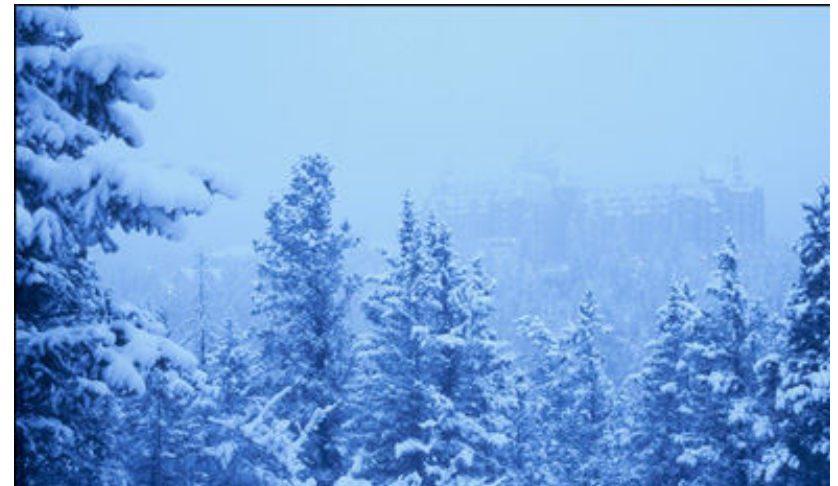
Strong, sultry red is an imperious color, it seems to challenge, to command attention.

Strong pinks and reds with a hint of blue are sensuous and voluptuous. Reds, oranges and yellow are thought of as warm colors; blues, greens and violets are felt to be cool. Although there is no clear dividing line between the two, it is generally believed that adding a touch of red to a color warms it and adding a little blue cools it.

Color can seem to change all the four dimensions. Bright colors create tension and aggression. Soft and subtle colors have the opposite effect.



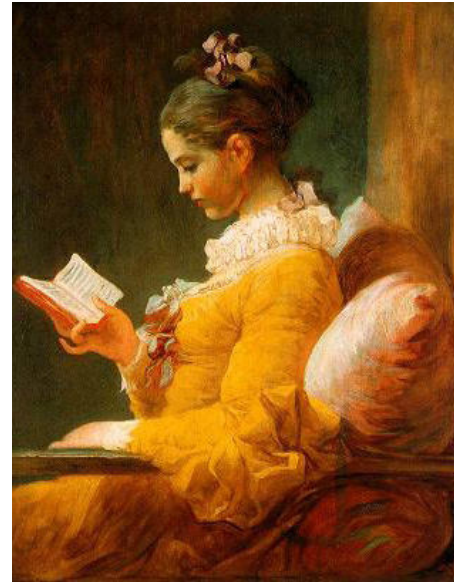
warm color



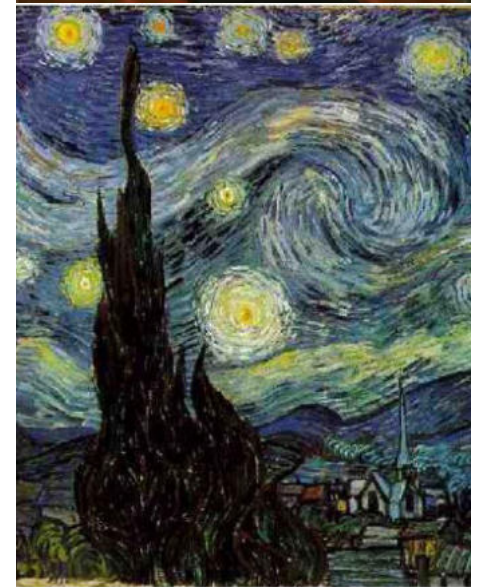
cool color

Artists using colors

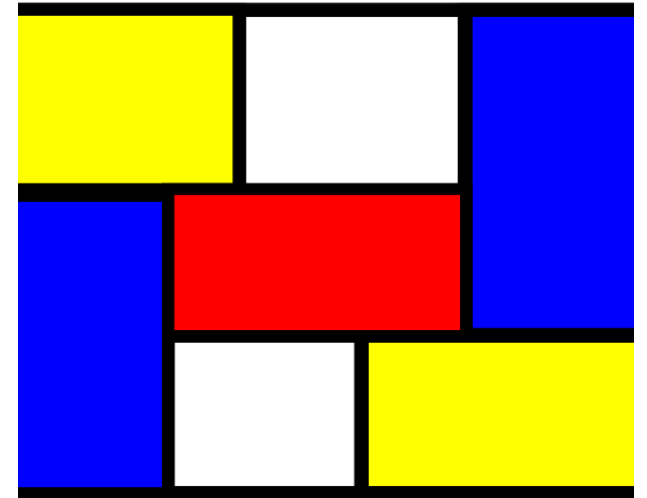
Rembrandt's works



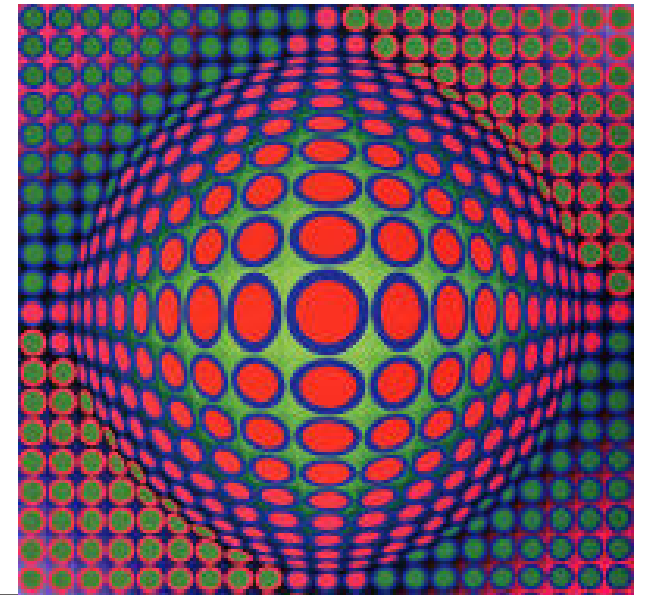
vincent van gogh's works



Mondrian's works



Vasarely's works



No more wet colors - using collage or color strips

There are many reasons why paper colors are preferred over wet colors. Some of the reasons are as following :

- Avoid unnecessary mixing of color paint, which is a very tedious task.
- Helps in keeping an active interest, as there are no failures of mixing and imperfect matching of paints.
- Precision can be maintained without the slightest change in tone, light or surface quality even in repetitive use of same color.
- Less tools and equipment required as compare to handling paints. It is cheaper, easier and more orderly.
- No undesired and unnecessary addition of texture caused by tools or varying hand pressure like brush marks and strokes.
- Choices of color selection increases as there is a large collection of tones displayed and one can compare neighboring and contrasting colors.

Color and its Interaction

Color is never seen or used as a single color, it is always related and connected to other colors. It is present in continuous flux, constantly related to its surrounding. Understanding the effect that one color placed next to another can help to create a certain atmosphere. Or it can prevent the atmosphere subtly induced by one color from being destroyed by its proximity to another.

The eye easily adapts to the sensation of a single hue, and such adaptation affects the perception of other colors seen immediately afterwards.

Flicker Effect

Flicker effect is an illusion of color seen when one looking at certain color rapidly changes to another. Red and blue are colors that flicker when seen together. The same happens with combinations of cyan and orange, yellowish red and greyish blue and red and green. These combinations will flicker only if both hues have

same saturation and lightness.

Flicker is an attention getting color device, most often used in advertising, in packaging and on signs, where the information conveyed by graphics or wordings must have immediate impact. Flicker does not seem to be pleasing to eyes, and for this reason it is rarely used in garment industry.

Color Harmony

Colors of the same hue but different saturation harmonize when juxtaposed. Similarly when light and dark of the same hue is used, it should harmonize as long as when they put together do not dull each other. Complementary colors and a series of contrasting colors are harmonious.

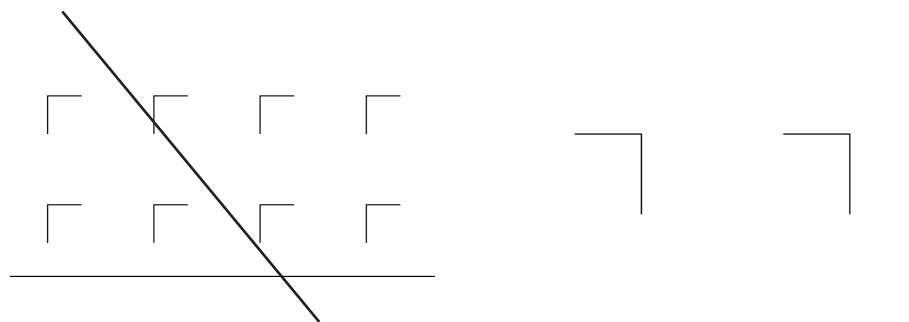
A color has many faces – the relativity of color.

This sample proves how color deceives with the change in surrounding. One and the same color can look so different in various surroundings. There are certain colors, which are very susceptible to change as compared to other colors.

It is very difficult to believe that upper and lower small squares are the same color

Correct way to demonstrate:

- Simultaneous influence from too many directions leads to illusional effects.



When relativity of color is seen from more than 1 direction it creates illusional effects leading to confusions

Correct way to demonstrate



The same patch of red looks different when it is placed in different background.

Color appears as 2 – Looking like the reversed grounds :

Same color can be looked as different color, if it's background is changed. Appearance of colors differ a lot when the background, scale and proportions are changed.



The same color can be perceived as entirely two different colors by changing the background. Here the same patch of orange when placed in a background of yellow



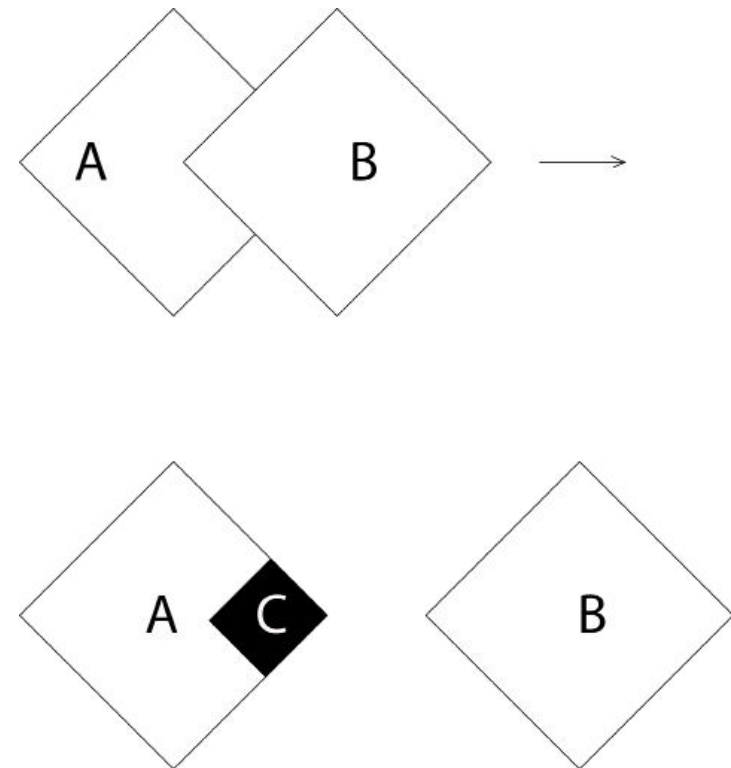
Here the relationship between the same two colors behave in a very different way, when its proportion and scale are changed.

Gradation of color, color intensity

It is very important to distinguish in high and low intensity between different hues. An exercise can be done to know whether one has a trained eye or not.

Exercise 1: To select the darker color from several pairs of color. The exercise needs to be produced for varying colors....and thus it proves that in certain colors

Darker color is the one that has visually more black into it. To find darker color in a pair a simple exercise can be done. 2 color sheets can be put on top of each other. Focus should be brought on the covering corner of the upper paper and then upper sheet should be removed quickly. If area 'C' appears lighter than the area 'A' than the upper paper is darker and vice versa.



Exercise 1 - to figure out lighter or darker shade.

Exercise 2: Gradation Studies

In order to be able to distinguish between lighter and darker in a color, color gradation exercise needs to be done demonstrating a gradual stepping up or down between white and black, between lighter and darker.

Exercise 3: Color intensity - brightness

Color intensity or brightness of a color is a very individual choice, and it's difficult for a group of people to agree upon the same intensity. This exercise deals with sorting out all possible shades and tints within a hue. It is biased towards individual choice.

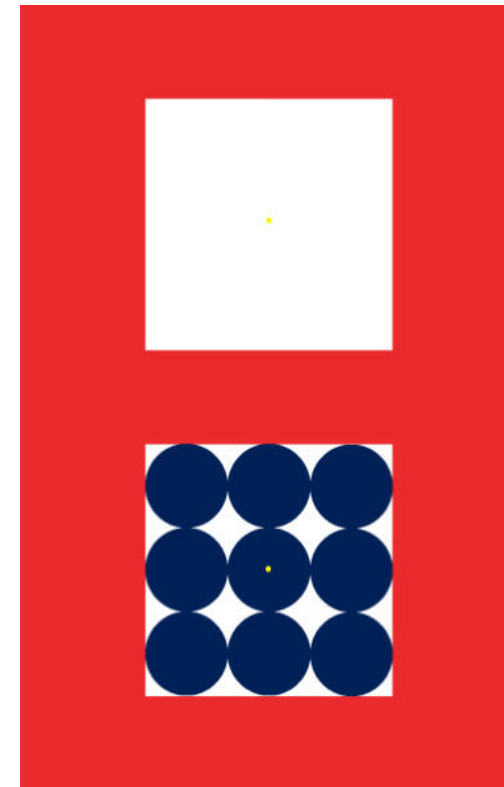


Exercise 3 - color Intensity

Color deception - after image

The phenomena of seeing complementary color, instead of white is called simultaneous contrast or after- image. No normal eye, no matter how trained it is can foolproof against color deception.

Color can be very deceptive. In this image, below image has blue circles of equal diameter which touch each other and fill out a white square. there is a yellow dot in the centre. While the image above has an empty white square, also with a centered yellow dot. Each on a black ground. After seeing box with blue circles for half a minute, suddenly shift the focus to upper box. One sees complement of blue color(yellow), diamond shapes in the leftover spaces.



Color mixing in paper

Color mixture in paper is a tough task as it all depends on the imagination. The mixing of 2 colors can produce many mixtures. To find out whether a mixture is convincing enough or not it should be placed in between the two-parent color.

A mixture depends upon the proportions in which colors are mixed.

Factual mixtures – additive and subtractive

Color mixture in paper is very illusive, so there are two ways of factual /physical mixing is analyzed.

a) Direct mixture of projected light. – Additive mixture

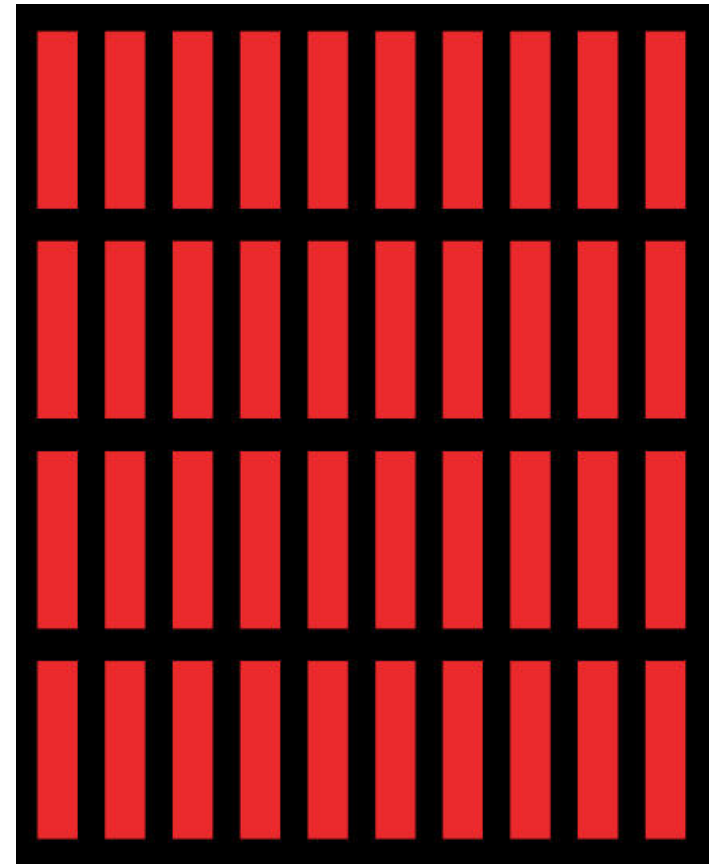
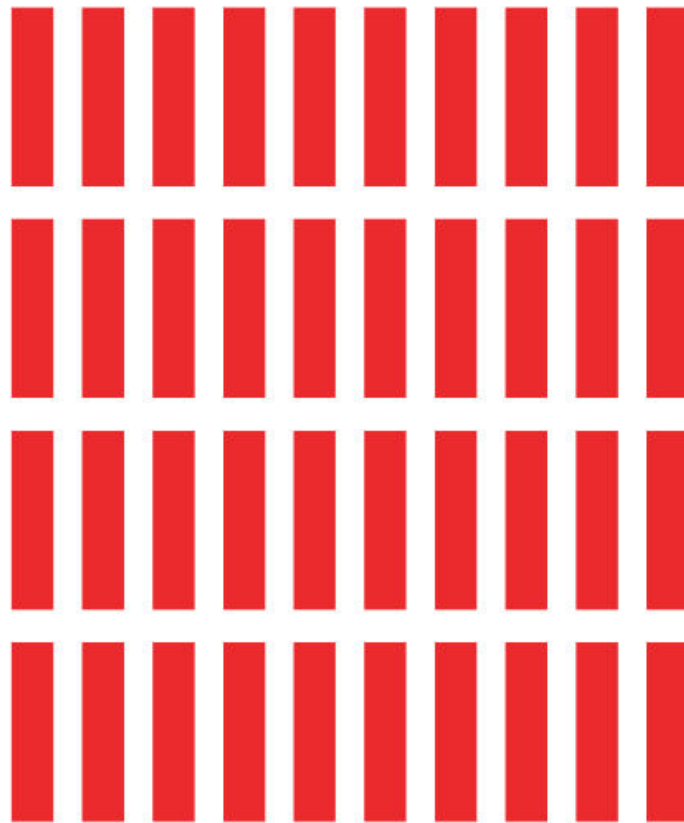
Its most familiar in theatre and advertising, in this overlapping of one color on top of other takes place. The mixture color is always lighter than the parent color. Sum of all the colors in light is white as it is already proven that color spectrum of the rainbow is a dispersion of the white sunlight.

b) Indirect mixture of reflected light – subtractive mixture

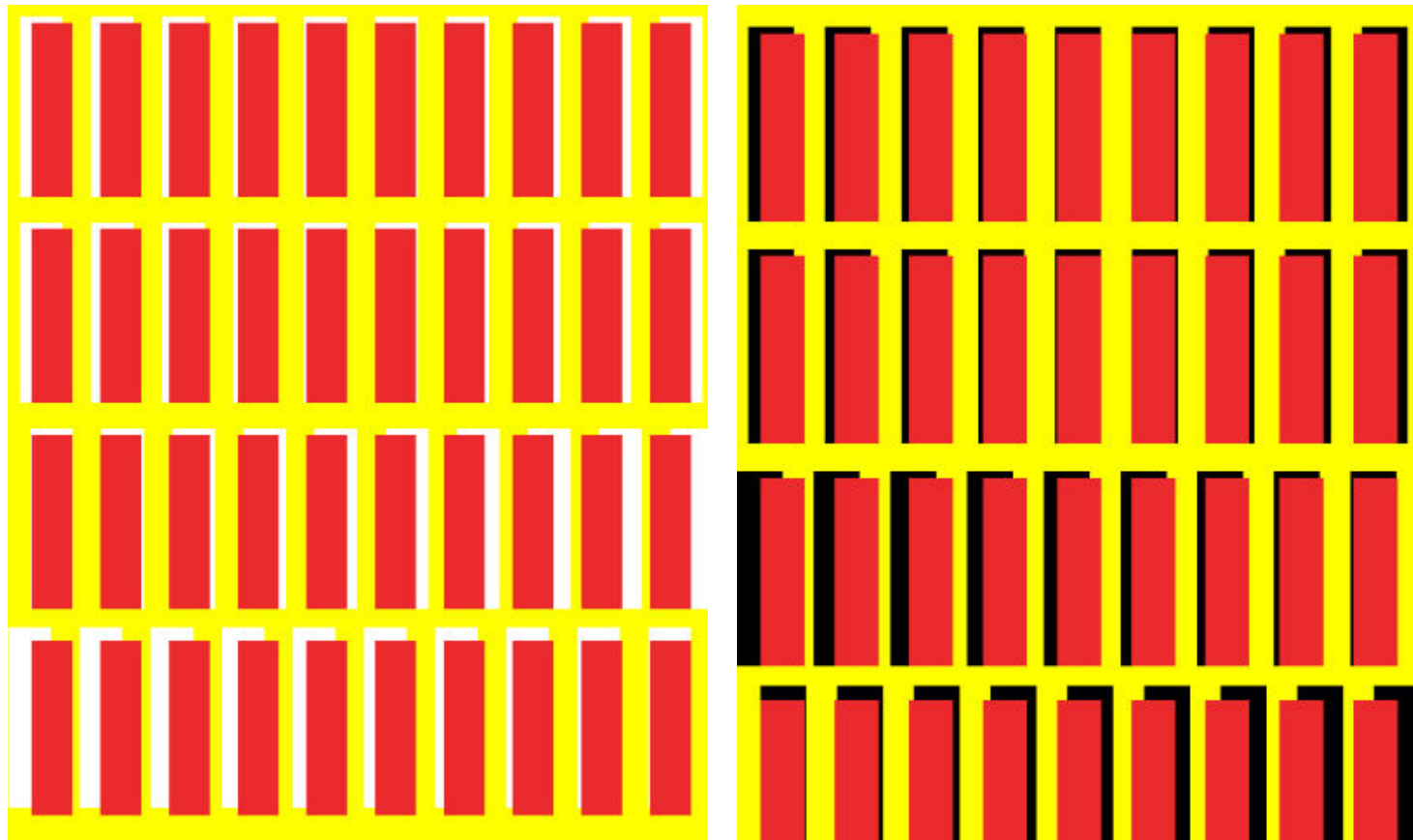
We see a reflected light when any pigment or paint is mixed on a palette. Sum of colors in this case is always leaning towards black. Under normal conditions, a subtractive mixture is not as light as the lighter parent color nor as dark as the darker parent color. The mixture is neither reciprocally higher nor lower in color intensity than the color parents.

Optical mixture

Two or more separate colors when viewed from a particular distance is perceived as another color. This new color that annuls, the first two colors is called optical mixture. This effect also depends on the size apart from the distance from it is viewed. In the example shown below, red rectangles when placed with white background appears much lighter than the red rectangles when placed in black background.



Optical mixture



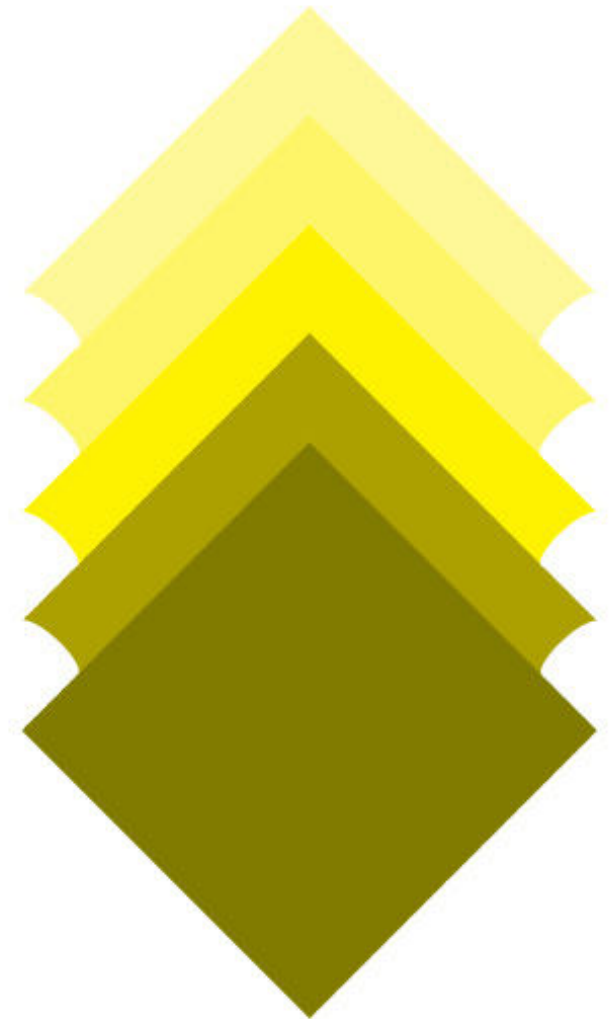
Substituting white for black, lights up all other colors. The one on left seems lighter than the one on right hand side. This demonstrate Bezold effect.

Intersection between colors

The true mixture is equidistant from both the parent color in terms of hue as well as light intensity.

The middle mixture if ideally placed, gives an illusion of space and volume if they are separate by boundaries. This is also known as fluting effect.

To achieve an illusion of intersecting colors, the separating boundaries of a middle mixture look elevated, or raised from the ground, causing a fluting effect. Here is a blown up view of the fluting effect, in this dark green color acts as a ground plan, and the channelings as 2 side elevations.



Color juxtaposition

Harmony, quantity, restricted juxtaposition

Harmony

- a) Color harmony happens when there is an equilibrium or symmetry to colors.
- b) Colors are connected in space and can be seen from any direction and pace.
- c) Color is represented by shape, size, repetition and placement.
- d) Complementary color is seen in an after image...but if this complimentary color is kept in different surrounding it will look different.
- e) Quantity, intensity, weight, transparency, space and intersection leads to illusions and new associations between colors.

Quantity

- a) It is dependent on the space- area and the frequency. Both of these are related to criteria emphasize and highlight.
- b) Reoccurrence, weight, intensity and intersection

The measure in mixture – Weber – Fechner Law

Physical fact – psychological effect

- While mixing pigments, the grades become darker and saturates at a certain point visually.
- The method of applying pigments on different layer is an additive mixture with respect to color and a subtractive mixture with regard to light.
- The change in the pigment grades visually appears to be in arithmetic progression, but this visual appearance depends on physical geometric progression.
- While perceiving the tints in AP, the boundaries become soft while in G.P boundaries remain clear and distinct.

Boundaries

Boundaries between the mixture and mixture parent help in recognizing the distance, nearness and equidistance between colors. Softer boundaries disclose nearness indicating connection and harder boundaries signifies distance, separation. In case of a middle mixture all the boundaries are equally soft or hard. The middle mixture appears frontal, as a color by itself only if it is of any symmetrical order.

Vibrating boundaries – enforced contours

If there are background and foreground of two near contrasting color and foreground has some pattern in it, than the boundaries of the pattern are not distinguishable because of the high contrast – when the focus is changed or the color quantity varies. This is also known as vibration effect.

Equal light intensity – vanishing boundaries.

Boundaries between two colors can be vanished, if they are of equal light intensity and they are kept adjacent to each other.

Inferences :

- Color is never seen as a single color, it is always related and connected to other colors. It is present in continuous flux, constantly related to its surrounding.
- Color deceives with the change in surrounding. One and the same color can look so different in various surroundings. There are certain colors, which are very susceptible to change as compare to other colors.
- Color intensity or brightness of a color is a very individual choice, and it's difficult for a group of people to agree upon the same intensity.
- The true mixture is equidistant from both the parent color in terms of hue as well as light intensity. The middle mixture if ideally placed, gives an illusion of space and volume if they are separate by boundaries. This is also known as fluting effect.
- Cool colors consists of shades of blue and warm colors consists of shades of red, orange and yellow. Within the spectrum also there is warm blue and cool red colors.
- Boundaries between the mixture and mixture parent help in recognizing the distance, nearness and equidistance between colors.

Reference :

Book Reference :

Interaction of Color by Josef Albers

The art of color by Johannes Itten

Colour by Marshall edition

<http://goo.gl/GxUGTf> as on 16th January 2014

<http://goo.gl/sD8Wa7> as on 08th June 2014

<http://goo.gl/zJbyMv> as on 10th June 2014

<http://goo.gl/wJ9AVx> as on 10th June 2014

<http://goo.gl/UxjNbQ> as on 10th June 2014

Internet Reference :

<http://goo.gl/QJryd8> as on 13th January 2014

<http://goo.gl/pRG62> as on 13th January 2014

<http://goo.gl/VXkPf> as on 14th January 2014

<http://goo.gl/GQVxeq> as on 14th January 2014

<http://goo.gl/SGXKkL> as on 14th January 2014

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<http://goo.gl/hZISmn> as on 15th January 2014

<http://goo.gl/cDEhqE> as on 15th January 2014

<http://goo.gl/BFHaXh> as on 15th January 2014

<http://goo.gl/C2nWAT> as on 12th June 2014

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<http://goo.gl/qmmuYG> as on 16th June 2014