Concise text <== self-evident

Instead of:

Ajude-nos a melhorar o nosso serviço, preenchendo o questionário apresentado em seguida. Não é estritamente necessário preencher todos os campos, apenas os preenchidos com (*). Se quiser deixar comentários adicionais, existe uma caixa de texto no final do questionário que pode preencher. (**40 word**)

Use:

Por favor ajude-nos preenchendo este questionário. Os campos obrigatórios estão assinalados com um (*). (13 **words**)

Concise text <== self-evident

Instead of:

Welcome to our website! We are Consulta, a consulting company in the field of computer science that will do everything at your disposal to help you. (**13 words**)

Use:

Nothing. (**0 words**)

Great Links

- A good link is one that allows you to foresee the destination.
- They must be visually distinct from the rest of the content.
- They should be short:

  instead of: "… which flights depart from our airport in the next few hours …" **use**: "… which are the next flights …"

- They must express a recognizable target. Avoid links like "here" and "list".

  instead of: "Pode agora ficar a conhecer as novidades da nossa loja aqui …"

  use: "Pode agora ficar a conhecer as novidades da nossa loja."

  instead of: "… e saiba mais sobre o Festival dos Oceanos …"

  use: "… e conheça a localização do Festival dos Oceanos."

Location and Orientation

Home > Products > Digital Cameras > Lenses

- Provide a sense of location, for example through ***breadcrumbs*** (caminhos de migalhas).
- They must obey the following principles:
  - Placed at the top of the page (almost a standard)
  - Small fonts
  - Highlight the last item
  - Do not work well alone
- Always provide a "homecoming" option

Standard Components

- A ***Homepage***. It should focus on a main topic, build a brand image, facilitate navigation and attract visitors to return.

- The ***Sign In/Up***, on a website. You should collect the minimum information necessary, have a clear privacy policy, a password recovery method, allowing user to explore before registration.

- The ***Shopping Cart***. Accessible everywhere, easy to add, do not allow unavailable products, detailed information of each item. Full cost information, a visible checkout link and a link to continue shopping. Allow "save for later …”.

- The ***Search Tool***. Consistent location, avoid blocked searches, provide default categories, flexibility of results and sorted by relevance. Customization.

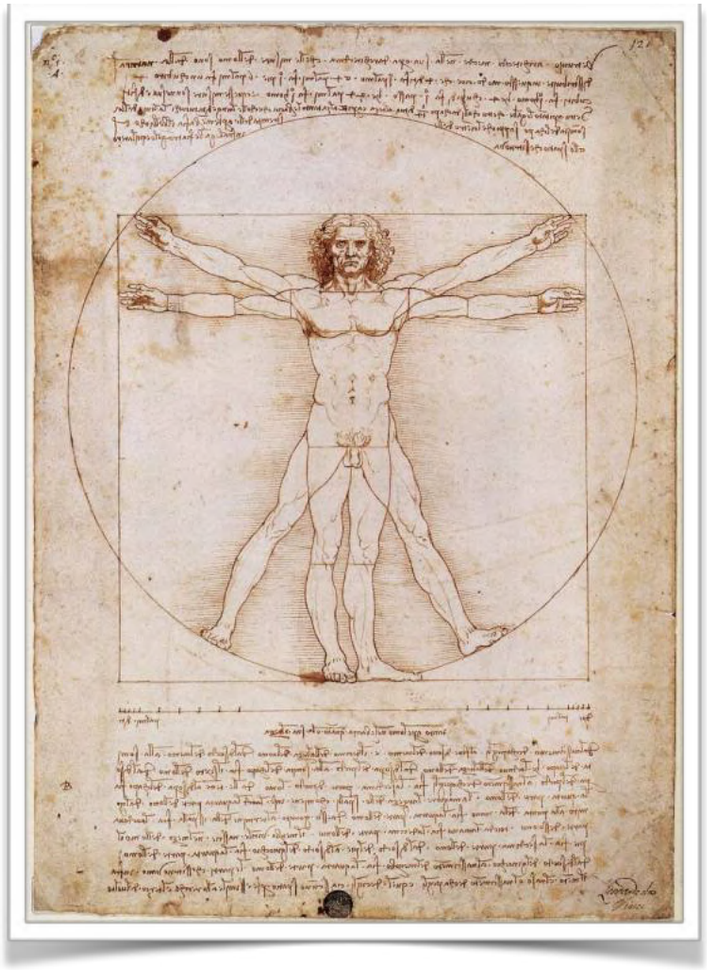
Aesthetics

"***Beauty is in the eye of the beholder***"

William Shakespeare

Aesthetic Patterns

- Are there universal aesthetic patterns, or even standards?
- Is there an objective concept of beauty?
- The Greeks looked for and found something! (aisthésis)
- The Renaissance established *Aesthetics* as an independent discipline, from *Metaphysics*, *Logic*, and *Ethics*.
- Is it important for HCI?



*O **Homem Vitruviano**, por Leonardo da Vinci, em 1487*

Aesthetic Patterns

Are there universal aesthetic patterns?

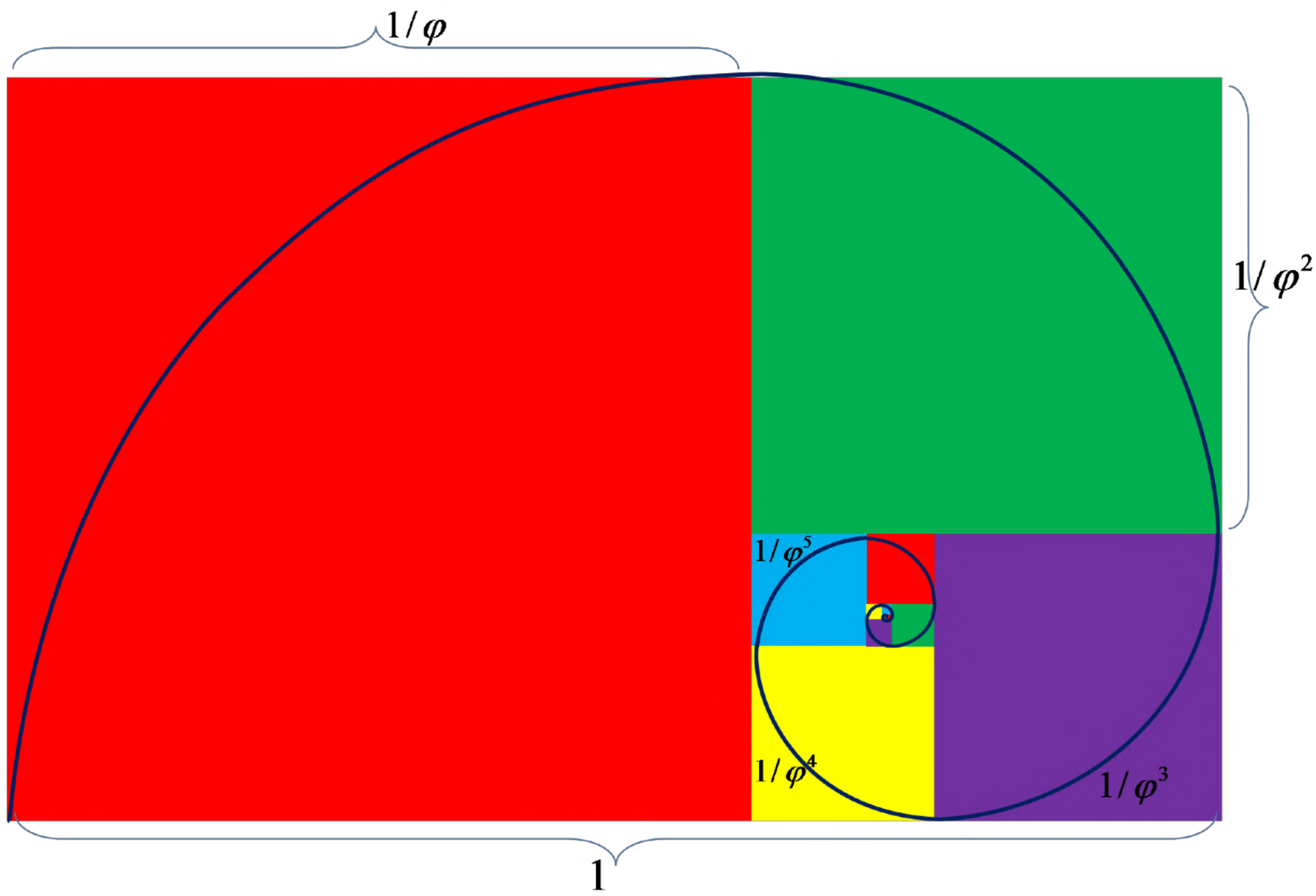
Is there an objective concept of beauty?

Starry Night, Vincent van Gogh

Venus de Milo
Louvre, Paris

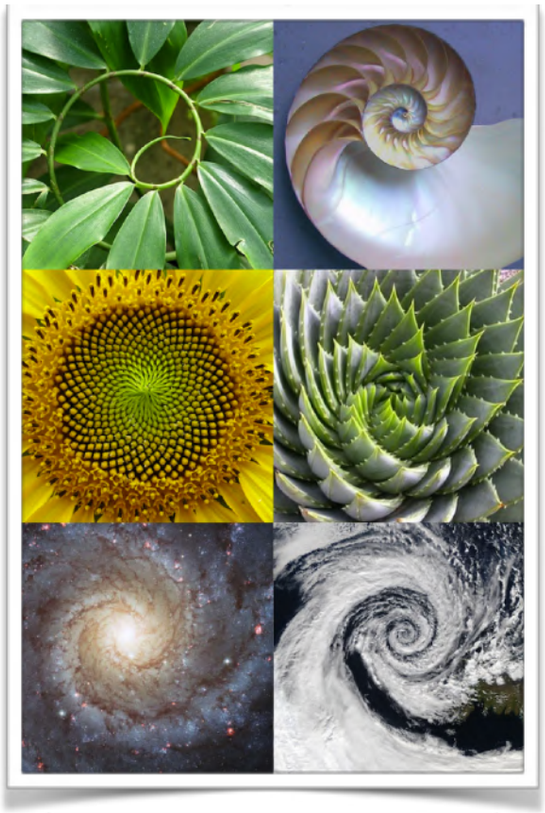
Aesthetic, size and proportion

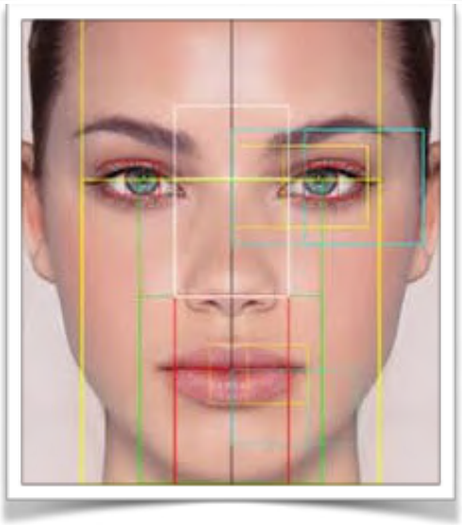
What can we say in terms of size and proportion among objects? Beautiful patterns?

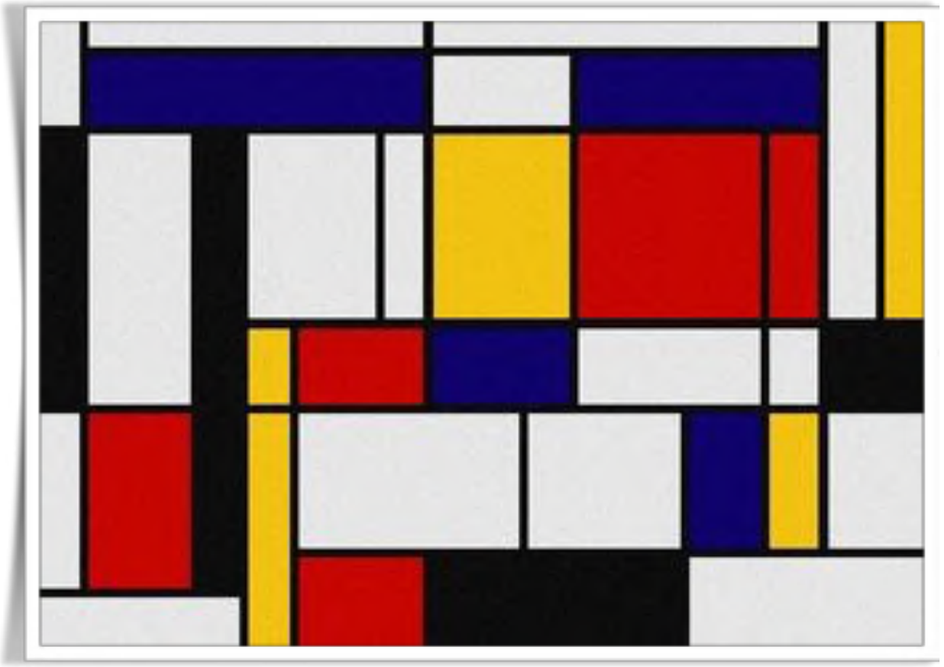


Aesthetic, size and proportion

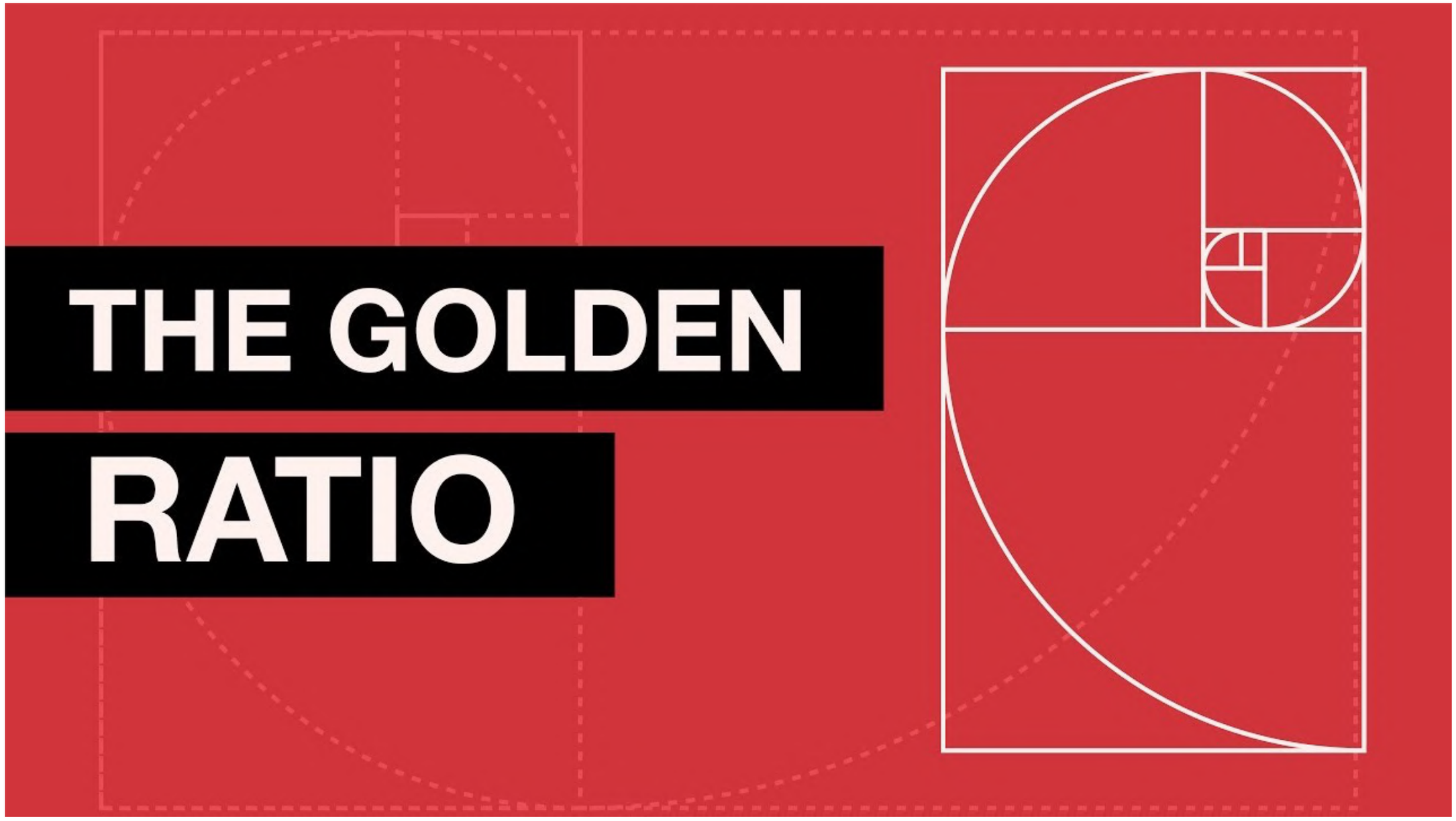
What can we say in terms of size and proportion among objects? Beautiful patterns?





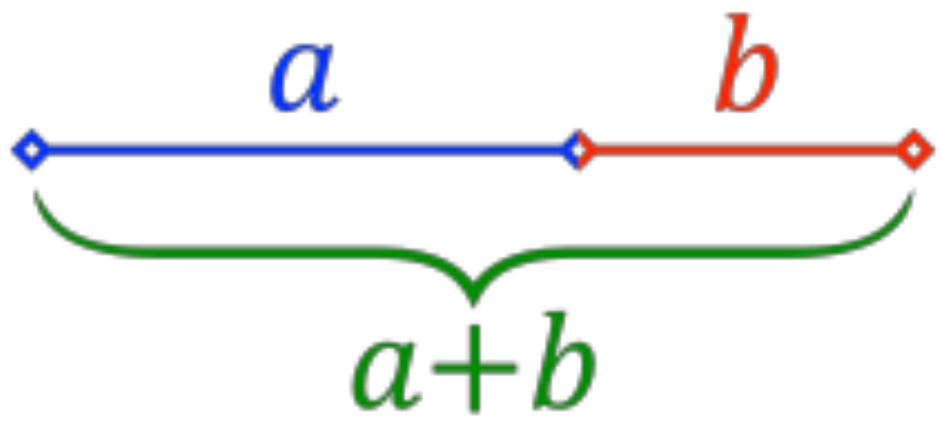


Aesthetic, size and proportion



The "Golden Ratio"

Concept and definition:

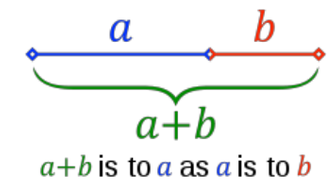


$a+b$ is to a as a is to b

Number φ

$$\varphi = \frac{1+\sqrt{5}}{2} \approx 1.6180339887\ldots$$

The "Golden Ratio"

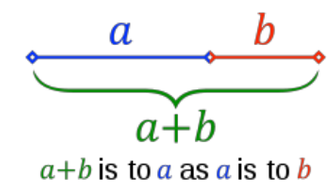


Number φ

Is it important? Is it observed out there, besides the mathematical realm?

Yes, indeed! It is present in many domains! From math to nature, music, art, architecture, etc.

The "Golden Ratio"



Number φ

Mathematics:

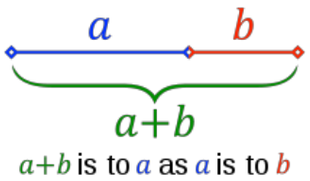
Interesting features!

$$\varphi = \sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\cdots}}}}.$$

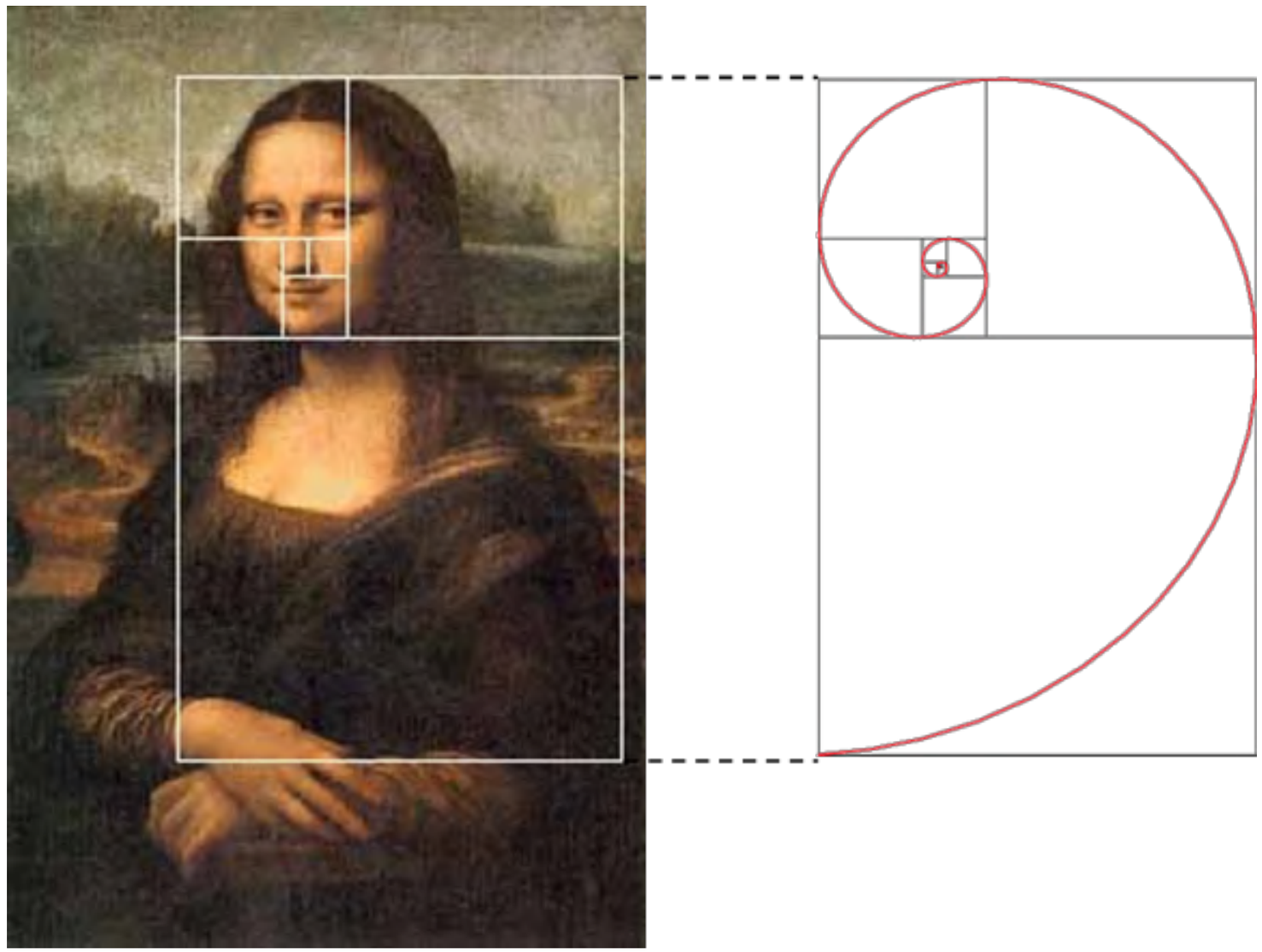
$$1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\ddots}}}}$$

The Golden Ratio

Number φ

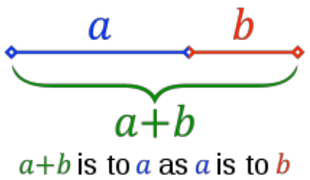


In Art



The Golden Ratio

Number φ

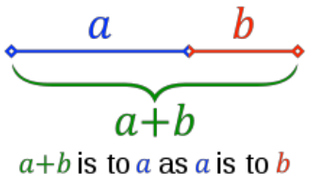


without proportion

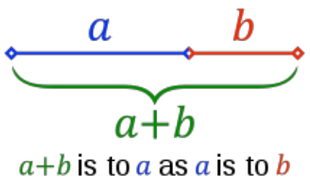
The Golden Ratio

Number φ

Art:

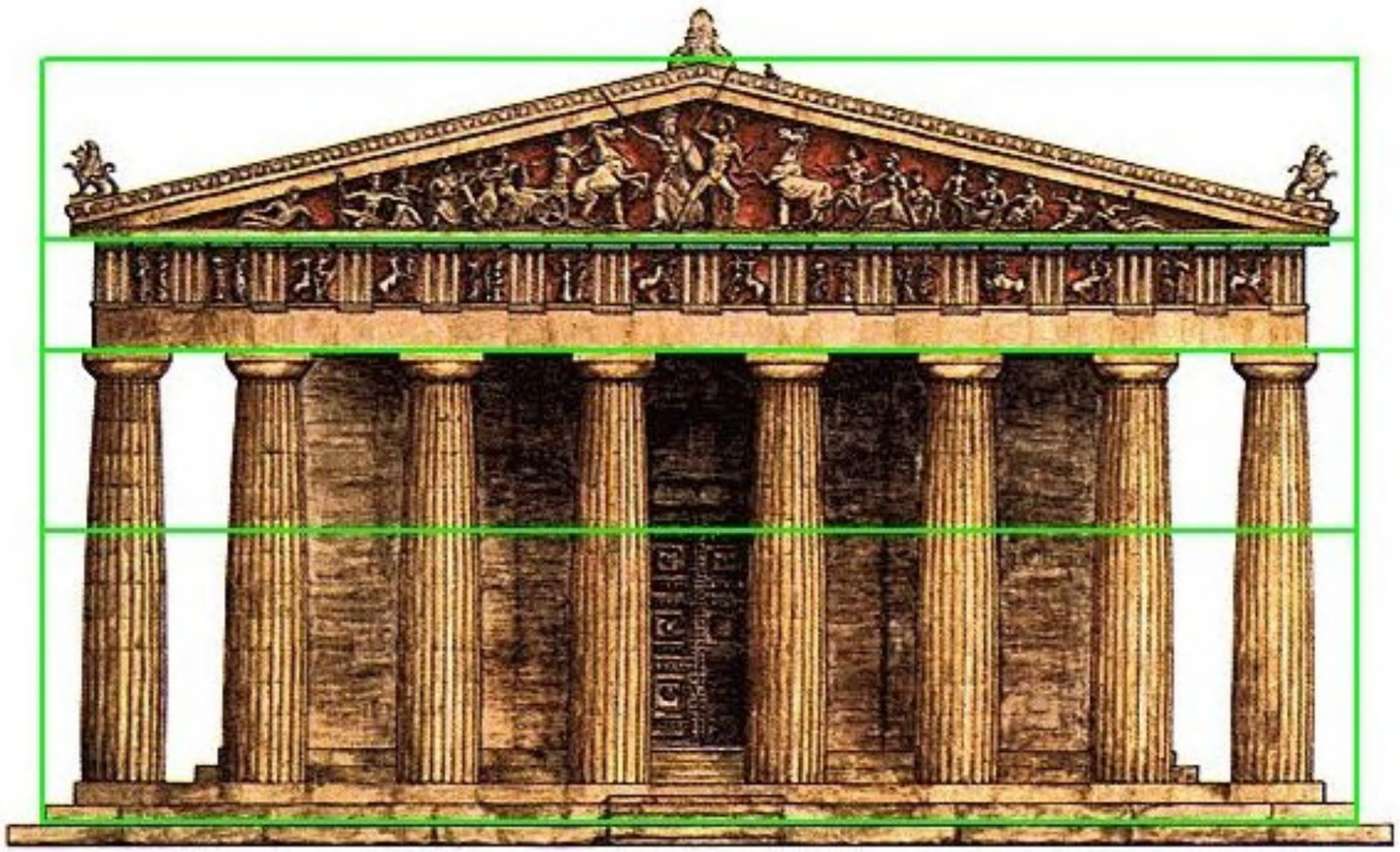


The Golden Ratio



Number φ

Architecture: since the Greeks

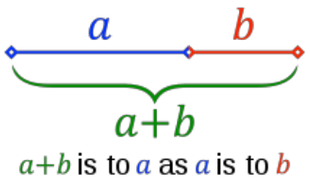


THE PARTHENON

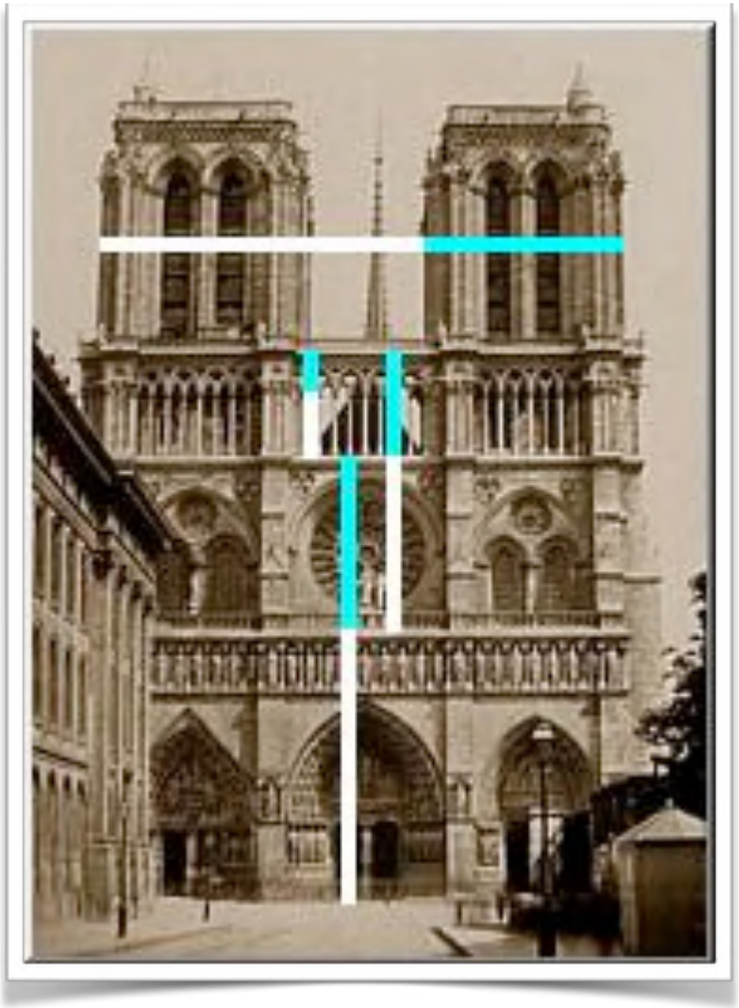
PHIL PONDER

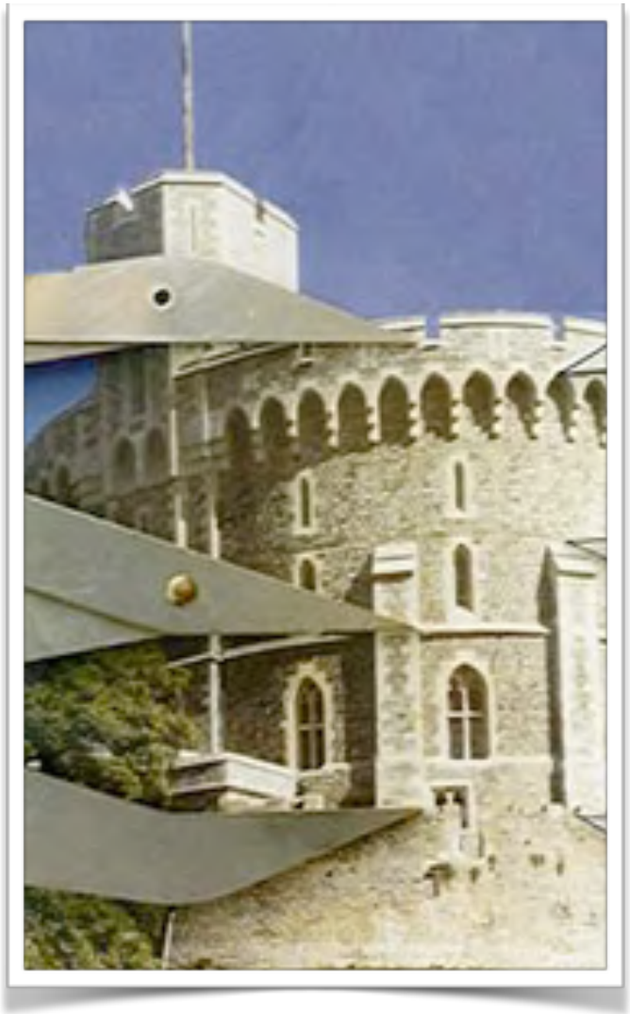
The Golden Ratio

Number φ



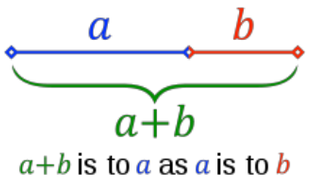
Architecture:



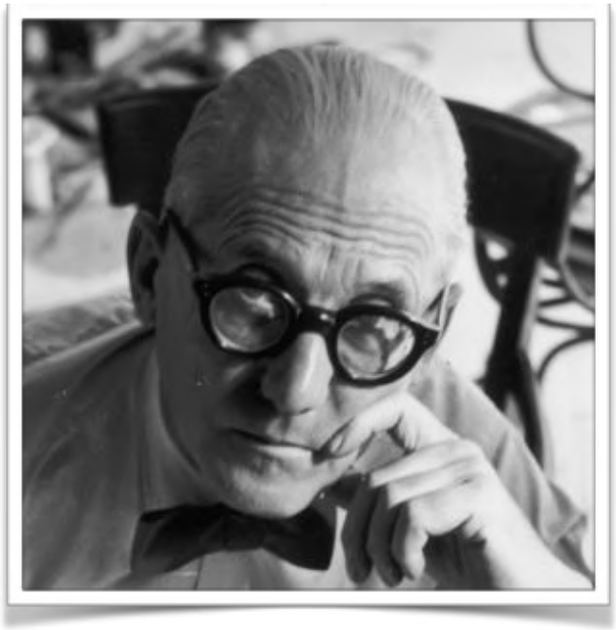


The Golden Ratio

Number φ



Architecture:

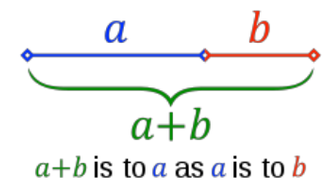


Le Corbusier

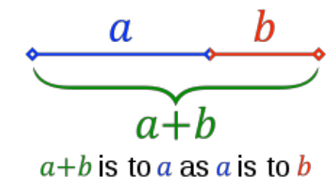
The Golden Ratio

Number φ

exercise



The Golden Ratio



Number φ

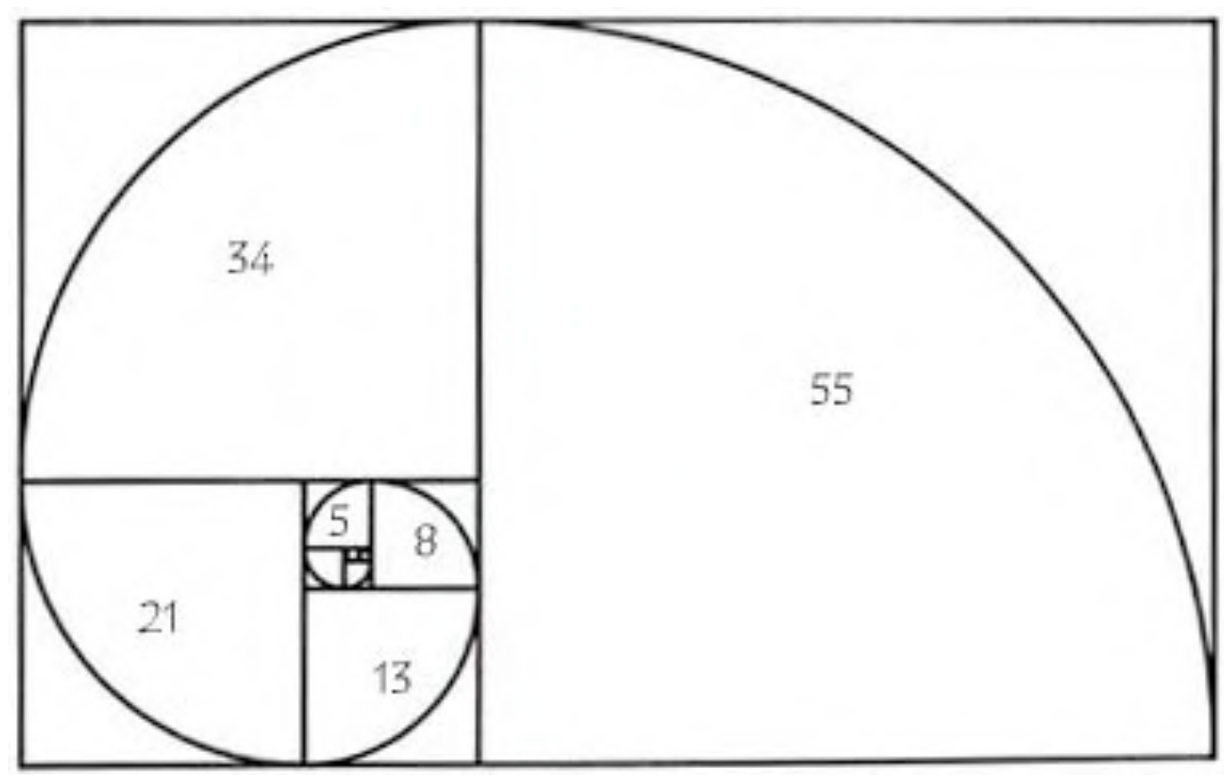
Mathematics: The Fibonacci sequence

$$F(1) = 1 \qquad 0,\ 1,\ 1,\ 2,\ 3,\ 5,\ 8,\ 13,\ 21,\ 34,\ 55,\ 89,\ 144,\ \ldots$$

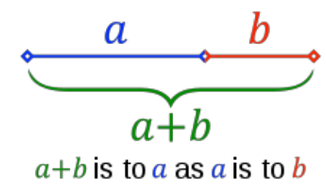
$$F(2) = 1$$

$$F(n) = F(n-1) + F(n-2)$$

$$\frac{F(n+1)}{F(n)} \approx \varphi$$

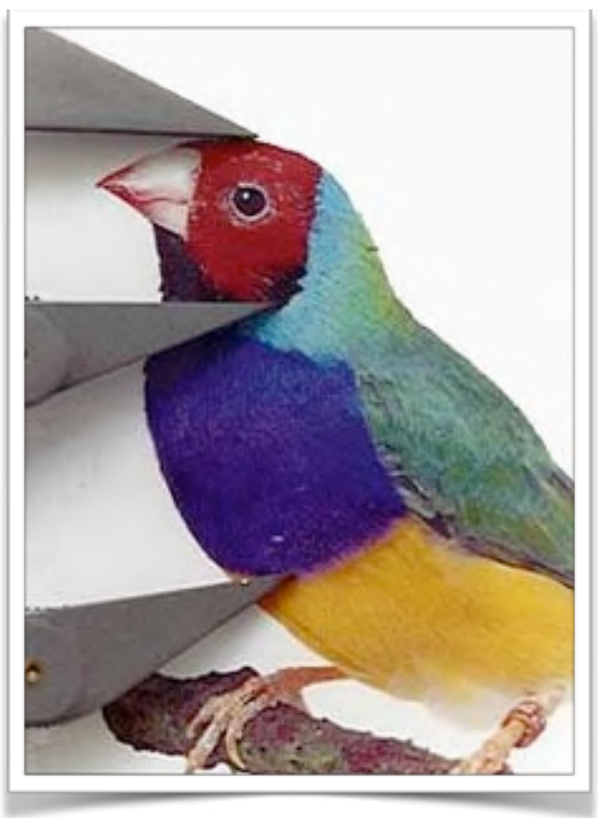


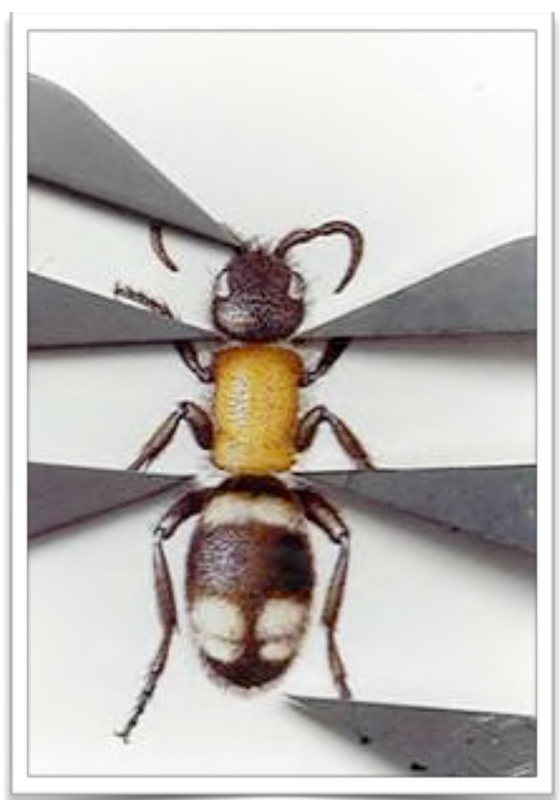
The Golden Ratio



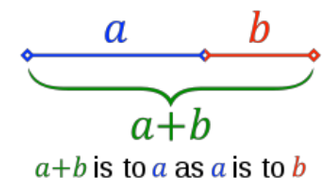
Number φ

Nature:



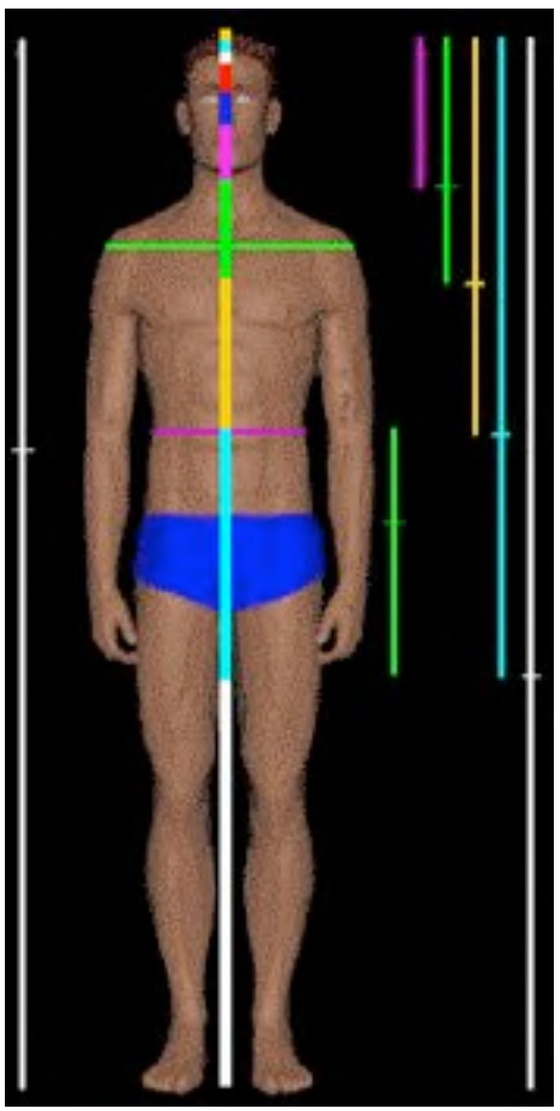


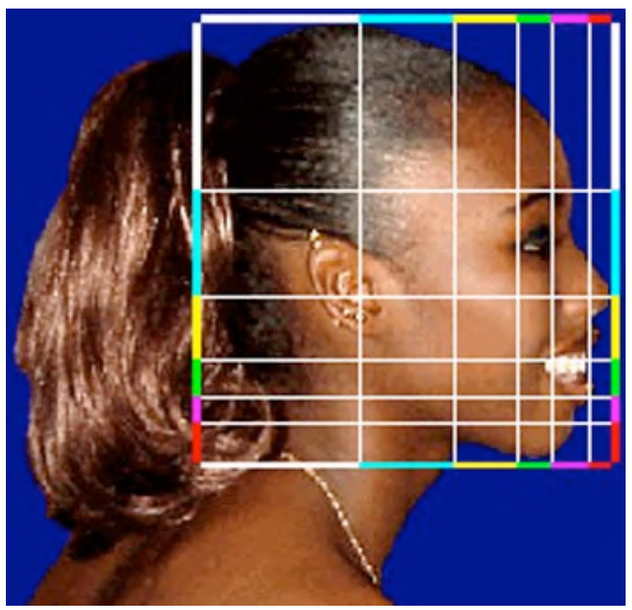
The Golden Ratio

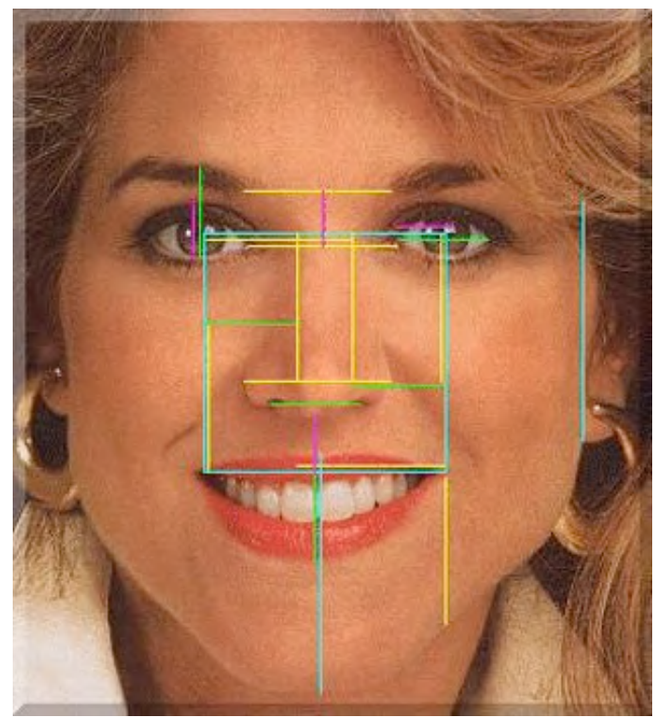


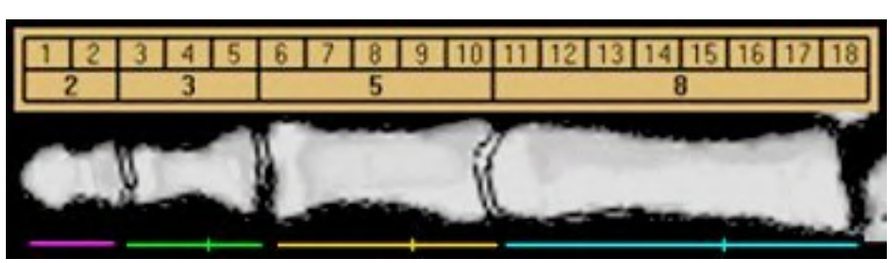
Number φ

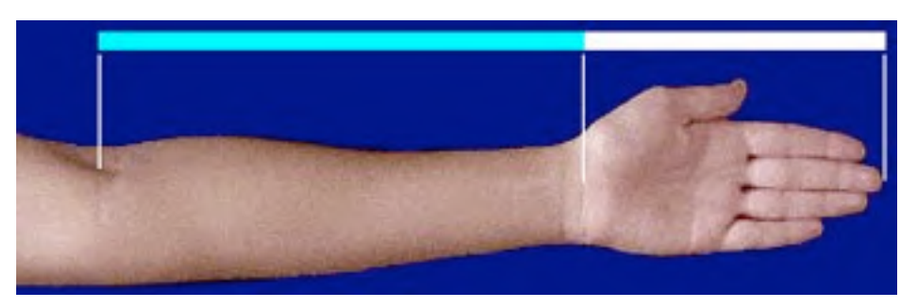
Human body:



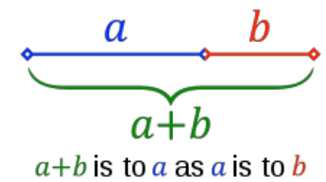








The Golden Ratio



Number φ

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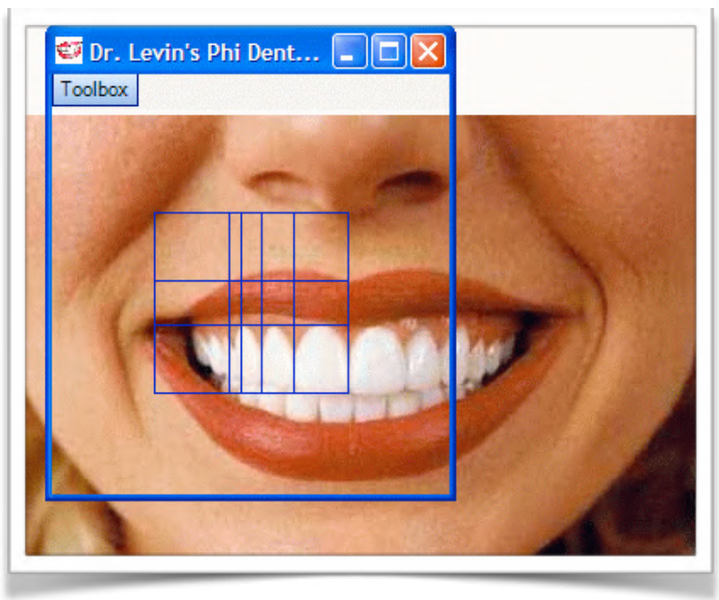
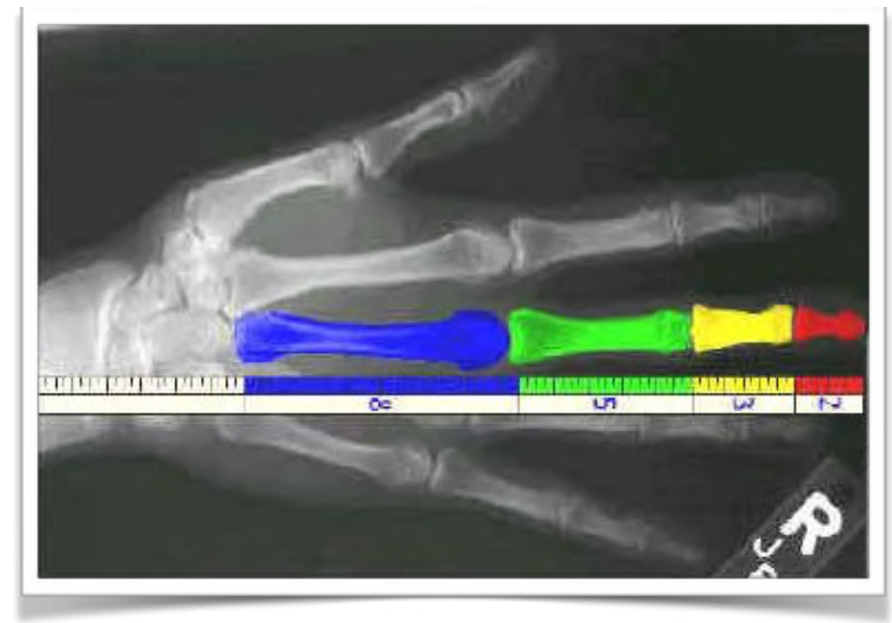
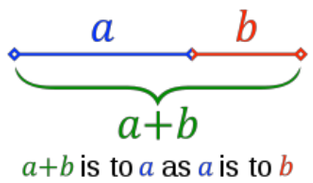




The Golden Ratio

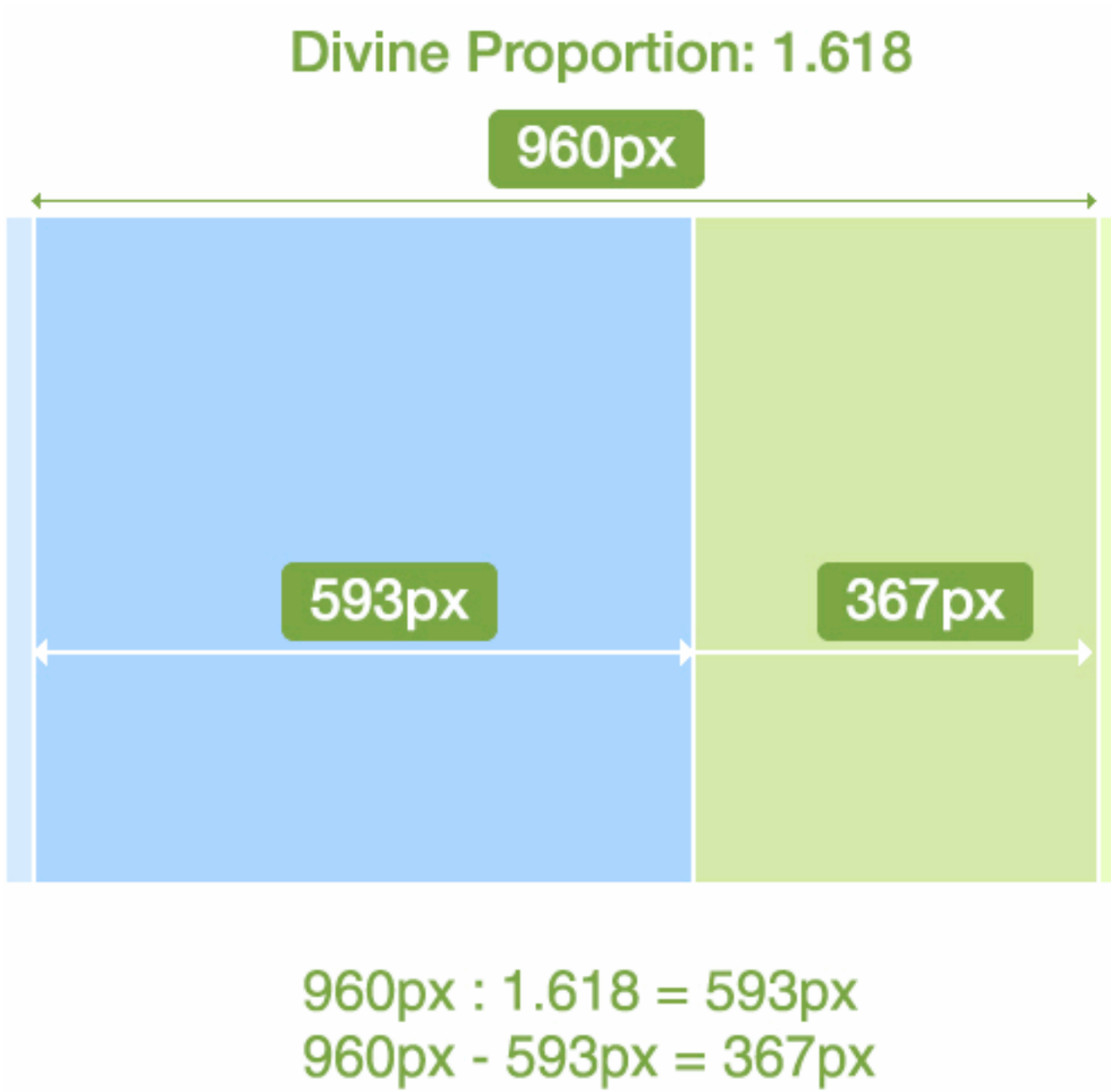


Number φ

Objects and equipment:

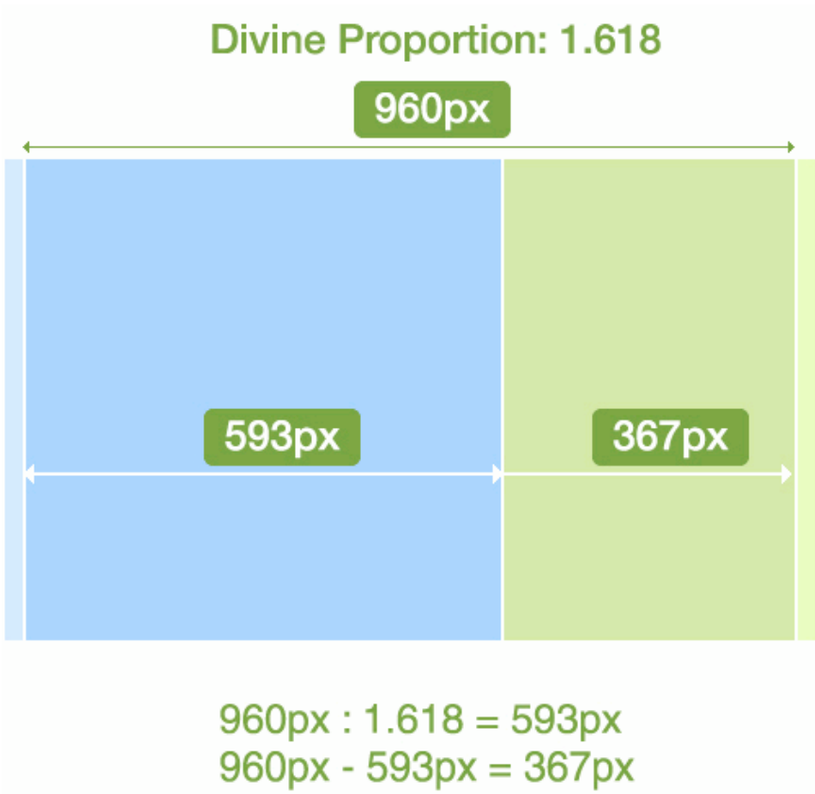
The Golden Ratio

Application in the design of GUI:



The Golden Ratio

Application in the design of GUI:



The Golden Ratio

Application in the design of GUI:

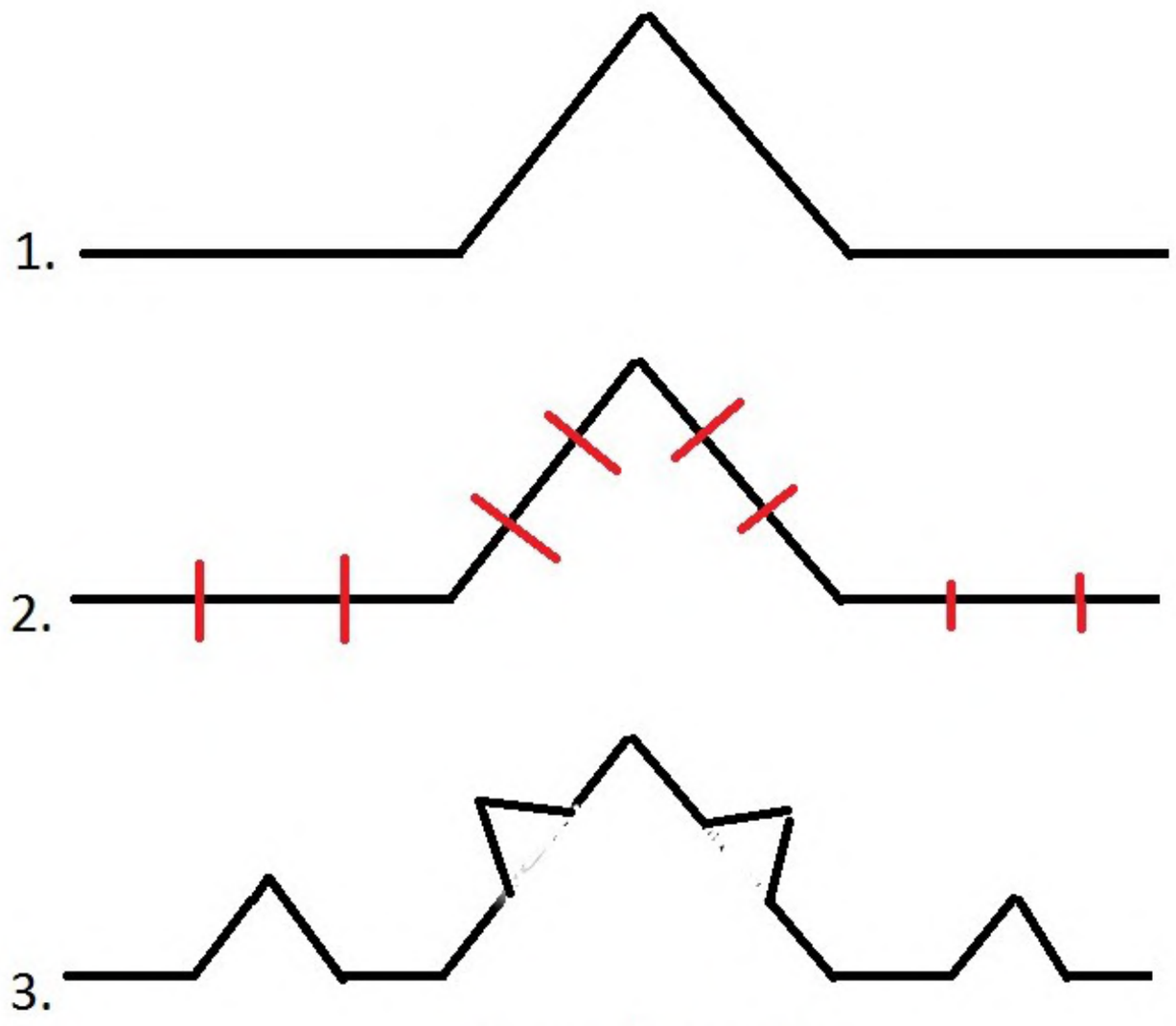
The Rule of Thirds

Rule of thumb in image composition

Proponents of the technique claim that aligning a subject with the intersection points creates more tension, energy and interest in the composition.

Self-Similarity and Fractals

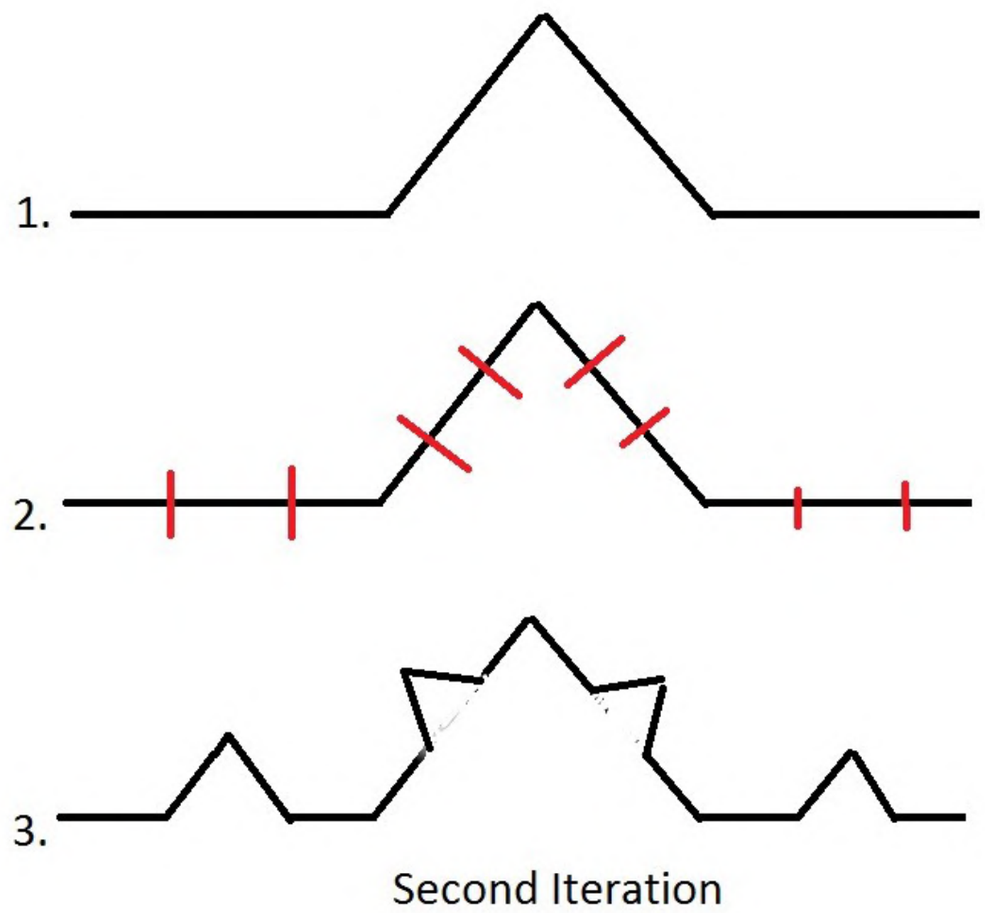
Induce beauty and represents well the patterns of nature.

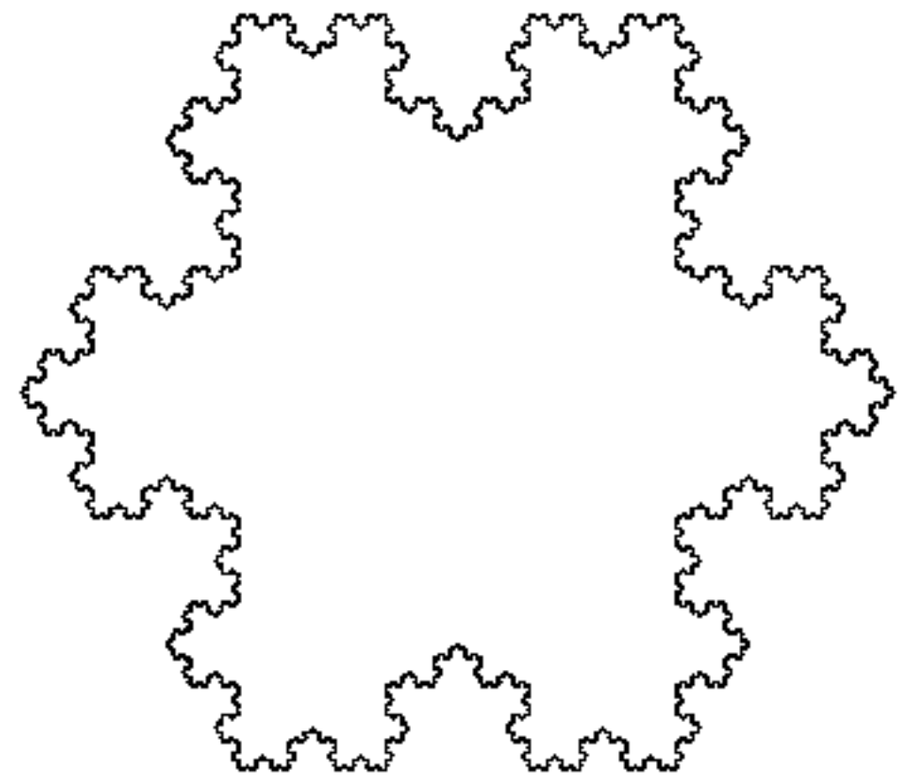


Second Iteration

Self-Similarity and Fractals

Induce beauty and represents well the patterns of nature.



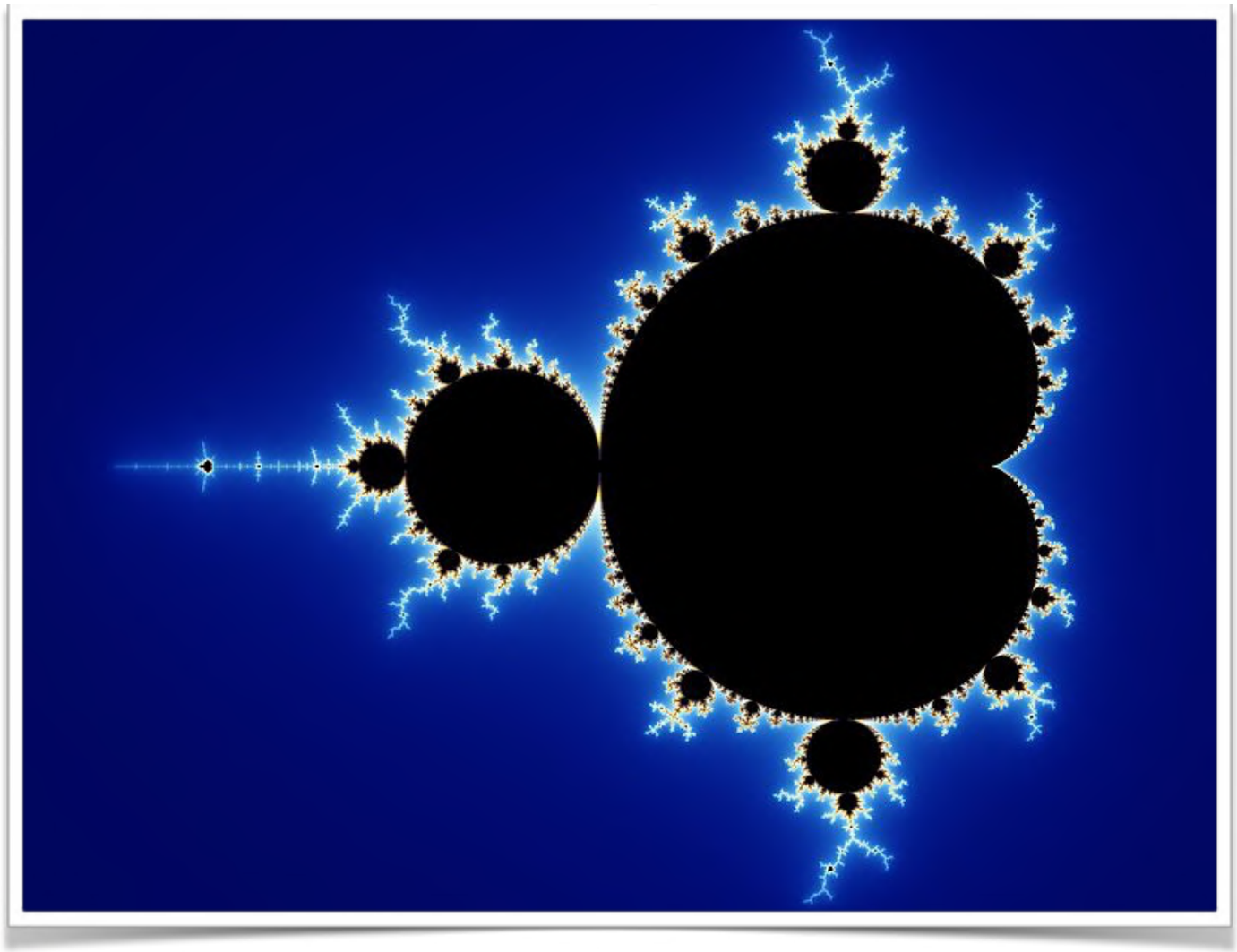


Recursively application of simple rules will induce rich and complex patterns of beauty. Nature is also fractal.

Self-Similarity and Fractals

Benoît Mandelbrot

1924 – 2010



The Mandelbrot Set

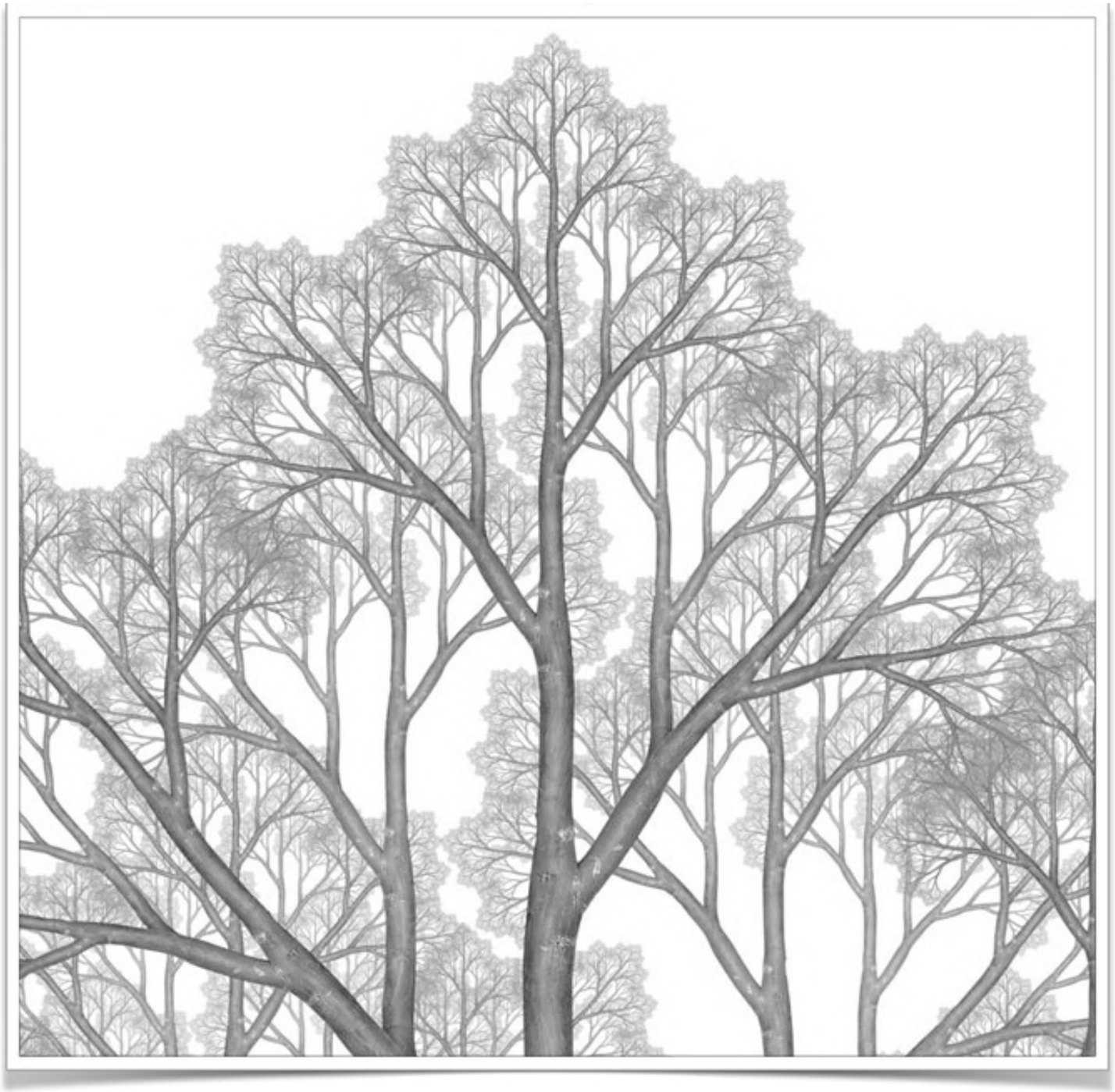
$$Z = Z^2 + C$$

Fractals and Beauty

Fractal Nature

Mandelbrot and Wheeler 1983

Fractal Nature

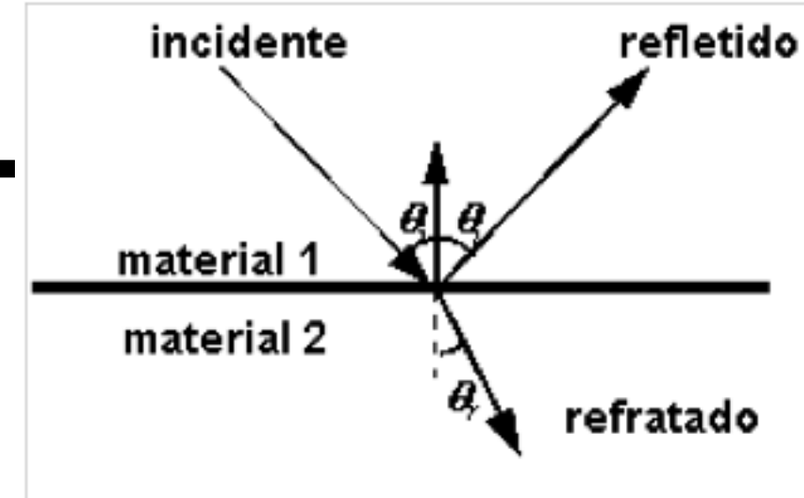


Fractal Tree

Light, Vision, and Color

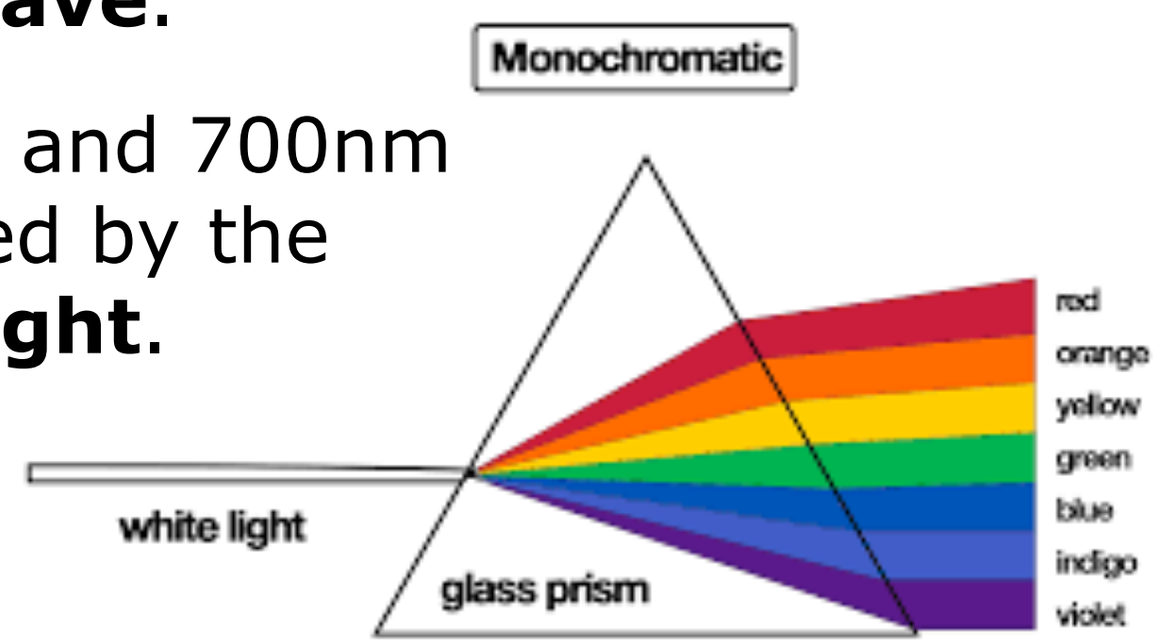
Fiat Lux

Light, Vision, and Color



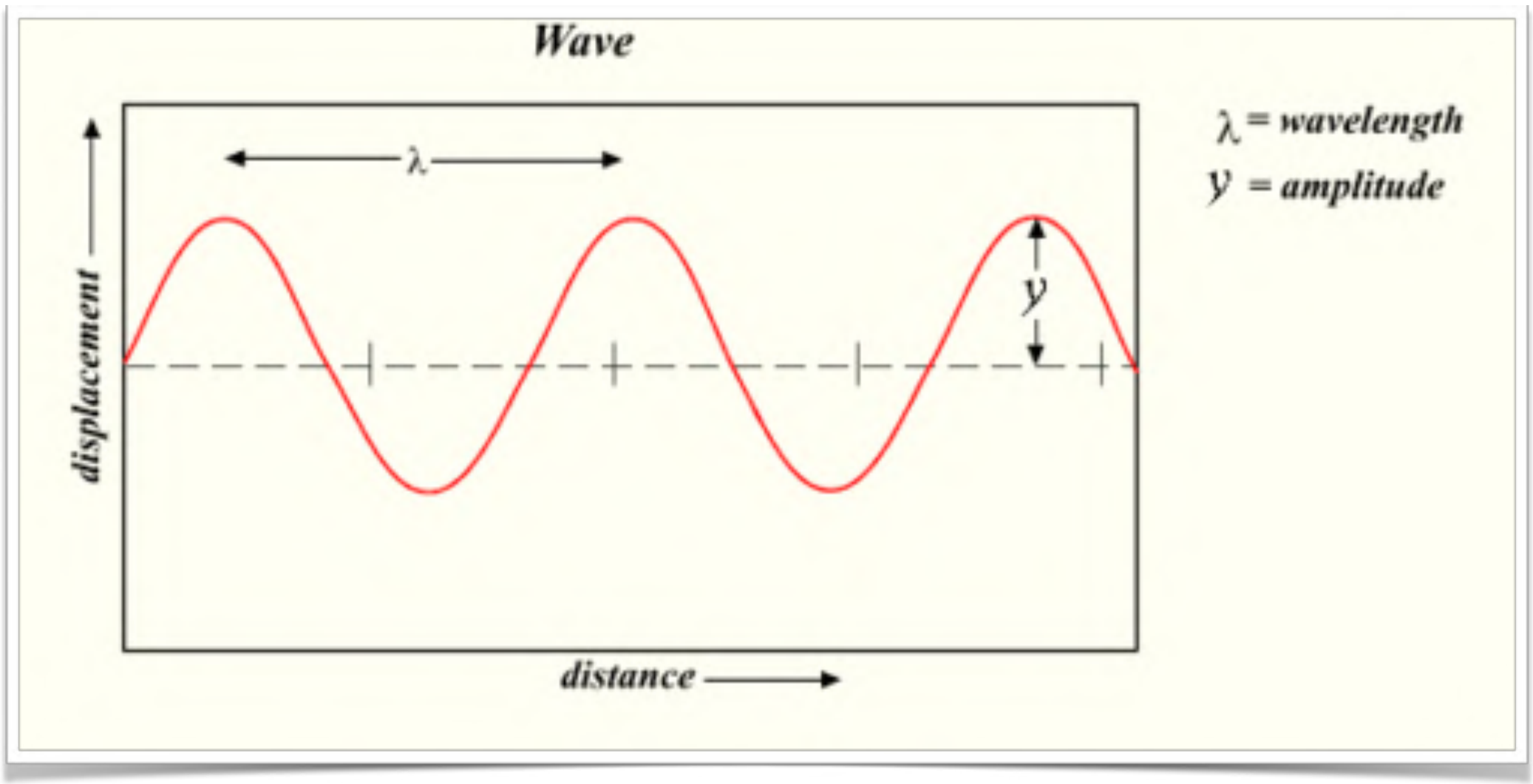
The light - a few concepts

- Light is **essential** for color visualization. Without it, nothing would be seen.
- In fact, what do we see? We do not see the objects themselves, but just the light that is **emitted** or **reflected** by them.
- Light is an electromagnetic **wave**.
- Wavelengths between 400nm and 700nm (visible spectrum) are detected by the human — **monochromatic light**.

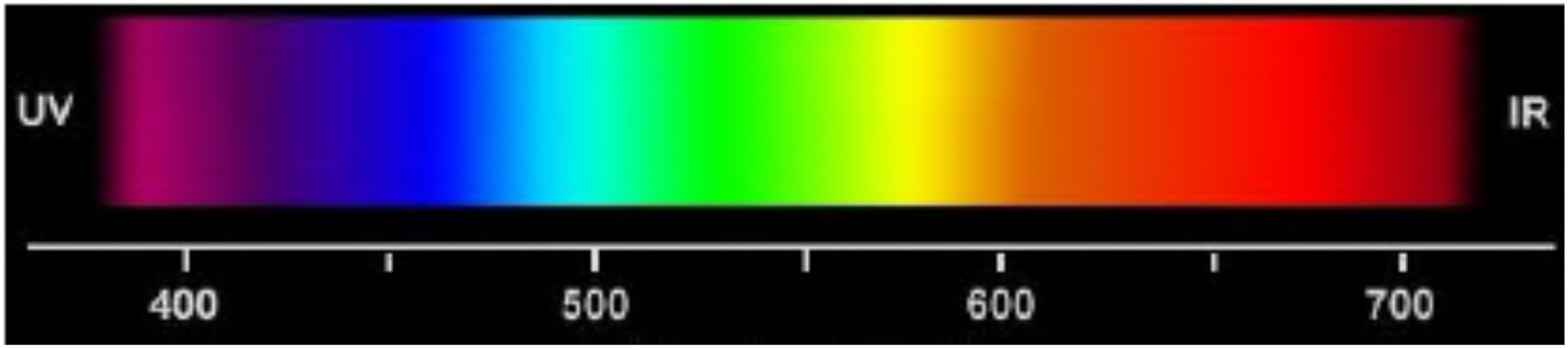


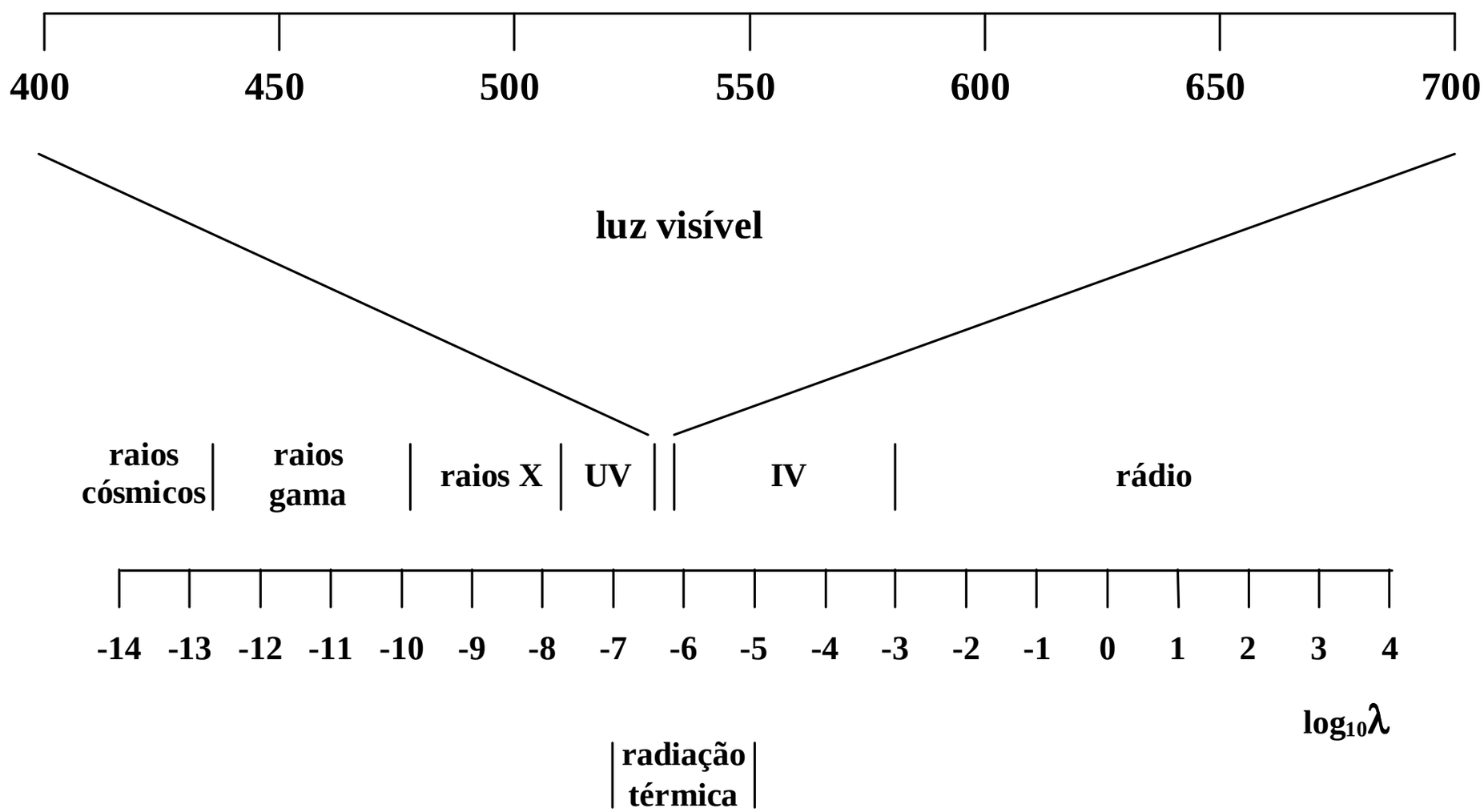
The nature of light

What we call light is an **electromagnetic wave**, with a given length and amplitude.



The nature of light





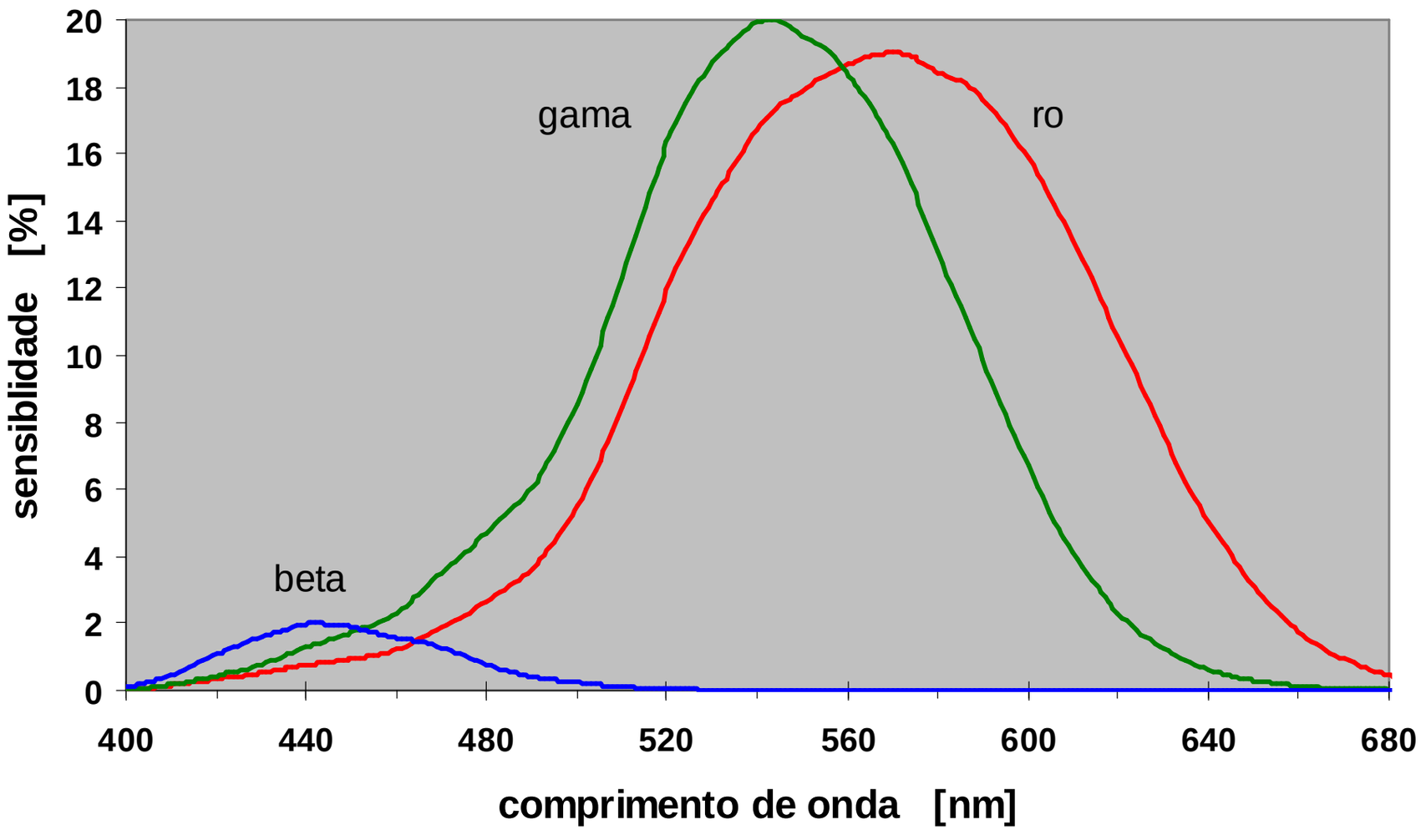
The nature of light

Spectral characteristics of human eye sensors

The two types of sensors:

- **cone** (color sensitivity)
- **rod** (brightness sensitivity)

- **The 3 kinds of cones:**
  - **vermelhos** (**red**)
  - **verdes** (**green**)
  - **azuis** (**blue**)



Light, color and human vision

Spectral characteristics of human eye sensors

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Tipo de cone	Cor principal	Distribuição relativa [%]	Gama detectada [nm]	λ da maior sensibilidade [nm]	Fracção de luz absorvida a λ_{max} [%]
β	azul	4	350-550	440	2
γ	verde	32	400-660	540	20
ρ	vermelho	64	400-700	580	19

Light and human vision

Spectral characteristics of human eye sensors

The two types of sensors:

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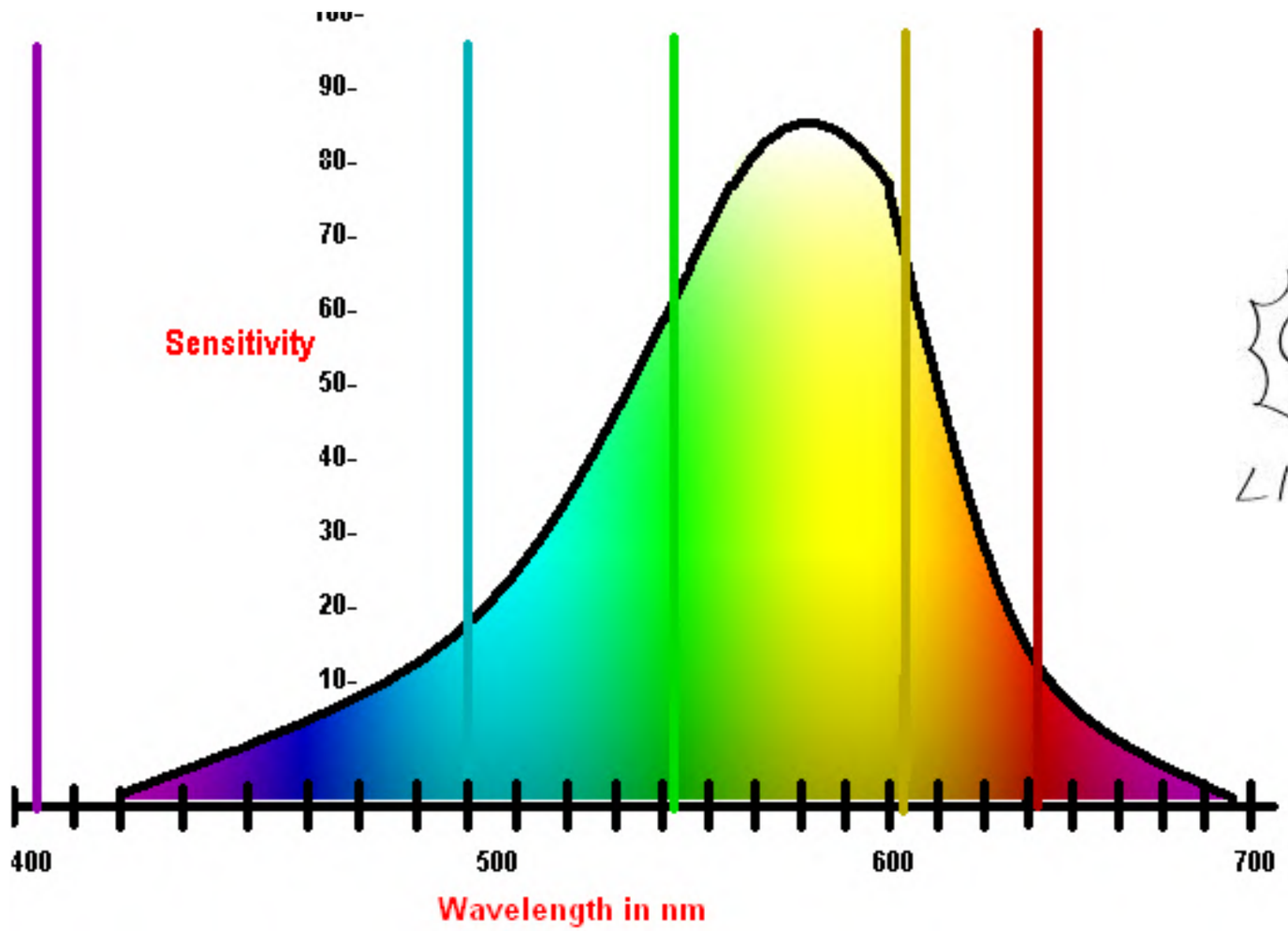
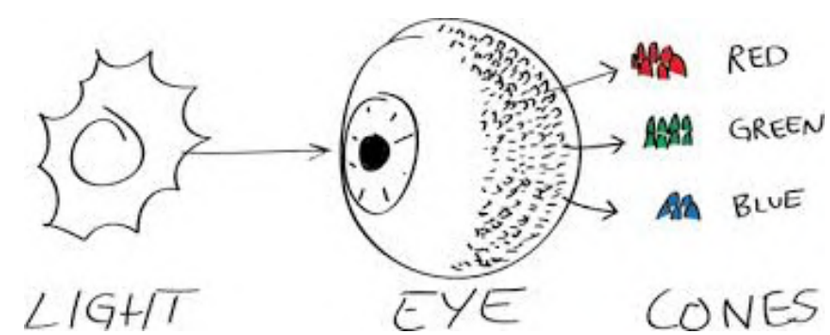
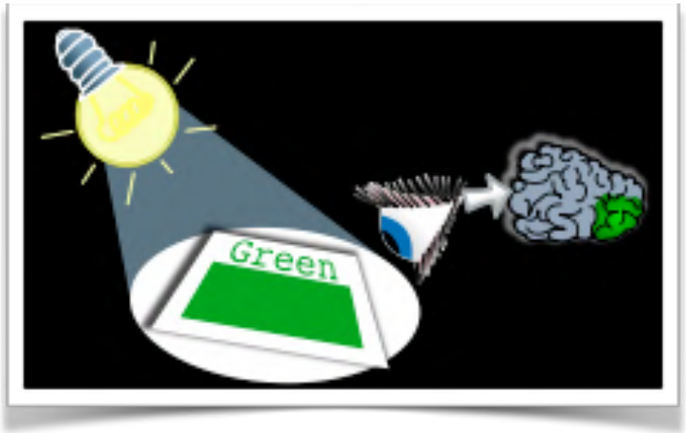




What is color? Subjective view

"(...) ***Impressão*** ***que produz a luz na retina do olho ao ser emitida, difundida ou reflectida pelos corpos*** **(…)"**



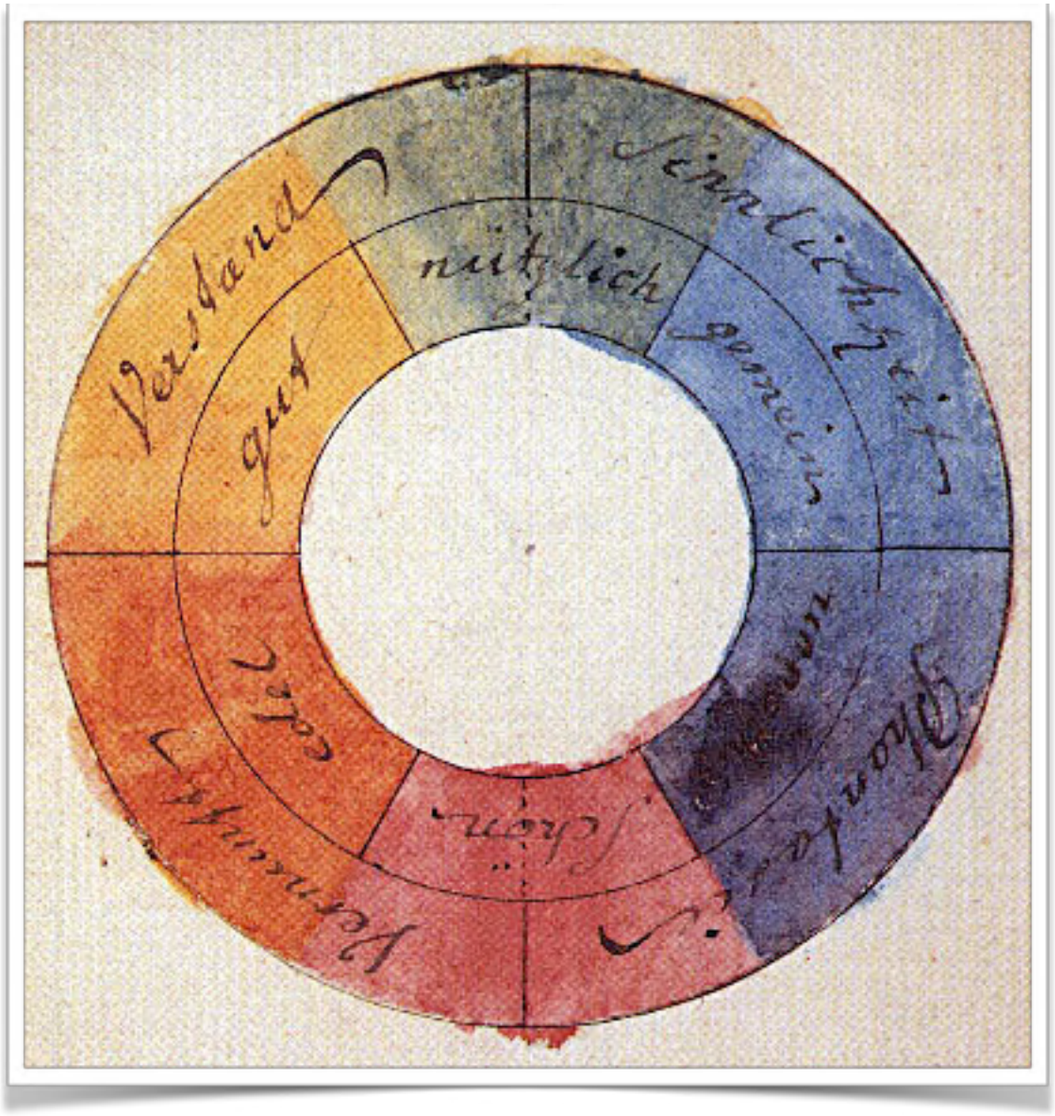
"(...) ***Sensação*** ***fisiológica que, afora em fenómeno do tipo alucinatório, é provocada pela acção da luz incidente numa região da retina sobre os pigmentos dos cones dessa região*** **(…)"**

"(...) ***Conjunto das*** ***características da luz*** ***distintas das suas heterogeneidades espaciais e temporais – sendo a luz o aspecto da energia da radiação que o observador humano é capaz de perceber pela estimulação que produz na sua retina*** **(…)"**

Color Theory

The **RYB** system

Goethe 1810



The color wheel

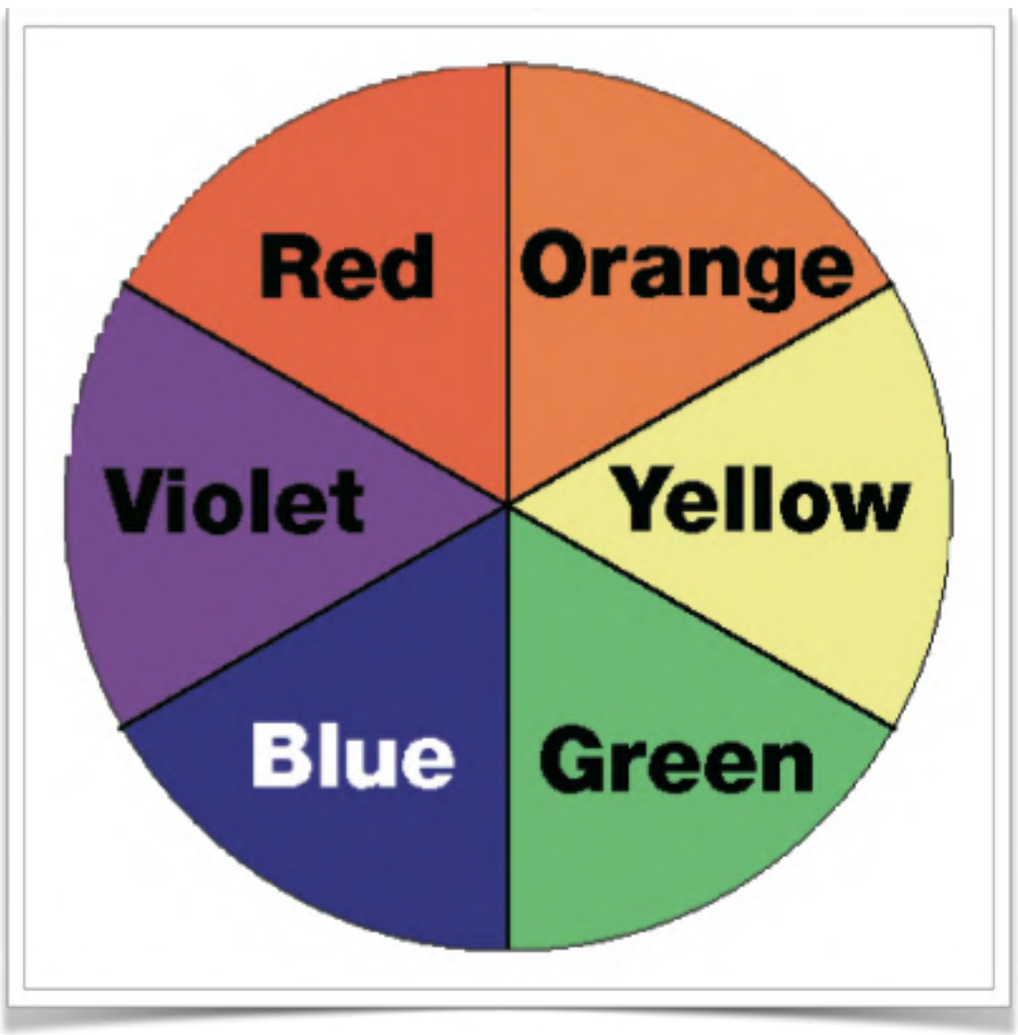
Red

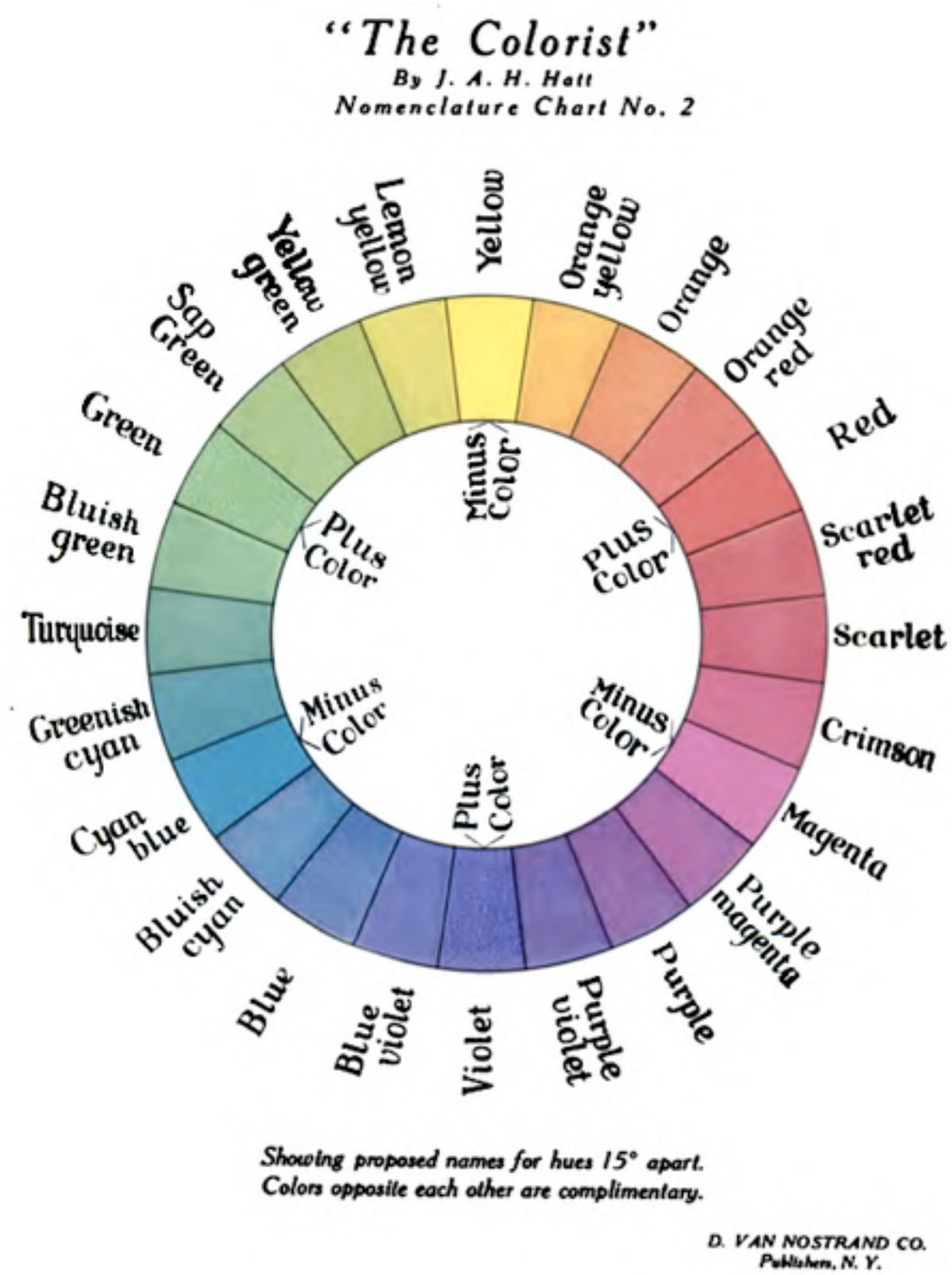
Yellow

Blue

Color Theory

The **RYB** system

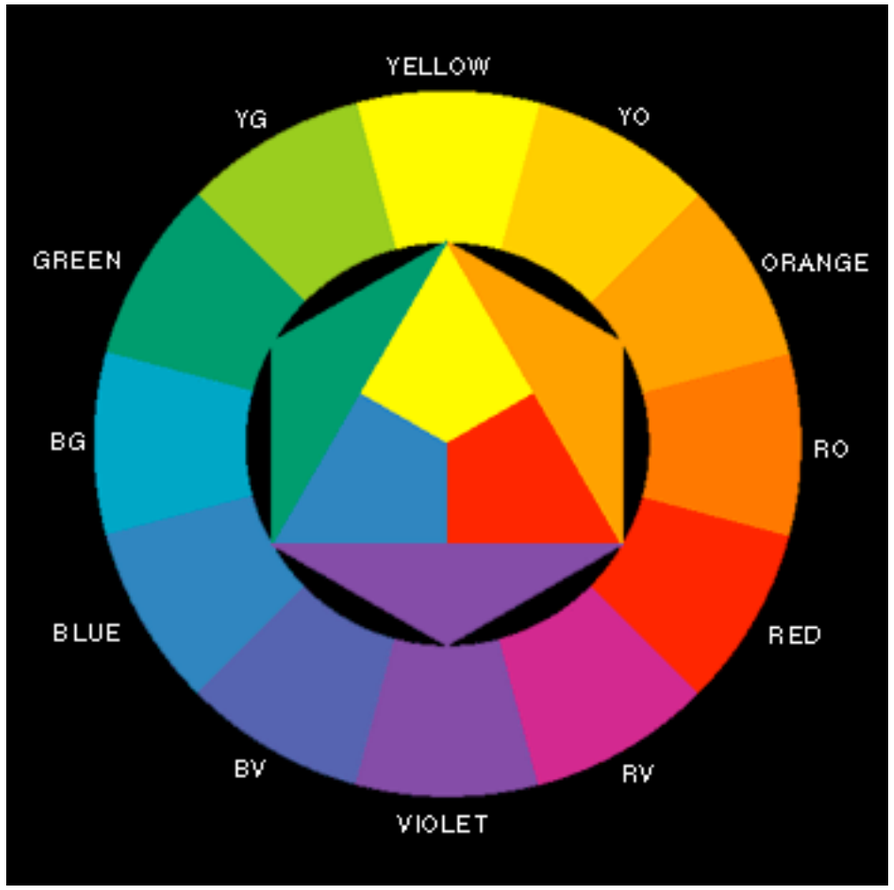




Color Theory

How can we generate a color wheel?

RGB ou **CMY**

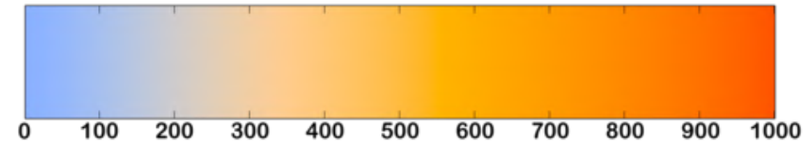


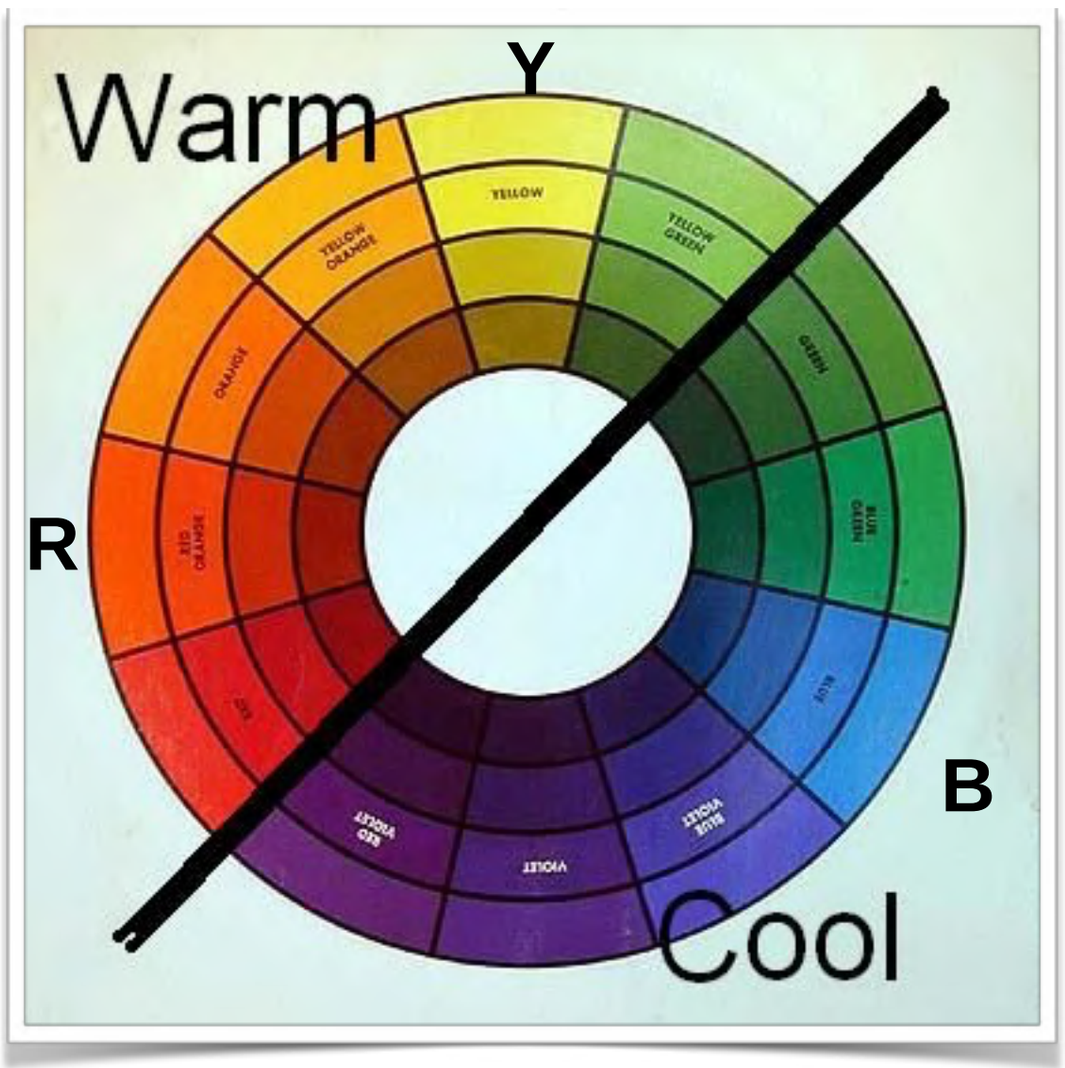
Johannes Itten,
Bauhaus School

1. Start from a RYB base
2. Complete the wheel with "Chromatic Gradation"

Color Theory

Warm and **cold** colors





COOL	LIGHT COOL	WARM	LIGHT WARM
black	dark gray	dark brown	brown
charcoal	gray	brown	camel
gray	light gray	beige	beige
white	bone	cream	cream
pink	light pink	peach	peach
fuchsia	pink	coral	coral
red	red	red	red
plum	mauve	rust	orange
purple	plum	orange	copper
cobalt	violet	mustard	yellow
navy	periwinkle	banana	banana
blue	light blue	green	chartreuse
blue-green	sea foam	olive	green
turquoise	turquoise	hunter	celery
emerald	emerald	teal	teal

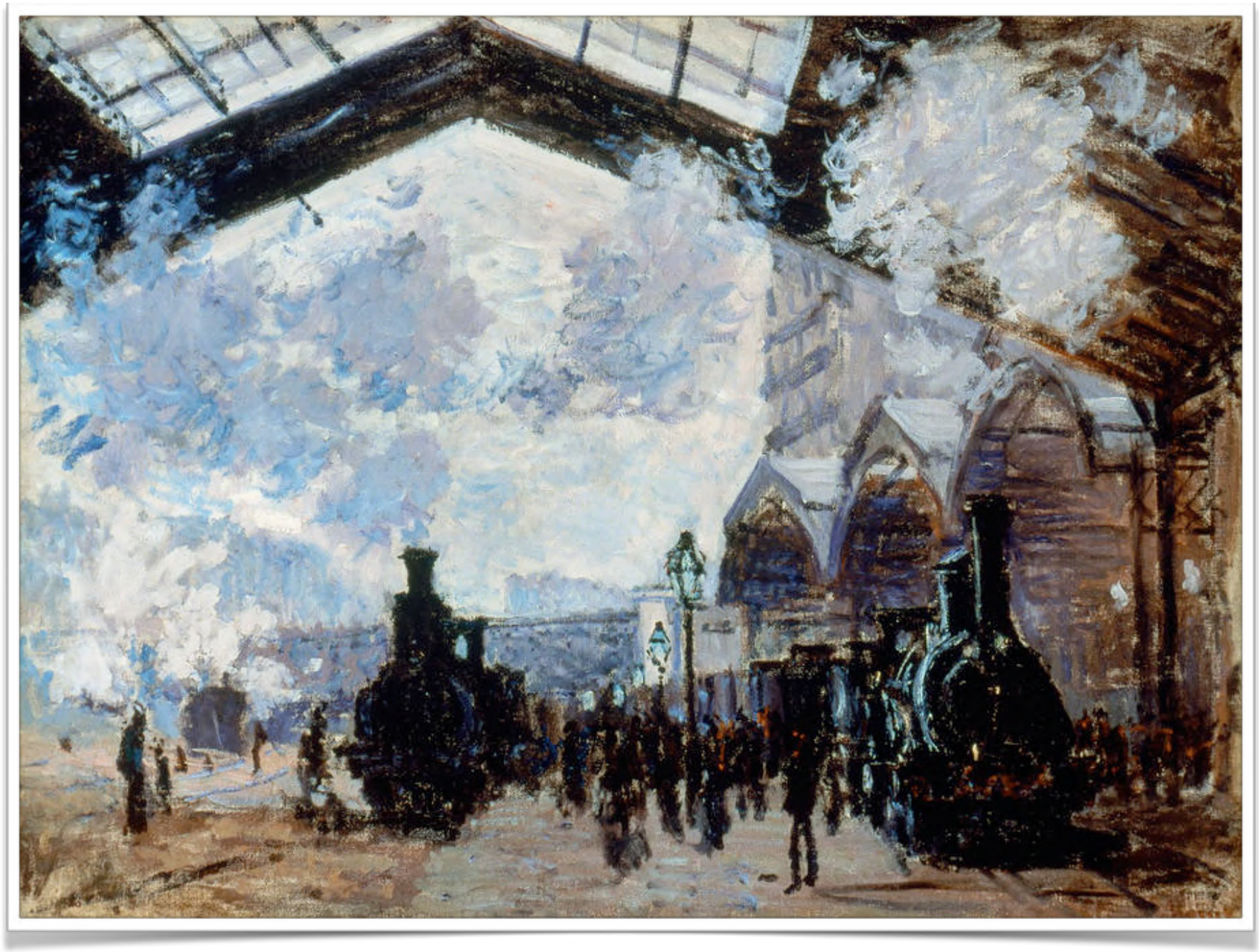
Color Theory

Warm Colors ~ Energy and adrenaline

"*Impressão do Sol Nascente*" - Claude Monet, 1873

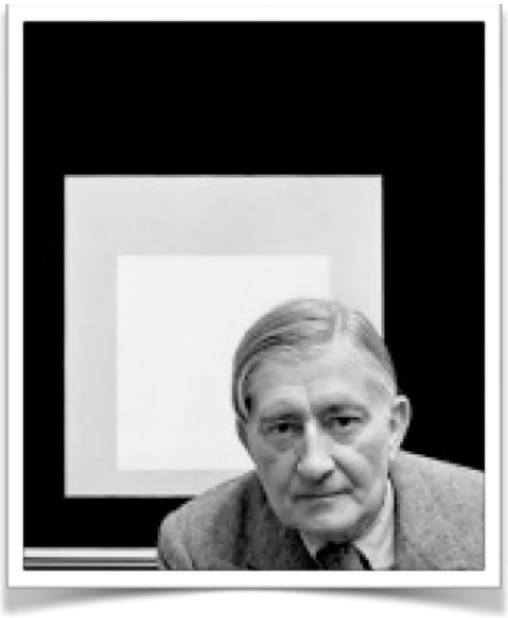
Color Theory

Cold Colors ~ Freezing, immobility, tranquility



"*The Gare Saint-Lazare*" - Claude Monet, 1877

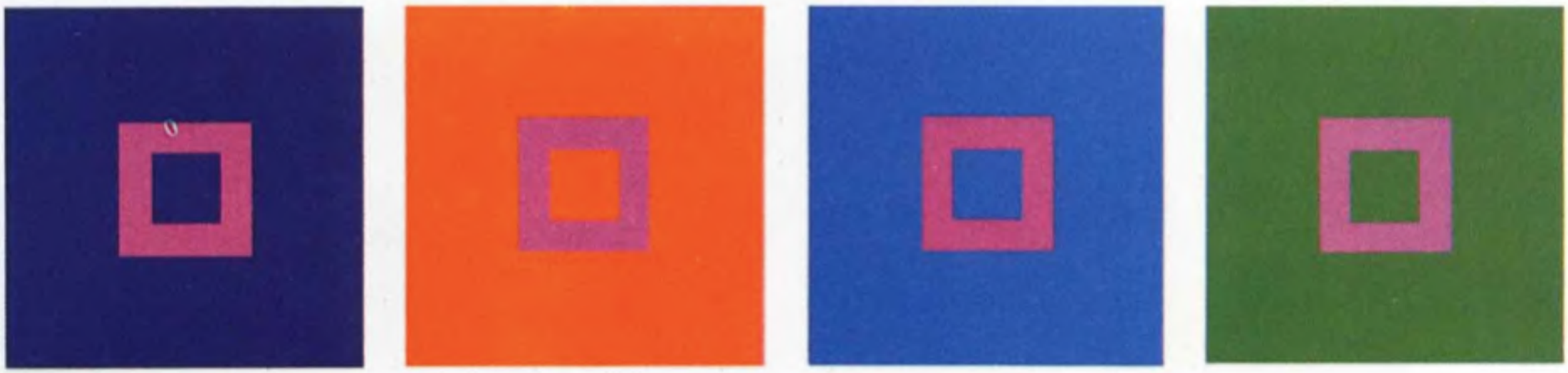
Color and Context



Joseph Albers
1888 - 1976

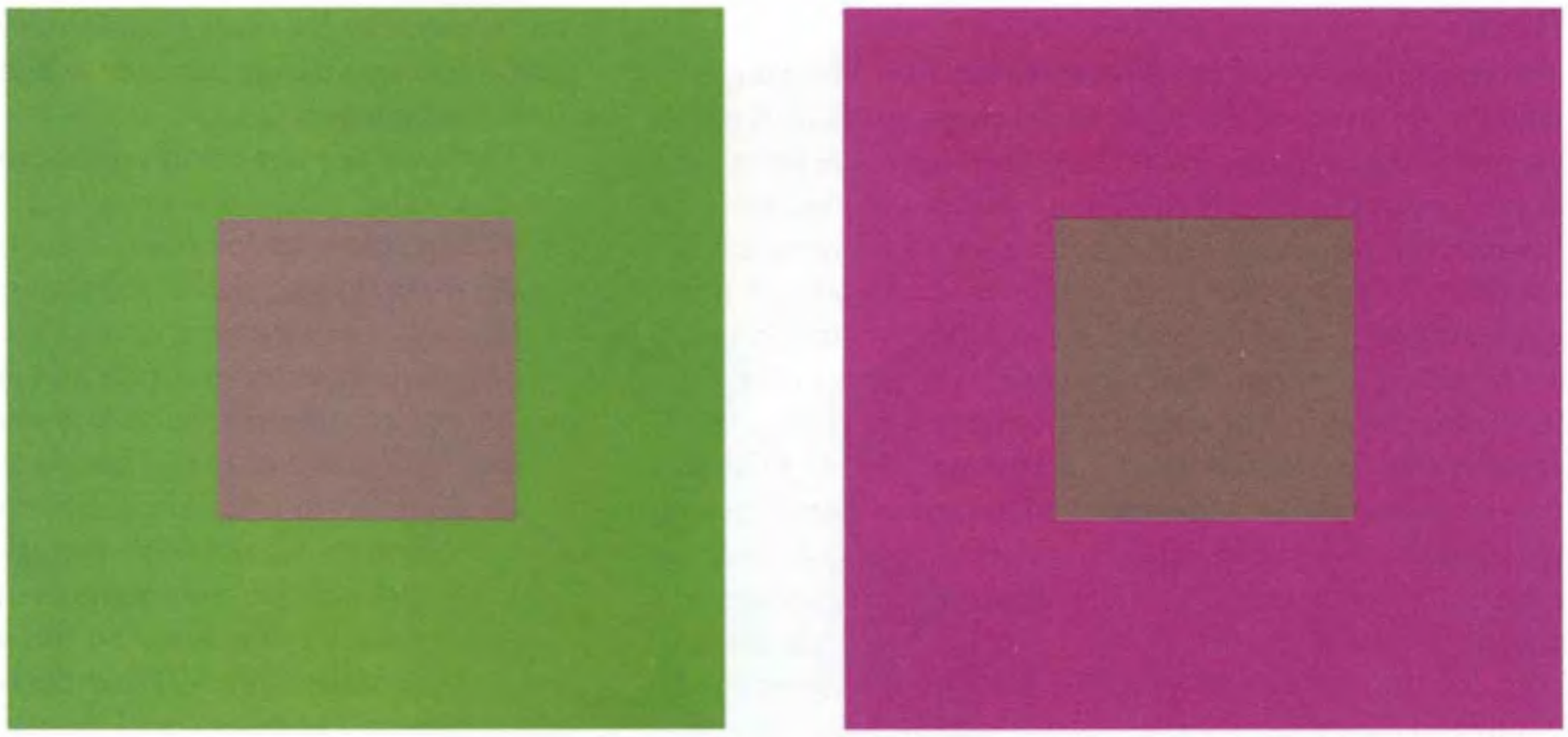
Untitled, 1921

Color and Context



A
The red-purple squares, although seemingly different, are identical.

Color and Context



C
The gray sample looks different against the two background colors.

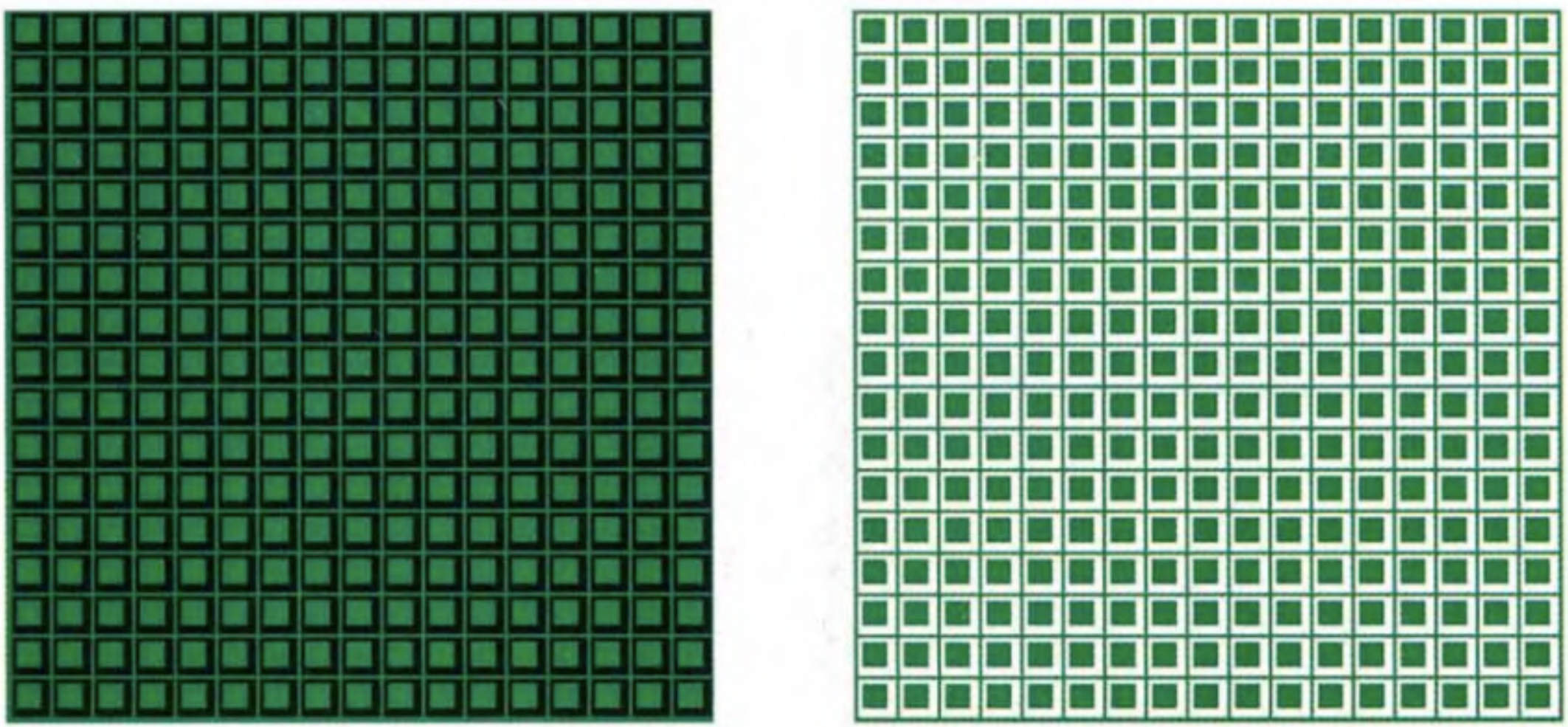
Color and Context

B

A brilliant, vibrant color will not show much change despite different surroundings.

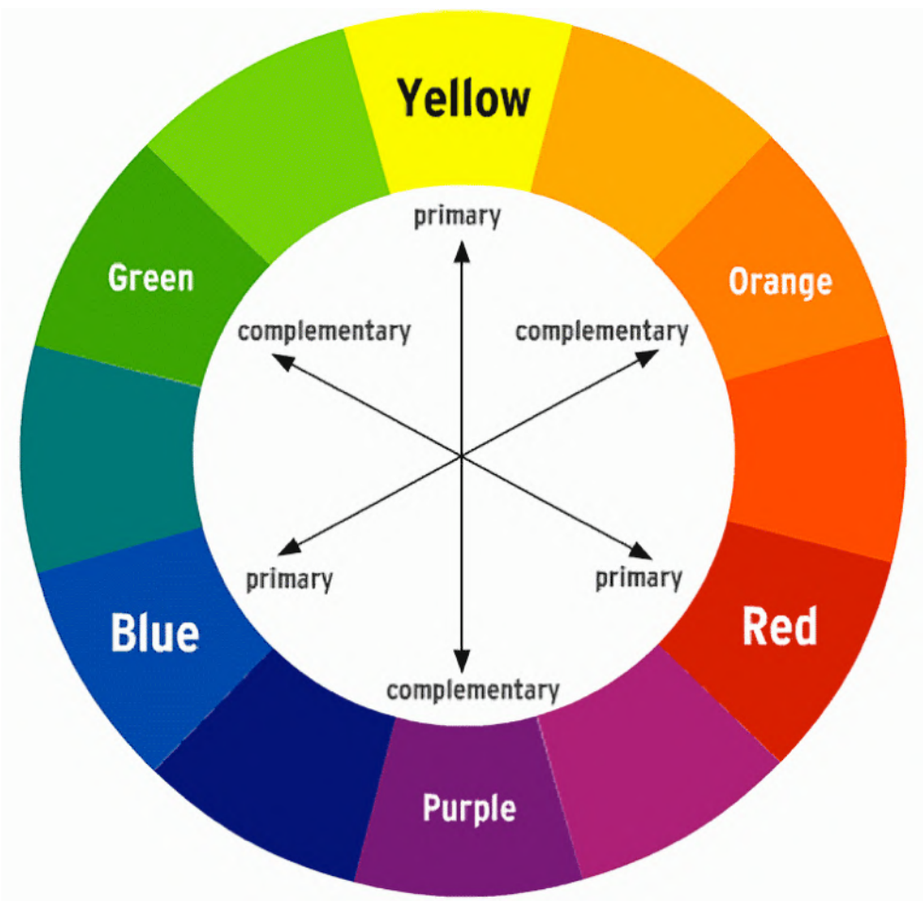
Color and Context

Contexts with different brightness



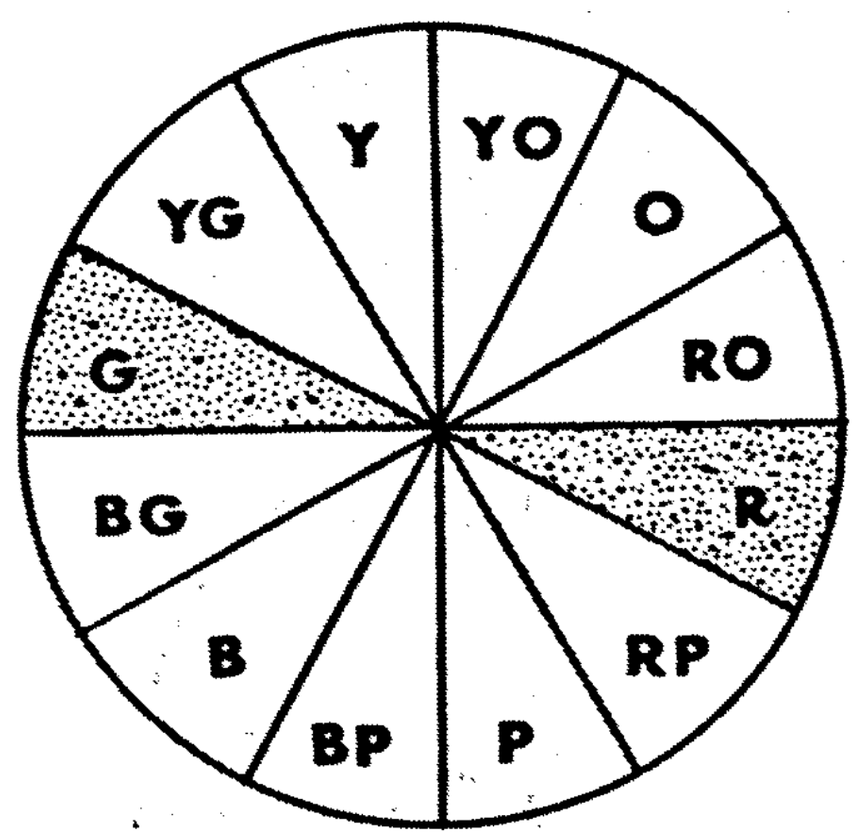
C
The visual mixture of green with black and white.

Color and Combinations

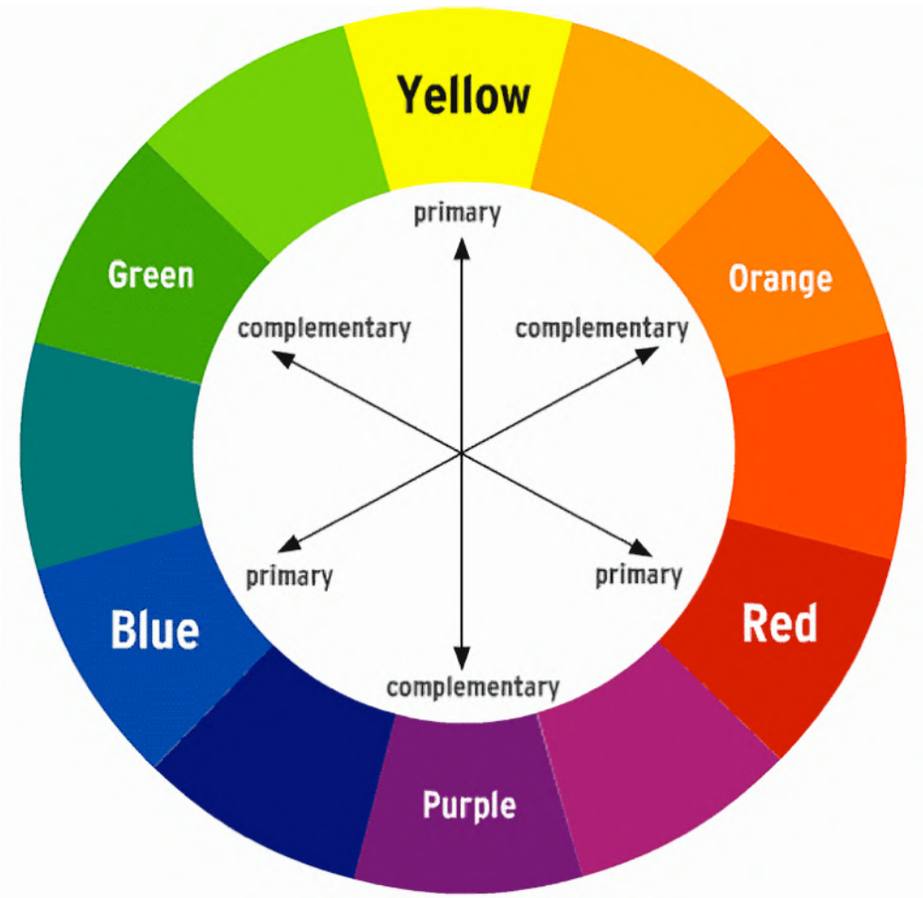


Complementary

- Two colors opposite each other on the color wheel
- Reddish hues are hardest to handle
- One of the complements used should be dull, light or dark, or in small amount

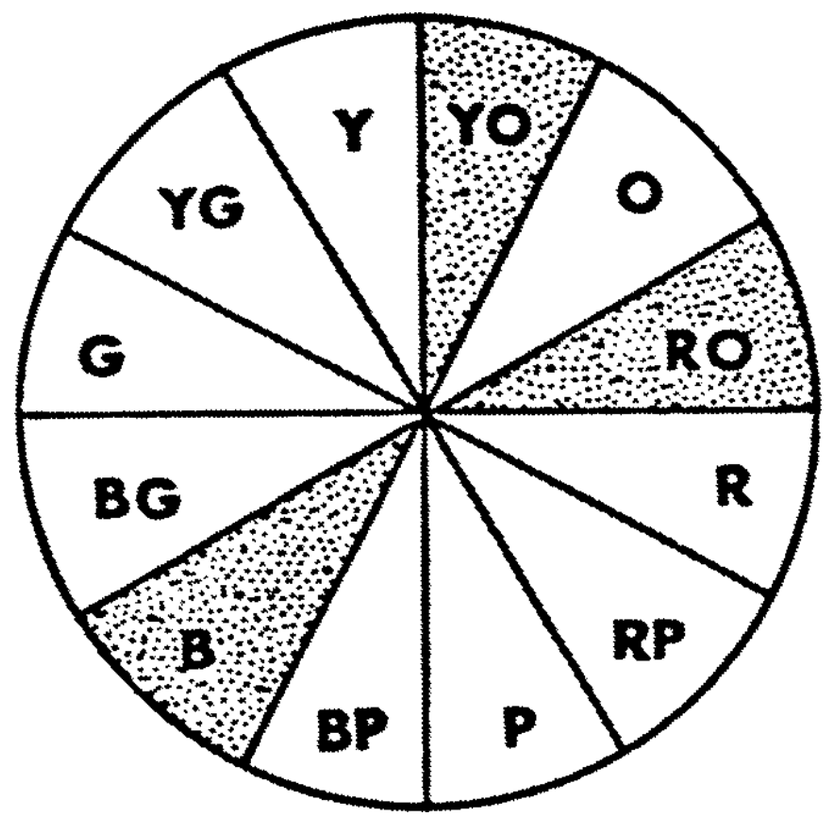


Color and Combinations

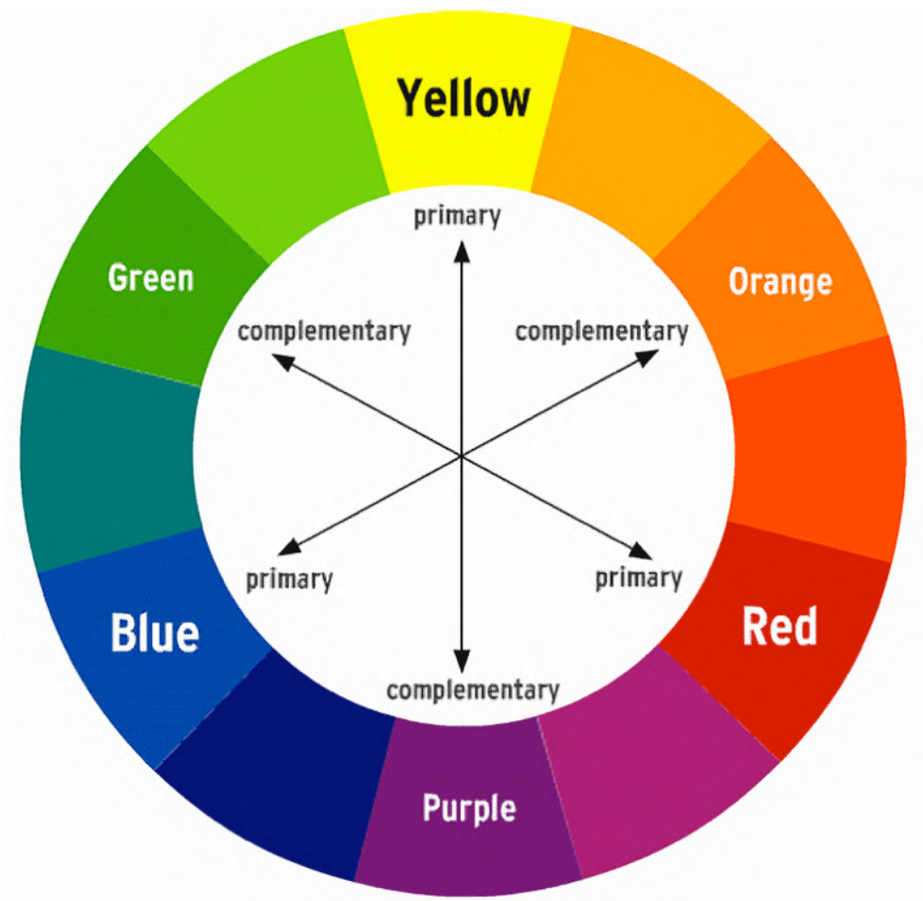


Split Complementary

- Combines a primary color with colors on either side of its complement
- Cannot start with a secondary color because its complement, a primary, cannot be split
- Adjust amounts of different values and intensities

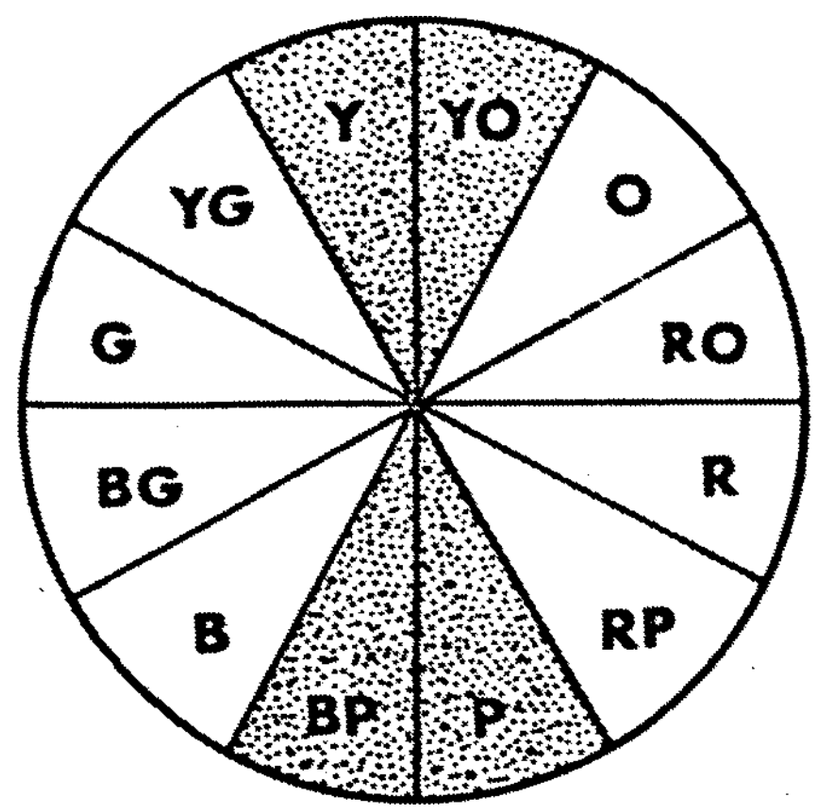


Color and Combinations

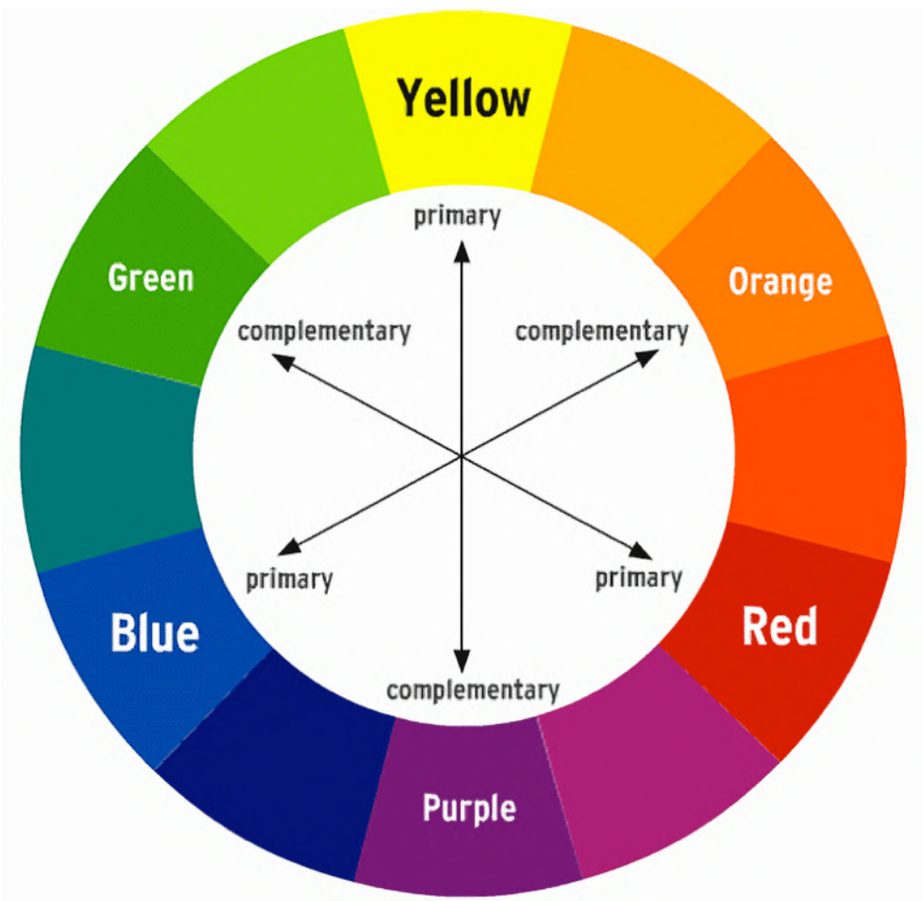


Double Complementary

- Two directly adjacent colors and their complements used together
- Pick only one hue to be outstanding and used in largest account (dulled)
- Vary intensities and values of other hues, as well as amounts

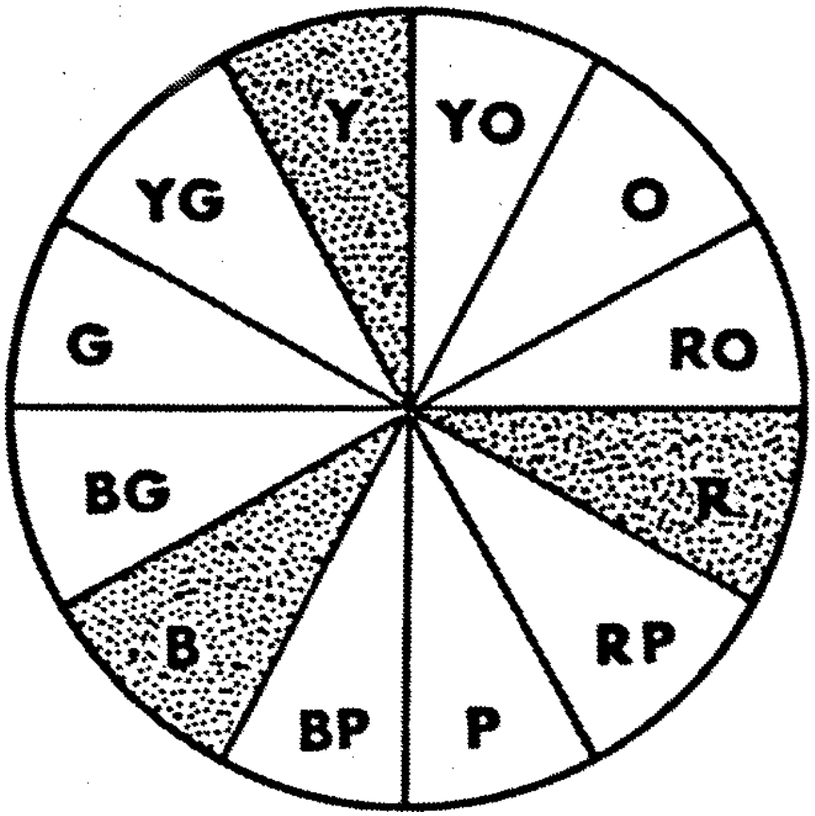


Color and Combinations



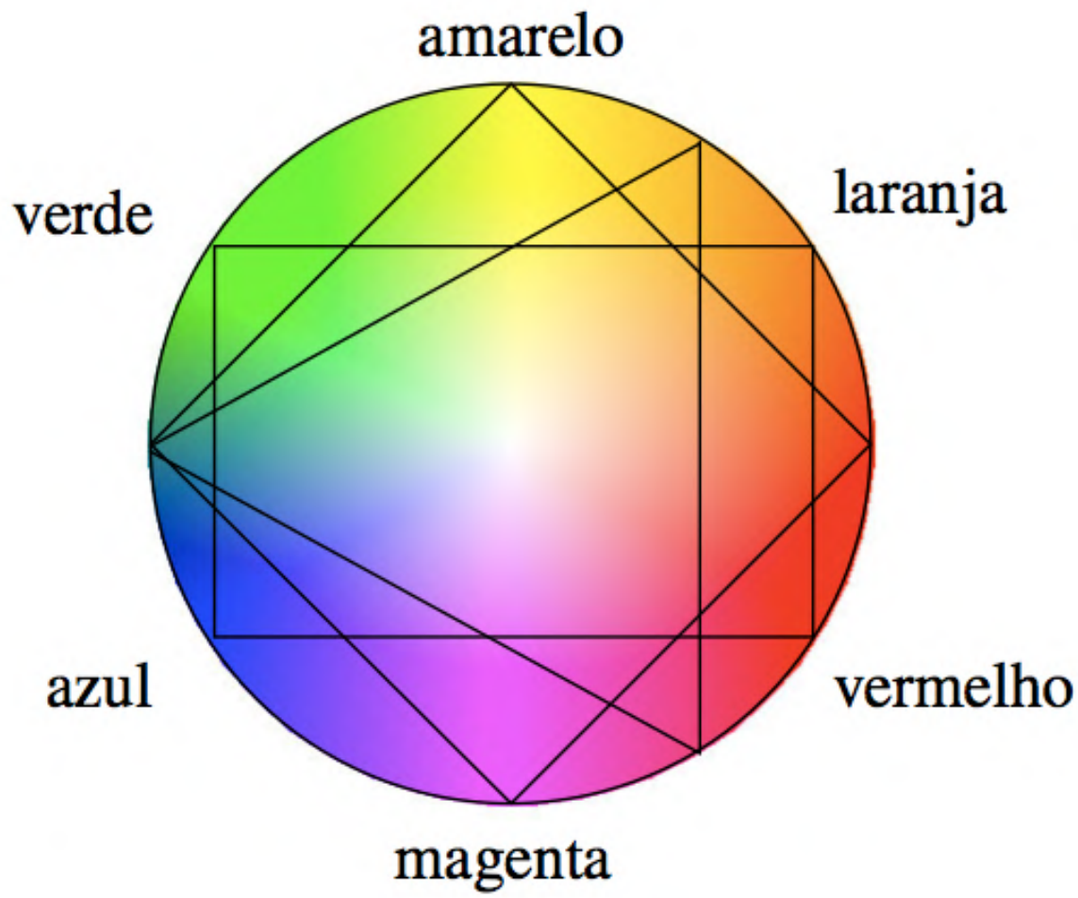
Triad

- Richest harmony if well-used
- Equilateral triangles create triads such as Red, Blue, Yellow; Green, Orange, purple; Yellow-Purple, Blue-Green, Red-Purple; AND Yellow-Green, Blue-Purple, Red- Orange.



Color Theory

Circle for the choice of colors:



Polygons inscribed in the color circle

Resource example: The "Paletton" Web App

Color Theory

Use of complementary colors

"*Boats*" - Van Gogh

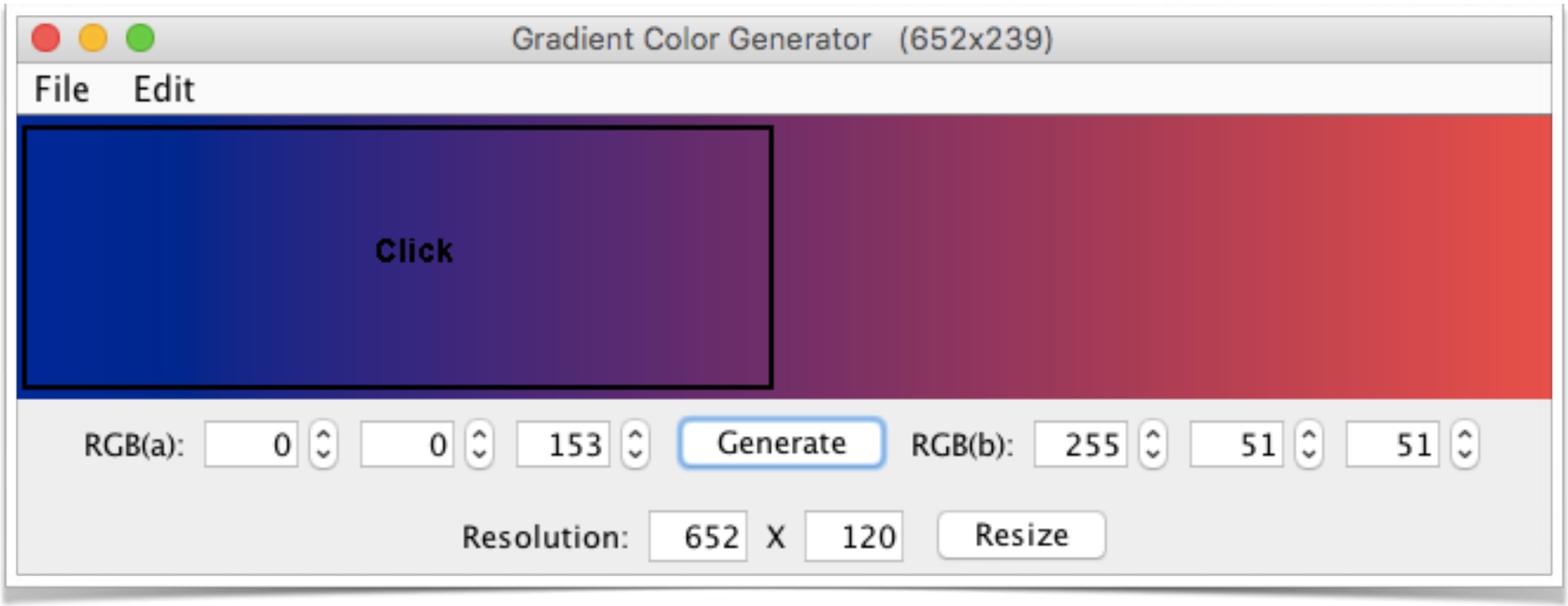
Color Theory

Without using Complementary

"*Boats*" - Van Gogh - Alterada

Color Theory

The use of color gradient

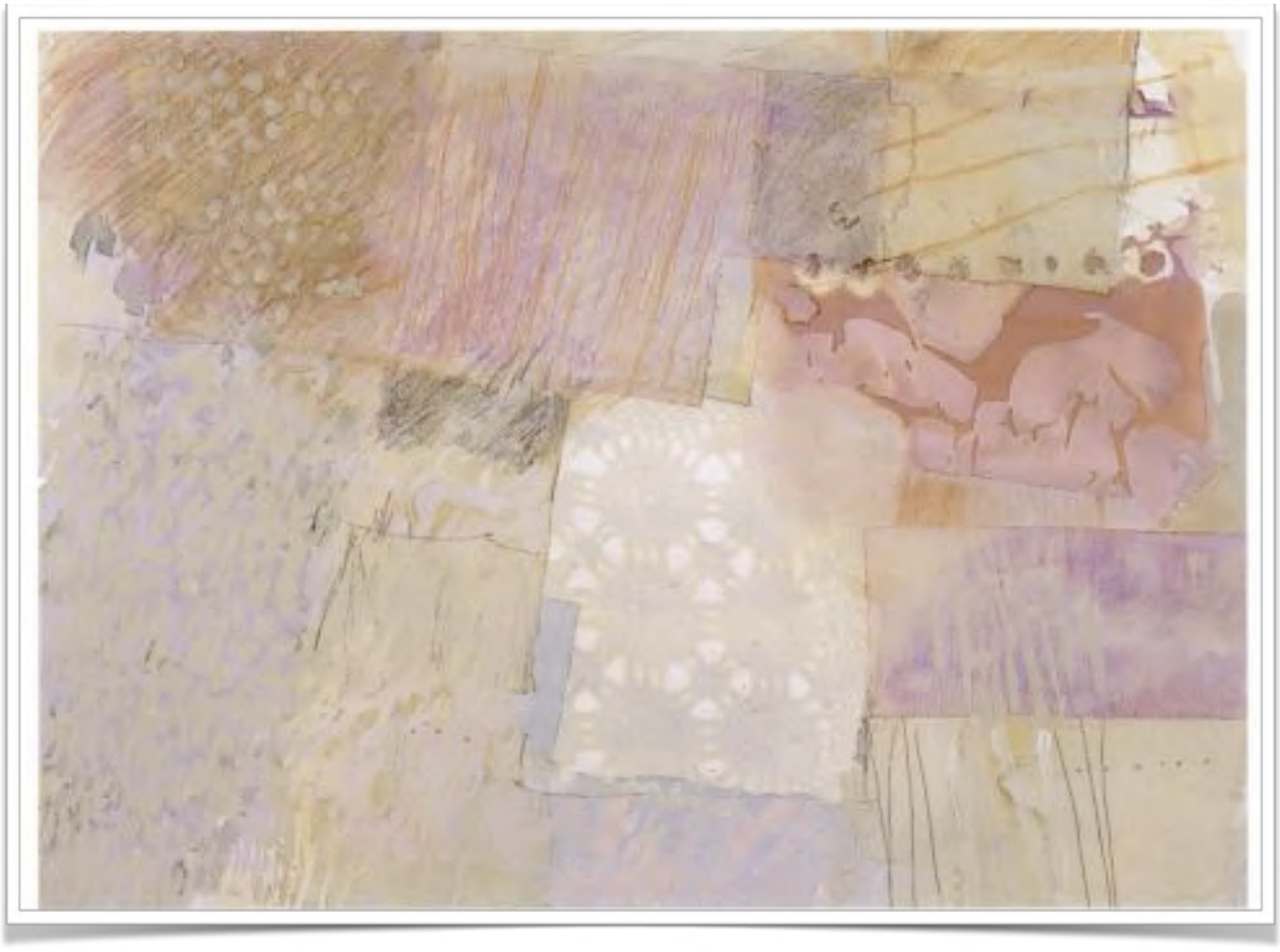


Color Theory

Seven General Principles:

- Harmony
- Contrast
- Rhythm
- Repetition
- Gradation
- Balance
- Dominium

Color Theory — Harmony



Combination of similar elements, colors with close tint or with slight variations in brightness and intensity.

Serenity, tranquility ... or melancholy!

Color Theory — Harmony

Edgar Degas (1834-1917) “Interior” (1868 or 1869)

Degas has used what appears to be a fairly limited palette to give this painting a tight color harmony. The color temperature is predominantly warm with dominating browns and reds, but woven through some of these fields of warm are subtly contrasting areas of cool green/grey.

In the wallpaper background, small patches of juxtaposed green and red blend to produce an animated field of warm. This sounds like a recipe for strong color contrast, but the visual blending Degas color arrangement creates a tight and very rich color harmony.

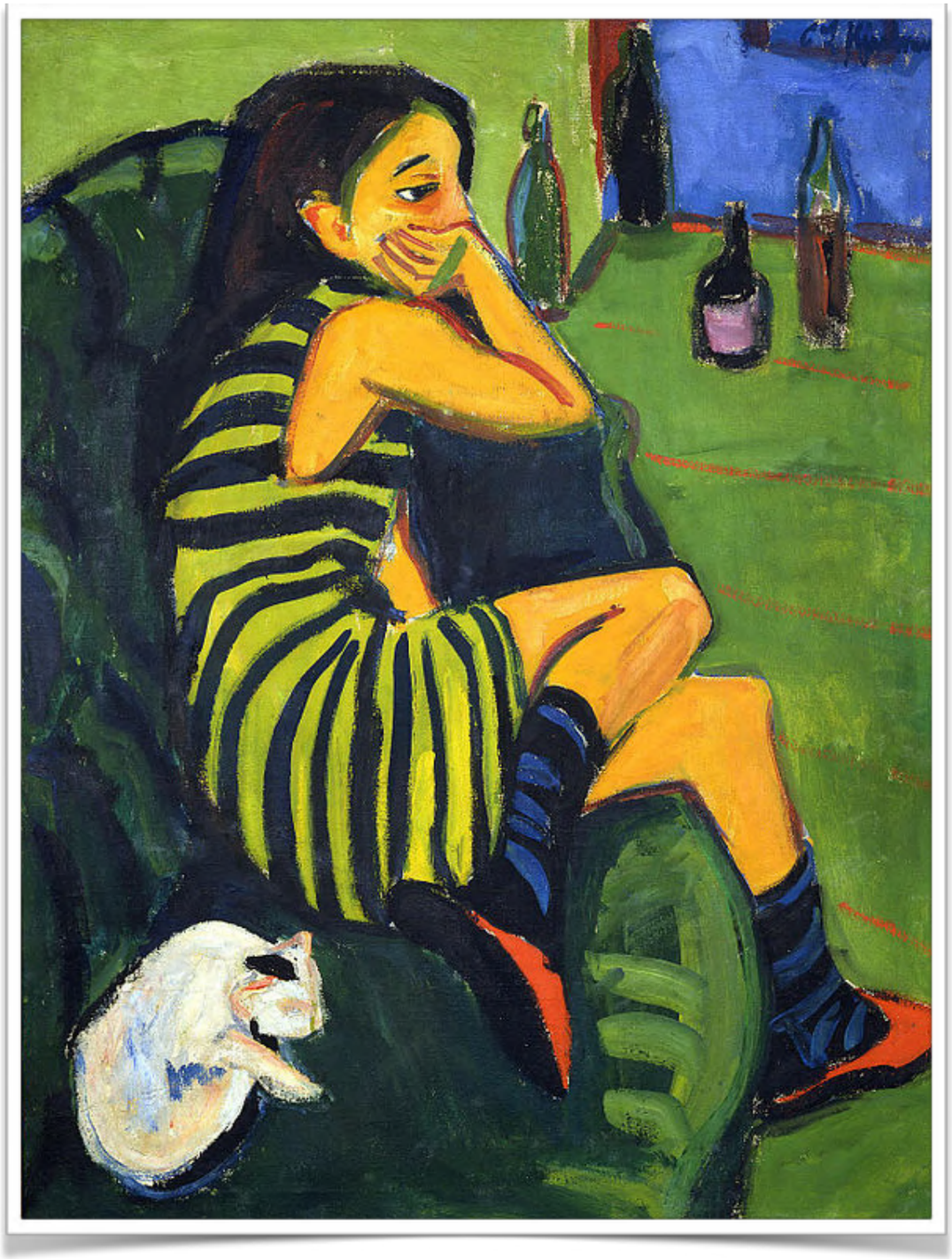
Source: `http://johnlovett.com/design/color-contrast/`

Color Theory — Contrast

Combination of opposing colors and/or different levels of saturation.

Action, movement, ... rhythm, excitement

Color Theory — Contrast



Ernst Ludwig Kirchner (1880-1930)
Artistin Marcella (1910)

The strong composition and dramatic tonal **contrast** in Ernst Kirchner's painting immediately grab your attention. The striped dress against the dark sofa establish a strong focal point, but the thing that really gives this work life and vibrancy is Kirchner's use of raw, contrasting red in the large expanse of green that dominates the painting. Without this color contrast the painting would lack the vitality that brings it to life.

Source: `http://johnlovett.com/design/color-contrast/`

Color Theory — Repetition

Shapes and hues are repeated following well defined patterns.

Order, Logic, Structure, ...

Color Theory — Repetition

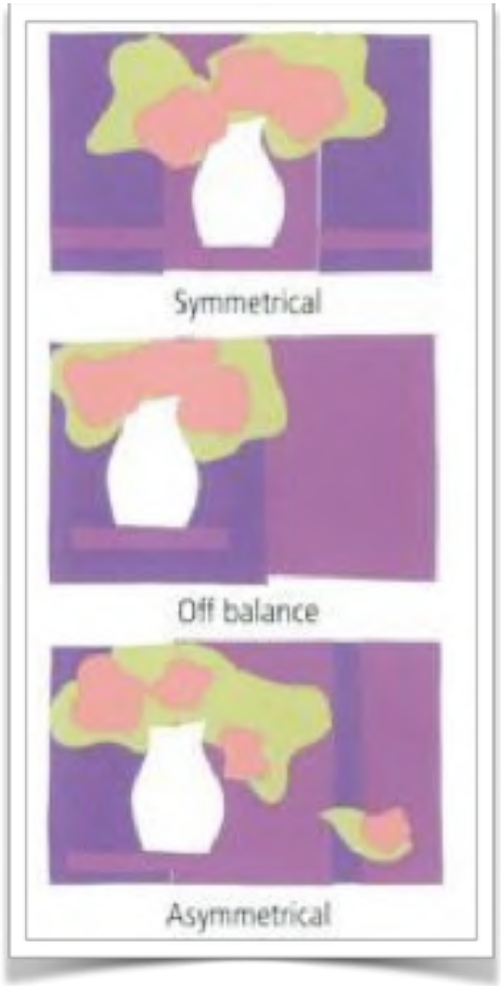
Gustave Klimt (1862-1918) “Attersee” (1900)

This simple composition relies on the repeating patches of blue and green to give it vitality and depth.
The graduating size of the ripples gives the painting a feeling of perspective, while the contrast between the warm grey underpainting and the similar toned turquoise and blue ripples creates the shimmering effect on the water.

Source: `http://johnlovett.com/design/color-contrast/`

Color Theory — Balance

Distribution of elements on a symmetrical or asymmetric form. With more elements it become complex and difficulty to perform.



More asymmetry results in higher emotional response.

Color Theory — Balance

Henri de Toulouse-Lautrec (1864-1901)”
At the Moulin Rouge: Two women waltzing” (1892)

Toulouse Lautrec has used an interesting arrangement of warm and cool to balance this painting. The dominating cool, dark mass of the women’s dresses and background waiter, are flanked by a pair of horizontal red stripes. The stripes are balanced, on the opposite side of the painting, by the shape of a red jacket. A small flick of red in the collar of one of the women creates a balanced triangular arrangement of reds in a field of predominantly cool blue/greys. The areas of light punctuating the dark masses establish the focal point, but it is the arrangement of reds that keep the painting balanced.

Source: `http://johnlovett.com/design/color-contrast/`

Color Theory — Dominance

When a color dominates the whole, it can sometimes unify conflicting parts. Setting a context

Unified chromatic blend

Color Theory — Dominance

Claude Monet (1840-1926) “Impression Sunrise” (1872)

Monet’s painting of a sunrise is dominated by a cool green/grey. This cool color occupies around three quarters of the painting and is relieved, in the upper sky, by a pale warm orange, intensifying as it approaches the rising sun. The sun is the direct complementary color to the surrounding sky, creating a shimmering intensity. By allowing the green/grey to dominate, the red/orange of the sun is injected with maximum intensity.

Source: `http://johnlovett.com/design/color-contrast/`

Color Theory

The Color Psychology

Color ==> Emotions

Color Theory

The Color Psychology

O Vermelho transmite coragem física, força, calor, energia, sobrevivência básica, estímulo, masculinidade e entusiasmo. Mas também, desafio, agressão, impacto visual, perturbação.

Área de Projecto 12ºD: Psicologia das Cores

O Azul transmite inteligência, comunicação, confiança, eficiência, serenidade, dever, lógica, frescura, reflexão e calma. Mas também frieza, frivolidade, ausência de emoções e ausência de simpatia.

Área de Projecto 12ºD: Psicologia das Cores

Color => Emotions

O Amarelo transmite optimismo, confiança, auto-estima, extroversão, força emocional, simpatia e criatividade. Mas também irracionalidade, medo, fragilidade emocional, depressão, ansiedade e suicídio.

Área de Projecto 12ºD: Psicologia das Cores

O Verde transmite harmonia, equilíbrio, frescura, amor universal, recuperação do descanso, segurança, consciencialização ambiental, equilíbrio e paz. Mas também aborrecimento, estagnação, malícia e enervamento.

Área de Projecto 12ºD: Psicologia das Cores