

Web applications design

Semester B, Mandatory modules, ECTS Units: 3

<http://webdesign.georgepavlides.info>

http://georgepavlides.info/tools/html_code_tester.html

George Pavlides

<http://georgepavlides.info>

course outline

- Introduction
 - What is 'design'
 - What is the Web
 - What are the principles
- Client-side web programming
 - Markup languages
 - Static programming with HTML
 - Dynamic programming with CSS and JavaScript
 - Introduction to HTML5
- **Visual media production**
 - Introduction to light, vision, perception
 - Introduction to basic image processing
 - Grid design with image processing
 - The golden ratio in design
- Server-side web programming
 - Introduction to PHP and MySQL
 - Usage of open-source CMS/blog packages

Introduction to light, vision and visual perception

on the way we see things...

light

"Γεννήθηκα πριν από αιώνες αιώνων, σε έναν Χώρο όπου δεν υπήρχε χώρος και σε έναν Χρόνο όπου δεν υπήρχε χρόνος. Με έναν περίεργο ωστόσο τρόπο, αισθάνομαι ότι προϋπήρχα της γενέσεώς μου. Κι ενώ από τότε όλα έχουν αλλάξει, εγώ αισθάνομαι ότι τίποτα δεν έχει αλλάξει. Η παρουσία μου μετρά το αιώνιο."



George Grammatikakis

light

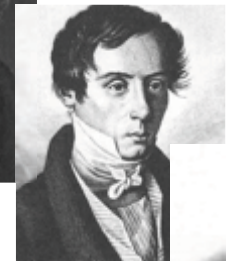
- **Particle theory of light**

- Newton (1675)
 - light is a continuous stream of particles traveling in a straight line



- **Wave theory of light**

- Robert Hooke (1660)
- Christiaan Huygens (1678)
- Leonhard Euler (1746)
- Thomas Young (1800s)
- Augustin-Jean Fresnel (1817)
- Simeon Denis Poisson (1820s)



light

- **Electromagnetic theory of light**

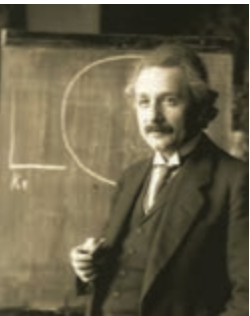
- Michael Faraday (1845)
- James Clerk Maxwell (1862, 1873)
- Heinrich Hertz



- **Special relativity** (duality in the nature of light)

- Einstein (1905)

- Solution to the paradox of the constant speed of light: space & time → variable quantities
- Correlation of energy, mass and the speed of light $E=mc^2$
- Solution to the photoelectric phenomenon paradox

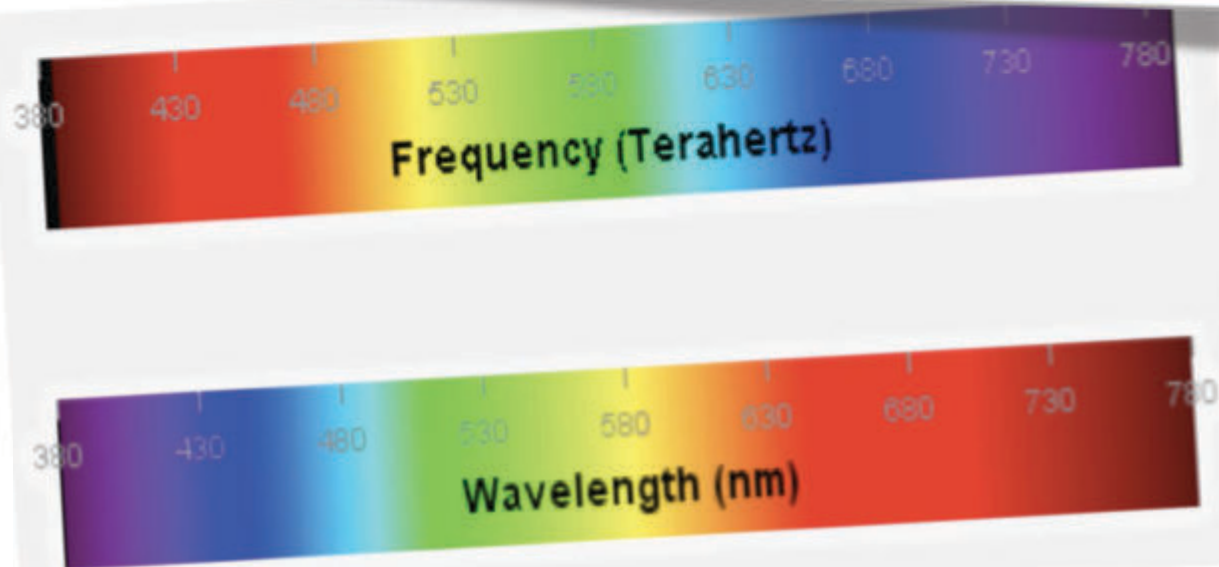
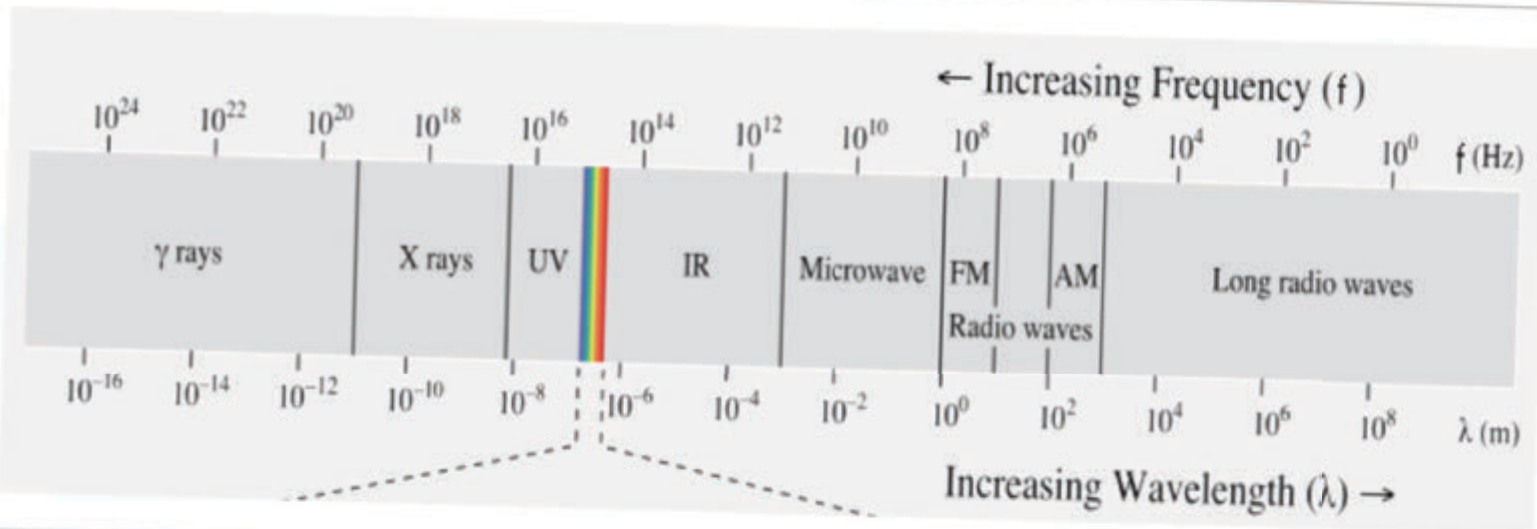


- **Quantum mechanics and electrodynamics**

- Max Planck (1900s)
 - Blackbody radiation → packets or quanta → photons $E=hf=hc/\lambda$



light



light and the human vision

- **Kepler (1604)**

- theory of diffraction by spherical lenses
 - application of theory to the eyes
 - considered the first to recognize that images are projected onto the retina reversed

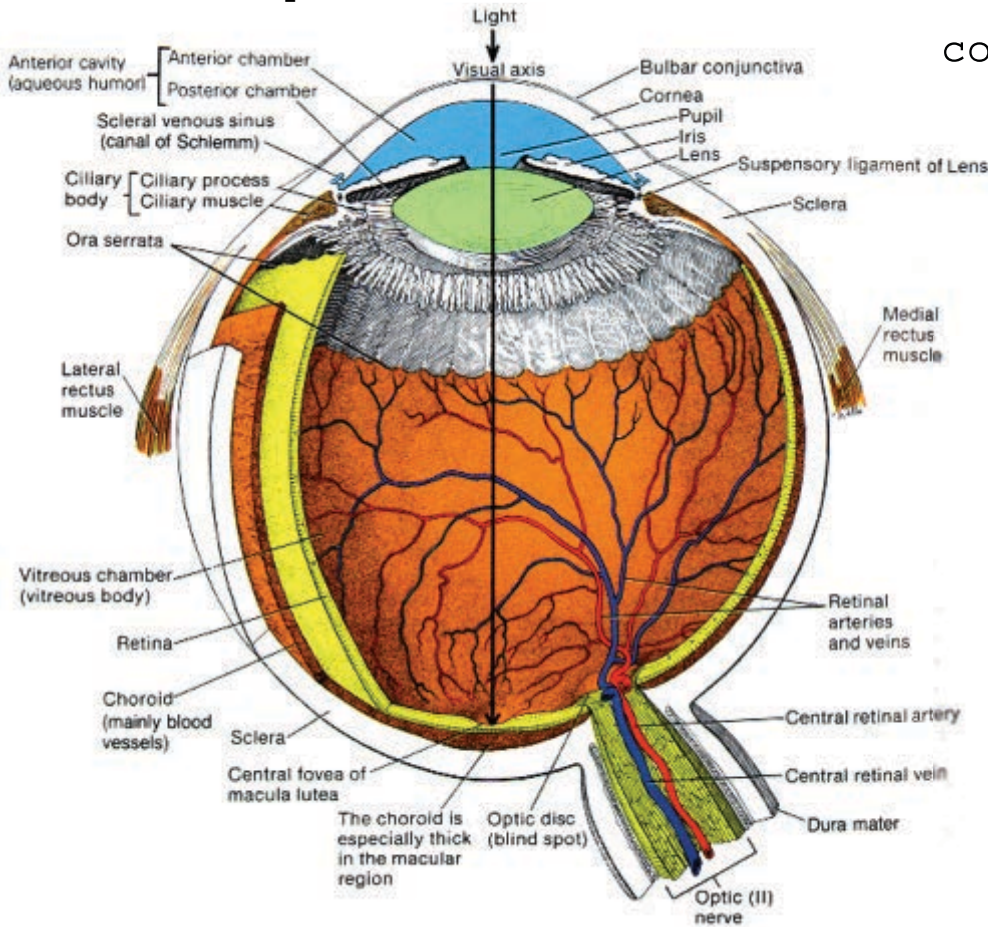


- **The retina**

- does not correspond to a film (a set of passive sensors)
- consists of a finite number of sensors

the light sensing device

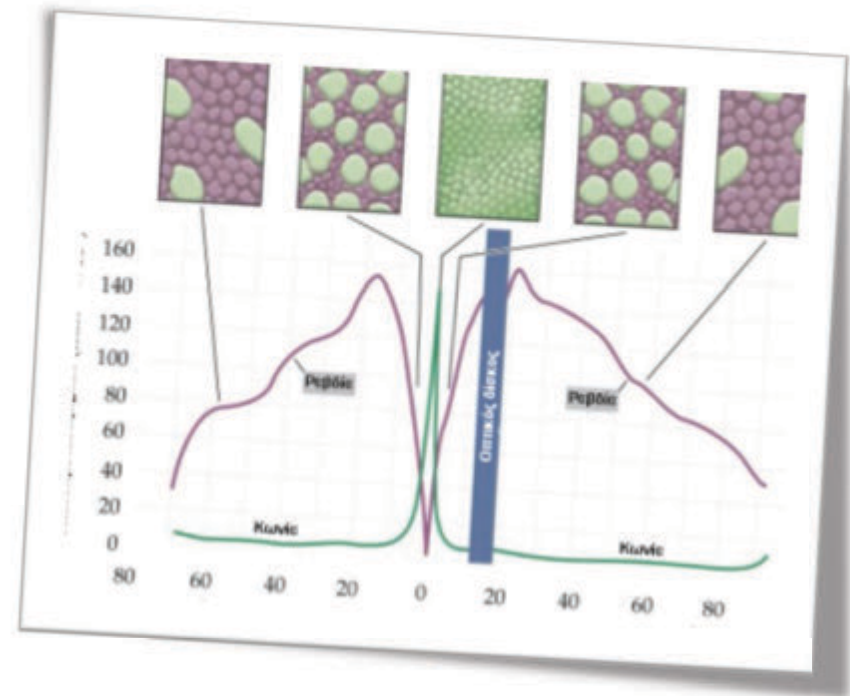
Horizontal section
of the left eye



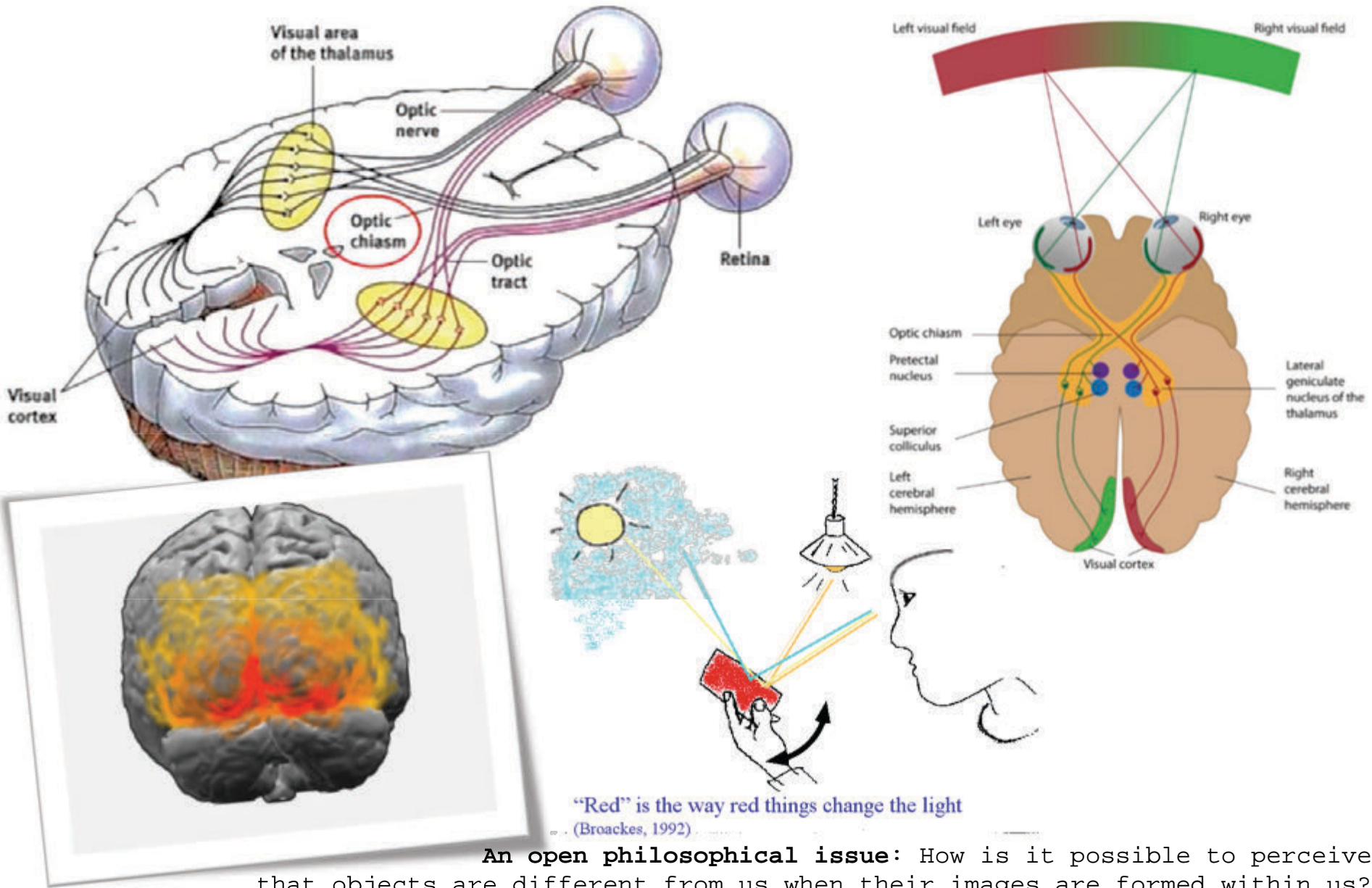
The retina and
concentration of cones and rods

Lens characteristics:

- Slightly **yellowish color** to compensate for chromatic aberration
- **Absorbs** about 10% of light
 - **Emits** at 300-1600nm
- **Is sensitive** to infrared and ultra violet



formation of an image



An open philosophical issue: How is it possible to perceive that objects are different from us when their images are formed within us?

visual acuity

- **Estimation of eye's resolution**
 - **ACTUALLY CANNOT BE DEFINITELY ESTIMATED**
 - The eye is a video camera continuously moving the focus and center of the viewing field
 - can distinguish two fine lines if they are separate by at least 0.6 arc-minutes (0.01 degrees)
 - equivalent pixel size of 0.3 arc-minutes
 - for 120 degrees field of view → **576 Mpixels**
 - $120^\circ \times 60 \text{ arc-min}/^\circ \times 1/0.3 \text{ px/arc-min} = 24.000 \text{ px for 1D}$
 - Really detailed vision only within the central field of view (**2° the fovea; and no more than 20°**)
 - corresponds to a resolution no more than **~7 Mpixels**
 - **plus ~1 Mpixel** for the rest of the field of view
 - Color resolution
 - 256 shades of each of the primary colors
 - → $2^{24} = 16.7 \text{ million colors}$

more here:

<http://webvision.med.utah.edu/book/part-viii-gabac-receptors/visual-acuity/>

<http://clarkvision.com/articles/eye-resolution.html>



(YOU CAN ROLL UP A SHEET OF PAPER AND CUT IT—OR ZOOM THE PAGE—SO IT MATCHES THIS IMAGE.)

YOUR CENTRAL VISUAL FIELD



HOW TO VIEW

COLOR VISION:

WE DON'T SEE MUCH COLOR OUTSIDE THE CENTER OF OUR VISION—OUR BRAINS KEEP TRACK OF WHAT COLOR THINGS ARE AND FILL IT IN FOR US.

SATURATION INDICATES COLOR RECEPTOR DENSITY

LEFT EYE* BLIND SPOT

WE HAVE FEW BLUE-SENSITIVE CONE CELLS, BUT THEY'RE FOUND OUT TO THE EDGE OF OUR VISION.

BLUE-SKY SPRITES

THESE TINY, DARTING BRIGHT SPOTS, VISIBLE AGAINST SMOOTH BLUE BACKGROUNDS, ARE WHITE CELLS MOVING IN THE BLOOD VESSELS OVER THE RETINA.

FLOATERS

SOME TYPES OF FLOATERS ARE CAUSED BY BREAKDOWN OF YOUR EYEBALL GOOP AS YOU AGE, BUT THIS TYPE IS SOME OTHER KIND OF DEBRIS NEAR THE RETINA. I DON'T KNOW WHAT.

DETAIL

WE ONLY SEE AT HIGH RESOLUTION OVER A SMALL AREA IN THE CENTER OF OUR VISION WHERE RETINAL CELLS ARE DENSEST (THE FOVEA).

IF YOU STARE AT THE CENTER OF THIS CHART, YOUR EYES ARE SEEING ALL THESE PANELS AT ROUGHLY THE SAME LEVEL OF DETAIL.

NORMAL LIGHT



RIGHT EYE* BLIND SPOT

NIGHT VISION

CONE CELLS (SHARP, CENTRAL COLOR VISION) DON'T WORK IN LOW LIGHT, BUT ROD CELLS (MONOCHROME, LOW-RES, NON-CENTRAL) DO. THIS IS WHY YOU CAN WALK AROUND IN DIM LIGHT, BUT NOT READ. IT'S ALSO WHY YOU CAN SPOT FAINTER STARS BY LOOKING NEXT TO THEM.

LOW LIGHT



HUMANS CAN SEE POLARIZATION—

STARE AT A WHITE AREA ON AN LCD DISPLAY WHILE ROTATING IT (OR YOUR HEAD)

LIKE THIS: [] (FAST)

POLARIZATION DIRECTION IS SHOWN BY A FAINT CENTRAL YELLOW/BLUE SHAPE. (ALSO VISIBLE IN DEEP BLUE SKIES.)

* NOT PICTURED: T-BOZ BUND SPOT, CHILLI BUND SPOT.

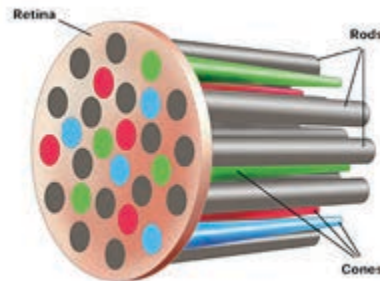
visual acuity



the retina

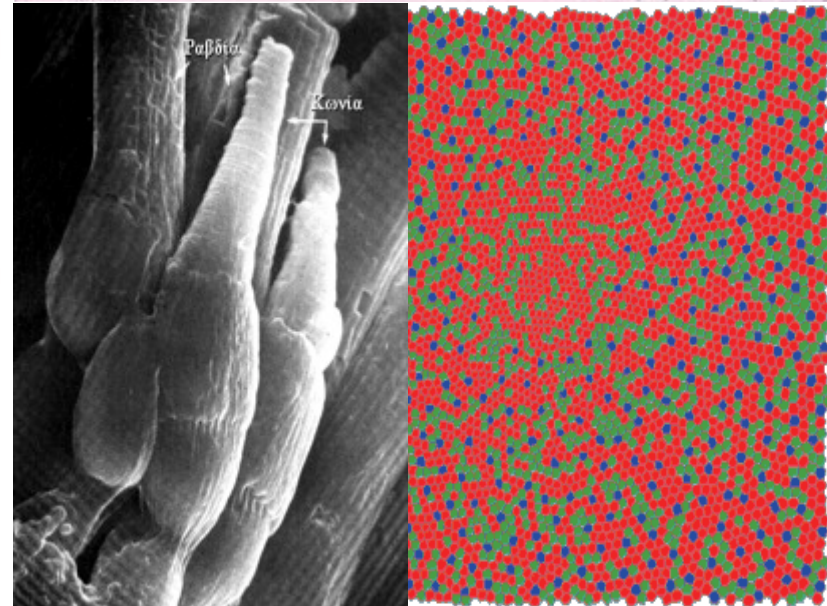
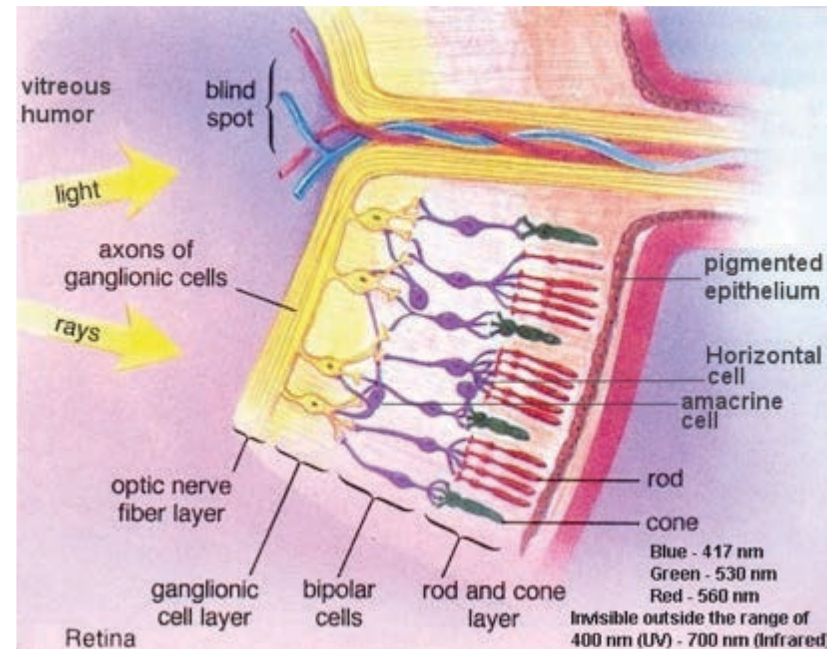
- **Cones**

- Cone-shaped cells
- Three types
 - S, M, L depending on the sensitivity
 - 420, 530, 560 nm
 - S cones → 7%, L:M=1,5
- Fovea
 - ~150.000 cones/mm²
- Day vision



- **Rods**

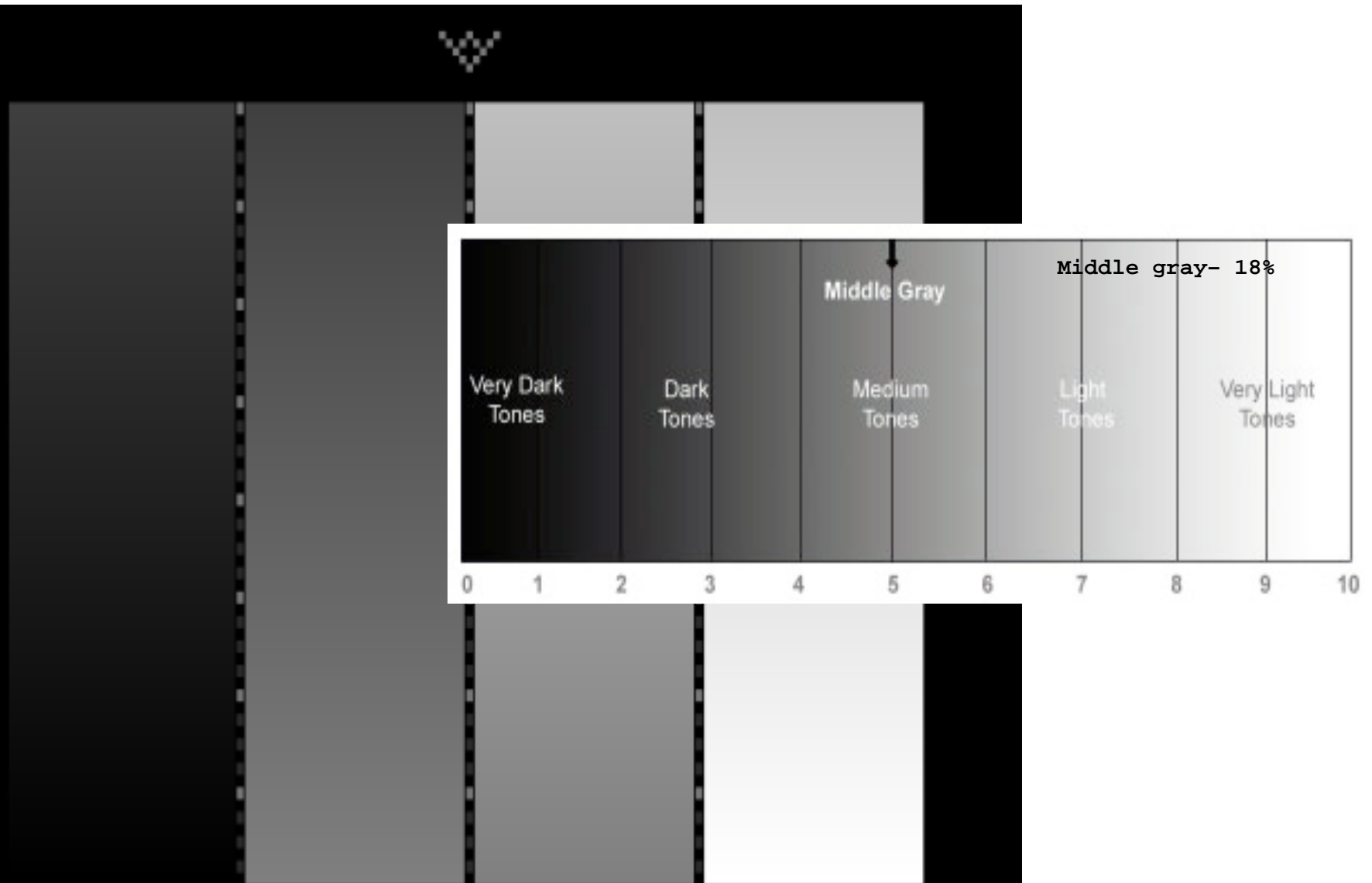
- Cylindrical cells
- Max sensitivity
 - 550 nm
- Night vision



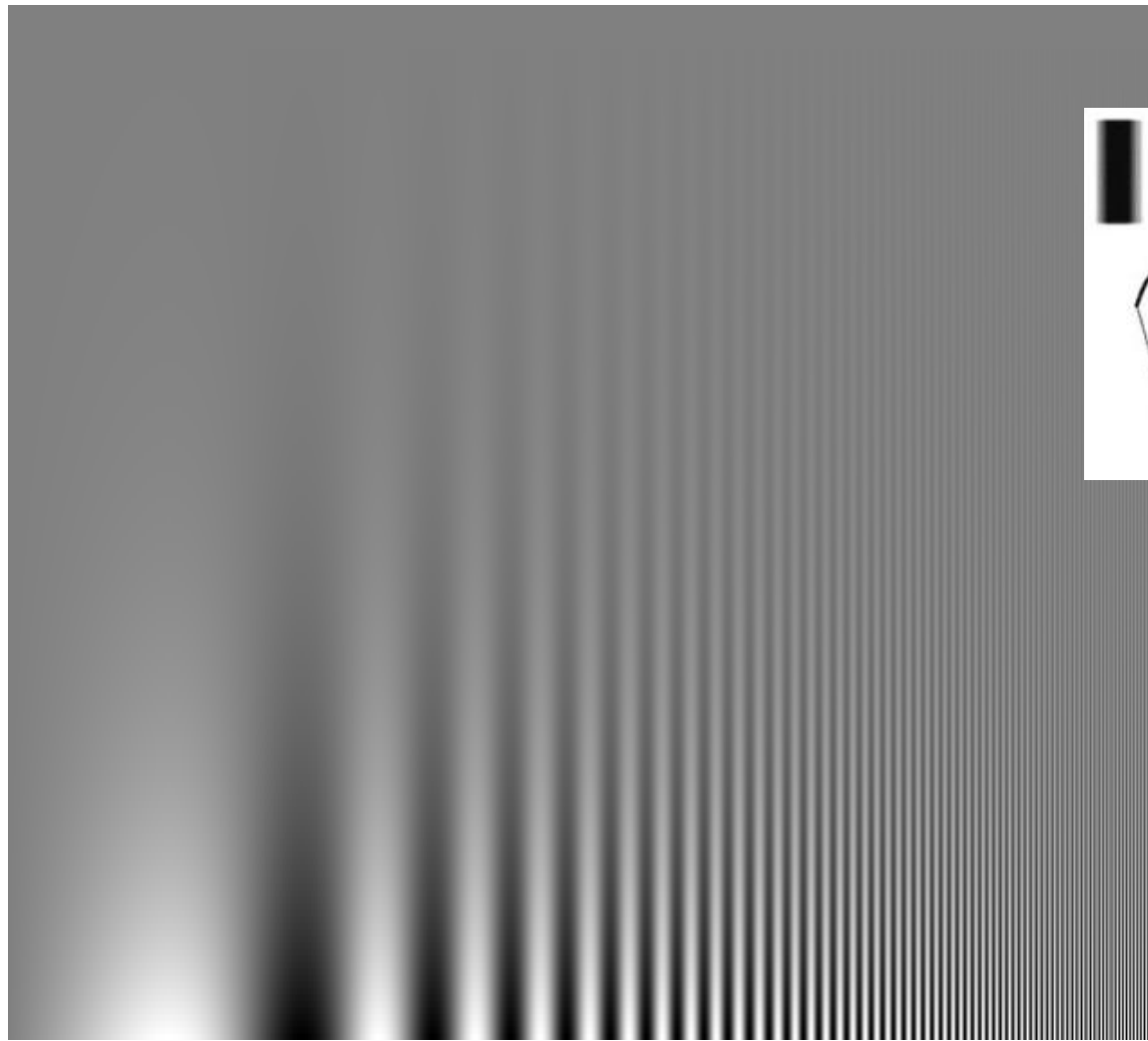
the retina

| Rods | Cones |
|--|---|
| Night vision (males excel) | Day vision (females excel) |
| Very sensitive to light | Not too sensitive to light Sensitive to direct light |
| Loss → night vision blindness | Loss → blindness |
| Low visual acuity | High visual acuity |
| Not present in fovea | Mostly concentrated within the fovea |
| Low response to light Sensitivity enhances with time | Fast response to light, perception of high contrast prevails |
| Contain more amount of pigment and can thus detect low light levels | Contain less amount of pigment and thus cannot detect low light levels |
| 20 times more than cones on the retina (~90 million) | ~4.5 million |
| One type of pigment | Three types of pigment |
| Graylevel (B&W) vision | Color vision |

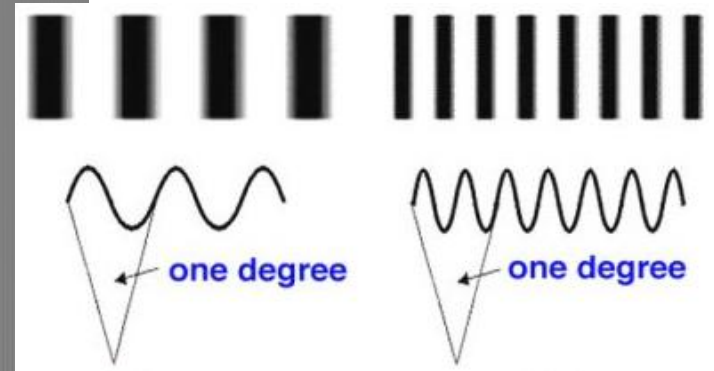
brightness sensitivity



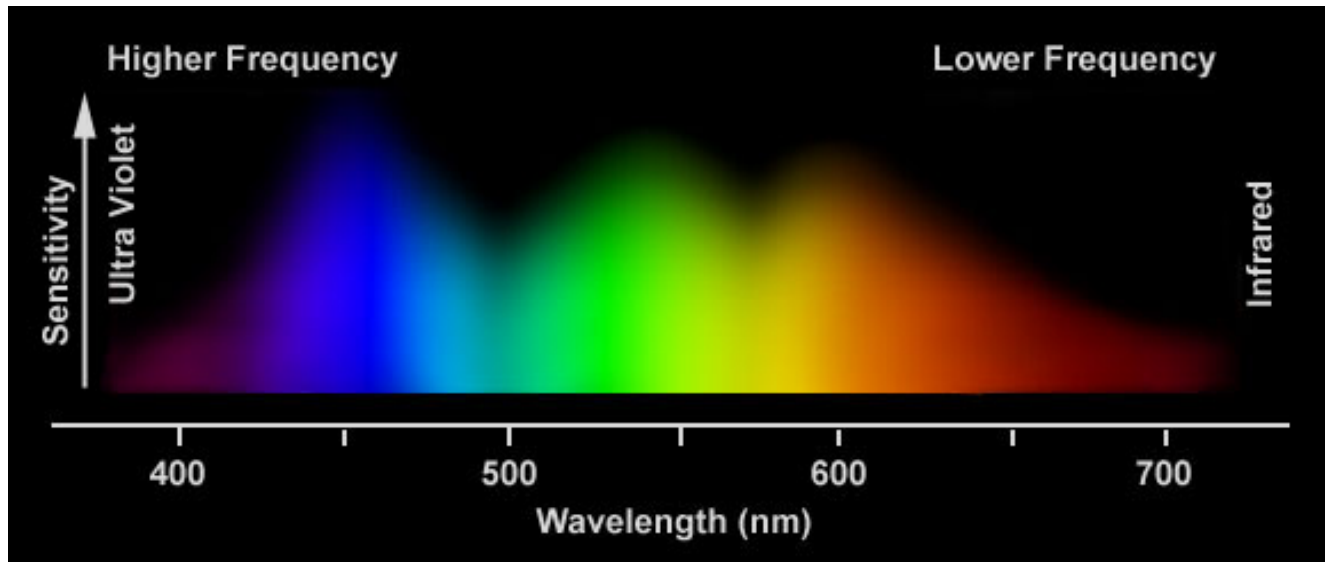
contrast sensitivity



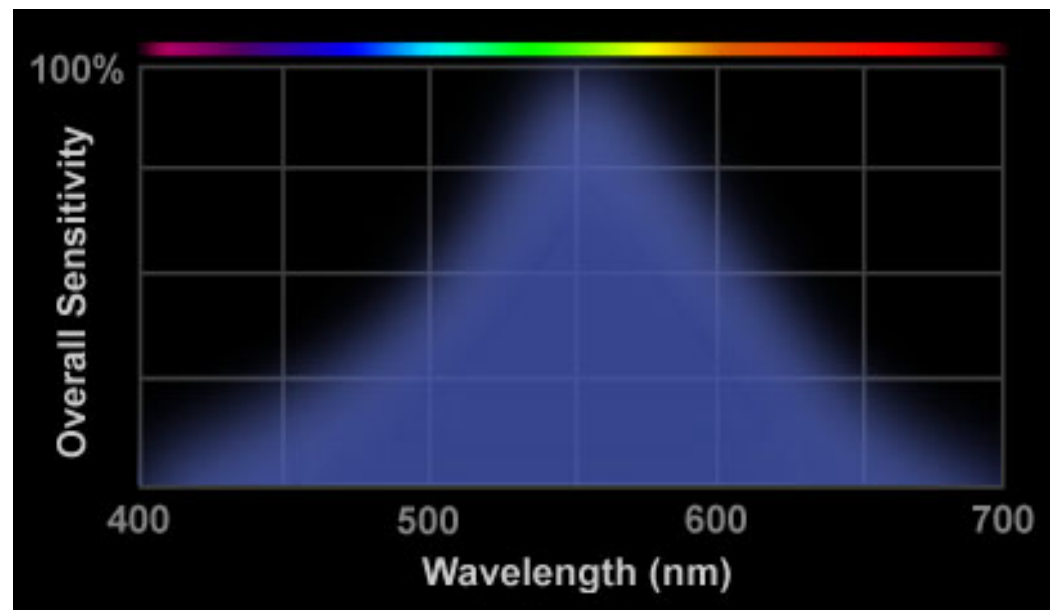
Spatial frequency c/deg



color sensitivity



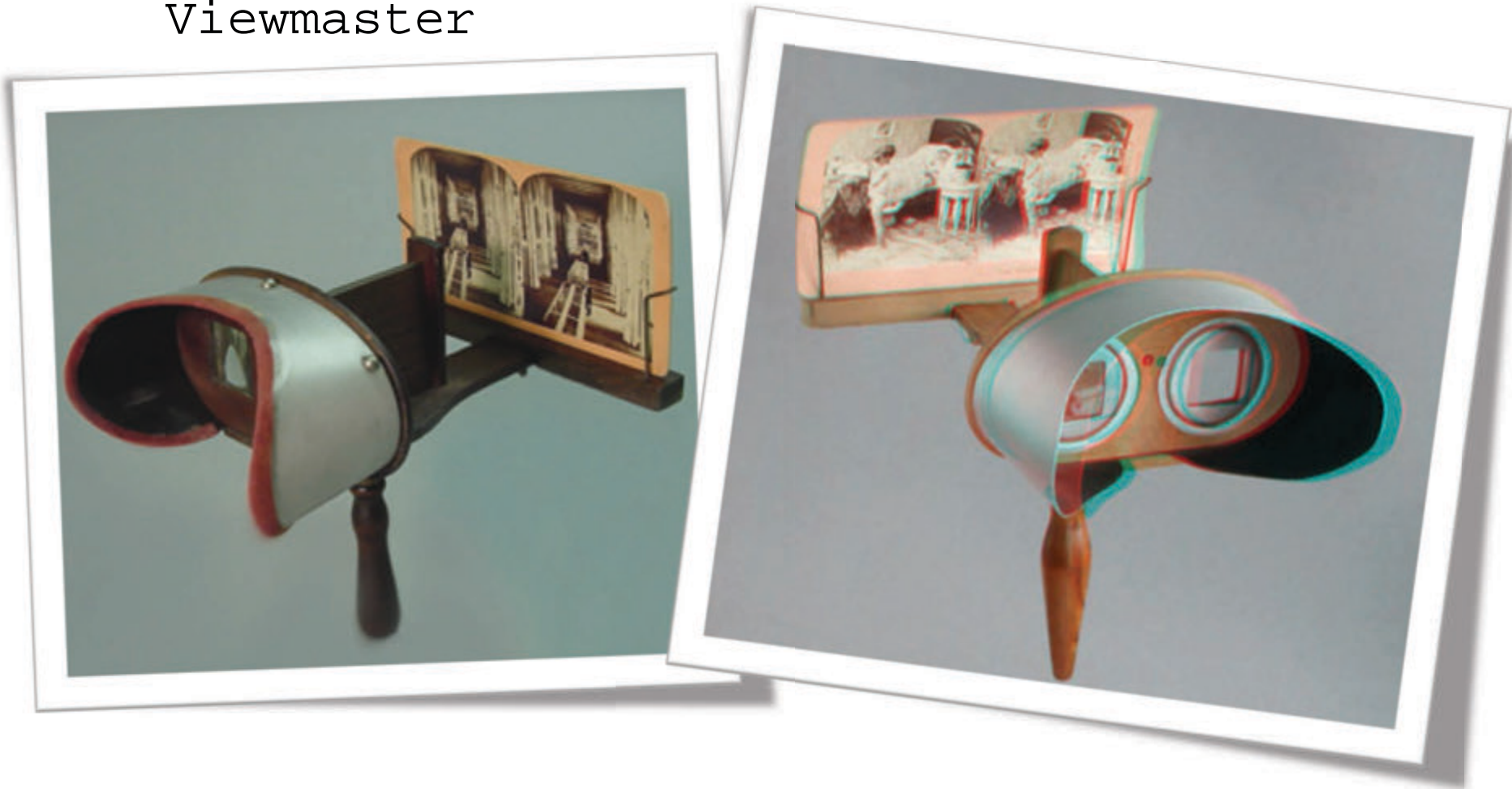
Day vision



Night vision

depth perception

- Coupling of the two different views from the eyes
 - Wheatstone (1838) → Stereoscope → Viewmaster



content perception

- **Plato's** 'allegory of the cave', 7th chapter of 'Politeia' (380 bC)
 - Socrates describes a gathering of people who have lived chained to the wall of a cave all of their lives, facing a blank wall.
 - The people **watch shadows projected** on the wall by things passing in front of a fire behind them, and begin to designate names to these shadows.
 - **The shadows are as close as the prisoners get to viewing reality.**
 - Analogy of the human perception
 - The perception of the world around us is made up of reflections of the external world within us
 - Perception is a **synthetic processing** within the brain that is based on sensory data



Raphael (1508-11): Plato and Aristotle
talk in the Athenian Agora

psycho-optics and vision limitations

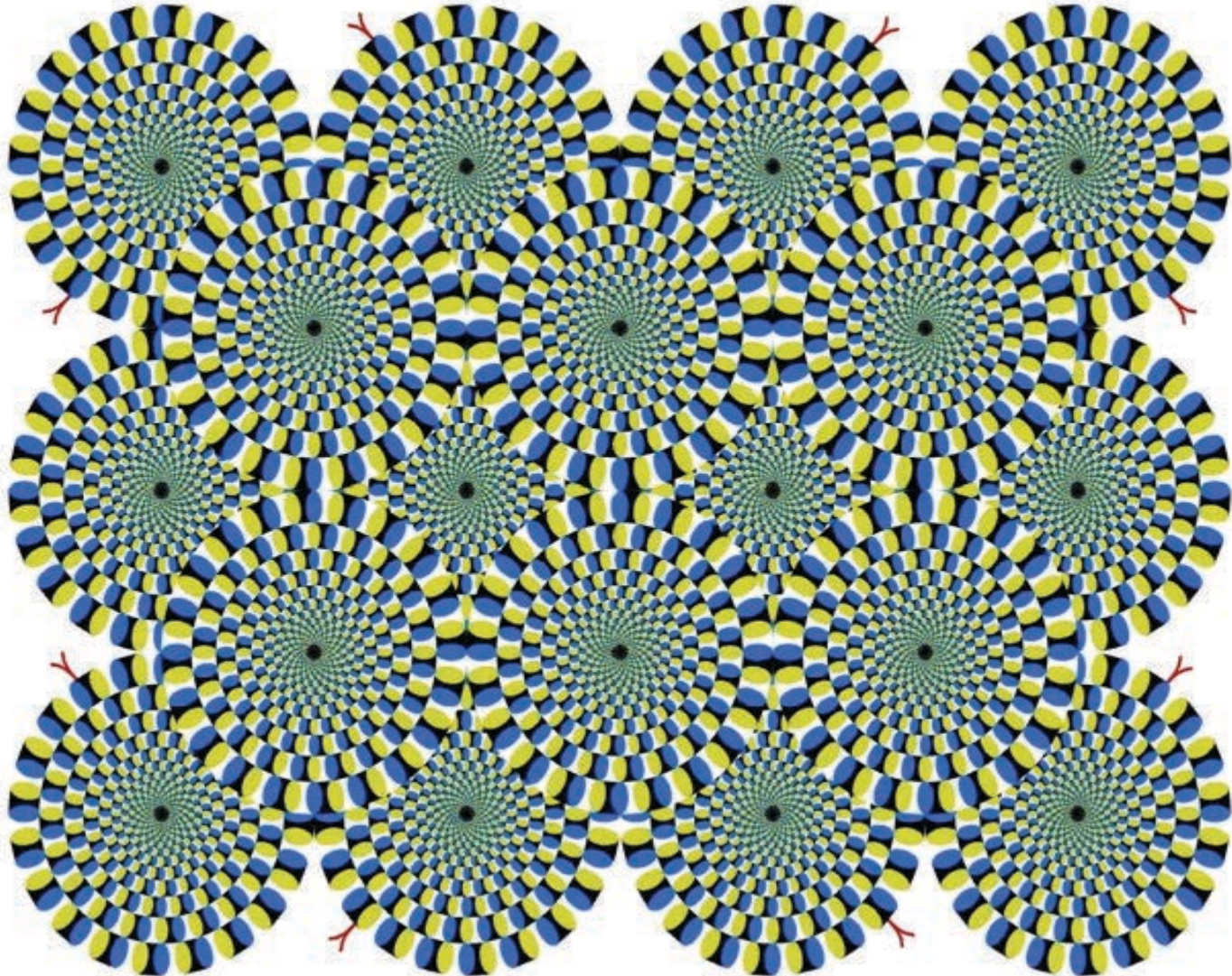
- Visual perception and logic
 - Experiment: Speak out the color of the words and not the words themselves.

| | | |
|--------|--------|--------|
| YELLOW | BLUE | ORANGE |
| BLACK | RED | GREEN |
| VIOLET | YELLOW | RED |
| ORANGE | GREEN | BLACK |
| BLUE | RED | VIOLET |
| GREEN | BLUE | ORANGE |

- The right brain tries to speak the color whereas the left brain insists on reading the word

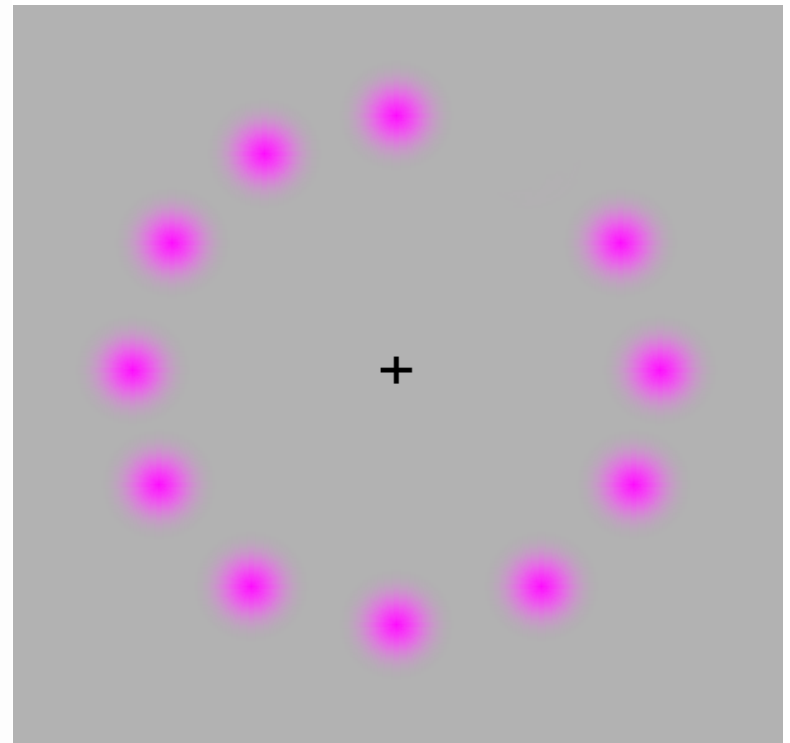
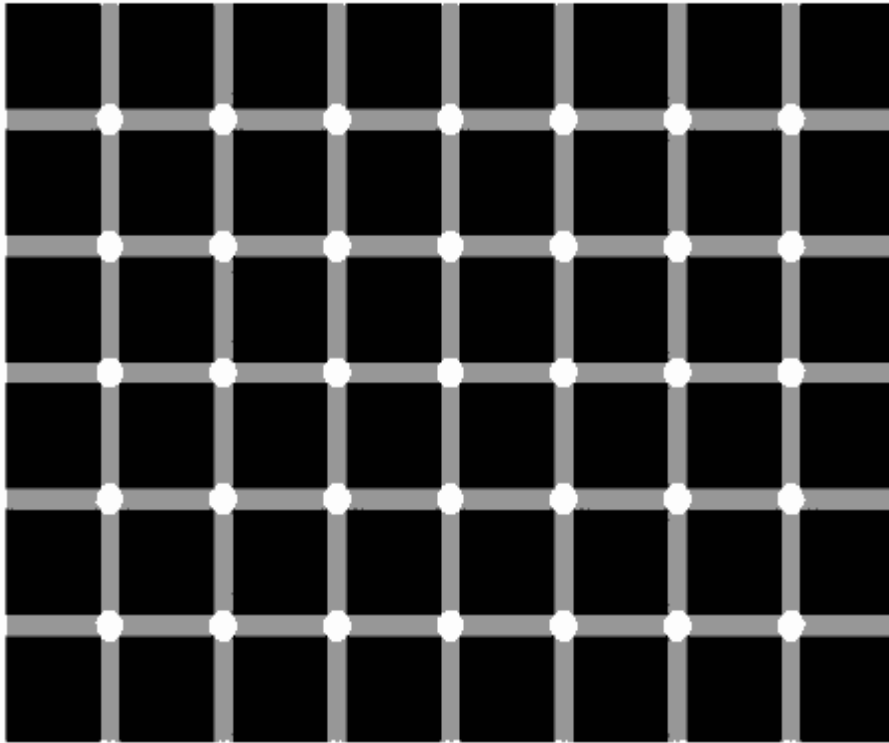
psycho-optics and vision limitations

- Motion illusion



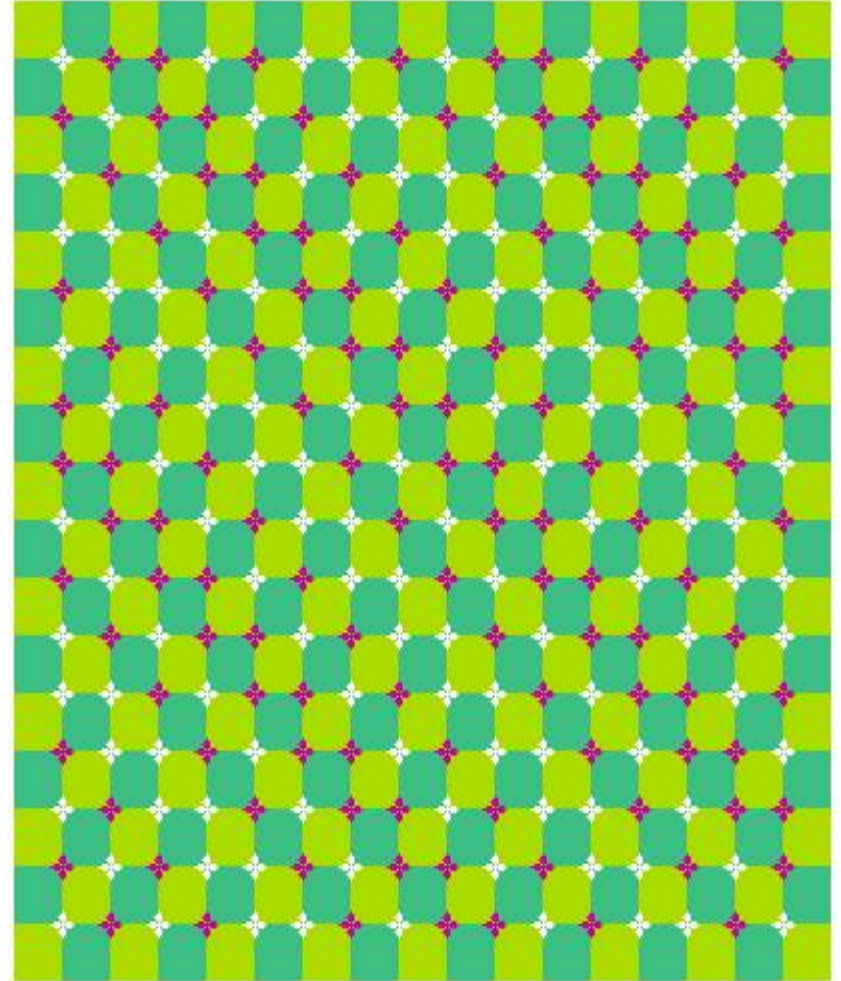
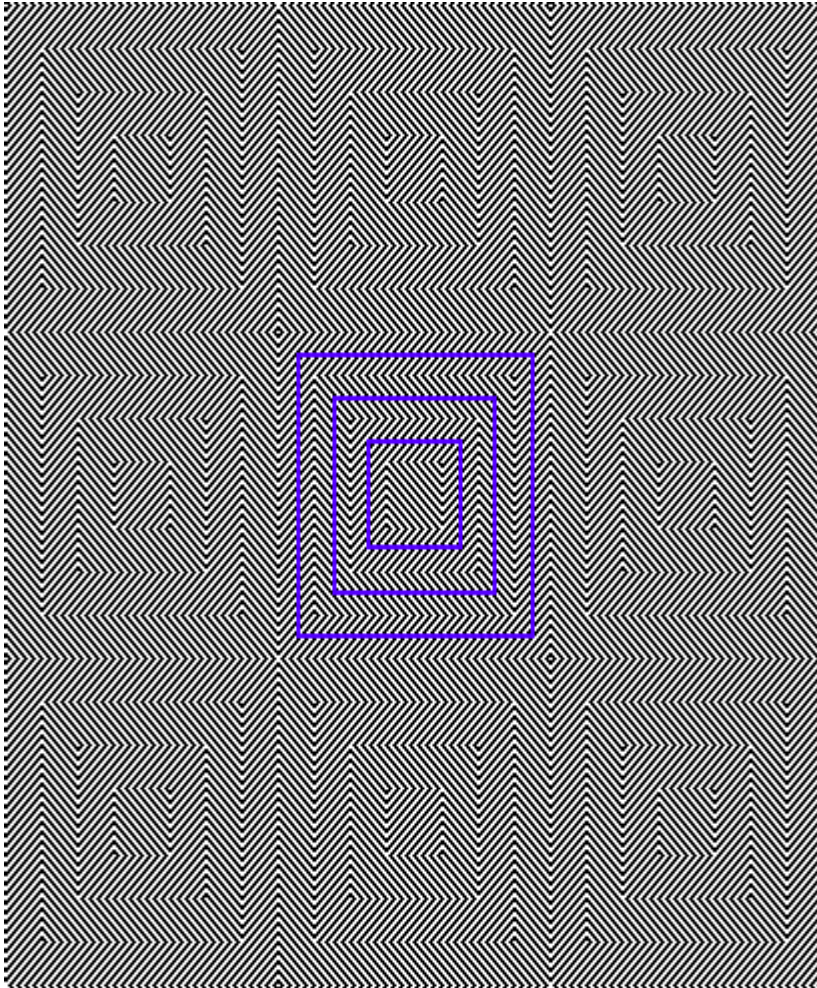
psycho-optics and vision limitations

- Color illusions



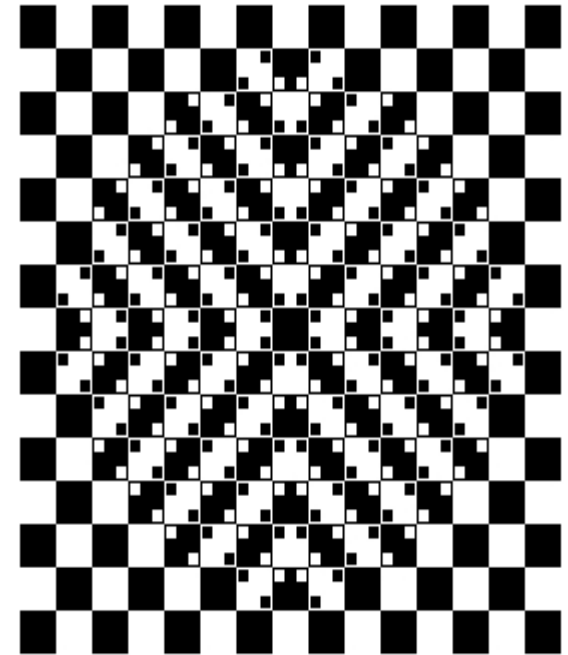
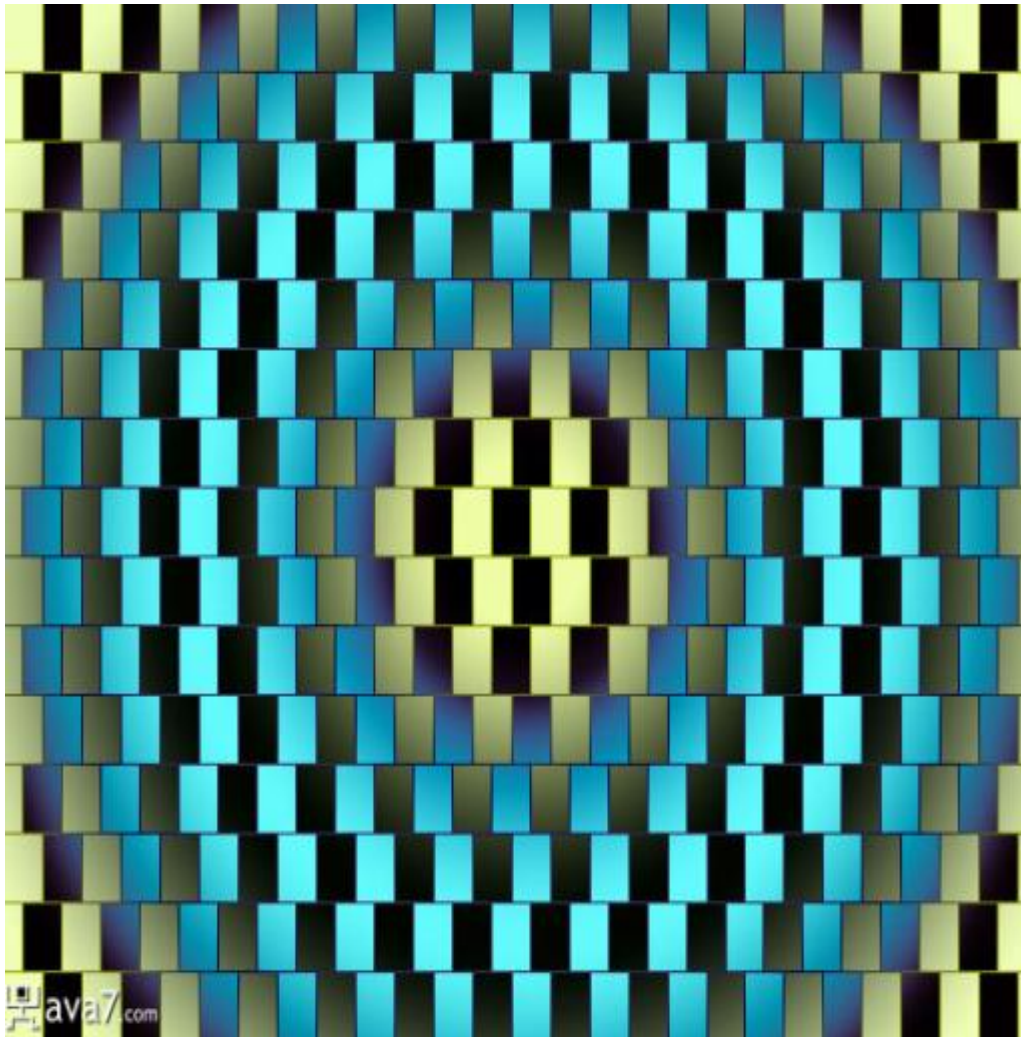
psycho-optics and vision limitations

- False distortions and waves



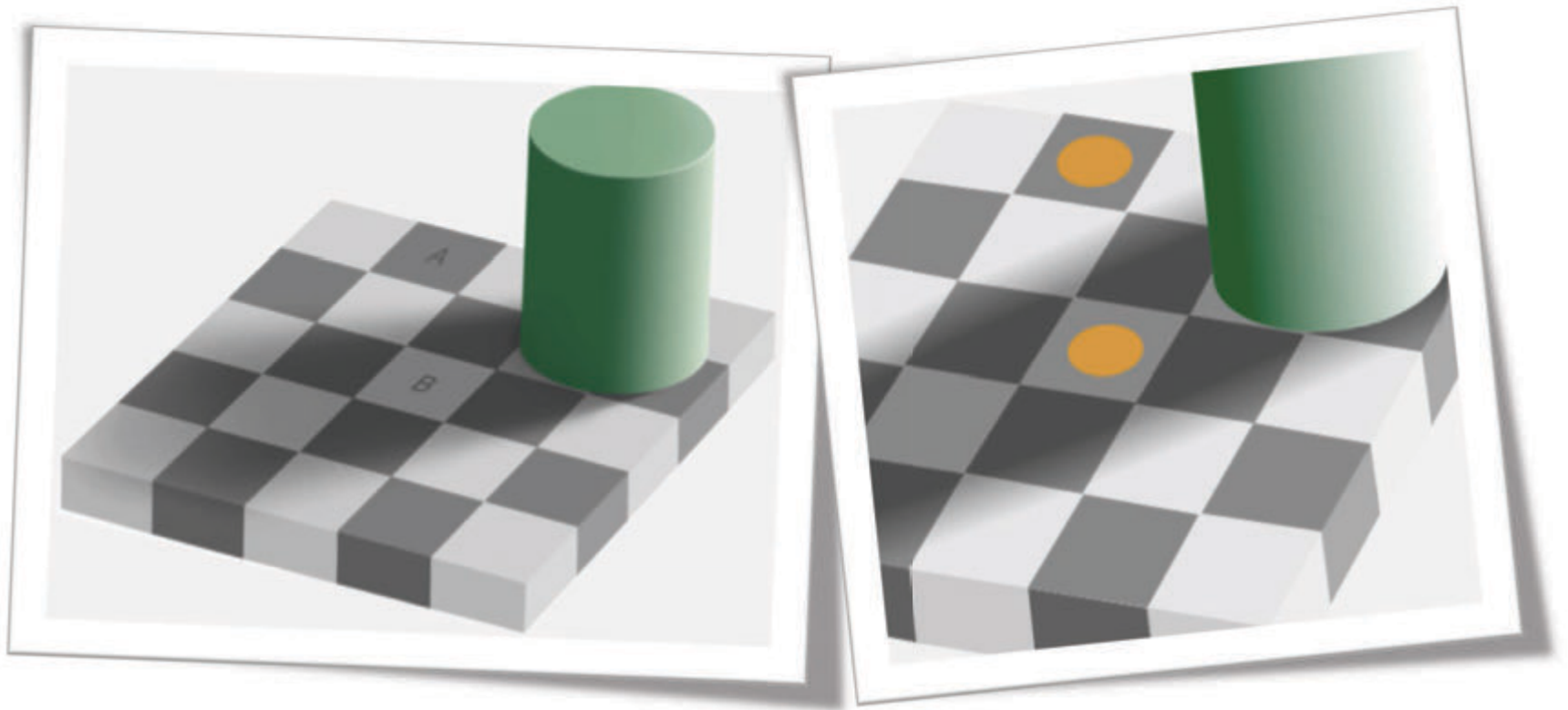
psycho-optics and vision limitations

- False distortions



psycho-optics and vision limitations

- Color constancy
 - Relative perception of same brightness or color under different lighting conditions



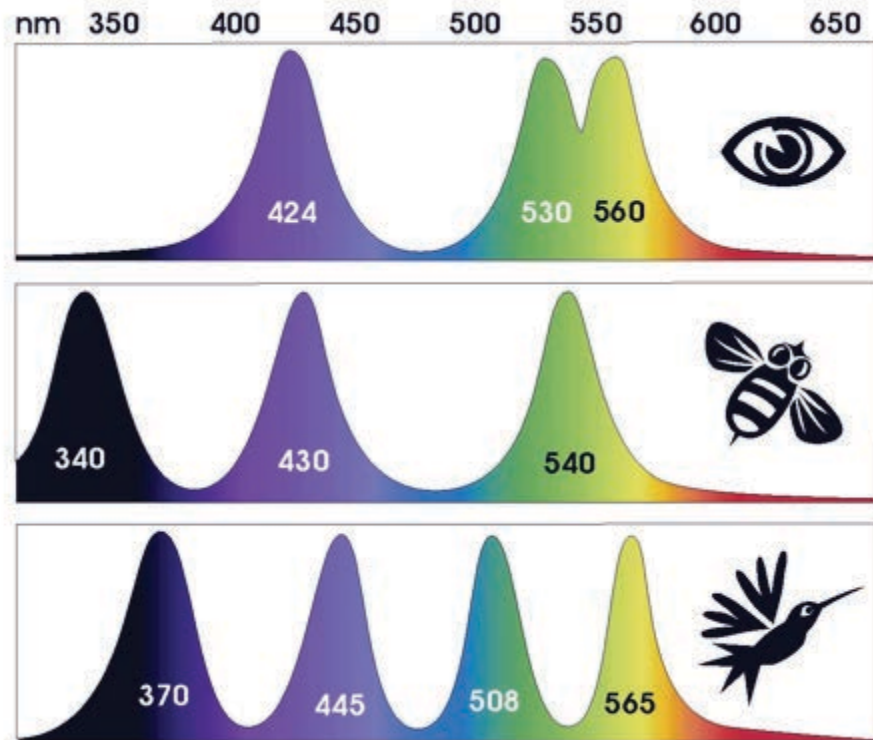
- Rectangles A and B have the same gray value -
Similarly, the orange points are of the same brightness

color and color perception

- **MeSH** (medical subject heading, National Library of Medicine)
 - **Vision:** The process in which light signals are transformed by the photoreceptor cells into electrical signals which can then be transmitted to the brain
 - **Visual perception:** The selecting and organizing of visual stimuli based on the individual's past experience
 - **Color perception:** Mental processing of chromatic signals from the eye by the visual cortex where they are converted into symbolic representations
 - **Color:** The visually perceived property of objects created by absorption or reflection of specific wavelengths of light

color and color perception

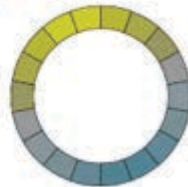
- ...as far as we are concerned, all these correspond to **human perception**



Human Trichromatic Color Vision



Horse Dichromatic Color Vision



Cat vision: decreased sharpness, removed most of red, less contrast, lighter, shadow filled, wider vision

Introduction to basic image processing

Working with Adobe Photoshop
(covers CS5 edition)

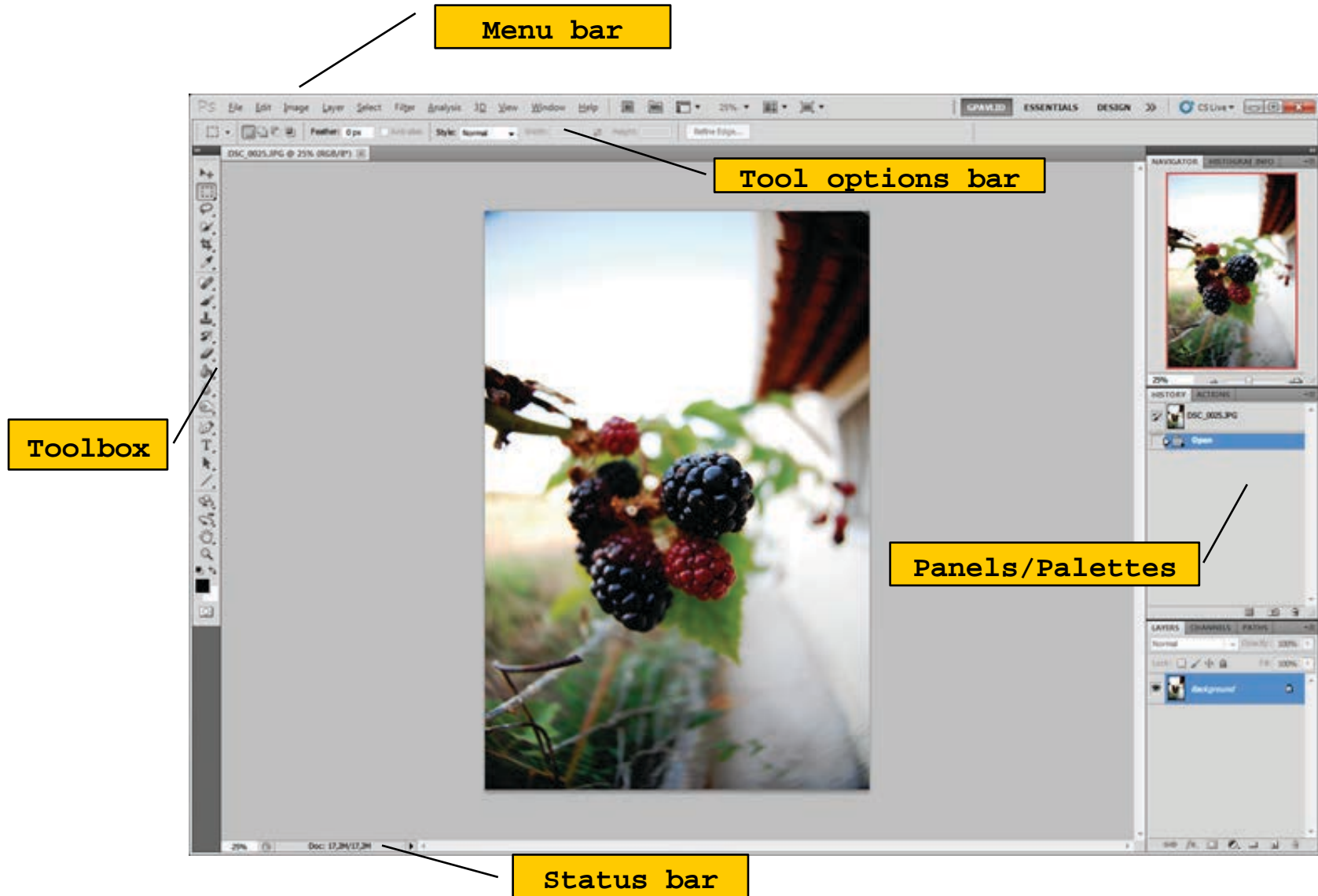
introduction to photoshop

- Adobe Photoshop is an extended application software for image processing
- Nearly everyone has (at least) heard of it
- People working in imaging and multimedia are very accustomed to it
- But only few are able to use it to its extreme capabilities

introduction to photoshop

- With Photoshop one can
 - Process digital imaging (raster graphics)
 - Apply color transformations
 - Apply geometric transformations
 - Apply processing on single video frames
 - Apply processing of 3D graphics
 - Design vector graphics
 - Mix processing and design
 - Produce highly complex compositions

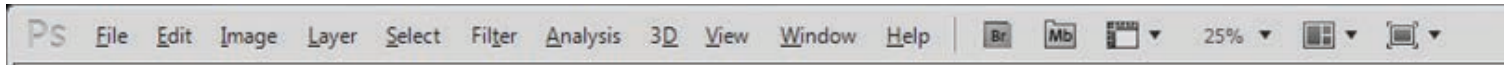
description of the environment



description of the environment

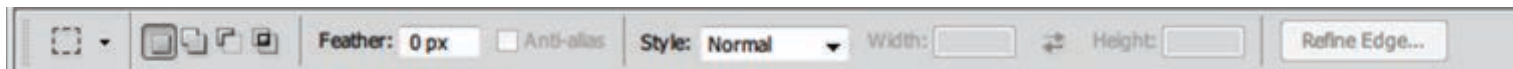
- **Menu bar**

- Typical menu bar in horizontal alignment
- Includes all capabilities of processing
- Menu bar can be customized



- **Tool options bar**

- Horizontal bar under the menu bar
- Includes all options for available tool



* tool options bar for the rectangular marquee tool

description of the environment

- **Toolbox**

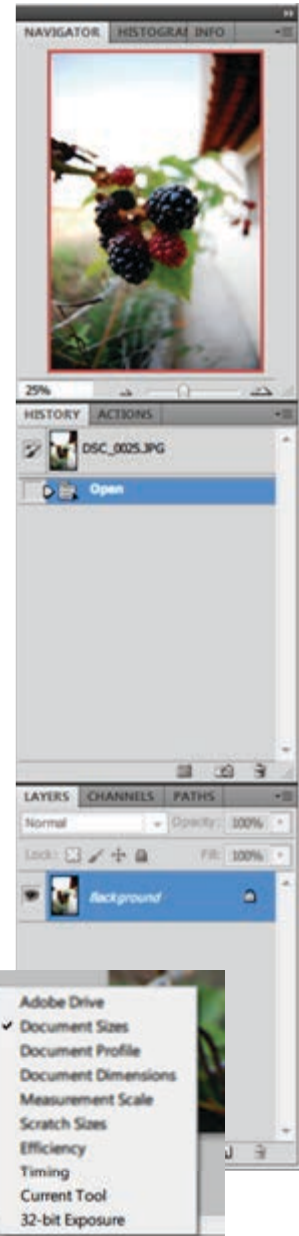
- Typical movable toolbox for all available editing/design tools

- **Panels/Palettes well**

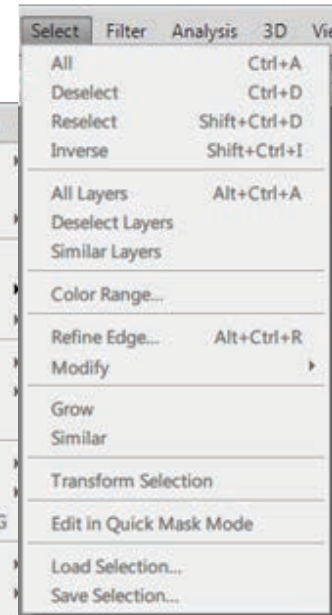
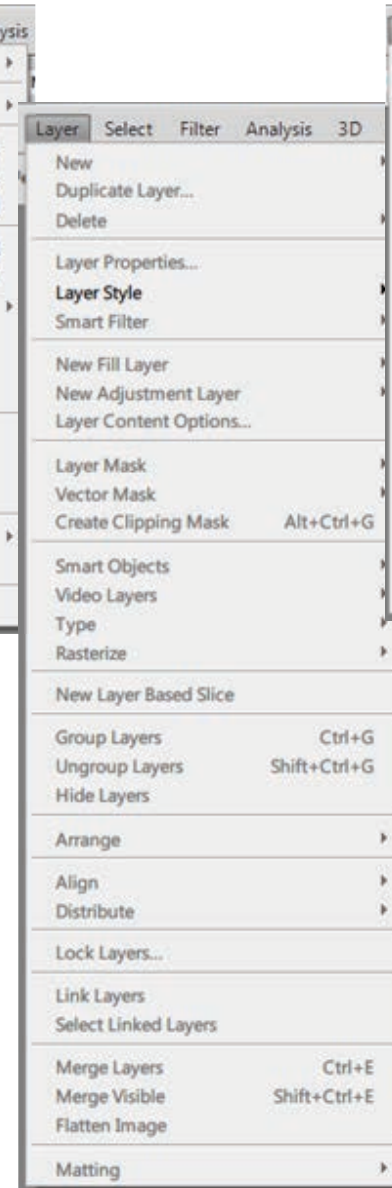
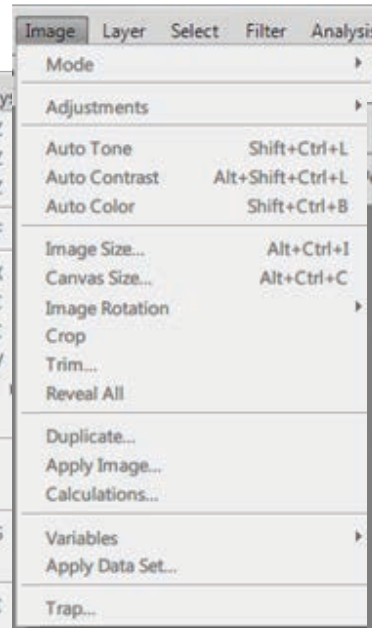
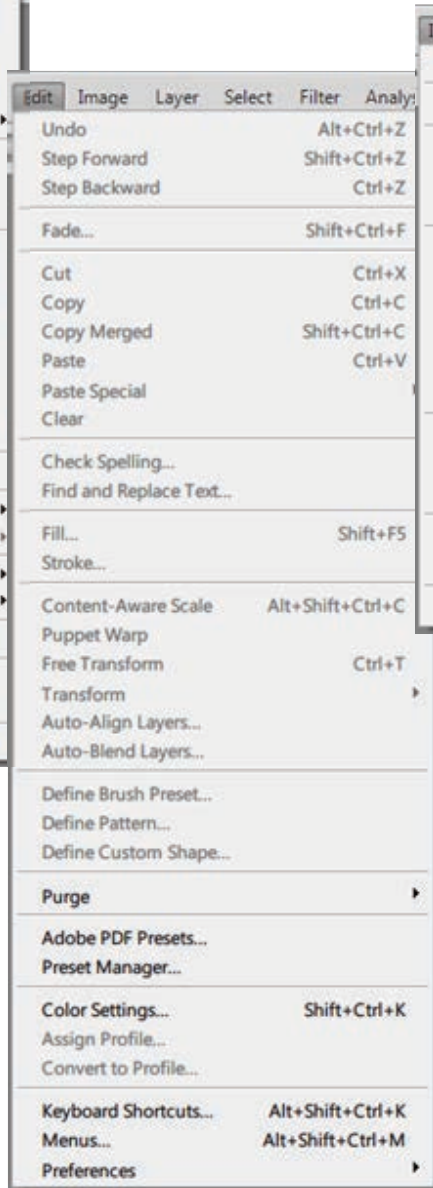
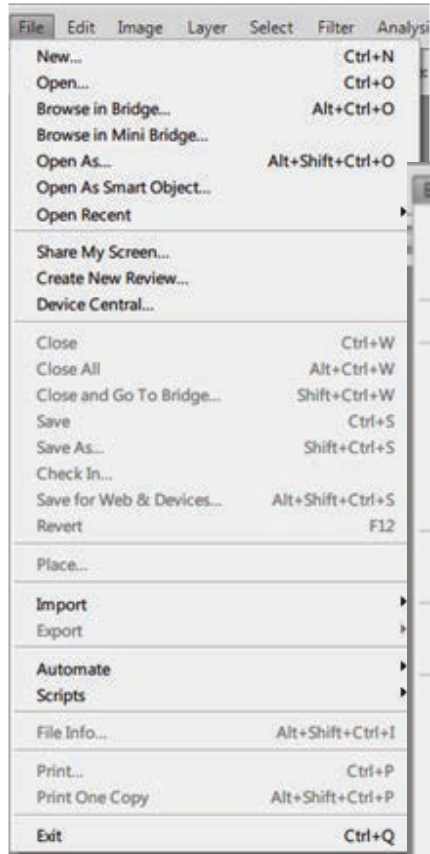
- A customized area where various panels appear
- Panels provide viewing and access to basic elements of an image or the actions upon it

- **Status bar**

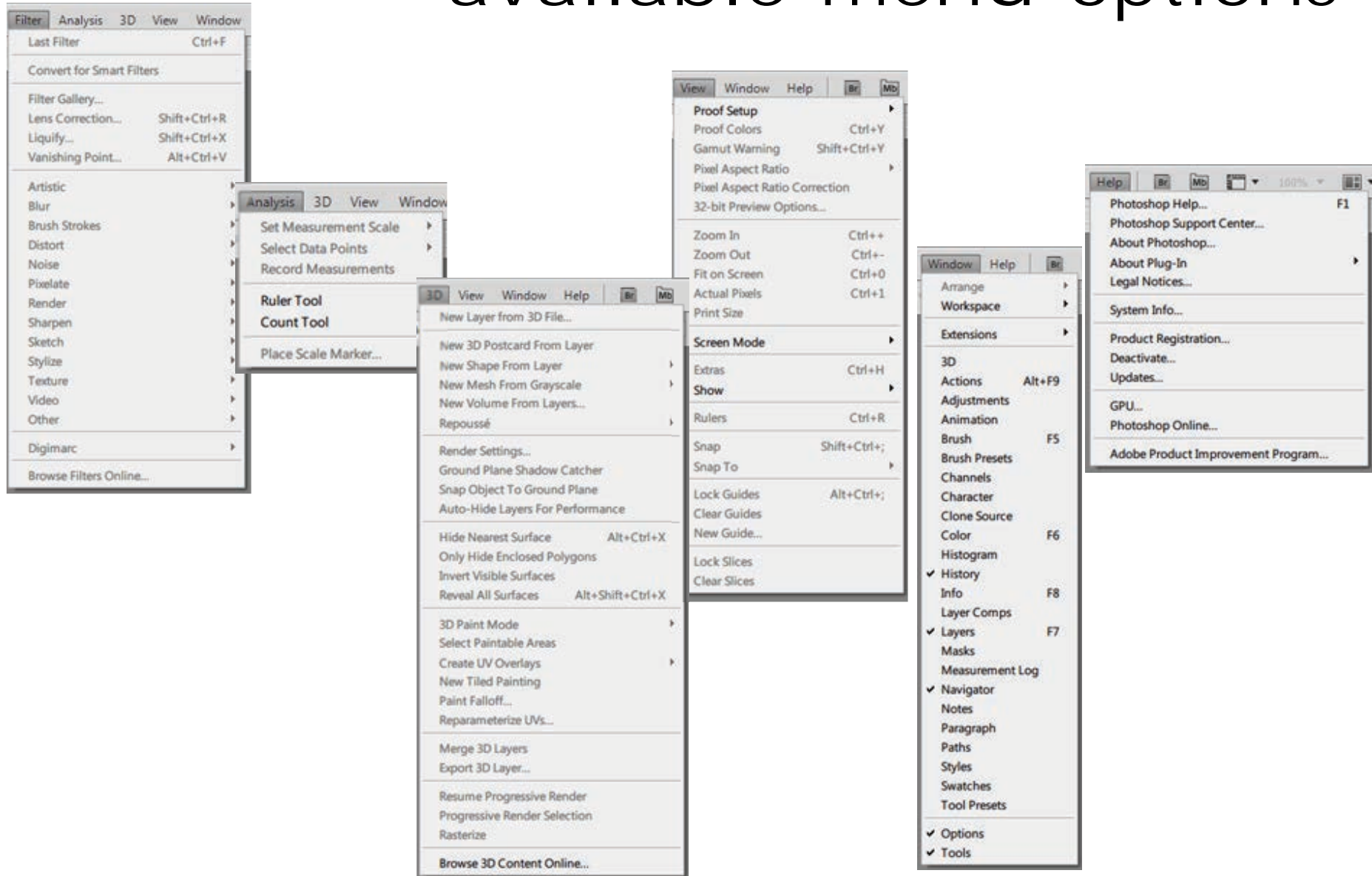
- Enhanced status bar with a series of managerial information



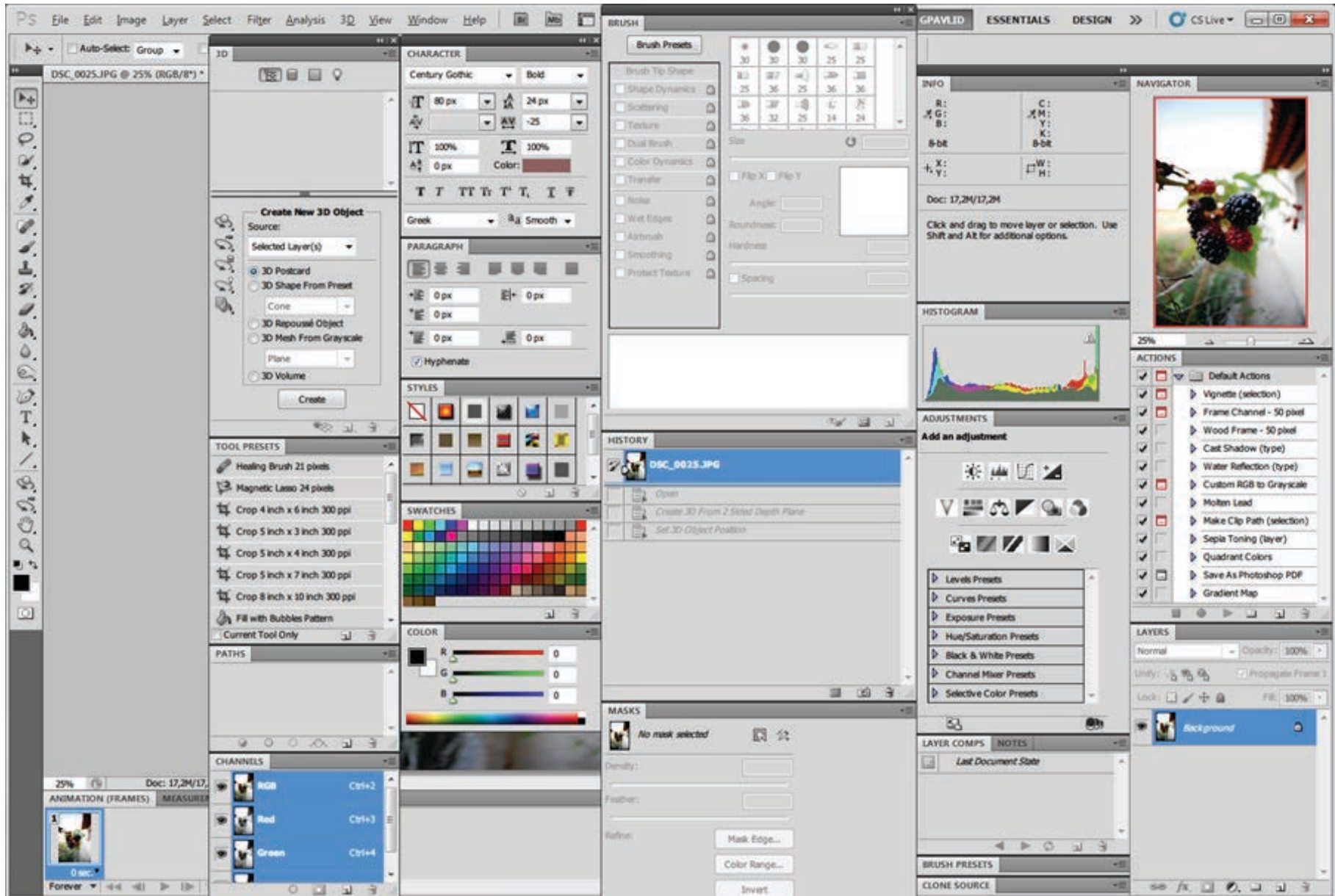
available menu options



available menu options



available panels



basic panels

- Depending on the user needs and preferences the panels can be arranged accordingly
- Usually, some of the panels that are frequently used are being made permanently visible
 - These panels include Navigator, Info, Histogram, History and Layers
- Panel actions can be activated either through them, either through the corresponding menu options, or through keyboard-mouse combinations
- Menu 'Window' controls the visibility of the panels



basic panels

- Navigator

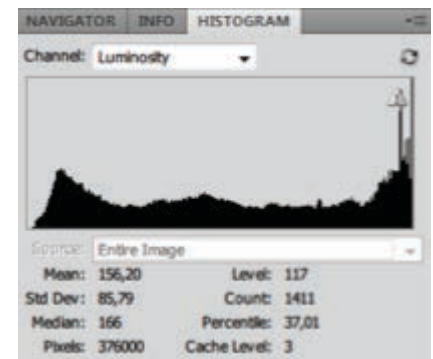
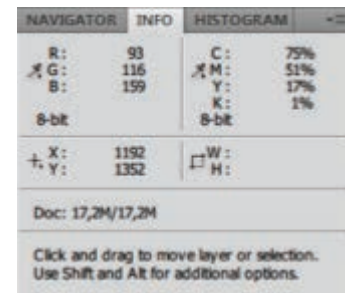
- This panel displays image canvas navigation and zooming capabilities.
- A **red rectangle** indicates the area of the image that is currently visible to the user. By moving this rectangle one may change the visible area of the image
- The **magnification slider** or the **percentage textbox** can be used to change the magnification factor by which the image is presented (it is not resize!)

- Info

- This panel presents basic image **information** regarding the position of cursor on the image canvas and the corresponding color under the cursor
- Colors are reported in **RGB** and **CMYK** color spaces
- Coordinates are shown using the user-defined units (preferences)

- Histogram

- This panel presents **histograms** of the image in real time for any of the color channels or the intensity channel, along with **statistics** of the selected channel
- Additional information are presented on mouse positions over the graph



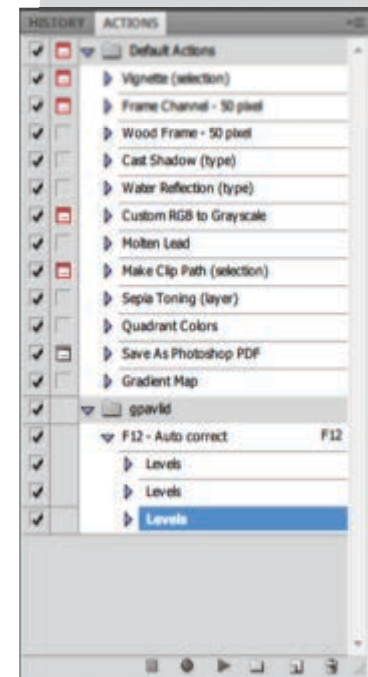
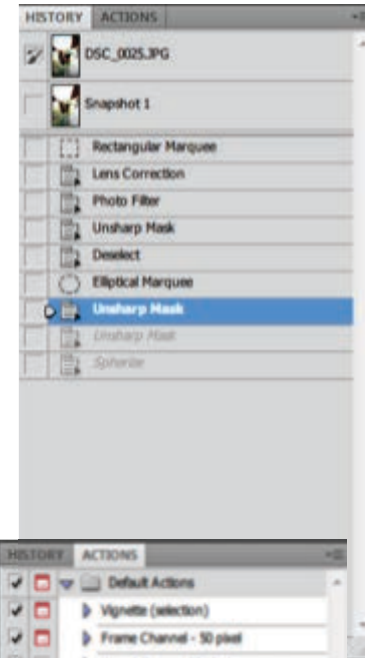
basic panels

- History

- Through the History panel one may navigate through the **previous actions** upon the image
- Every new processing action is recorded in this panel
- By selecting any previous action the user may return (**undo**) to that state of the image
- The history is being **reset** every time the image file is closed
- Additional **snapshot** capabilities are also available to provide instant view of images after certain processing

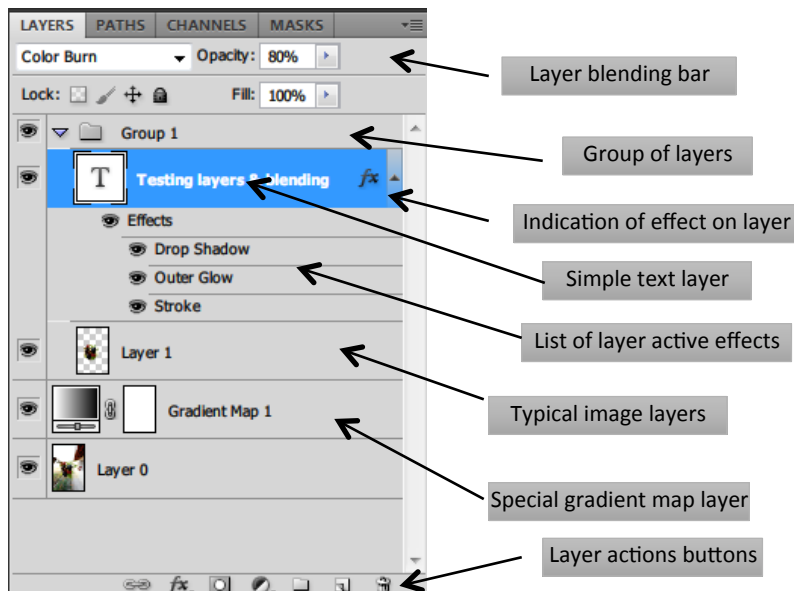
- Actions

- The Actions panel provides a functionality similar to the functionality of **macros** in other software
- Sets of processing actions may be grouped and recorded as one "action" with a specific name and possible keyboard combination for easy access
- These processing steps within an action are **sequentially executed** and automatically stopped on error occurrence
- Photoshop provides a set of "Default Actions" but each user can create his/her **own sets of actions**



basic panels

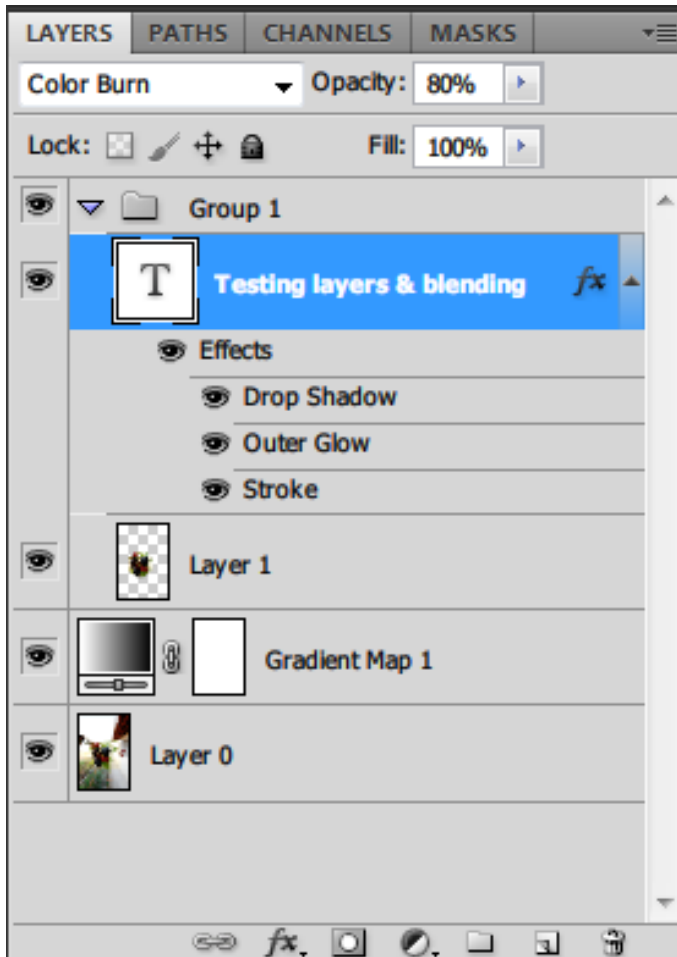
- Layers
 - The Layers panel provides
 - Access and **management** on image layers
 - Access to **special layers**
 - Access to layer **blending options** and **effects**
 - Layers can be
 - **visible** or hidden
 - **grouped**



- Different functionalities are available through clicks on the image thumbnails, the layer names and the various icons above and below the layer list

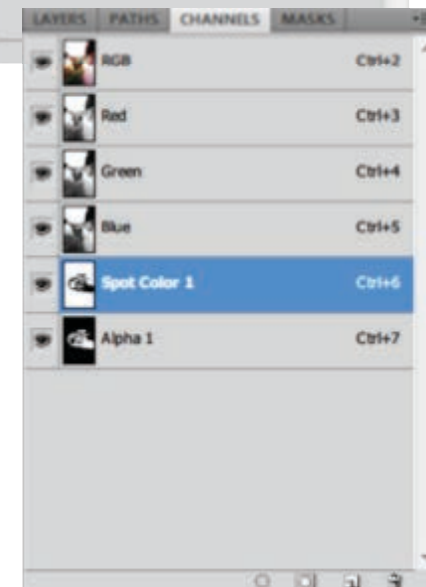
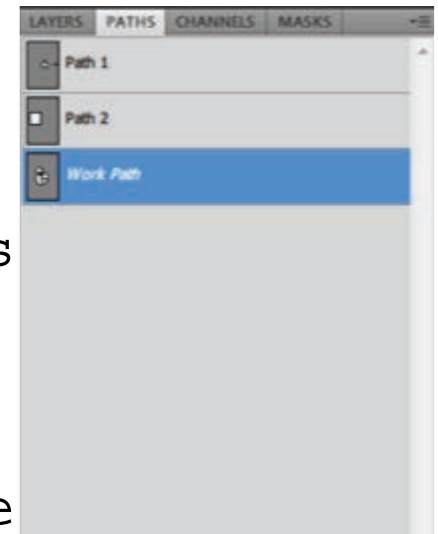
basic panels

- Layers
 - Demonstration of layer management options



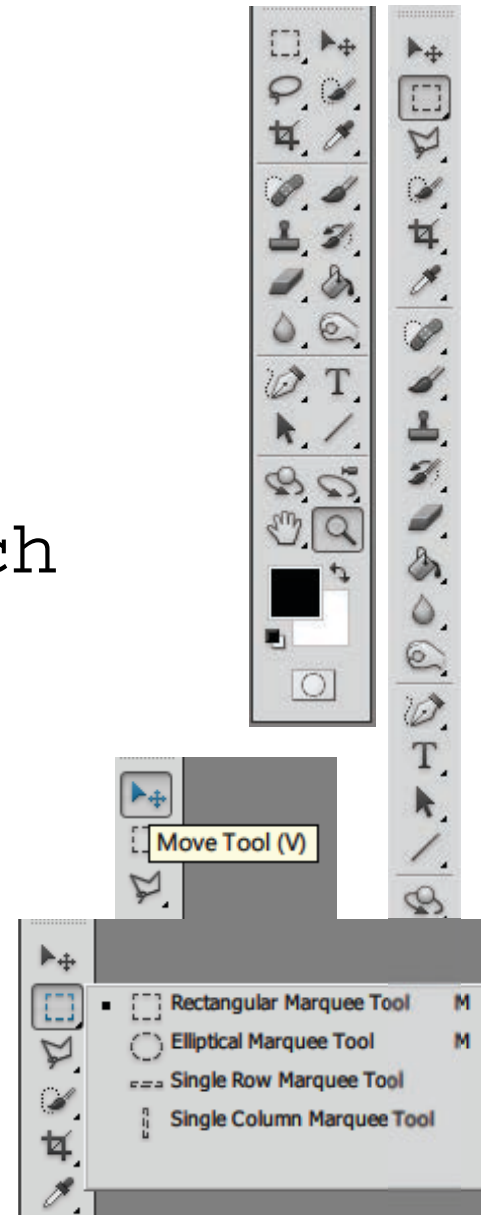
basic panels

- Paths
 - Photoshop provides vector graphics functionalities
 - The Paths panel is related to vector graphics and path selections
 - Different paths can be kept in different path-layers
- Channels
 - The Channels panel presents all the image channels
 - Color channels are presented first (i.e. RGB, CMYK)
 - Three types of channels are defined
 - Color channels
 - Typical color channels
 - Alpha channels
 - Transparency channel
 - Spot channels
 - Products of alpha channels



the toolbar

- The toolbar consists of families of tools
 - Provide manual editing/drawing functionalities
 - One of the most important panel of Photoshop
- Tooltips are provided for each tool
- Tools with a small arrow (bottom-right) are part of tool families





the toolbar extended

the toolbar

Move tool is used to move objects or selected image areas

Marquee tools are used to select simple areas of images

Lasso tools are used to select complex areas of images

Magic wand and quick selection tool are used to select areas based on the color

Crop tools are used to crop, slice or correct the perspective of images

Eyedropper tool is used to sample image colors

Patch tool, like the other tools of the family (healing brush tool and spot healing brush tool) can be used to erase artifacts in images. The red eye tool also included in the family corrects the red eye problem in photos of persons

Brush tool helps in painting on an image canvas. Pencil tool is also included in this family. Color replacement tool in the same family help replace colors

Clone stamp tool clones areas of images onto other areas. Pattern stamp tool paints using an image area as a pattern

History brush tool paints a copy of a selected state or snapshot on image. Art history brush tool in the same family, uses various brushes to paint states and snapshots

Eraser tools are used to erase image areas



the toolbar



Paint bucket tool fills homogeneous areas with the foreground color. Gradient tools create color gradients in various forms

Blur tool blurs image areas using a brush. Sharpen tool sharpens area images using a brush. Smudge tool smudges an image

Dodge tool increases the brightness/contrast of an image area in contrast to the Burn tool which decreases the brightness/contrast of an image area. Sponge tool affects the saturation of colors in an image area

Pen tools are used to create vector graphics. Custom shape tool aids in inserting predefined vector shapes

Type tools create vector text in a new image layer

Path selection tools select shapes or segments

3D object rotate tool belongs to a family of 3D manipulation tools

3D rotate camera tool belongs to the family of 3D view manipulation tools

Hand tool moves an image within the viewing window

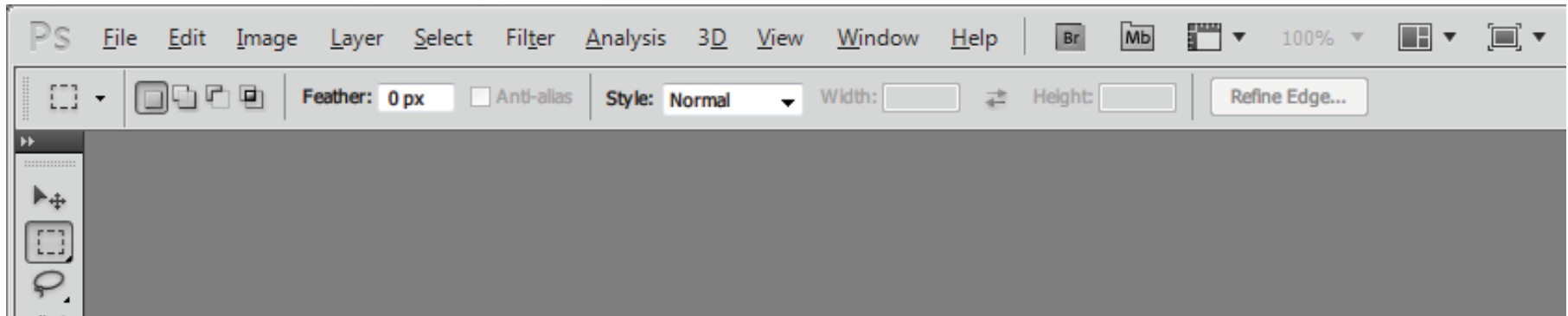
Zoom tool zooms in or out the image viewing window

Foreground/background colors and selection

Quick mask mode changes the usual usage of other tools like the brush tool to use them as selection tools

tool options bar

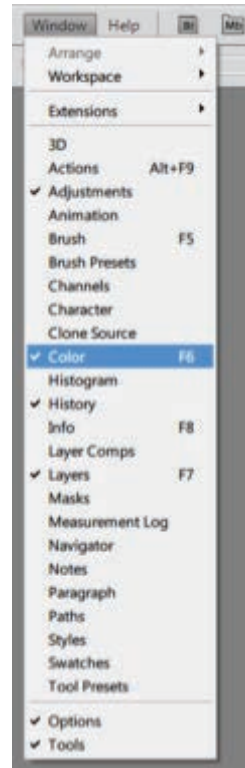
- Below the Photoshop menu is the tool options bar



- Provides options for every tool selected from the toolbar
- The bar is movable

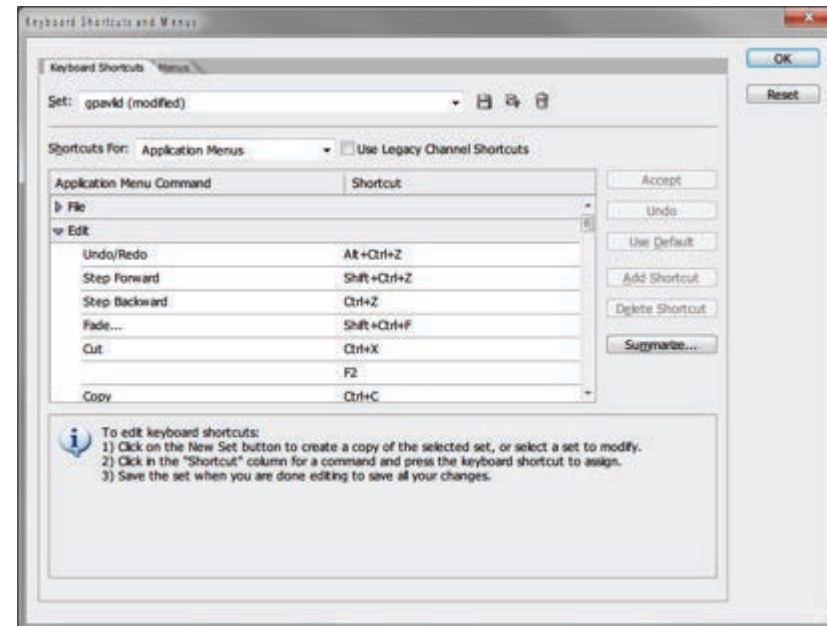
workspace customization

- Workspace can be customized (here an example)
 - Right click on "Color/Swatches/Style" and select "Close Tab Group" to hide the panels
 - This can be also done by deselecting the corresponding menu options in the menu "Window"
 - Do the same on "Adjustments/Masks" panel
 - From the "Window" menu options, activate the "Navigator/Histogram/Info" and "History/Actions" panels
 - The panel "Layers/Channels/Paths" should be definitely visible



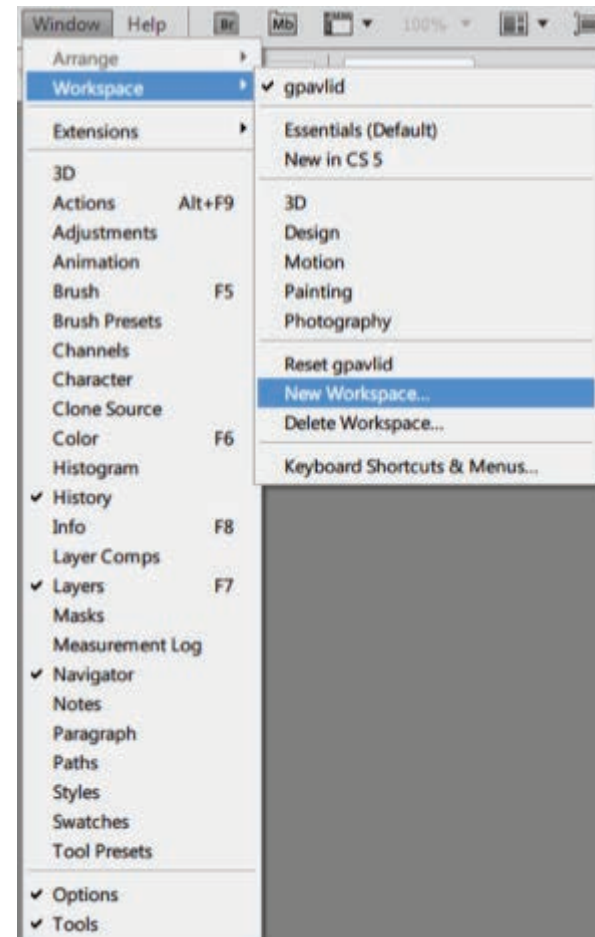
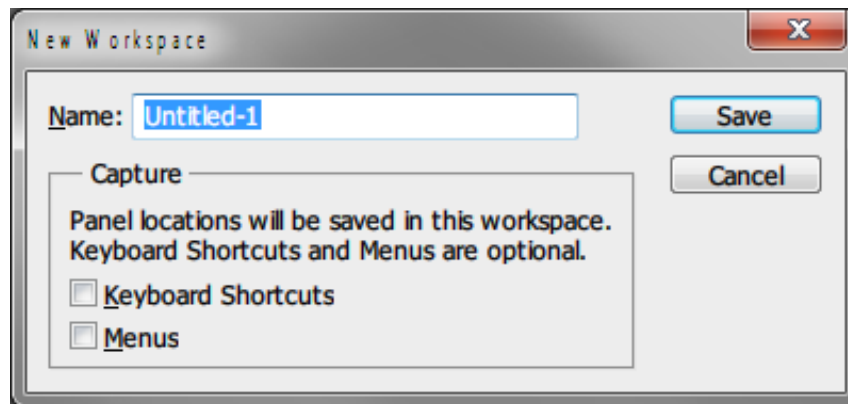
workspace customization

- Workspace can be customized (here an example-continued)
 - Through menu > "Edit" > "Keyboard shortcuts" change the key combinations regarding the unde/redo actions
 - "Undo/Redo" should be controlled by "Alt+Ctrl+Z"
 - "Step Backward" should be controlled by "Ctrl+Z"



workspace customization

- Save the customization through menu Window > Workspace > New Workspace...
- Name the workspace for future reference



practice, practice, practice

Typical workflows using real examples



basic color retouching

- Layer
duplication
- Adjustment
layers
- Blending
options



- Selecting
- Adjusting Hue/Saturation
- Duplicating layers
- Setting blending options
- Using adjustment layers



coloring

text, brush, blending



Σύναξη

- Text editing & advanced text features
- Brushes and special brush editing
- Layer blending
- Using the gradient tool

composition

- Layers
- Text
- Blending
- All together

ΗΦΙΑΚΗ ΦΩΤΟΓΡΑΦΙΑ ΑΙ ΕΠΕΞΕΡΓΑΣΙΑ ΕΙΚΟΝΑΣ

Εσας καλεί σε έναν κύκλο μαθημάτων πάνω στη γνώση, την πρακτική την τεχνική της πιο προσιτής πλέον τέχνης, της ψηφιακής φωτογραφίας, τη γέννησή της έως την επεξεργασία και προβολή της.

ΟΡΓΑΝΙΣΤΗΣ: Γεώργιος Παυλίδης

ΗΛΕΚΤΡΟΛΟΓΟΣ ΜΗΧΑΝΙΚΟΣ, ΚΥΡΙΟΣ ΕΡΕΝΗΤΗΣ, ΕΡΕΥΝΗΤΙΚΟ ΚΕΝΤΡΟ «ΑΘΗΝΑ»

Έναρξη
μαθημάτων

6 ΑΠΡΙΛΙΟΥ
2011

Ώρα 15.00

Αίθουσα **1.1**

ΚΤΗΡΙΟ ΗΜΜΥ
ΚΙΜΜΕΡΙΑ

Πληροφορίες
Δηλώσεις συμμετοχής
Χριστίνα 697 6767676



IEEE Student Branch
of Thrace

<http://goo.gl/lnColb> lang:GR



- Healing brushes
- Manual liquifying filter

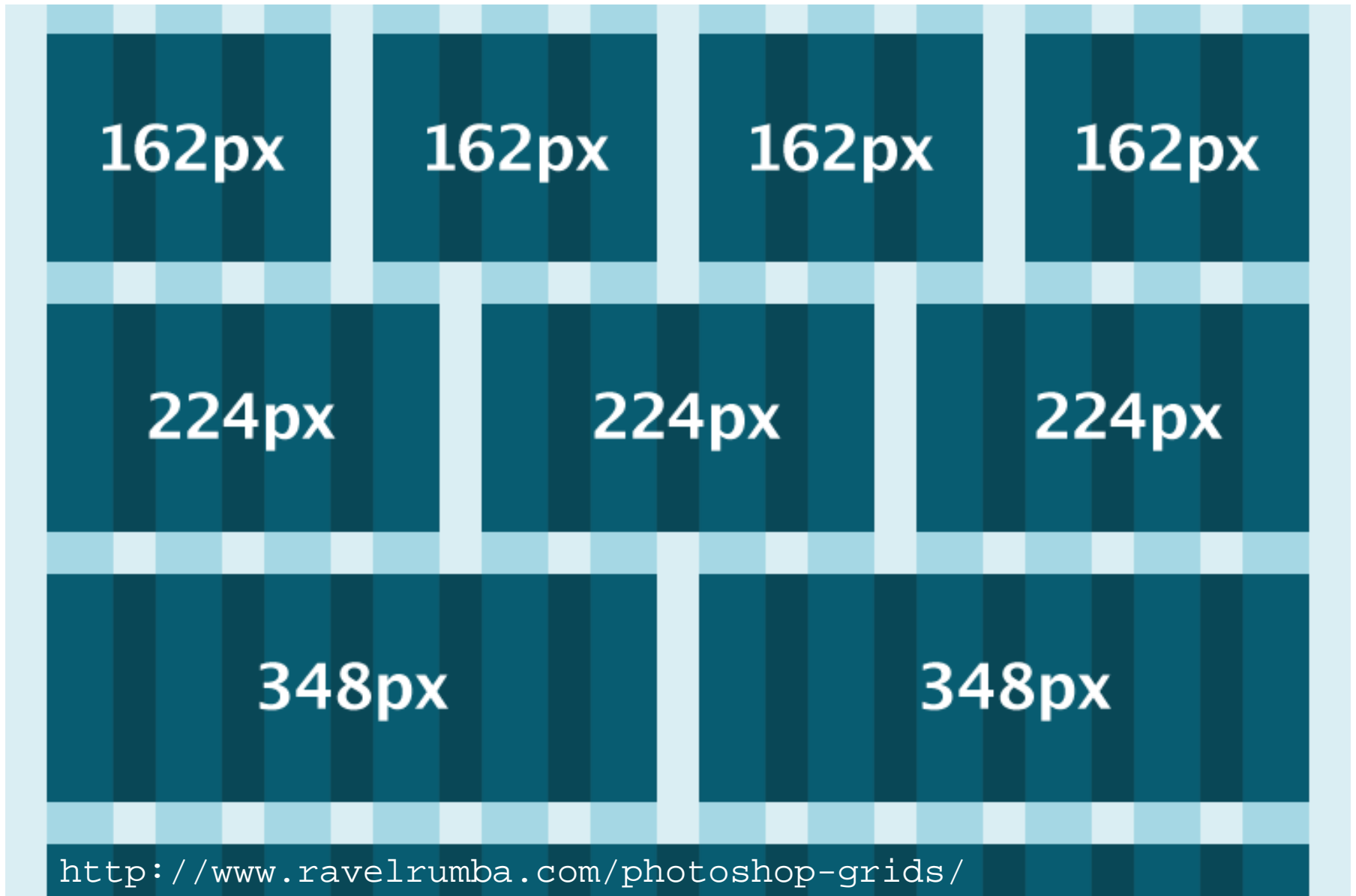




making art

- Multiple images
- Multiple layers
- Multiple blending effects
- Multiple masks
- Multiple filters
- Multiple image processing actions

grid design & templates

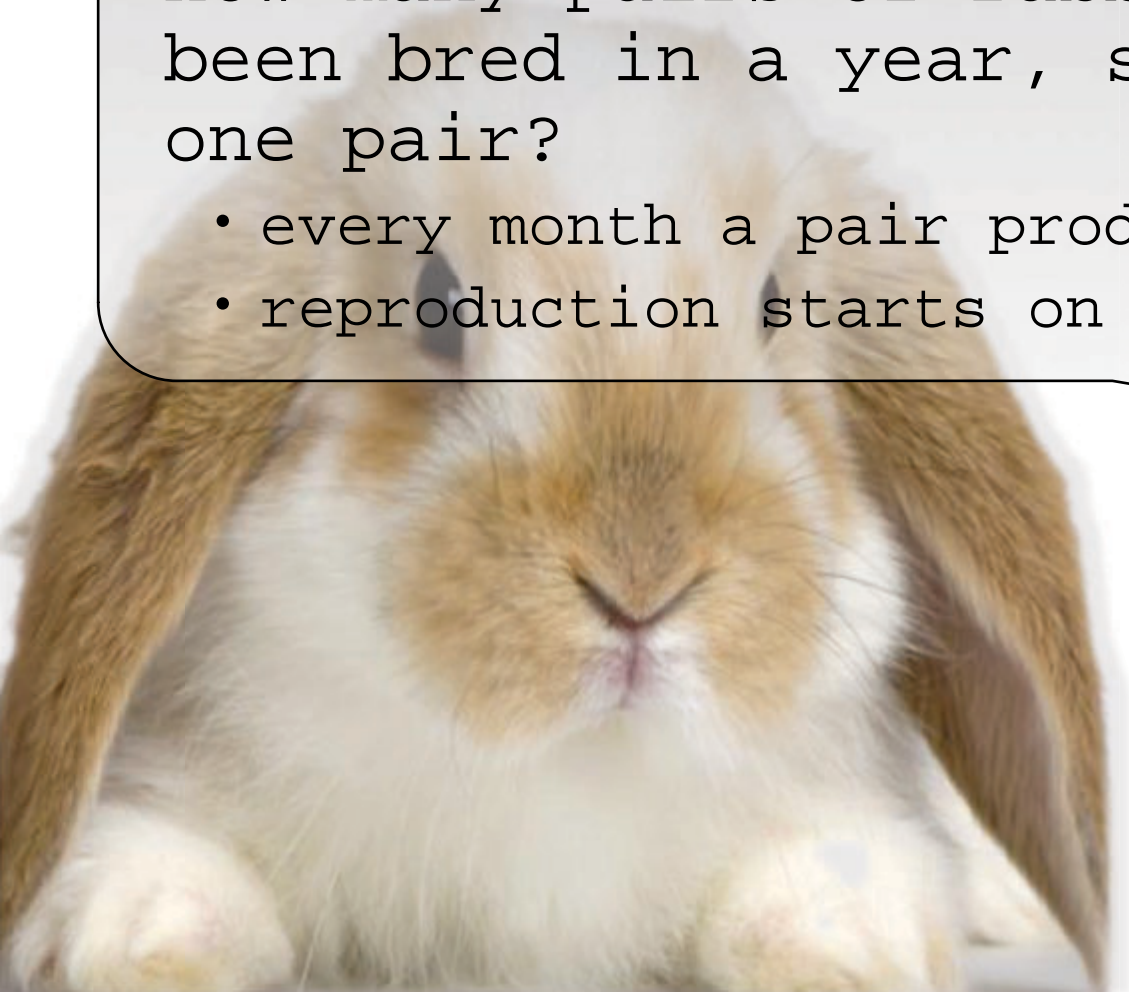


the golden ratio in design.-

Fibonacci (Leonardo Pisano/da Pisa).-

"Liber Abaci" (Book of Calculation), 1202

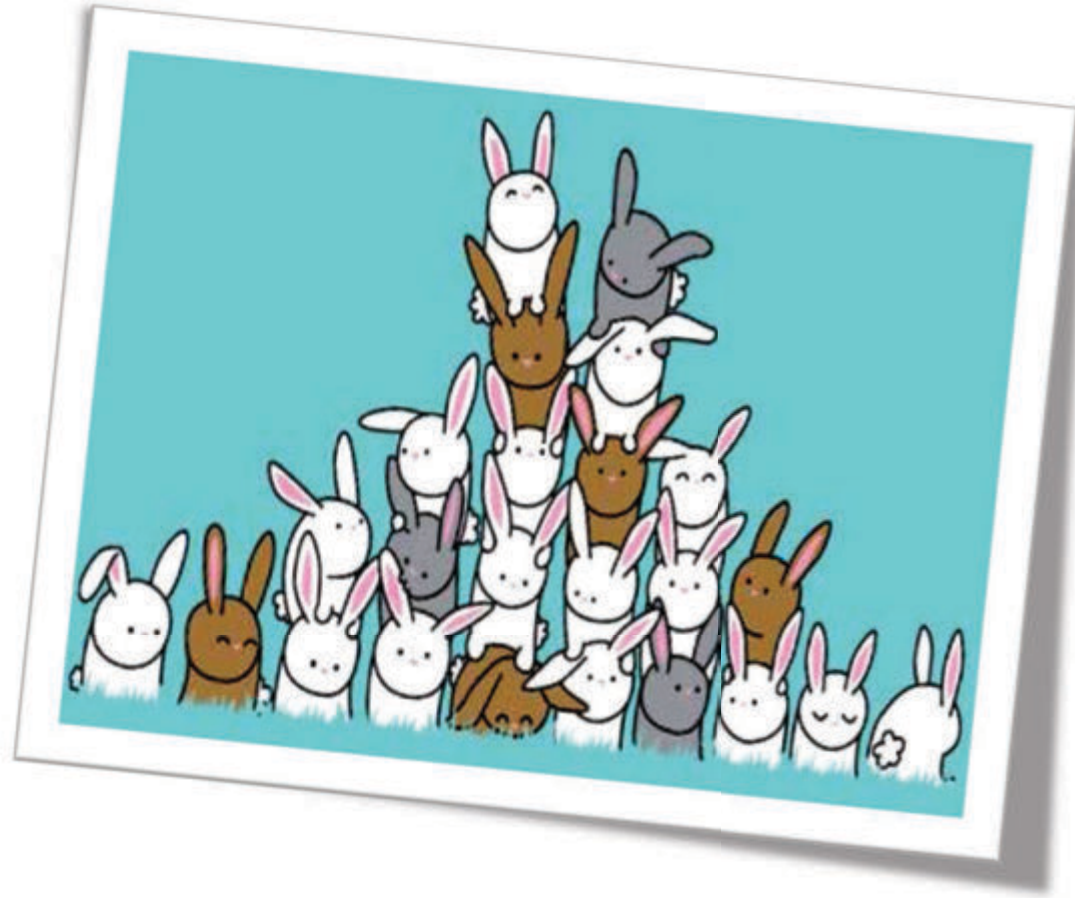
- How many pairs of rabbits would have been bred in a year, starting with one pair?
 - every month a pair produces another pair
 - reproduction starts on the second month



Fibonacci (Leonardo Pisano/da Pisa).-

“Liber Abaci” (Book of Calculation), 1202

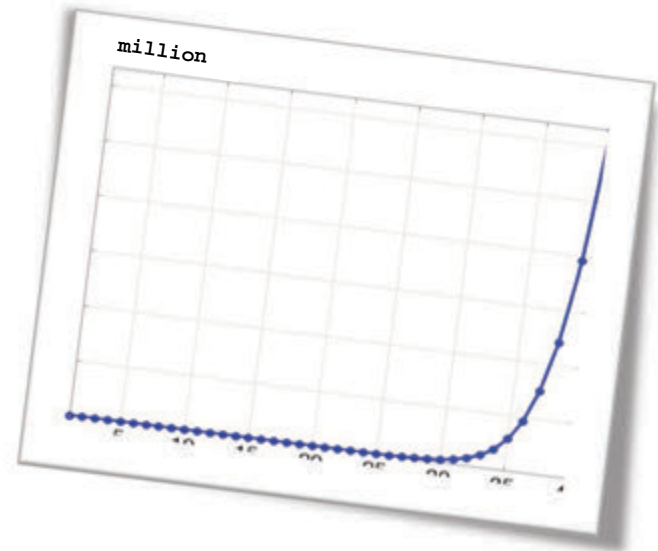
- 1st month: **1** pair
- 2nd month: **1** pair
- 3rd month: **2** pairs
- 4th month: **3** pairs
- 5th month: **5** pairs
- 6th month: **8** pairs
- 7th month: **13** pairs
- 8th month: **21** pairs
- 9th month: **34** pairs
- 10th month: **55** pairs
- 11th month: **89** pairs
- 12th month: **144** pairs



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

Fibonacci's sequence.-

| | | | |
|-----|---------|-------------|---------------|
| 0 | 377 | 317.811 | 267.914.296 |
| 1 | 610 | 514.229 | 433.494.437 |
| 1 | 987 | 832.040 | 701.408.733 |
| 2 | 1.597 | 1.346.269 | 1.134.903.170 |
| 3 | 2.584 | 2.178.309 | 1.836.311.903 |
| 5 | 4.181 | 3.524.578 | 2.971.215.073 |
| 8 | 6.765 | 5.702.887 | 4.807.526.976 |
| 13 | 10.946 | 9.227.465 | 7.778.742.049 |
| 21 | 17.711 | 14.930.352 | |
| 34 | 28.657 | 24.157.817 | |
| 55 | 46.368 | 39.088.169 | |
| 89 | 75.025 | 63.245.986 | |
| 144 | 121.393 | 102.334.155 | |
| 233 | 196.418 | 165.580.141 | |



the ratio in Fibonacci's sequence.-

1 1 2 3 5 8 13 21 34 55 89 144 233 377 610

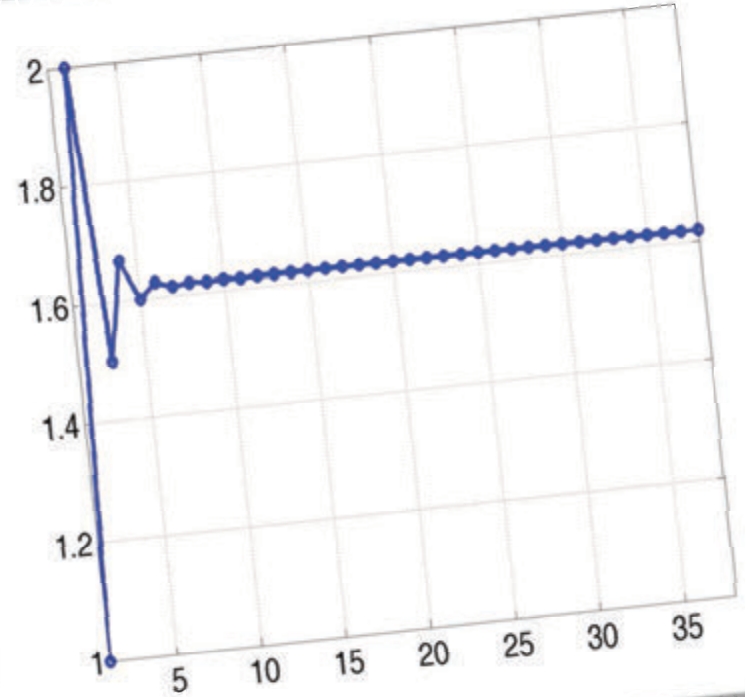
$1/1 = 1.000$

$$2/1 = \mathbf{2.000000000000000000000000}$$

$3/2 = 1.50000000000000000000$

$$5/3 = 1.66666666666666666666740$$
$$8/5 = 1.6000000000000000000088$$

13/8 = **1.625**0000000000000000

$$21/13 = 1.6153846153846154$$
$$34/21 = 1.61904761904761906$$
$$55/34 = 1.61764705882352943$$
$$89/55 = 1.61818181818181816$$
$$144/89 = \mathbf{1.6179775280898875}$$
$$233/144 = 1.6180555555555555$$
$$377/233 = 1.6180257510729614267575016128830611705780...$$
$$610/377 = \mathbf{1.618}0371352785145599995075826882384717464...$$


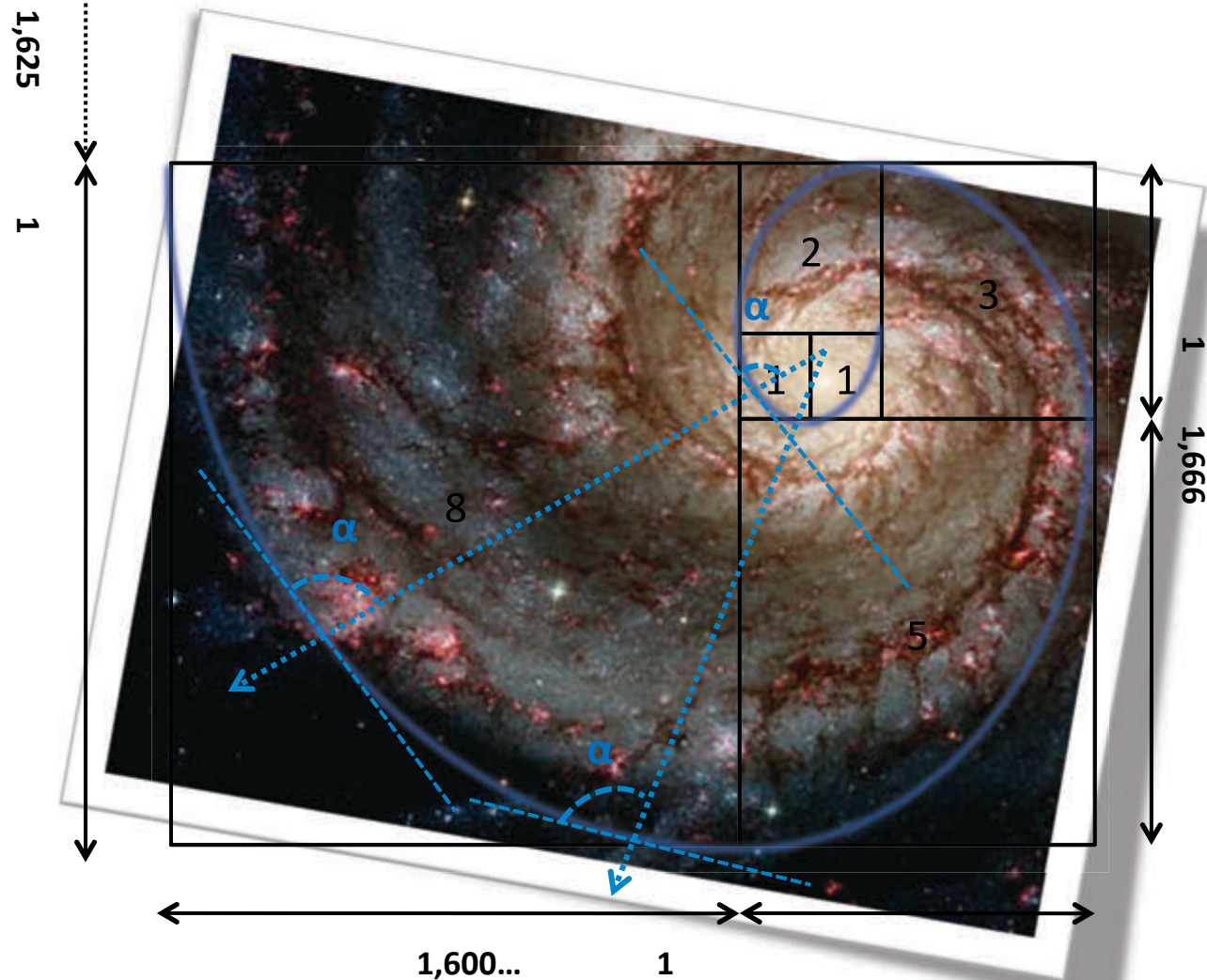
the ratio in Fibonacci's sequence.-

- It can be proven that the ratio corresponds to the **irrational** number:

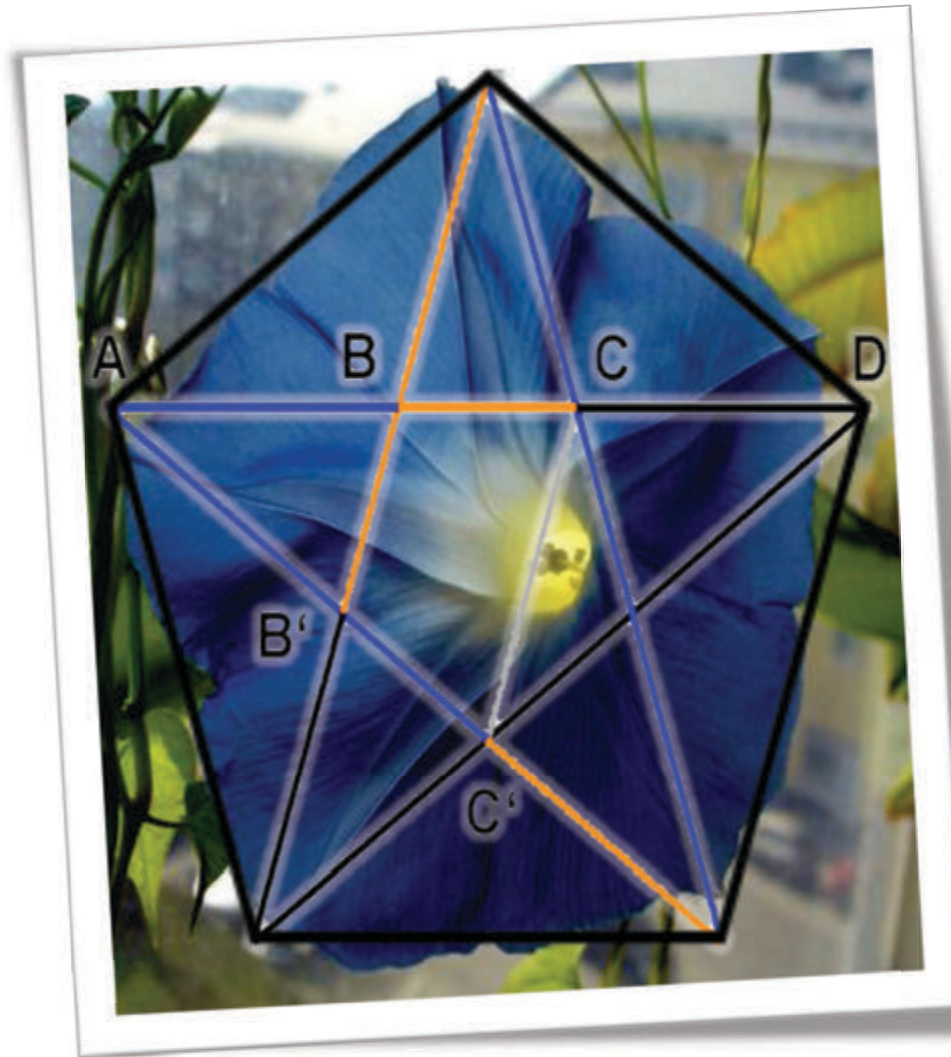
$$\frac{1 + \sqrt{5}}{2}$$

- Ancient Greeks
 - named this number **the golden section**
 - used the ϕ letter as a symbol to this number
 - regarded the ratio $\phi:1$ the perfect ratio aesthetically (**golden ratio**)
 - used the golden ratio in arts and architecture - in design in overall

the number ϕ in our world.-



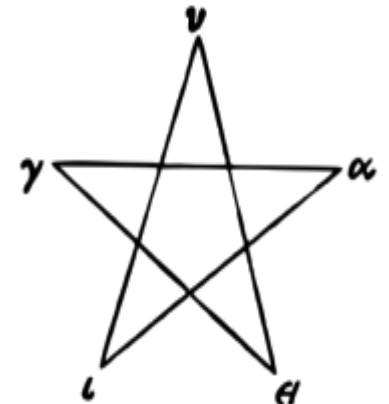
the number φ in our world.-



$$\frac{AD}{AC} = \frac{AC}{AB} = \frac{AB}{BC} = \varphi$$

Pentagram or pentacle or pentagram star

Normal
Pentagon



Pythagoreans - Υγιεία
Mathematical Perfection

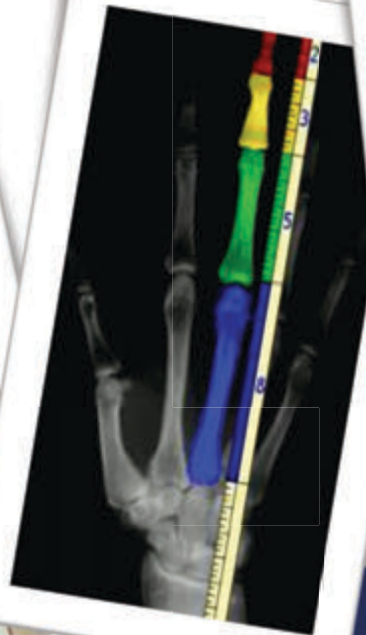
the number ϕ in our world.-

- And it is not only in shapes...

| Number of petals | Flower |
|-----------------------|---|
| 3 (or 2 sets of 3) | lily, iris |
| 5 | buttercup, wild rose, delphinium, columbine (Aquilegia), vinca |
| 8 | delphinium |
| 13 | ragwort, calendula, cineraria |
| 21 | aster, black-eyed susan, chicory |
| 34 | plantain, daisy, pyrethrum |
| 55 / 89 | daisy family Asteraceae |



the number ϕ in our world



$\varphi = 1.$

6180339887 4989484820 4586834365 6381177203 0917980576 2862135448 6227052604
6281890244 9707207204 1893911374 8475408807 5386891752 1266338622 2353693179
3180060766 7263544333 8908659593 9582905638 3226613199 2829026788 0675208766
8925017116 9620703222 1043216269 5486262963 1361443814 9758701220 3408058879
5445474924 6185695364 8644492410 4432077134 4947049565 8467885098 7433944221
2544877066 4780915884 6074998871 2400765217 0575179788 3416625624 9407589069
7040002812 1042762177 1117778053 1531714101 1704666599 1466979873 1761356006
7087480710 1317952368 9427521948 4353056783 0022878569 9782977834 7845878228
9110976250 0302696156 1700250464 3382437764 8610283831 2683303724 2926752631
1653392473 1671112115 8818638513 3162038400 5222165791 2866752946 5490681131
7159934323 5973494985 0904094762 1322298101 7261070596 1164562990 9816290555
2085247903 5240602017 2799747175 3427775927 7862561943 2082750513 1218156285
5122248093 9471234145 1702237358 0577278616 0086883829 5230459264 7878017889
9219902707 7690389532 1968198615 1437803149 9741106926 0886742962 2675756052
3172777520 3536139362 1076738937 6455606060 5921658946 6759551900 4005559089
5022953094 2312482355 2122124154 4400647034 0565734797 6639723949 4994658457
8873039623 0903750339 9385621024 2369025138 6804145779 9569812244 5747178034
1731264532 2041639723 2134044449 4873023154 1767689375 2103068737 8803441700
9395440962 7955898678 7232095124 2689355730 9704509595 6844017555 1988192180
2064052905 5189349475 9260073485 2282101088 1946445442 2231889131 9294689622

known 'unknowns'.

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

$$\frac{\pi}{4} = \sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1}$$

circumference/diameter
 $\pi=3.141592653\dots$

$$\sqrt{2} = \left(x_{n+1} := \frac{1}{2} \left(x_n + \frac{2}{x_n} \right) \right) = 1 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \dots}}}$$

hypotenuse of a square $\sqrt{2}=1.414213562\dots$

Unique properties:

$$\begin{aligned}\varphi &= 1,618033989\dots \\ \varphi^2 &= \varphi + 1 = 2,618033989\dots \\ 1/\varphi &= \varphi - 1 = 0,618033989\dots\end{aligned}$$

$$e = \sum_{n=0}^{\infty} \frac{1}{n!}$$

Euler number
 $e=2.718281828\dots$

...by the way...always remember
Euler's identity: $e^{j\pi}+1=0$

architecture.-



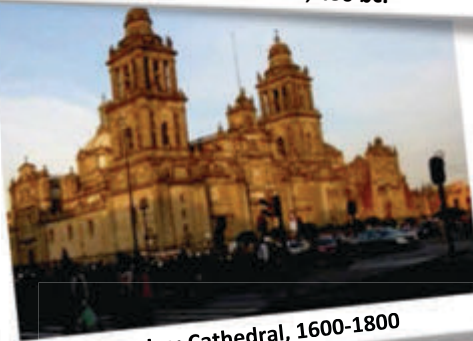
France: Cathedral of Chartres, 1200



Greece: The Parthenon, 430 bc.



India: Taj Mahal, 1630



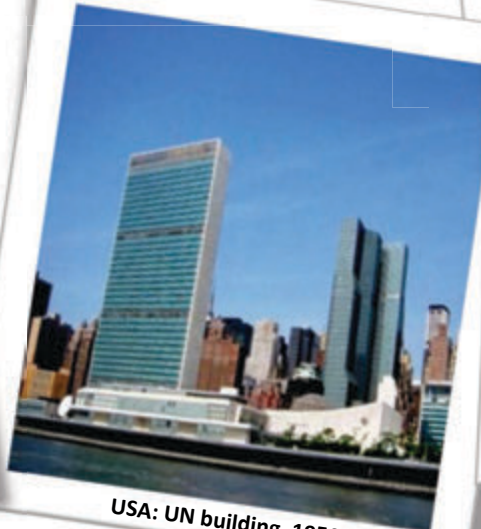
Mexico: Cathedral, 1600-1800



Egypt: Giza pyramids, 2560 bc



Netherlands: Gas service headquarters, 1994



USA: UN building, 1950



Germany: Mercedes museum, 2006

the arts.-



440 bc., Phidias, Athena



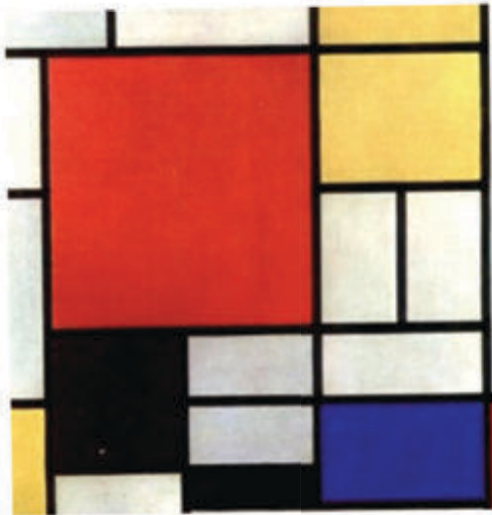
1495, Da Vinci, The Last Supper



1514, Duerer, Melancholy



1504, Michelangelo, David



1921, Modrian, Composition...

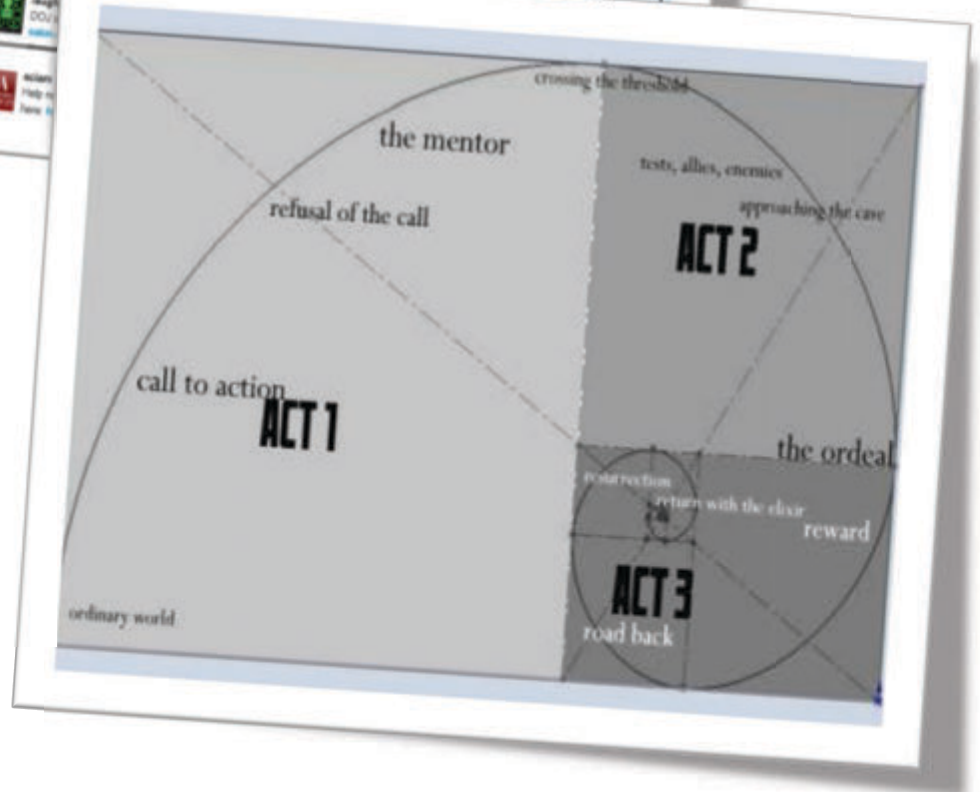


1888, Sir Lawrence Alma-Tadema, The roses of Heliogabalus



1955, Salvador Dali, The Sacrament of the Last Supper

the arts.-



poetry.-

Counting syllables...

(the number of syllables in each verse follows the Fibonacci sequence)

1 I
1 am
2 sitting
3 quietly,
5 listening for the
8 quiet noises in the darkness,
13 ghostly images flying between the tall pine trees,
21 illusion created by the mind, made by shadows, the brain playing tricks on
itself.
34 It sits there, the raven, black as night, looking at me with its dark eyes
in the dark night. Inspiration comes. Words form in my head. Evermore.

-Jim T. Henriksen

music.-

The golden string (Fibonacci word, rabbit sequence)

1 0 1 1 0 1 0 1 1 0 1 1 0 1 0 1 1 0 1 0 1 1 0 1 1 0 1 1 0 1 ...

| | | |
|----------------------------------|-------|--|
| $s(0)=0$ | $= 0$ | |
| $s(1)=1$ | $= 1$ | |
| $s(2)=1+0$ | $= 1$ | |
| $s(3)=1+0+1$ | $= 2$ | |
| $s(4)=1+0+1+1+0$ | $= 3$ | |
| $s(5)=1+0+1+1+0+1+0+1$ | $= 5$ | |
| $s(6)=1+0+1+1+0+1+0+1+1+0+1+1+0$ | $= 8$ | |

1 0

Music

'1' represent D note (D, 1173.33Hz)

'0' represents next octave D (D, 2346.66 Hz)

The sound of the golden string: 

Composition using the Fibonacci sequence: 

(1961 John Chowing, Daisy Bell)

Composition using the Fibonacci sequence: 

(1977 John Chowing, Stria)

Music based only on the Fibonacci sequence: 

(1988 Al Biles, PGA-1)

cinema.-



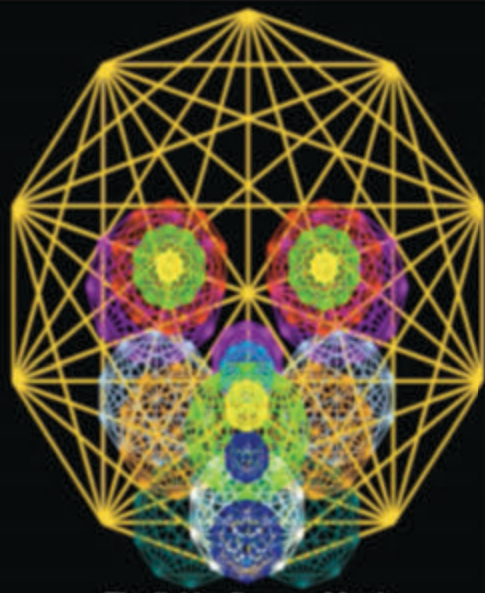
1925, Sergei Eisenstein, The Battleship Potemkin
the length of the film from scene to scene
follows the golden ratio

beauty(?).-

- Definition(?)
 - The **quality** or a **combination of qualitative elements** of an object or subject **that trigger a combination of strong positive feelings and a high degree of attraction** to an observer
 - Special case on human face
 - 'Qualities' into four categories
 - Colour, Texture, Size, **Shape**

(*) Marquardt Beauty Analysis [http://www.beautyanalysis.com/index2_mba.htm]

beauty(?).-



The Golden Decagon Matrix
With The Facial Component
Golden Decagon Matrices



The Golden Facial Mask
With The Golden Elements



The Golden Facial Mask
With The Golden Elements



The Golden Facial Mask

Formation of a 'beauty mask'

beauty(?).-



The Golden Facial Mask
In 3-D



The Golden Facial Mask
In 3-D
Soft Contoured



The Golden Facial Mask
In 3-D
Soft Contoured
With Framing (Hair, Ears & Neck)



The Archetypal Human Face

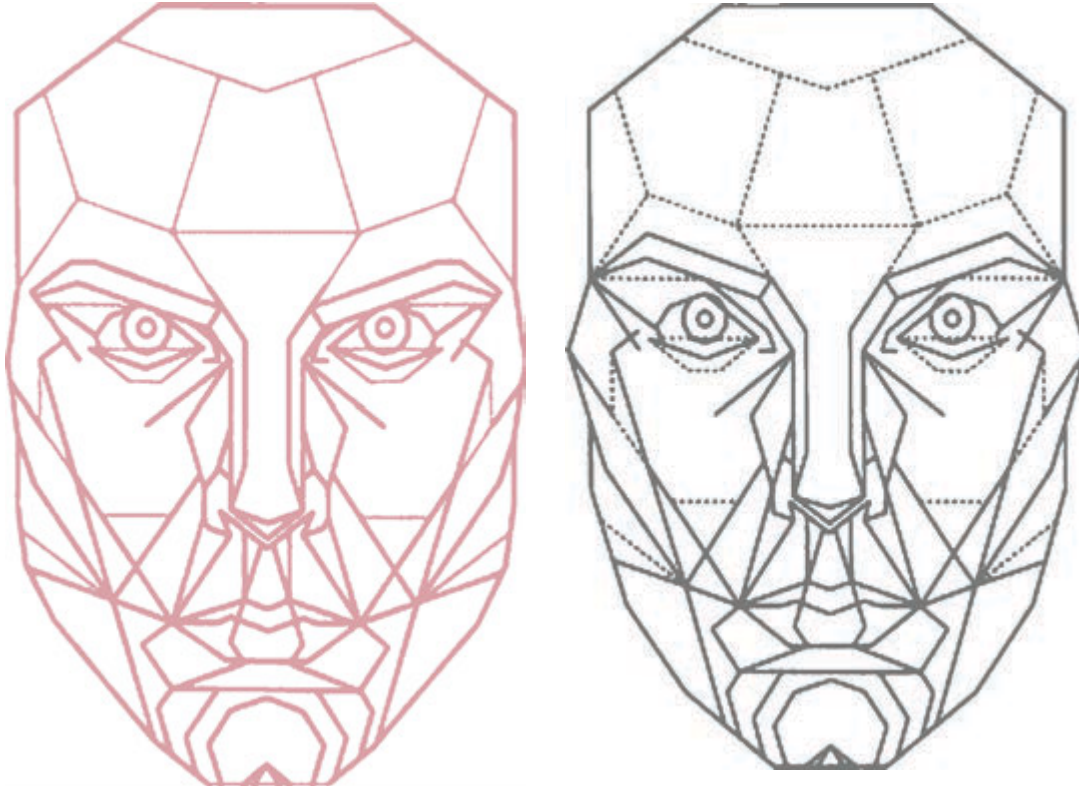
Formation of a face from the model mask

beauty(?).-

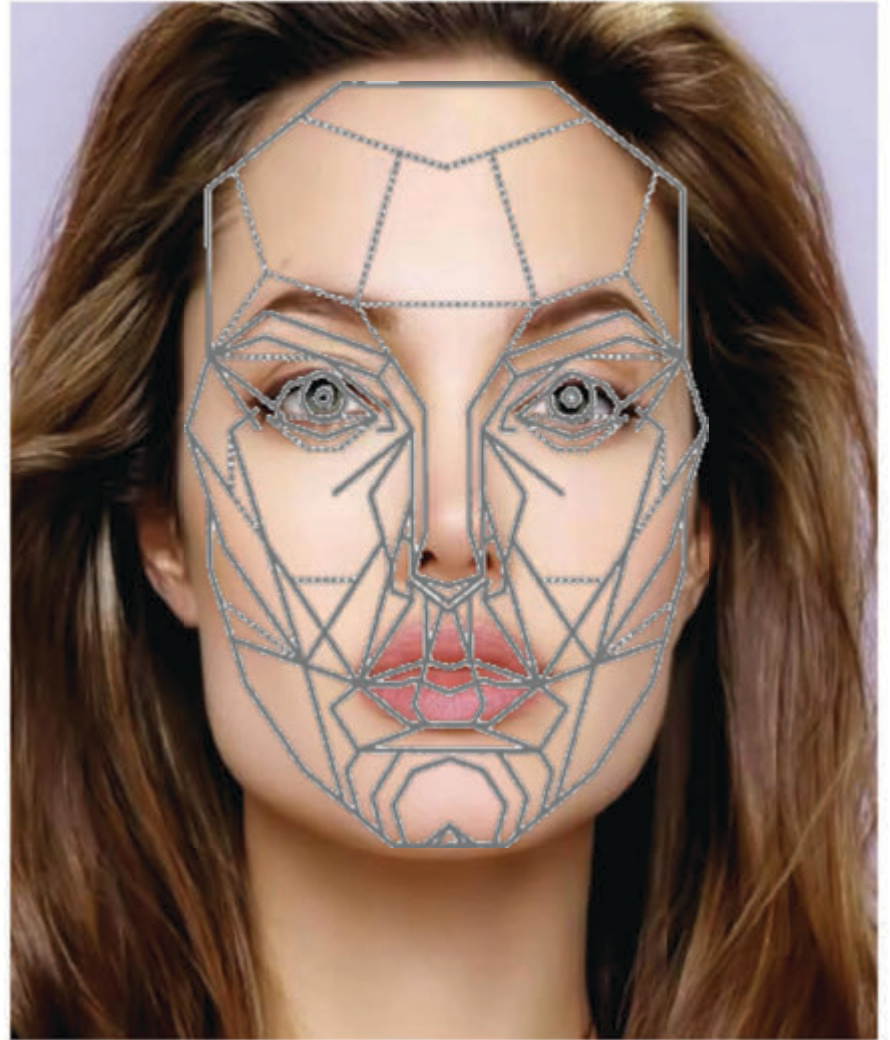
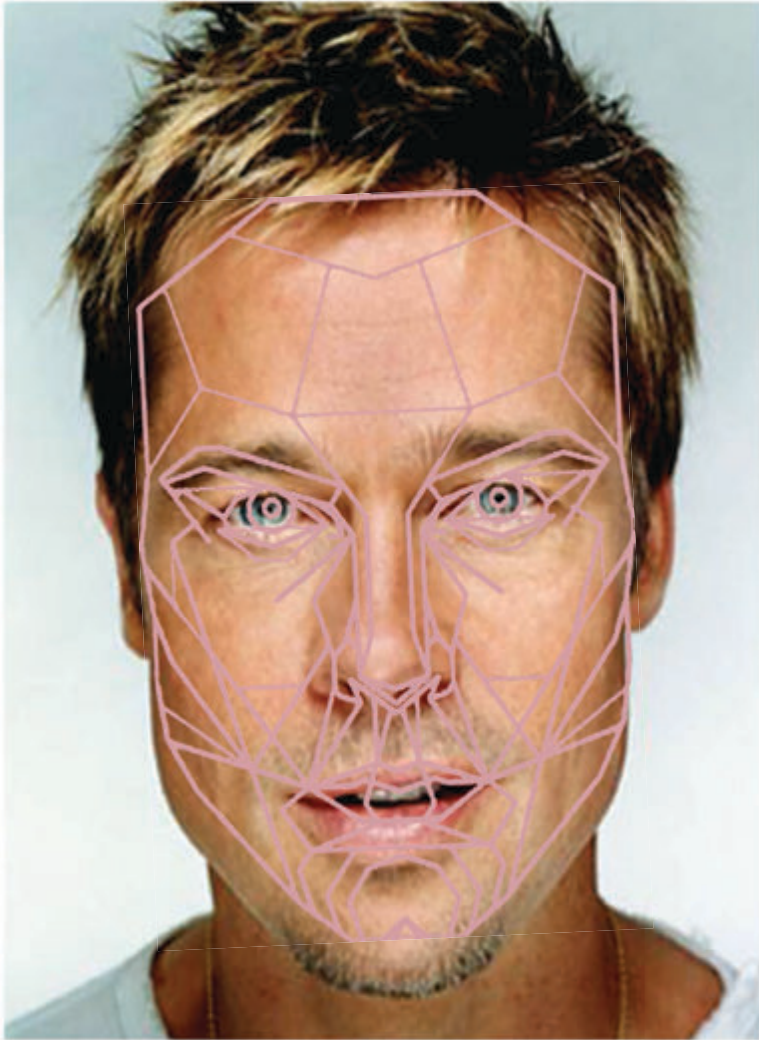


beauty(?).-

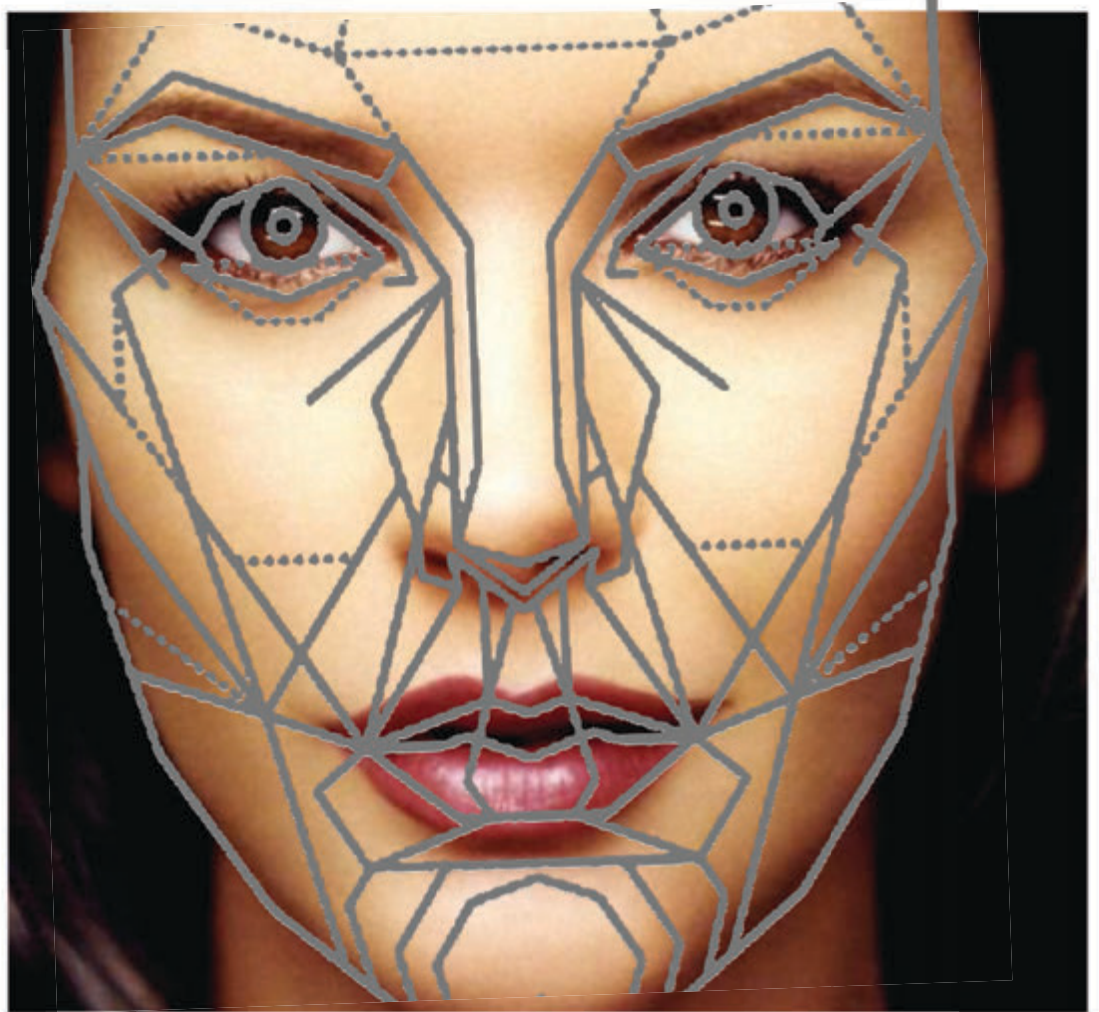
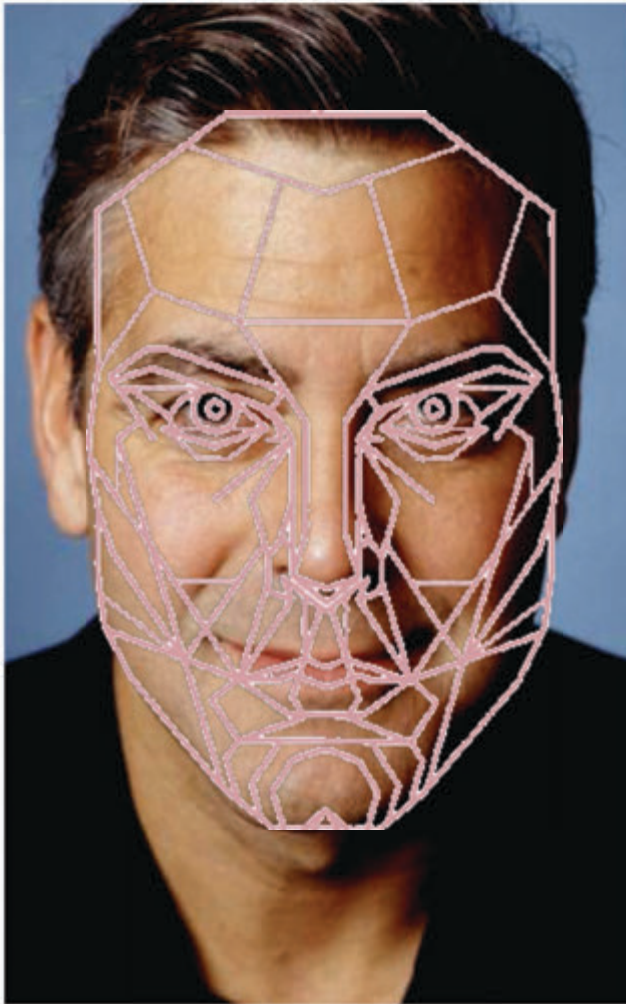
- Ultimately, one mask for each sex



beauty(?) – test.-



beauty(?) – test.-

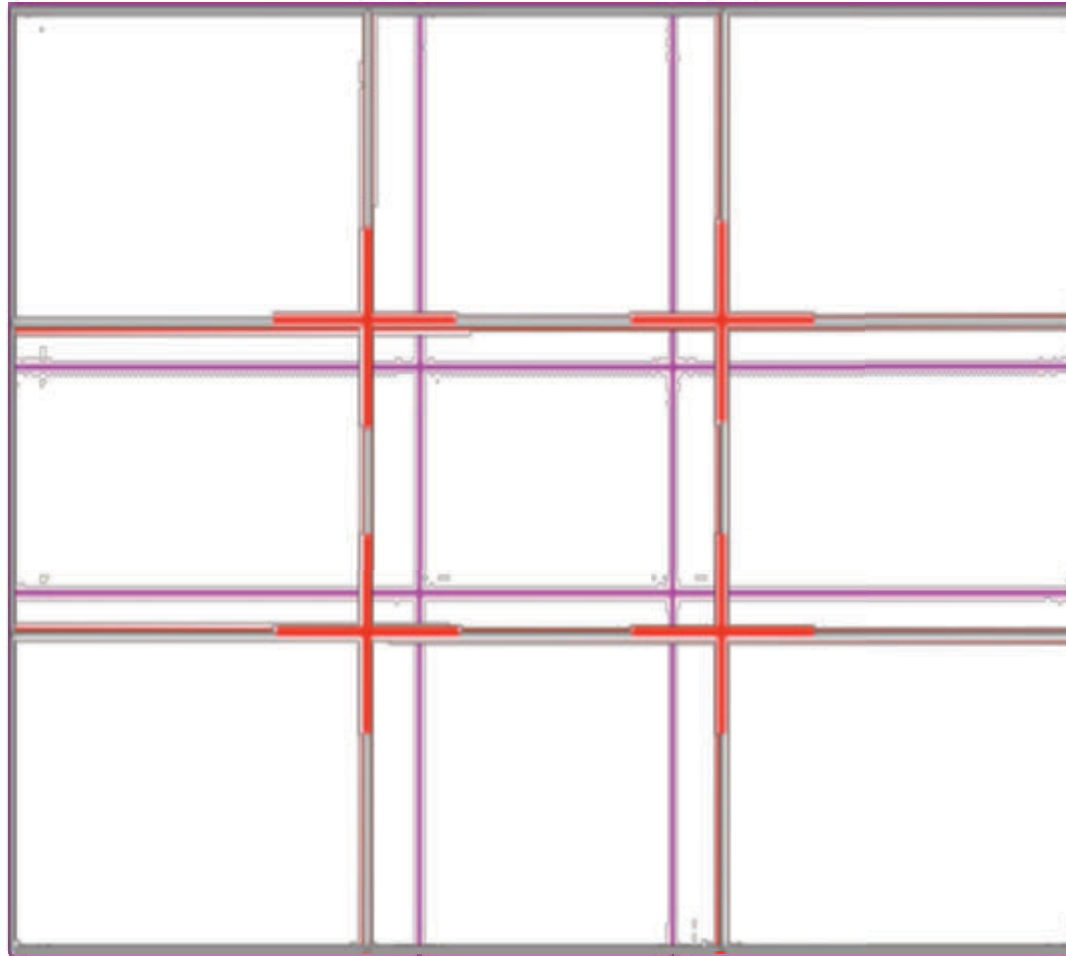


beauty(?) – symmetry.-



design.-

golden ratio



points of interest

rule of third

visual design - examples.-

