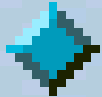
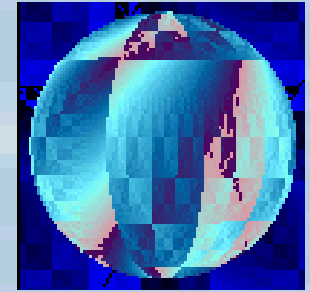


GRAPHICS

**Applied Multimedia
Design and development**

Index:



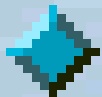
CHAPTER 1:

Basic concepts about how light and color work in nature, his perception by the human eye and its representation and exhibition on computers



CHAPTER 2:

This chapter focuses on the tools that enable creation of the visual content of multimedia presentations.



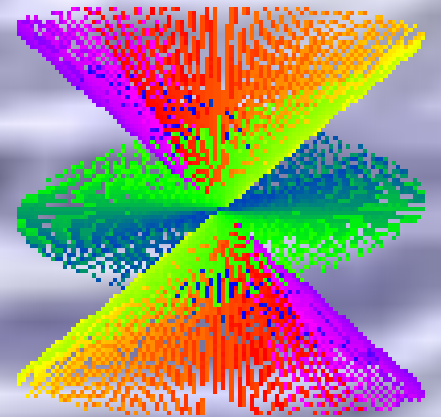
CHAPTER 3:

Set out some of those basic design concepts and provides some ideas about how to get the most from computer-based graphic tool



CHAPTER 1: Graphics Technology

 INDEX





Properties of light and color



what is light?. Light is a wavelength band of the electromagnetic spectrum which can be divided into:



Amplitude: the amplitude of the waves is perceived by the eye as brightness, or luminance.



Wavelength: the exact wavelength of the light determines the color, ranging from red on the long end to violet on the short end.



Additive color in direct light: human visual perception is based on the TRICHROMATIC THEORY of color: Any colors can be produced by blending three basic, or primary colors(red, green, blue). Direct light is light that is visible right from the source.

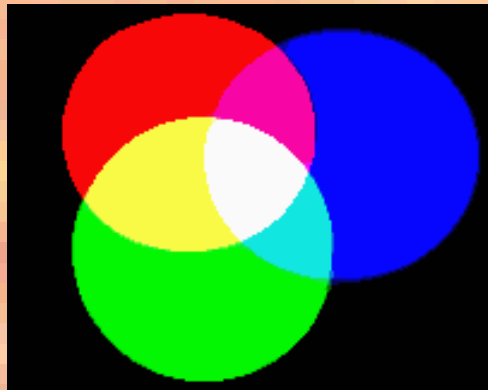




Subtractive colors in reflected light: most of what we see is influenced by the wave-like properties of reflection, absorption, refraction, and diffraction. The primary subtractive colors are magenta, cyan (light blue), and yellow.



ADDITIVE



SUSTRACTIVE





Reflection: light is reflected by an object at an angle that is complementary to the angle of incidence on the opposite side of the normal or perpendicular.



Light scattering: during the reflexion process, the sunlight causes the atmospheric molecules to vibrate causing additional sources of light



Specular reflection: the reason some surfaces seem shinier and more reflective than others is a direct result of how smooth the surface is.





Light transmission: the object degree transparency is given by:

- the transmitting waves,
- the thickness of the object,
- the density of the material,
- the color.



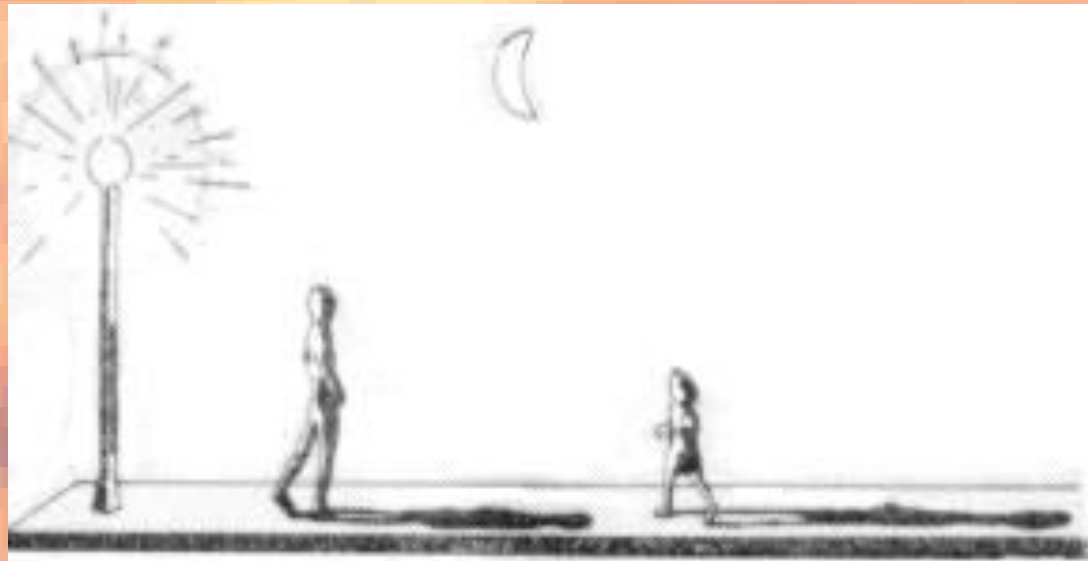
Refraction: a wave travelling through one medium refracts when it encounters another medium.





Shadows: the wavelengths of all visible light waves are smaller than any individual object you can see, therefore any opaque object large enough to be visible will cast a shadow opposite the light source. The length of the shadow depends on:

- **The position of the light source.**
- **The size of that source.**





MONITORS



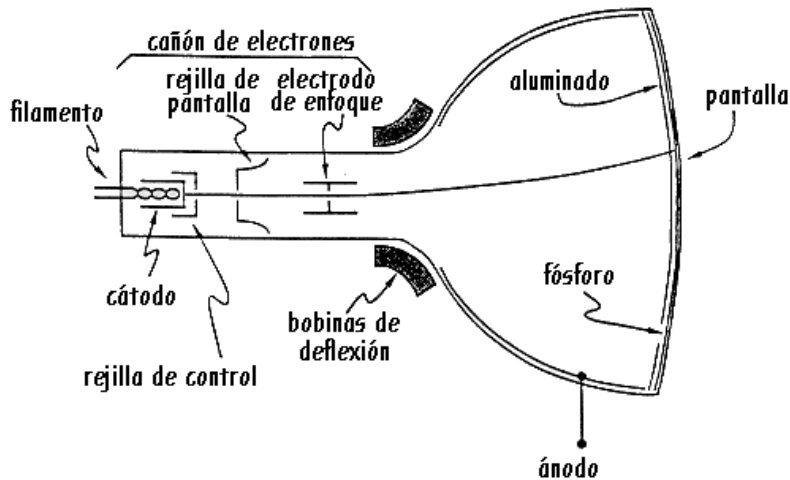
How is it working internally a monitor?

let's see how it operates so we can see color images on them!

The monitors were first formed by:

Cathode-ray tubes (CRT): the CRT consists of a screen coated with phosphorescent dots called pixels (short for picture elements). The phosphors glow when bombarded with electrons from an electron gun at the back of the tube. The glow lingers for a short time after bombardement has stopped due to a phenomenon known as persistence. The pattern and intensity of the bombardment determines the nature of the image on the screen.

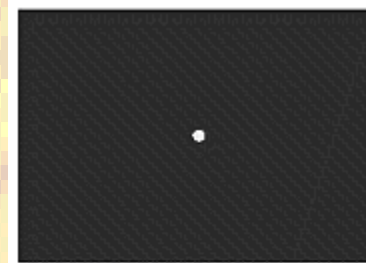




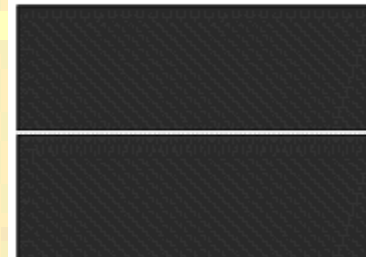
The basic element of that pattern is the scanline (one complete horizontal line of pixels). A sawtooth current applied to one of the coils directs the flow from the electron gun.

Similarly vertical occurs:

When it comes down, there is a vertically interleaving off



Expedición de una señal de video en pantalla pero sin barridos



Sólo hay barrido horizontal

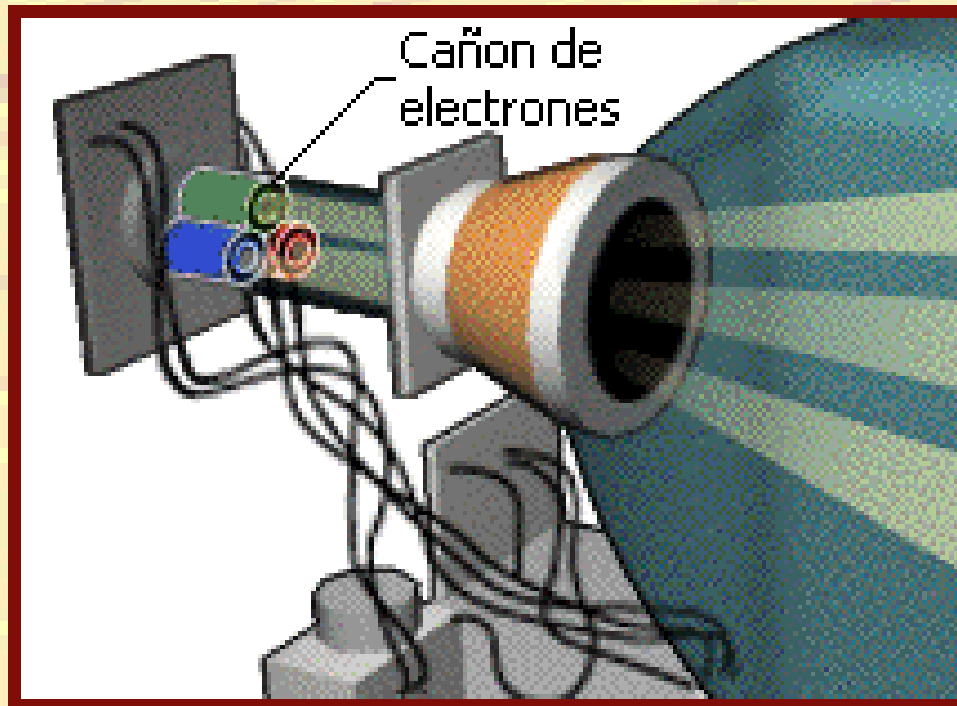


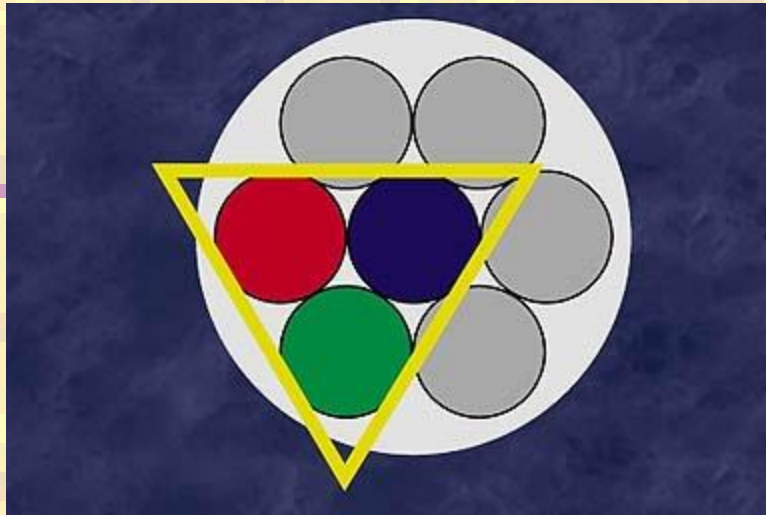
Expedición de una señal de video, combinada con barrido horizontal y vertical





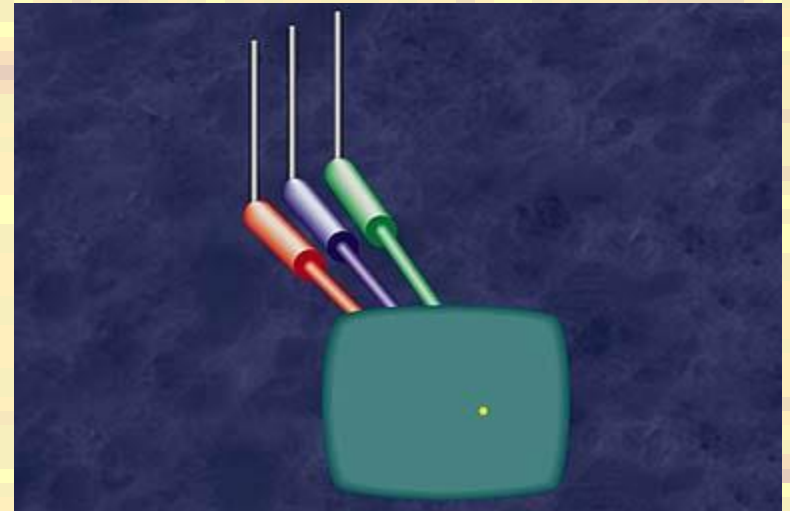
Color CRTs: they are combinations of the three primary colours (red, blue, green).





The internal screen is coated with phosphors grouped in "triads".

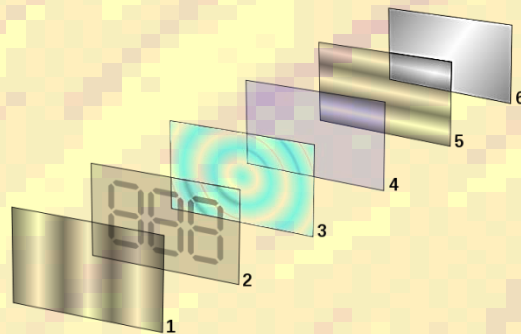
There are also three guns, throwing a beam of electrons through a shadow mask to excite three phosphorescent elements in a triad





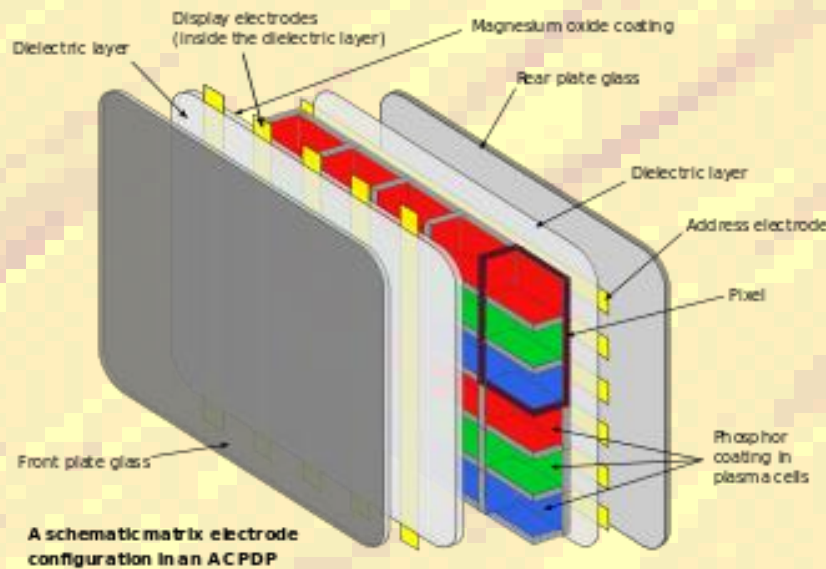
LCD monitors: A liquid-crystal display is a flat panel display that uses the light modulating properties of liquid crystals. This liquid crystals do not emit light directly.

The LCD screen is more energy efficient than a CRT allowing it to use in battery-based electronic equipment.





Plasma monitors: Its system includes multiple small cells which are placed between two glass panels composed of a mixture of gases. This gas, electricity through it, becomes a light emitting plasma.





New technology!

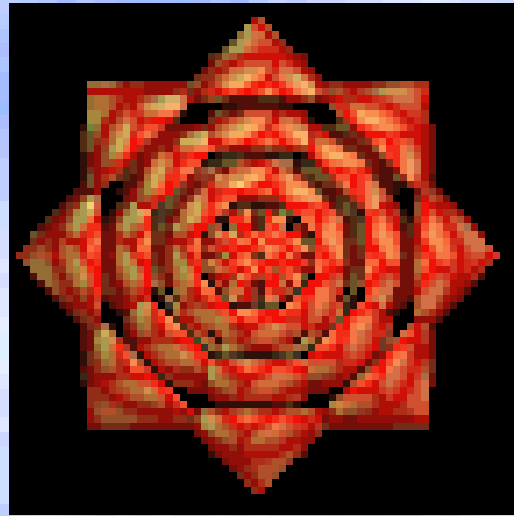
OLED monitors: They are organic light-emitting diode where the emissive electroluminescent layer is a film of organic compound which emits light in response to an electric power.

The biggest technical problem for OLEDs was the limited lifetime of the organic material and the manufacturing costs.

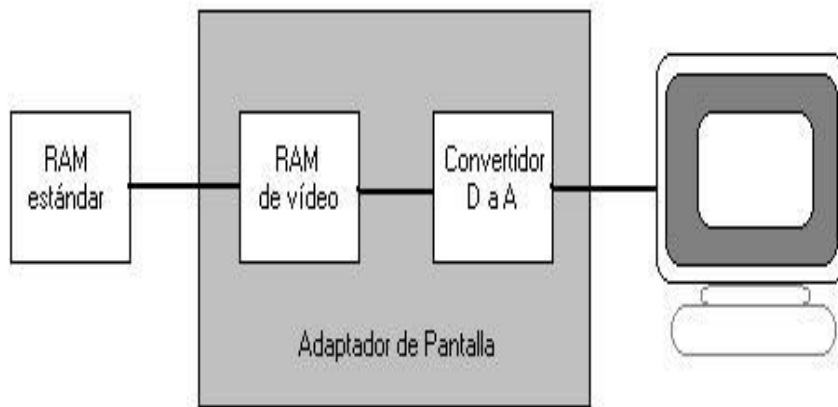




Display technology



The signals that drive information are generated by the computer's display circuitry. This circuitry can be integrated into the motherboard or added into the system bus in the form of a video card.





Video memory : the computer creates and stores graphic images in a memory called video memory, which is used when an image or portion thereof needs to be displayed.



Device resolution : this is the measurement of the number of pixels that can be represented in a given space on an output device such as a monitor or printer. It's measured in dots per inch.

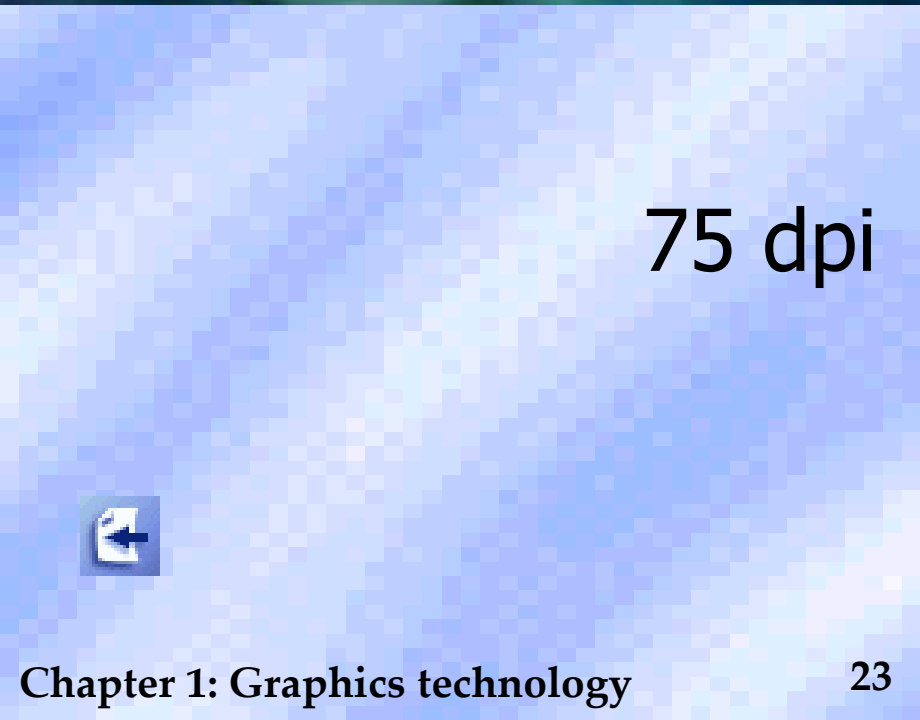


Image resolution : is the number of pixels that are in a horizontal scan line multiplied by the number of lines. Is independent of the definition of the device.





50 dpi



75 dpi





150 dpi





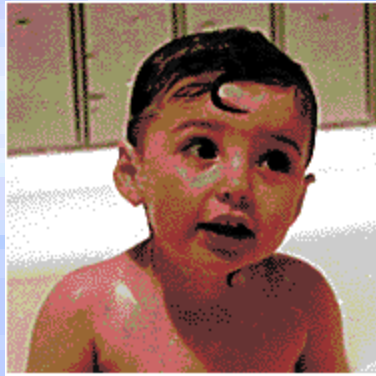
Color resolution : each pixel can be represented in video memory by a number which can be represented by 8, 16 or more bits. The greater the number of bits needed to represent a pixel, better color and image can have and more video memory will be needed to represent it.

The number of bits used to represent a graph is called bitmap.

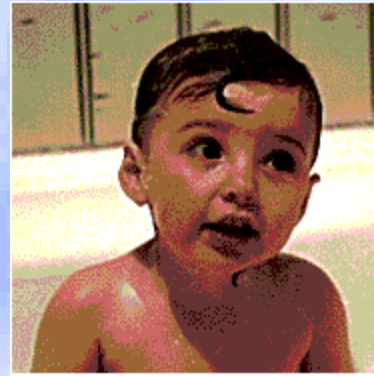




3 bits per pixel
22,407 bytes



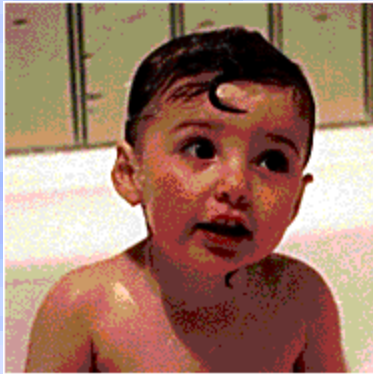
4 bits per pixel
24,681 bytes



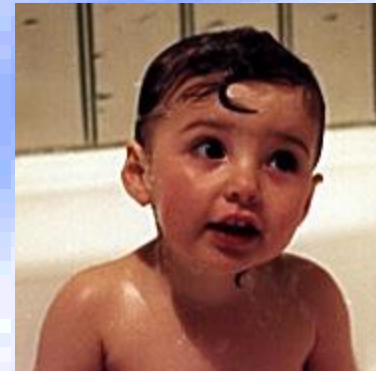
5 bits per pixel
44,187 bytes



6 bits per pixel
47,517 bytes



8 bits per pixel
53,941 bytes

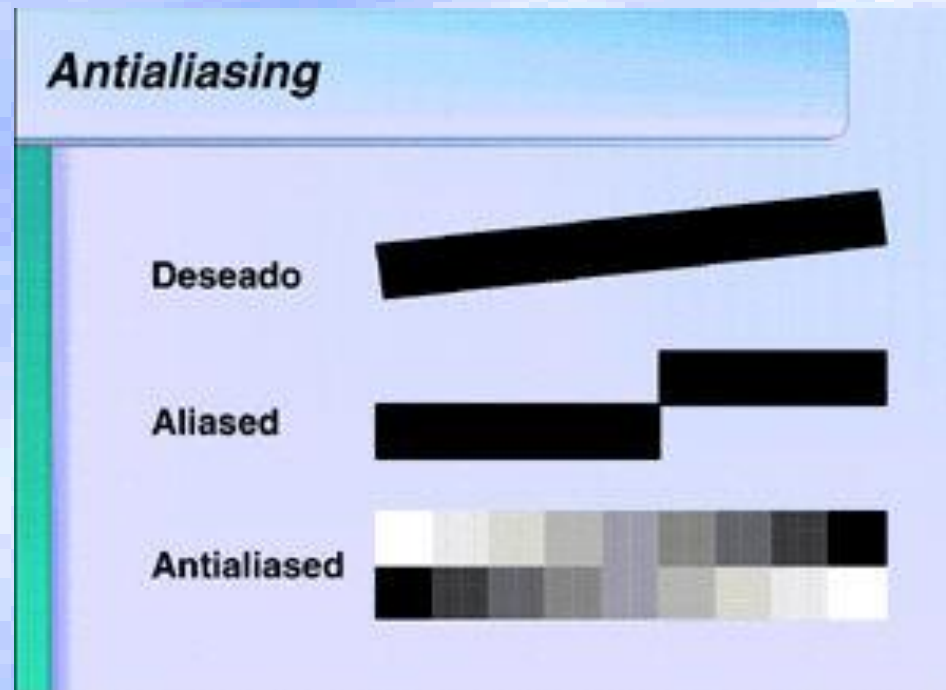


Original JPEG image
24 bits





Aliasing and Anti-aliasing: aliasing takes the form of staircases exhibited by groups of pixels that are not confined to horizontal or vertical lines. The other way to soften the appearance of the edges is by adding transitional colors in a process called anti-aliasing





Memory trade-offs : Several factors are juxtaposed in a limited amount of display memory.



Display buffers: the memory required to hold the data for a single screen is often referred to as a **frame buffer**. Since the monitor is always looking at the next display memory, they use a double buffer.



Enhancing speed: there are several ways to improve the speed like:

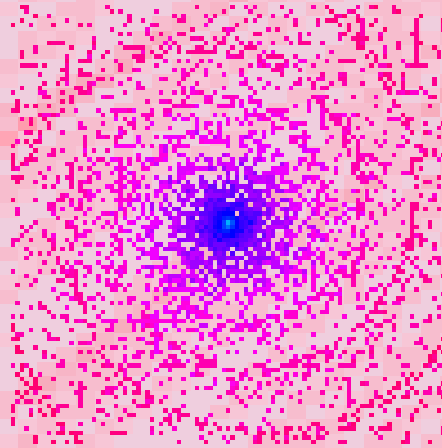


Coprocessed video: dedicates circuitry to processing and displaying video without the help of the CPU.



Graphics accelerators: they are the responsible for performing a number of functions related to the display of graphics on the screen, which otherwise would have to do the processor.





Bitmapped VS Structured Graphics



Bitmapped Graphics:

Each pixel is represented by one or more bit planes.

Most important features:

They don't have the same resolution as the screen

They are big

Disadvantage: dependency with the resolution (they are not suitable for scale and perspective changes).



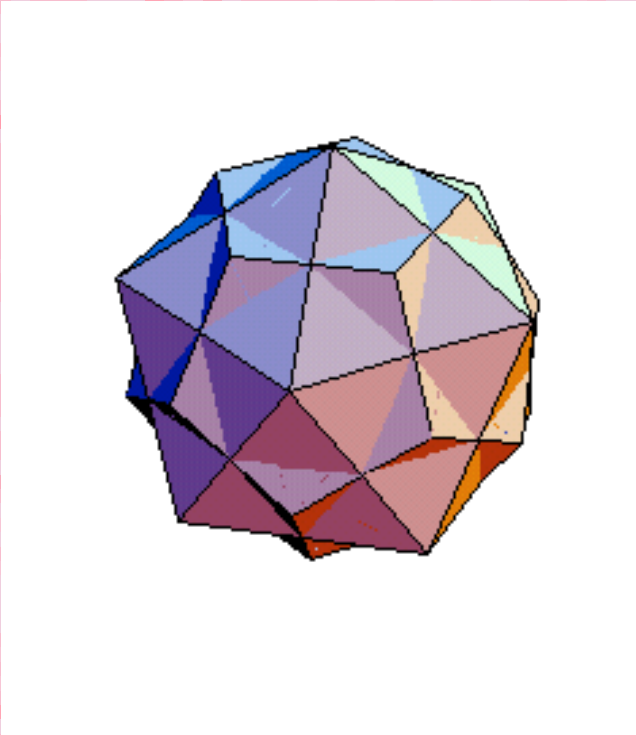
Structured graphics : also known as object-oriented, or vector, graphics.

- these formats describe objects such as lines, circles, rectangles, and polygons. The descriptions typically include attributes like anchor points, size, angles, position, line weight, and hollow/fill characteristics.

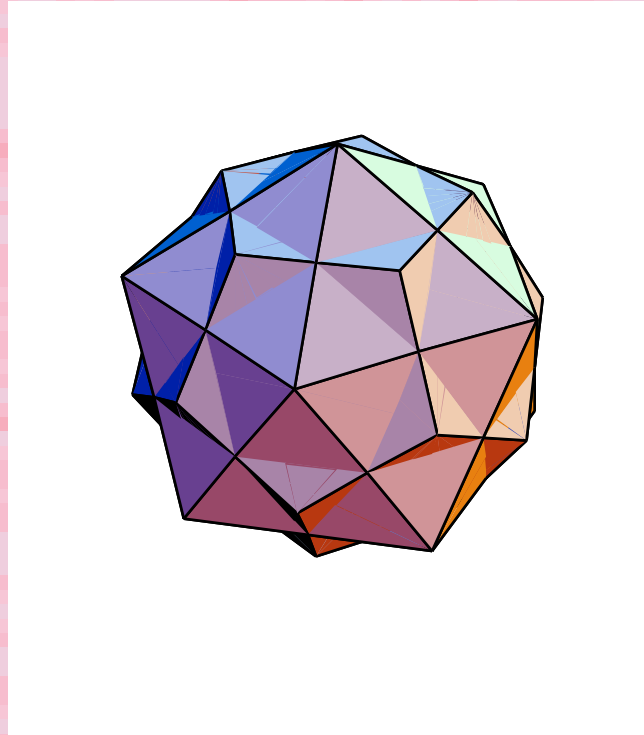


	Bitmap	Scaled object
Definition	Depending on output device	Independent of the output device
Resolution	Depending on the resolution	Independent of the resolution
Size	They are very big	Greatly reduced the size of the bitmaps





BITMAP (.BMP)
Size: 126 Kbytes



SCALED OBJECT (.WMF)
Size : 64 Kbytes





JPEG compression:

- One of the challenges in image file size is photorealism which requires 24-bit color, and the fact that colors vary subtly even between adjacent pixels.

-The solution is to compress these images according to optical guidelines based on:

People discern color areas and edges more readily than subtle shading, detail, and absolute brightness.

This is why JPEG is a form of lossy compression, because it works by compressing the variations in color and brightness





Postscript: is a structured *page description language* (PDL) made up of object-oriented drawing commands that take the form of an ASCII text file.

These graphics are only visible when interpreted by a PostScript-compatible output device

It is designed to communicate a document created by computer to a printing device.

The print speed is higher because less information is transmitted.

It is an Adobe product (disadvantage: the license increases the price of the print device).

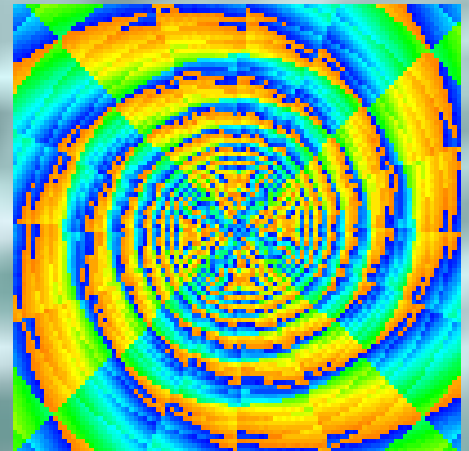


CHAPTER 2:

Computer Graphic

Tools

 INDEX

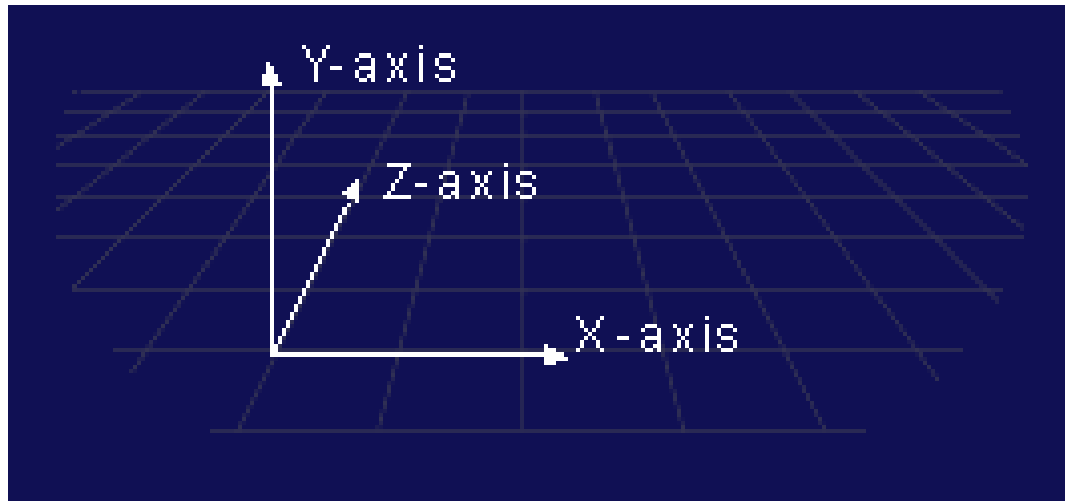




2-D and 3-D coordinate systems



Creating graphics is essentially the moving and placing of visual objects within a conceptual base. The computer use three axes, as seen in the following graph.

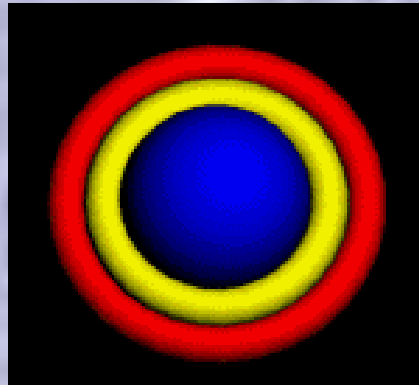


In the two-dimensional graphics computer is only able to draw on the X and Y. Objects in this 2½-D world are still flat, but the computer can intelligently scale and rotate them in a 3-D space. Graphics programs that are 3-D are actually aware of the third dimension in the objects as well as the viewing space.





Structured Drawing Programs

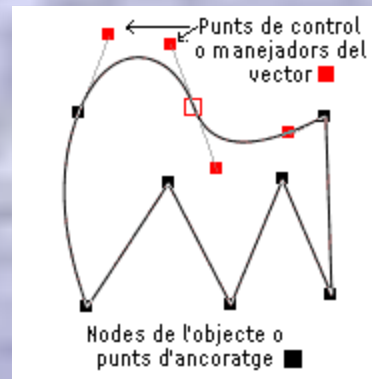
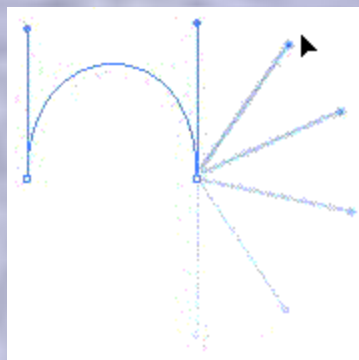
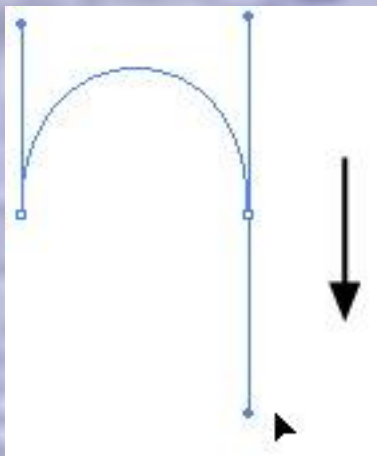


Paint programs are object-oriented programs, the images are created based on descriptors, not pixel by pixel. For being structured, they are smaller.



Objects: the drawing tools resemble some of those found in paint programs: squares, rectangles... Unlike their bit-mapped counterparts, you can always click on these objects to make the anchor points visible and manipulable.

The more advanced structured drawing programs incorporate Bezier curves, sort of an electronic implementation of the mechanical French curve.





Layers: each object is drawn on its own conceptual layer. Menu commands, such as “send to front” and “send backward”, are used to rearrange the order of the layers.



Special effects: object-oriented programs contain some limited special effects including stretching, deformation and perspective warp. Color palettes and gradient fills are typically more limited than in bitmapped programs.



Resolution: object-oriented programs can often print at a higher resolution than that of the screen.



The best of both worlds: object-orientation makes structured drawing ideal for graphs where the information is both straightforward and subject to change. Some packages offer two distinct layers for structured drawing and bit-mapped painting.

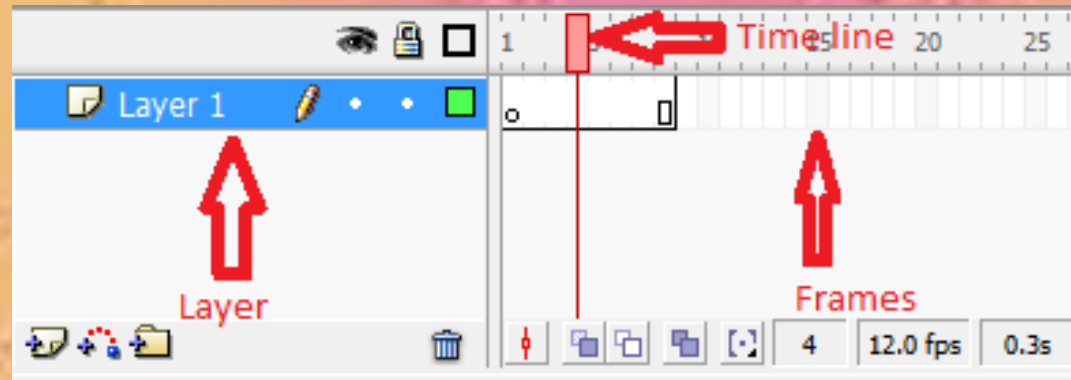


6

2-D Animation



The basic theory animation is simple: if a series of progressively varied static images are displayed fast enough, the viewer perceives motion. The average viewer perceives animation as more than a series of individual frames at around 16 frames per second (fps). The 24 fps frame rate used in film ensures smoothness.



What you want to achieve, both with previous techniques as with current is to present enough frames per second to give the illusion of movement.





Types of 2-D animation: this type of animation has an additional dimension time, which is the main difference between the animation programs. Types of animations:



Page flipping: this term is derived from flip books that you bend and release to make the gradually changing images on successive pages seem to move.



Cel animation: this animation is used in cartoon. The background for a given scene only be created once since all the action takes place in the foreground. A series of foreground cels depicting each unique character movement is then created. This process requires patience, practice, skill and knowledge of the organic movement. Then we can see this type of animation in the following image.





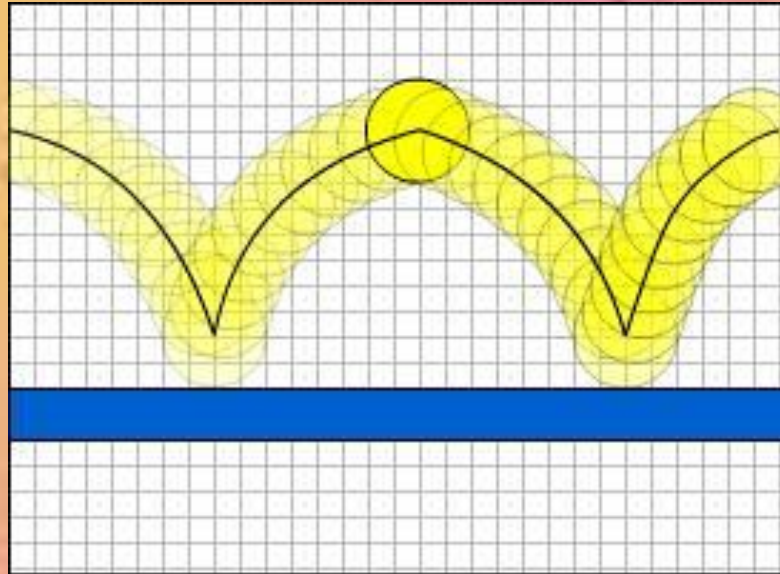


Speed and memory issues: the amount of data that must be processed and displayed for each frame of animation directly impacts on the speed with which a series of frames can be displayed. It also places practical limitations on the file sizes required for animation



Motion compression: stores the starting frame and then calculates and records only the differences between subsequent frames (a process called frame differencing). The resulting data stream is then typically compressed using runlength encoding (RLE). This type of compression is effective when we have a few changes and it is not usually performed in real time.



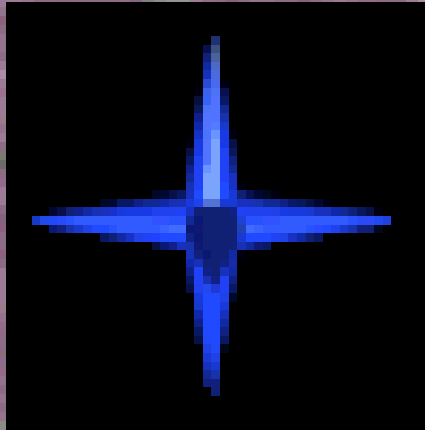


Direct disk access: some animations formats only supports the ability to access successive frames from RAM, but more recent developments provide the ability to access the disk directly, in order to have longer animations.





3-D Graphics



In this graphics user provides a three-dimensional description of each object's characteristics and their relationships to each other, the 3-D space, light sources, and the viewer's position. The software then computes this data and renders the scene based on the information supplied. The process is roughly divided into stages of modeling, scene description, rendering, and animation.





3-D Modeling: is the process of defining the shape and other characteristics of objects that will later be rendered and animated. There are three types of modeling:

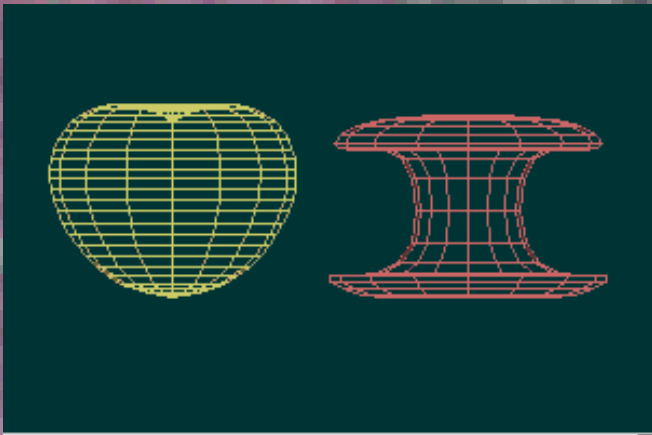
1

Solid Modeling: builds complex objects from simple 3-D solids or primitives such as cubes, cylinders, and cones. Is usually used when cut-aways are required.

2

Wire-frame modeling: employs 2-D and 3-D skeletons of objects such as polygons, circles, and cubes. Curves are usually supported in the form of splines. They are essentially curved lines with a mathematical relationship to two or more points.







Polygonal-surface modeling: employs a series of 2-D polygons that are linked together and grouped to construct objects. The triangle is the most commonly-used polygon due to his flexibility.



Surface properties: once the shape of the model is created, the surface properties are specified. This prepares the objects for the rendering process.



Modeling enviroment: Modeling three-dimensional objects with a screen and mouse is challenging. Two basic approaches are taken to the dilemma of user interface: world-view and tri-view: the *world-view* navigation is accomplished by rotating and zooming with various key combinations and mouse moves. *Tri-view* provides a smaller window for each of the three axes.





3-D Scene description: after individual objects have been modeled, they must be arranged in a scene before rendering. These scenes are described by the orientation (posture) of objects by three factors:

1

Roll: rotation in the X axis.

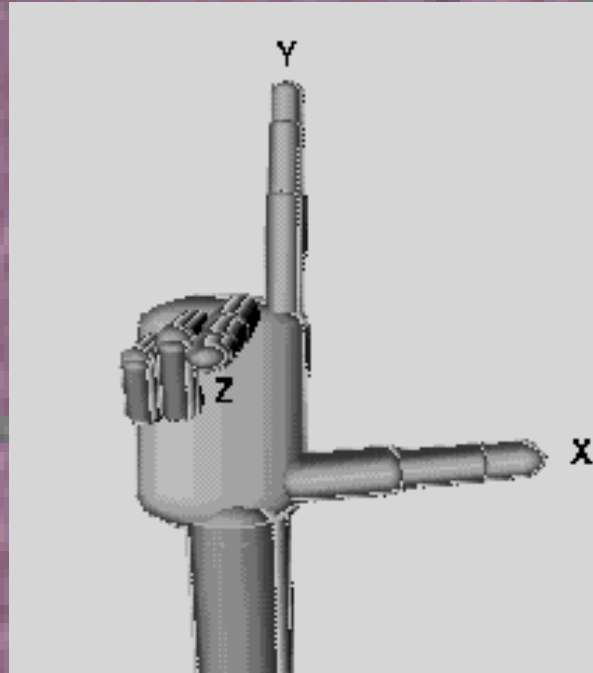
2

Yaw: rotation in the Y axis.

3

Pitch: rotation in the Z axis.



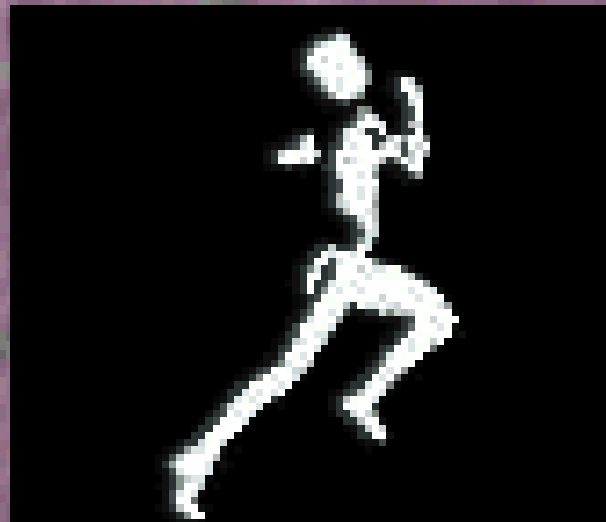


Then you need to specify the sources of light (intensity, color, focus) and the observer's position.





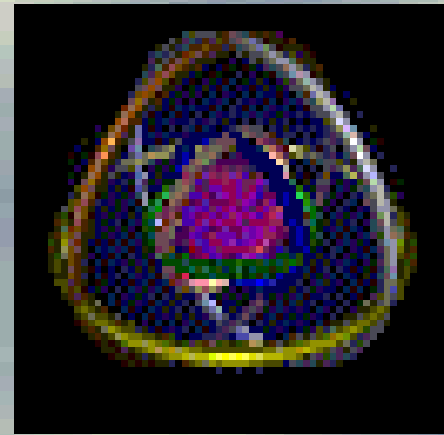
3-D animation: is a series of frames that depict motion when viewed in rapid sequence. Each frame is rendered separately, and the illusion of motion is created by making changes to the object and scaling, lighting attributes, or viewer angle in the scene description.



CHAPTER 3: Using Graphics



 INDEX



Using color



Some guidelines to help us choosing the right color depending on the message you want to transmit.



Color psychology: Colors can communicate general moods or associated items: red - alert, orange - attention, black - evil.

Specific color combinations and categories can also carry implied meaning, specially with countries, patriotism, and corporations.

For these reasons we have to choose the colors depending on the audience.



COLOR EMOTION GUIDE

OPTIMISM CLARITY
WARMTH

FRIENDLY CHEERFUL
CONFIDENCE

EXCITEMENT YOUTHFUL
BOLD

CREATIVE IMAGINATIVE
WISE

TRUST DEPENDABLE
STRENGTH

PEACEFUL GROWTH
HEALTH

BALANCE NEUTRAL
CALM

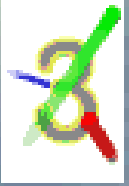


Color continuity and differentiation: we can use to establish conceptual relationships, assigning colors to concepts.

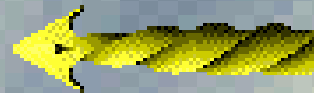


Keep it simple: The more colors you have, the greater the complexity and therefore it has to be simple when using color.



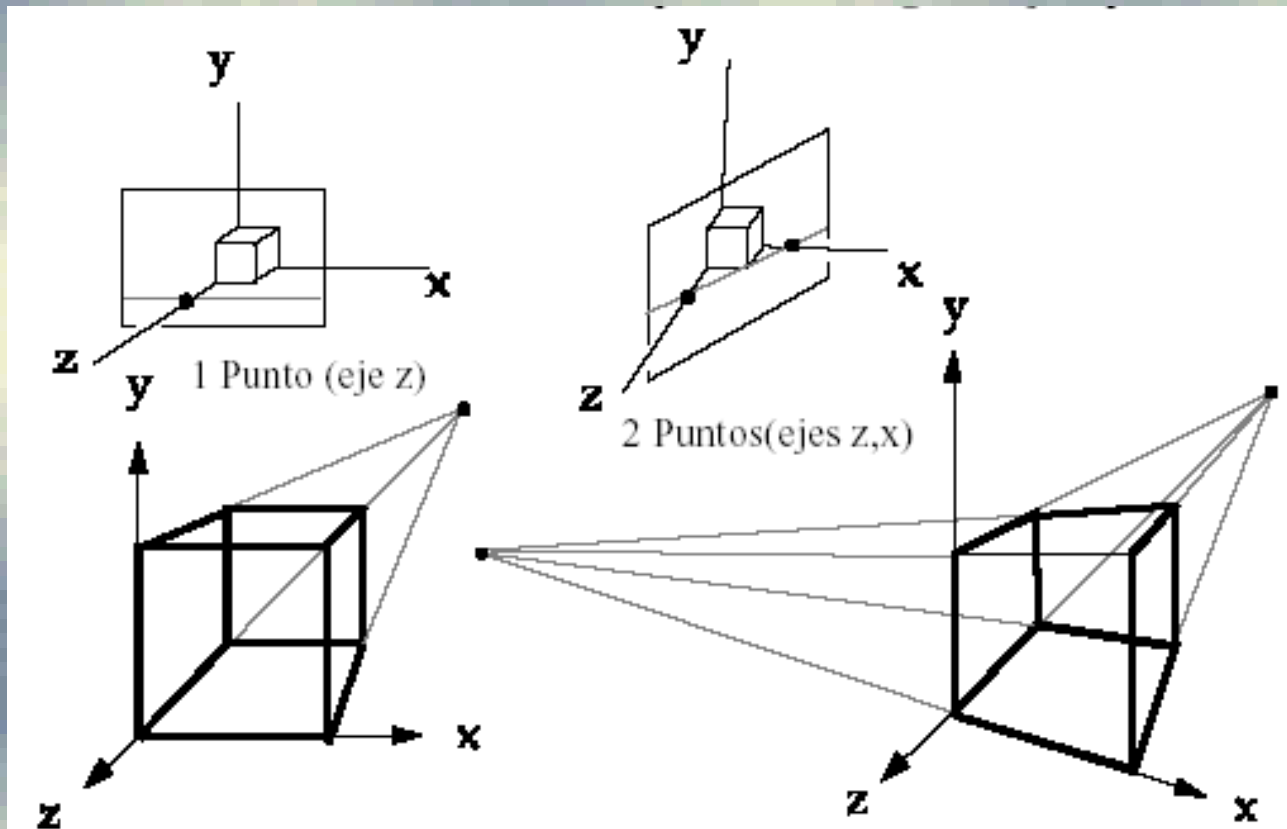


Using perspective





While parallel projection is fairly simple, true three-dimensional objects become smaller as they grow more distant and eventually recede into a *vanishing point*.





Typography and titling



Fonts make a big difference in how text messages and overall images are perceived:



Font: it's a single collection of alphabetic and numeric characters in one size and style.



Typeface: is technically a complete grouping of fonts that bear a family resemblance.



Font families: they are related series such as roman, italic, and bold.





Leading: is the amount of space between lines of text.



Spacing: there are two types of spacing:



Proportional spacing: is the amount of horizontal space allocated for each character changes according to each letter.



Letter-spacing: is the standard distance between the letters of a font.



Kerning : or negative letterspace, can be used to tighten the letters up.





Font classifications: the fonts are classified according to four basic types: Ancient Roman (Garamound, Elzevir ...), modern Roman (Didot, Bodoni ...) and sans serif and Egyptian.

ABCDEFGHIJKLMNO
Romano antiguo

ABCDEFGHIJKLMNO
Romano moderno

ABCDEFGHIJKLMNOPS
Palo seco

ABCDEFGHIJKLMNO
Egiptico





Using fonts: in print design, the two major classifications are body copy and display type.



General concepts: as a general rule, avoid using more than two font families on a screen, since it lends an effect of confusion. It is also important continuity throughout the presentation.



Body copy: perceived on two levels taking into account the nature (psychological attitude) of the beholder.



Global : the whole body of text should be nice and provocative.



Formal printing: justified.



Informal printing: left.



Artistic printing: right and centered.



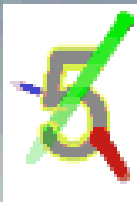
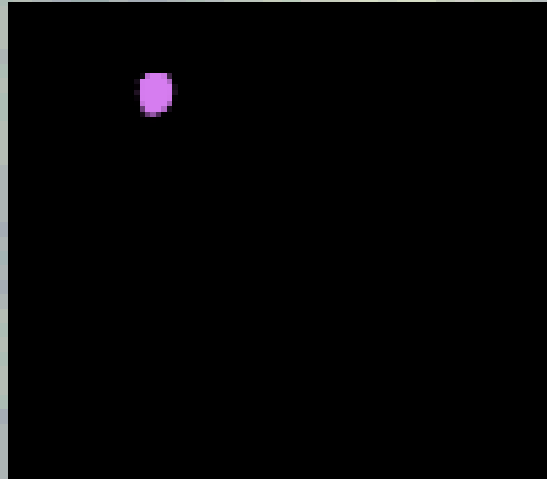


Display type: it's important because they make an immediate subconscious statement about the message and its presenter



Type as art: various modifications can be made in the letters for design. Here are some examples:





Design basics

In professional design, images should be modified and design new ones to transmit what it's desired.



Establishing a style: once you establish a style, stick with it! Continuity unifies your message and gives your audience a sense of comfort.



The design grid: serves as a sort of visual outline and provides a method of working elements in together without being distracted by their details.



Attracting the viewer: the use of a dominant object can be effective in getting the readers' attention. Keeping things simple also avoid visual clutter and reduces the risk of elements competing for your attention.





Leading the eye: good design works with the tradition of reading from left to right and top to bottom rather than fighting it.



Keeping it interesting: when we want to emphasize something, we have to differentiate it from the rest. We also have to avoid all forms are equal and flat.





Sometimes we want a picture that is not entirely realistic, to attract more attention.

You can give a sense of movement to the images using angles and shading.





Computer graphic techniques





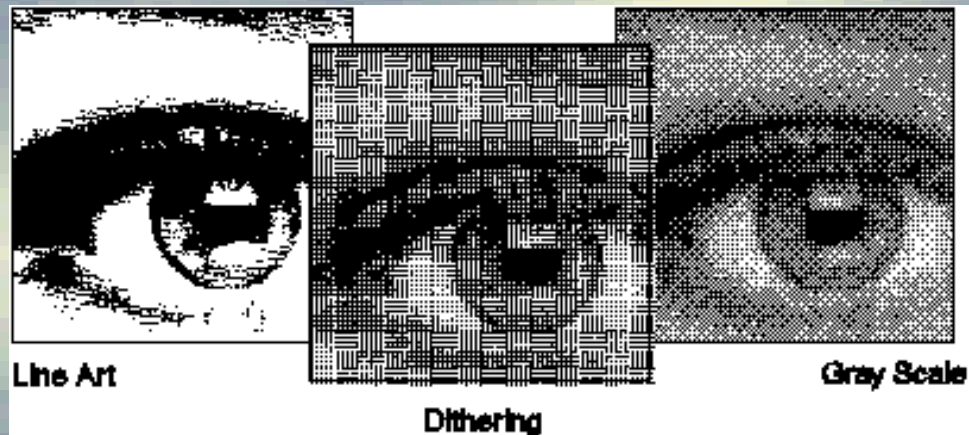
Choosing the right resolution: most computer based presentations rely on images created with the color look-up tables (CLUT). Two basic concepts are involved in working with CLUTs:



Establishing the number of bit planes: fewer bit planes mean smaller files and faster load, display, and animation times.



Choosing the exact colors of that palette: you can use a standard palette, a palette adaptive, or customized palette.





Working with animation: the animation needs more resources. Fortunately, several production techniques can be used to maintain smooth and manageable animations.



Smaller files: to reduce the file size, you should minimize the size of the CLUT, using compression to avoid storing redundant data and redrawn.



Animate during delivery: Many presentation packages allow objects to be manipulated during delivery.





Animation ideas: there are as many animation techniques as design techniques. Line drawings and logos with a scripted or artistic element lend themselves to being drawn before the viewer's eyes.

