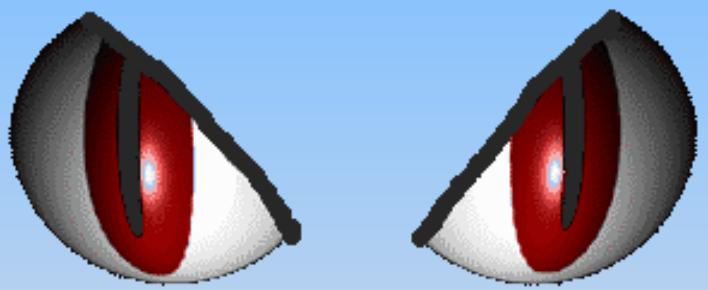
THE SENSES!

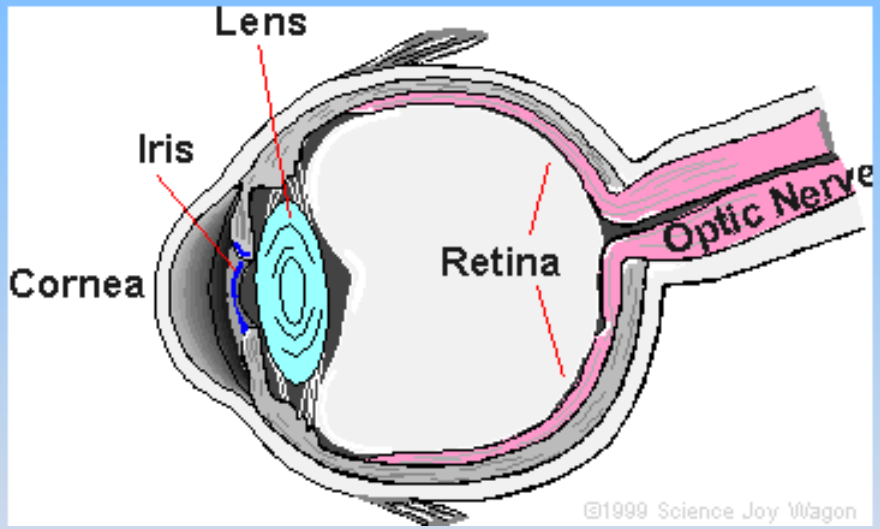
I The Eyes and Vision

- The eyes have been described as windows to the soul



A . Parts of the Eye/Vision Process

- 1. **Image- reversed** (upside down) enters the eye- brain turns the image upright
- 2. **Light waves-** light waves are reflected back into the eye- the lens and the cornea focus the image
-



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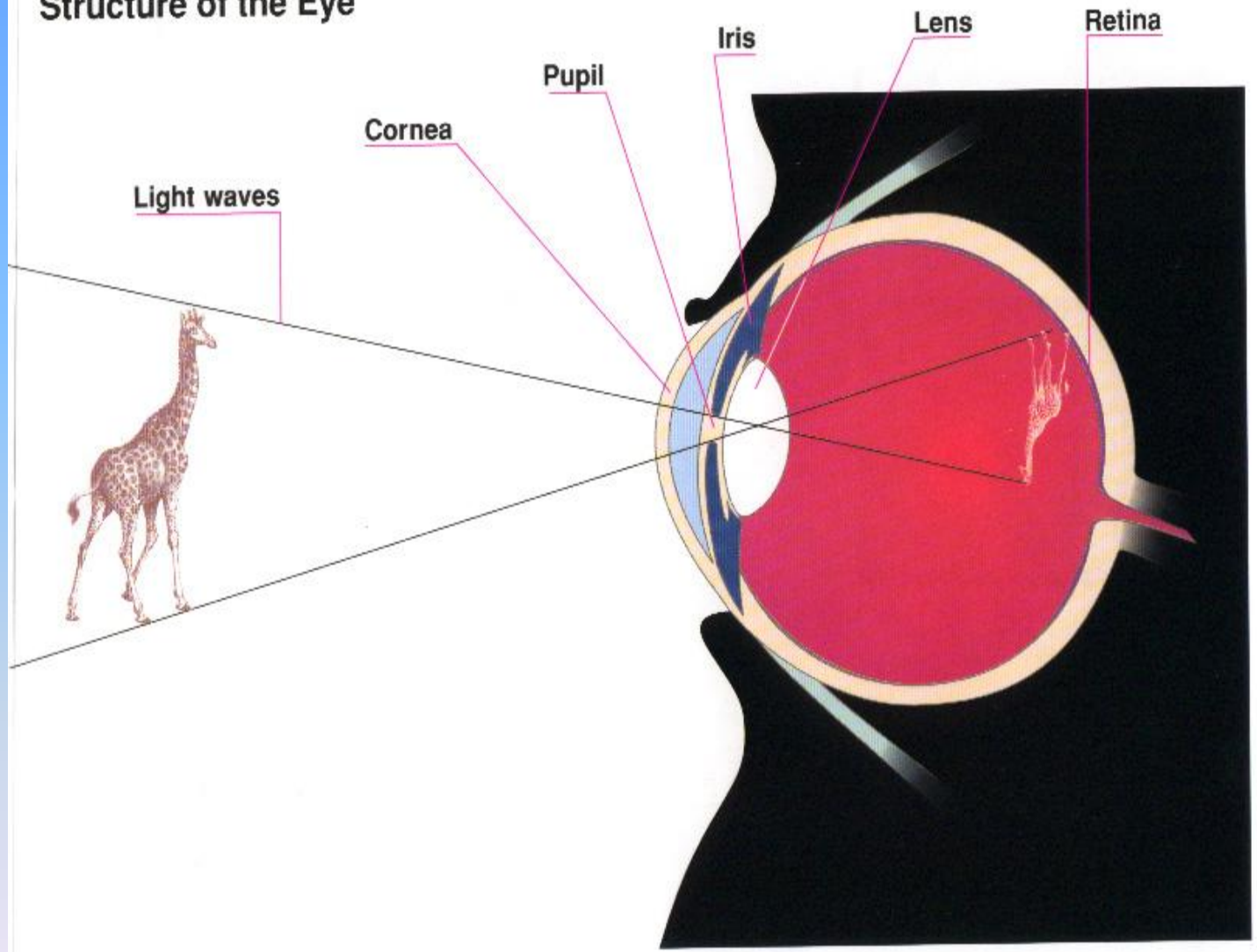
Structure of the Eye



Parts of the Eye/Vision Process

-

- 3. **Cornea-** rounded front/ **Pupil**- controls light passage (black part)/ **Iris**- muscle around the pupil gives your eye its color/ **Lens and retina-** process and focus light waves

Parts of the Eye/Vision Process

- 4. **Eyeball**- entire eye/ Normal vision- light waves are perfectly focussed/ **Nearsighted-** the eyeball is too long- distant objects are blurry/ **Farsighted**- the eyeball is too short- near objects are blurry

-
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LASIK Surgery http://www.lasik1.com/LASIK_Detailed.html

B. Pathway to the Brain

-

- **Optic Nerve-** impulses flow through the nerve- to the **Thalamus**- sends impulses to the **Occipital lobe**– primary visual cortex– visual association area

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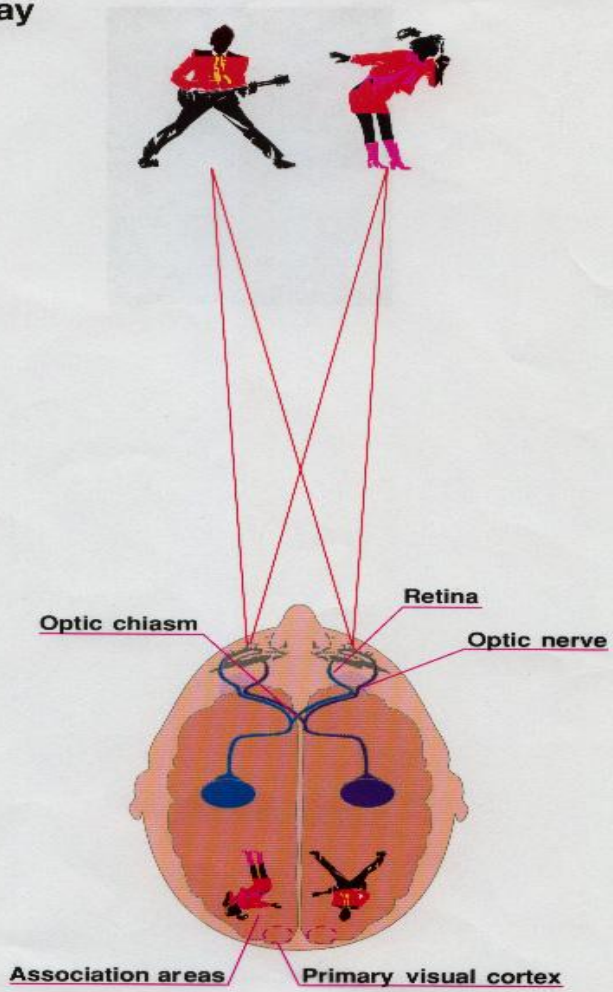
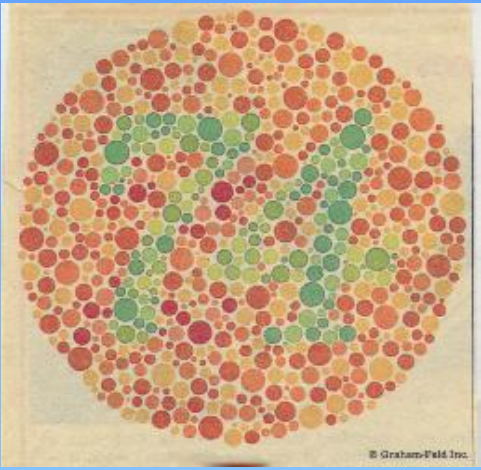
Visual Pathway



C. Color Blindness

- 1. **Monochromats-** see only black and white
- 2. **Dichromats-** difficulty distinguishing red from green- usually found in males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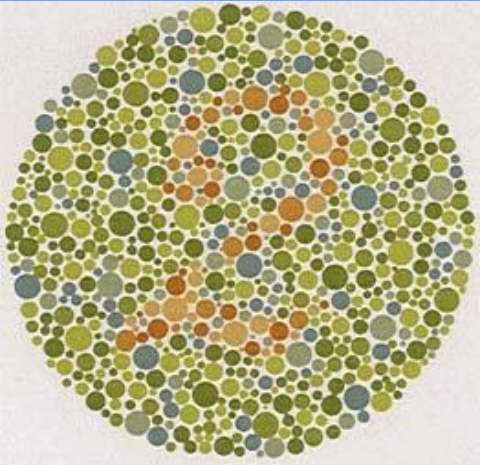
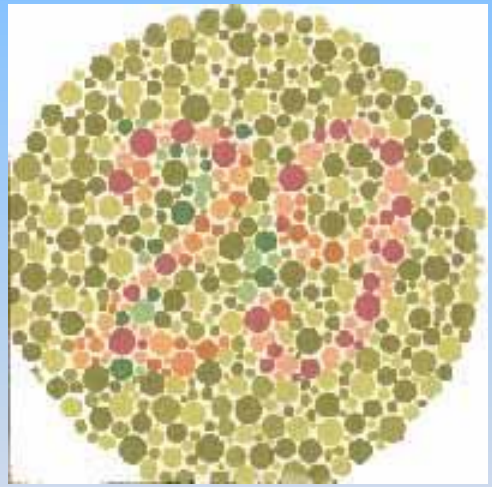
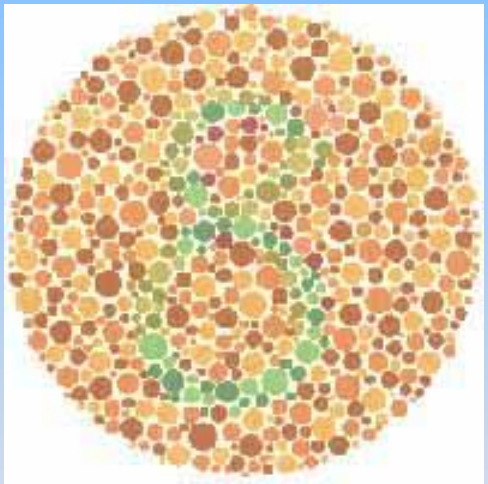


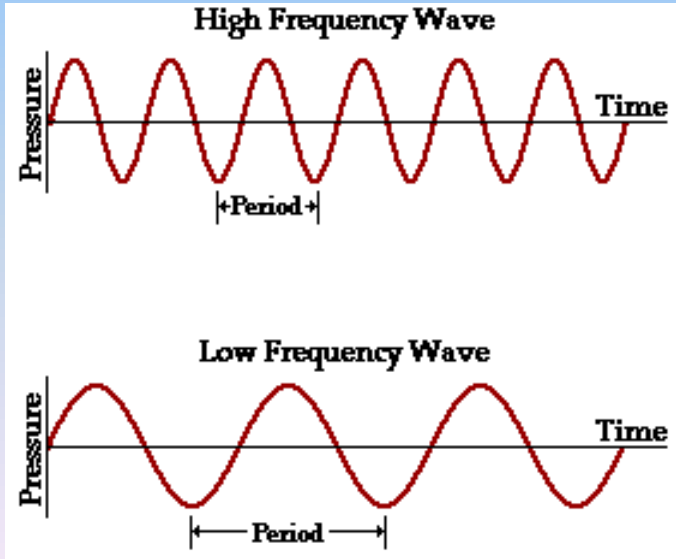




II Ear/Audition

A. Sound

- 1. **Sound waves-** ripple of sound/ height of the wave is **amplitude**/ speed- number of waves in one second is **frequency**



Sound

- 2. **Loudness-** amplitude or sound intensity
- 3. **Pitch-** frequency of sound waves
- 4. **Decibel-** unit to measure loudness/ 0-140

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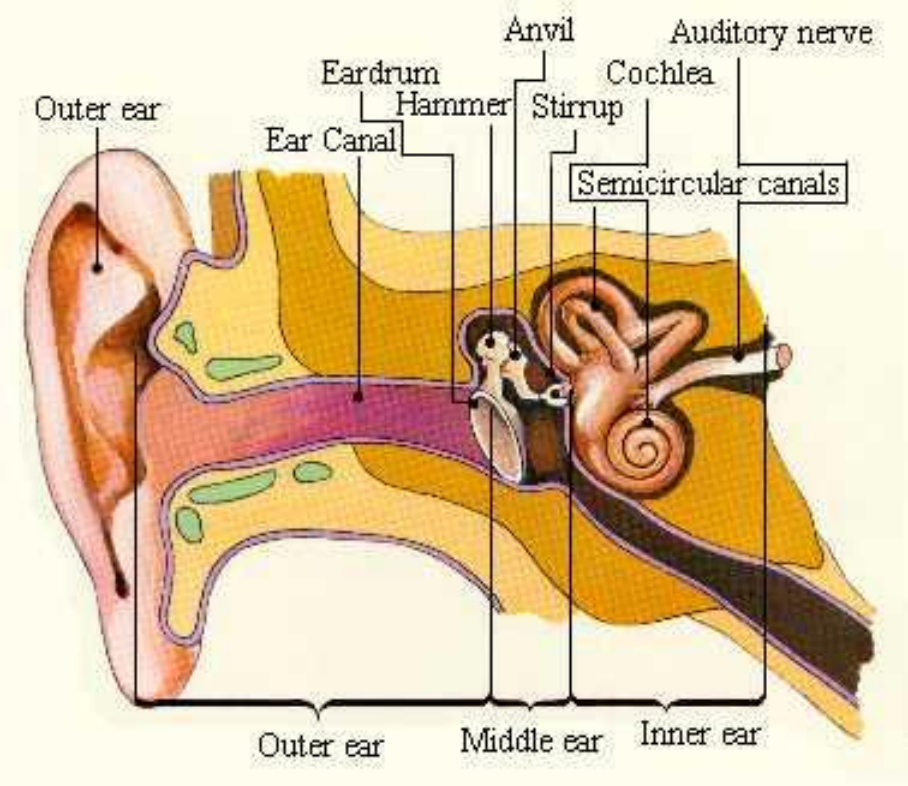
Decibel Levels

Decibel level	Examples of sounds at representative decibel levels	Exposure time to produce permanent hearing loss
140	Jet engine	Any exposure is dangerous
120	Rock concert near speakers, thunderclap	Immediate danger
100	Chain saw, jackhammer	Two hours
80	Subway, heavy city traffic, alarm clock at 2 feet	More than 8 hours
60	Conversation, air conditioner at 20 feet	
30	Whisper, quiet library	
0	Threshold of hearing	

B. Parts of the Ear/Hearing Process



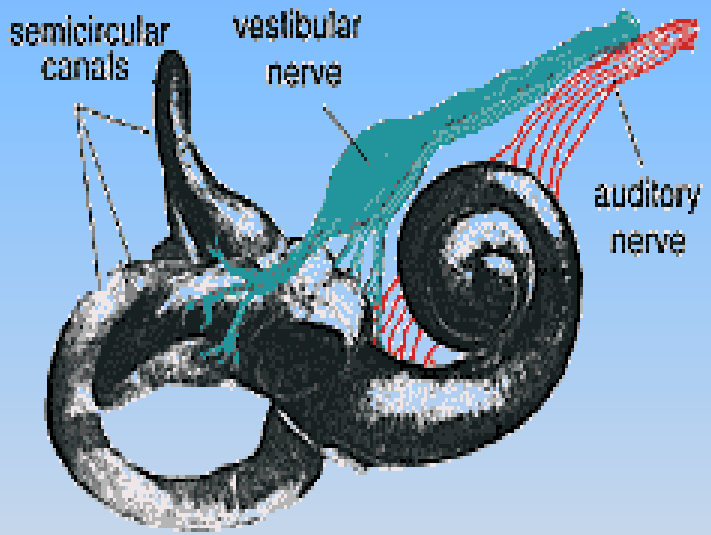
- 1. **Outer ear-** shaped to gather sound waves
- 2. **Middle ear-** picks up and increases or amplifies vibrations
- 3. **Inner ear-** contains the Cochlea and the Vestibular System

C. Pathway to the Brain/Cochlea

- 1. **Cochlea-** contains receptors for hearing/ transforming vibrations into nerve impulses sent to the brain for processing

- 2. **Auditory nerve-** carries impulses to the **Temporal Lobe-** primary auditory cortex- auditory association area

D. Vestibular System



Vestibular System

- 1. **Vestibular system** – filled with fluid that moves in response to movement of the head/ keeps head upright and maintains balance

Vestibular System

2. **Motion sickness** – caused by mismatch between vestibular system and visual information

Vestibular System

- 3. **Vertigo** – caused by a blow to the head or infections

III Chemical Senses

A. Olfaction / Smell

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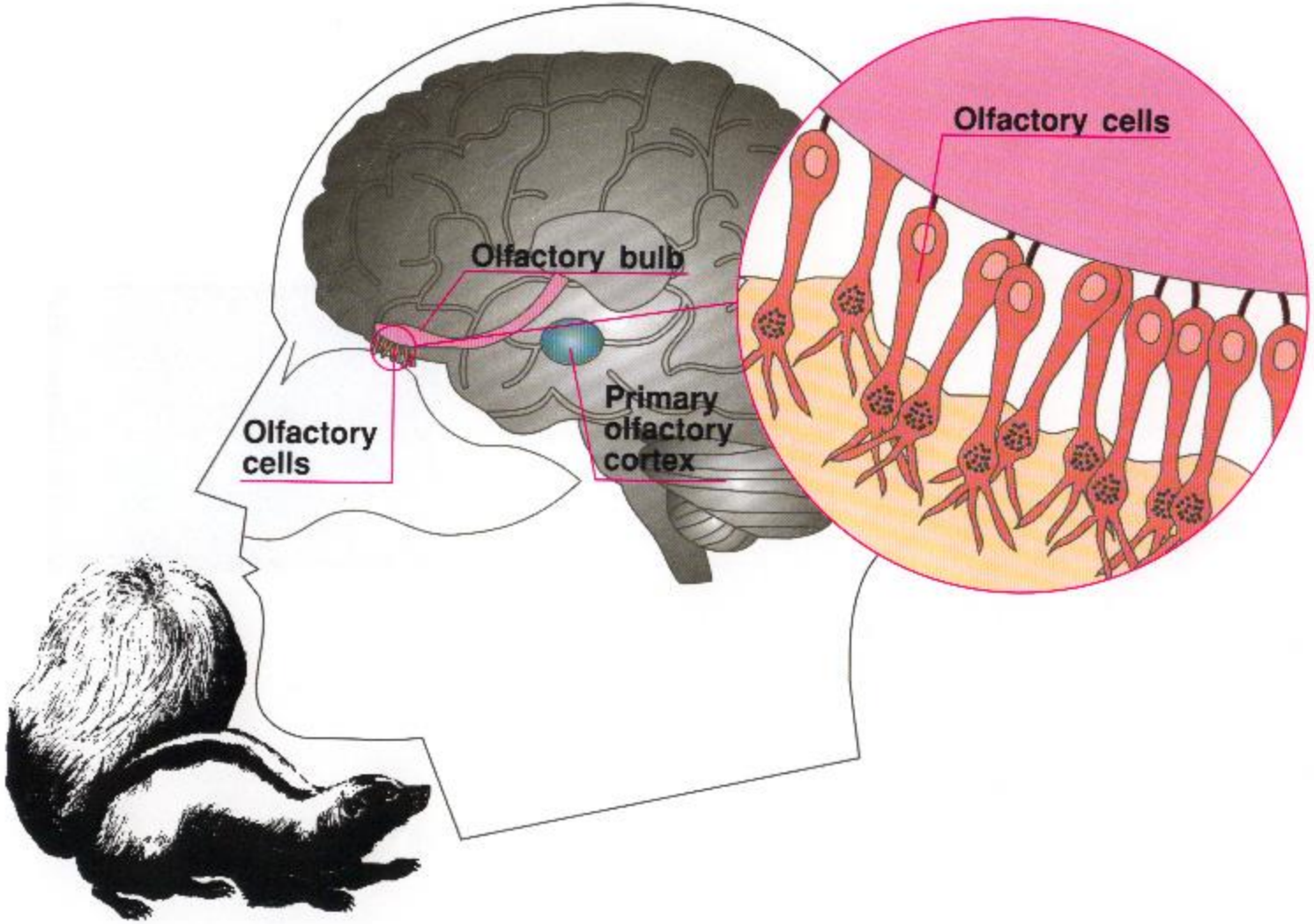
Smell

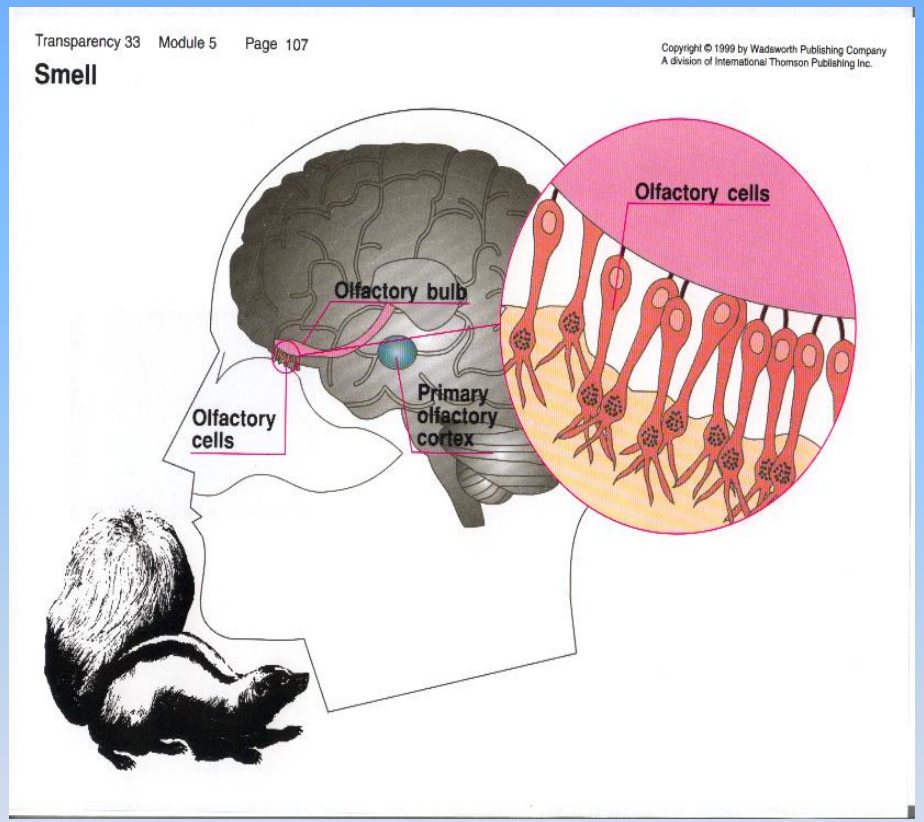


Olfaction

- 1. Stimuli are chemicals carried in the air **(volatile substances)** nose has millions of receptors

Olfaction

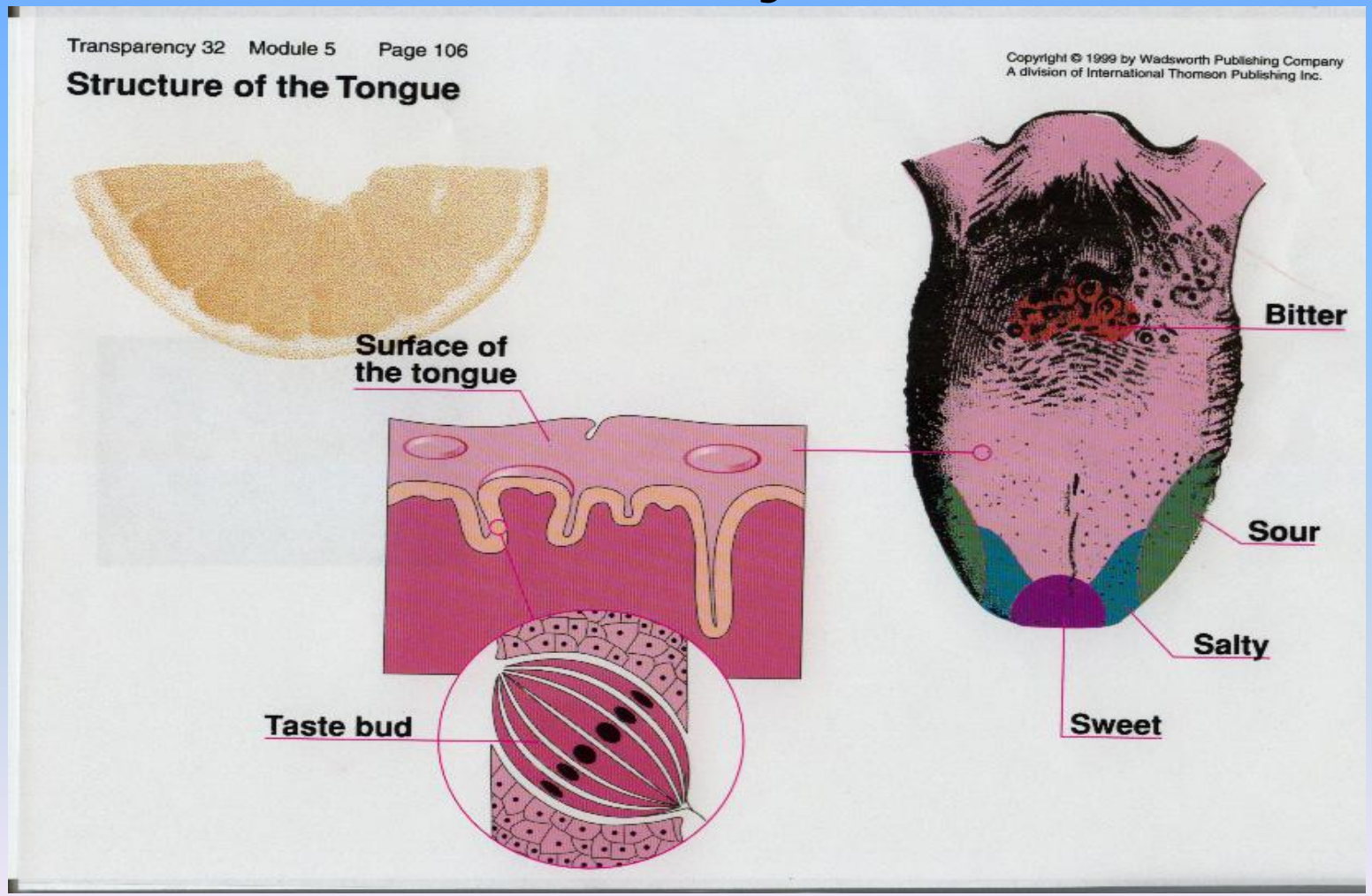
- 2. **Primary Olfactory Cortex** –located underneath brain – transforms impulses into sensations



Olfaction

- 3. **Functions of olfaction**
- - intensifies the taste of food
- - warning of dangerous foods
- - memory association

B. Gustatory /Taste

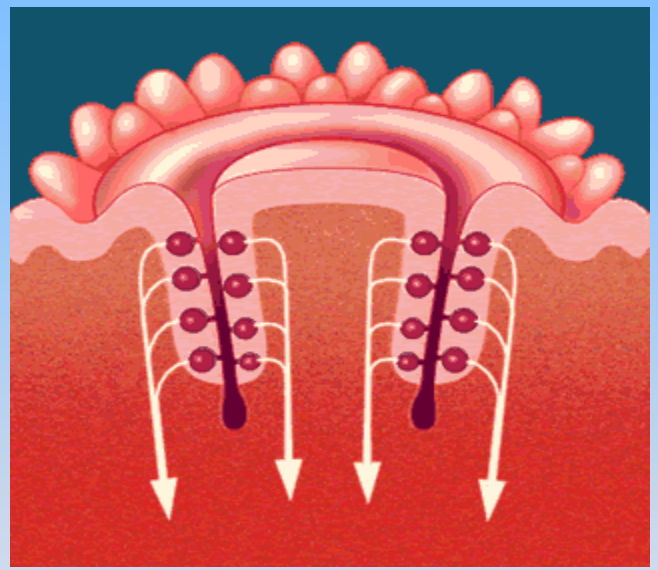


Gustatory

- 1. Stimuli are chemicals – sweet, salty, sour or bitter- transduction into nerve impulses

Gustatory

- 2. **Taste buds-** inside trenches of the tongue – several hundred
- 3. **Flavor** – combines taste and smell to distinguish between sour or sweet substances



IV Touch and Pain

- 1. Touch – includes temperature, pressure, and pain – hair receptors in skin can adapt quickly or slowly to new sensations – impulses travel up the spinal cord to the Somatosensory Cortex

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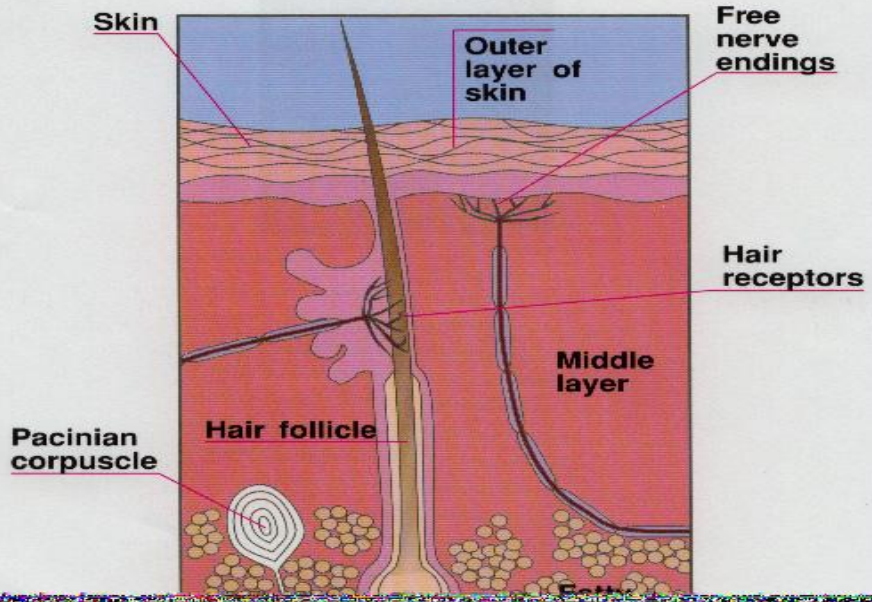
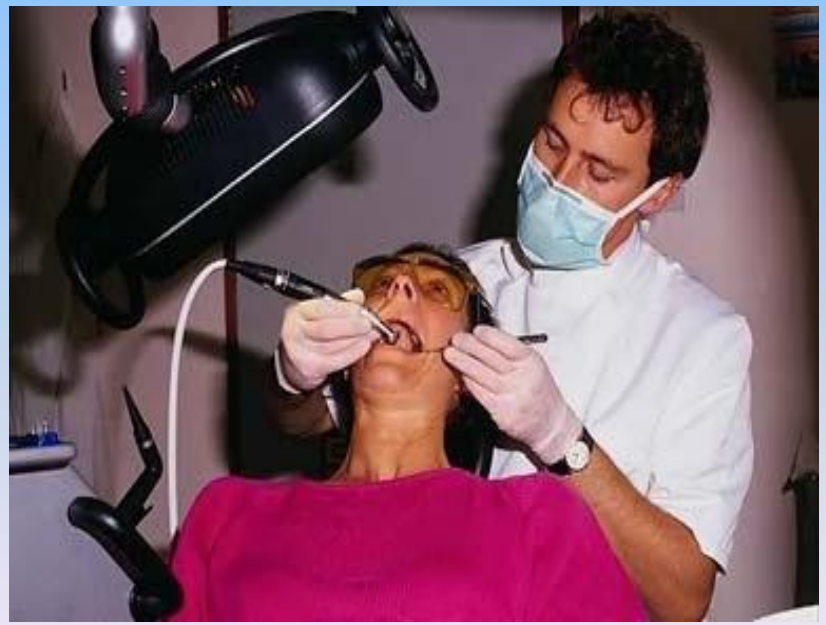
Sense of Touch



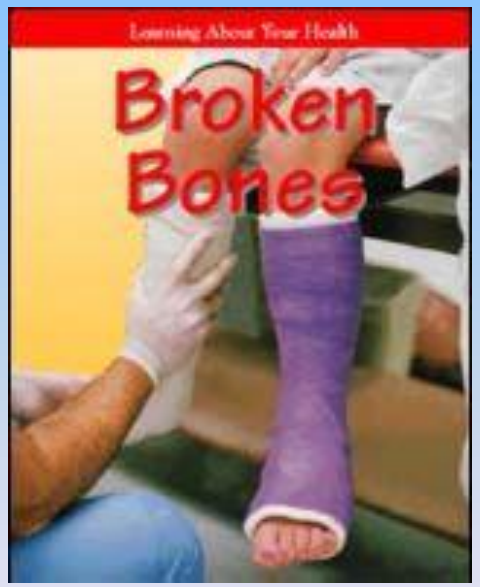
Touch and Pain

- 2 . **Pain** results from many different stimuli – intensity of physical stimulus and psychological factors



Touch and Pain

- **Acute pain** – short acting -intense



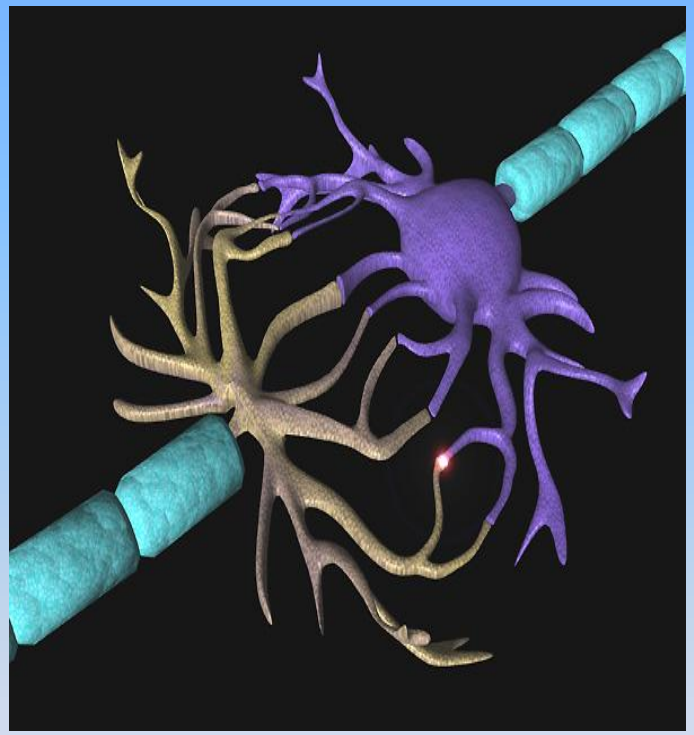
- **Chronic pain** – long acting - troublesome

Touch and Pain

- **Gate Control Theory-** competition between painful and non-painful impulses reaching the brain – pain appears to go away – comes back with less stimulation

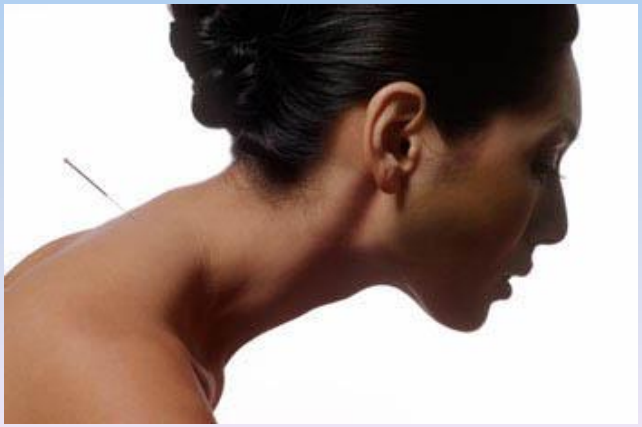
Touch and Pain

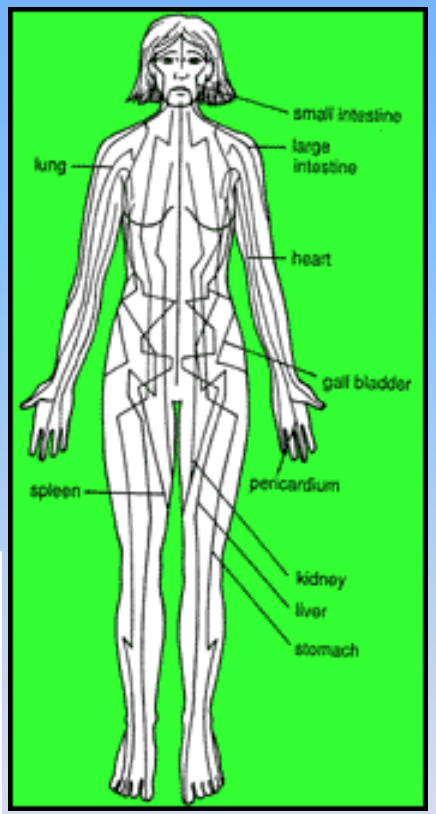
- **Endorphins** – neurotransmitters produced by the brain as an immediate response to fear, anxiety, stress or injury



Touch and Pain

- **Acupuncture-** needle insertions –unrelated to “source” of pain – pathways that conduct pain – causes secretion of endorphins





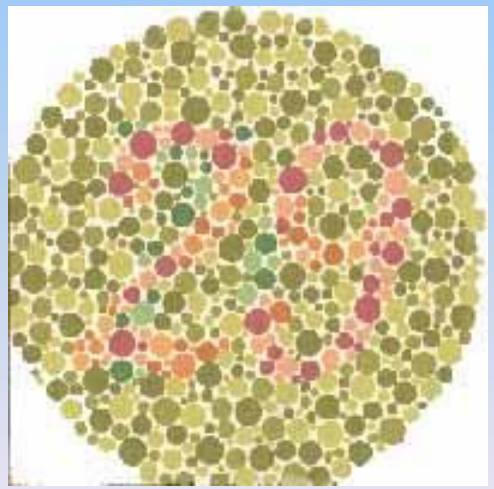
Rules of Organization

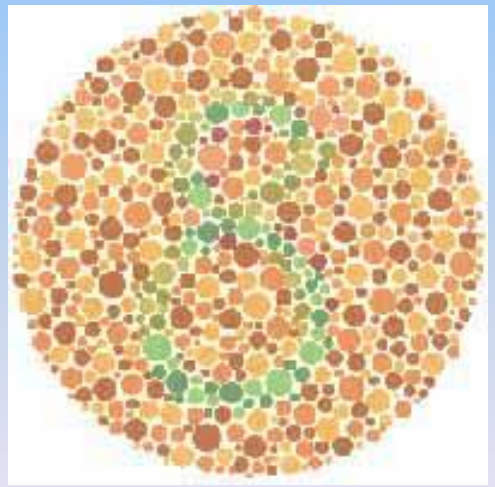
Figure - Ground

- **Automatically distinguish between figure and background – figure has more detail**

Similarity

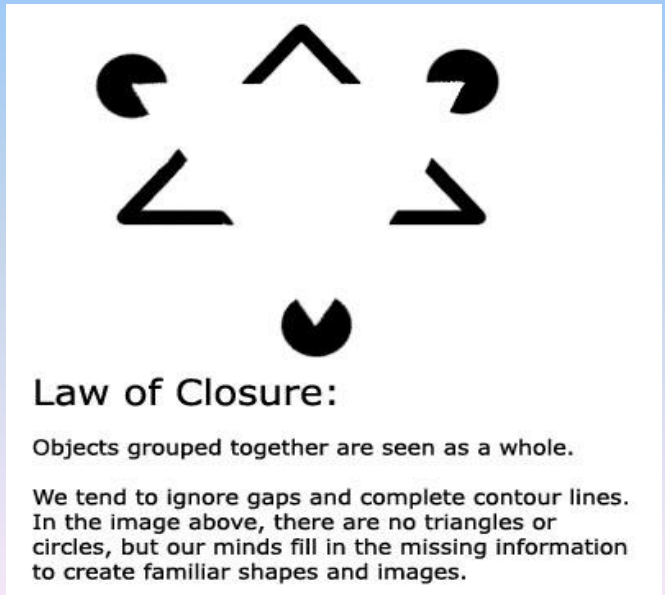
- **Person groups elements that are similar together**





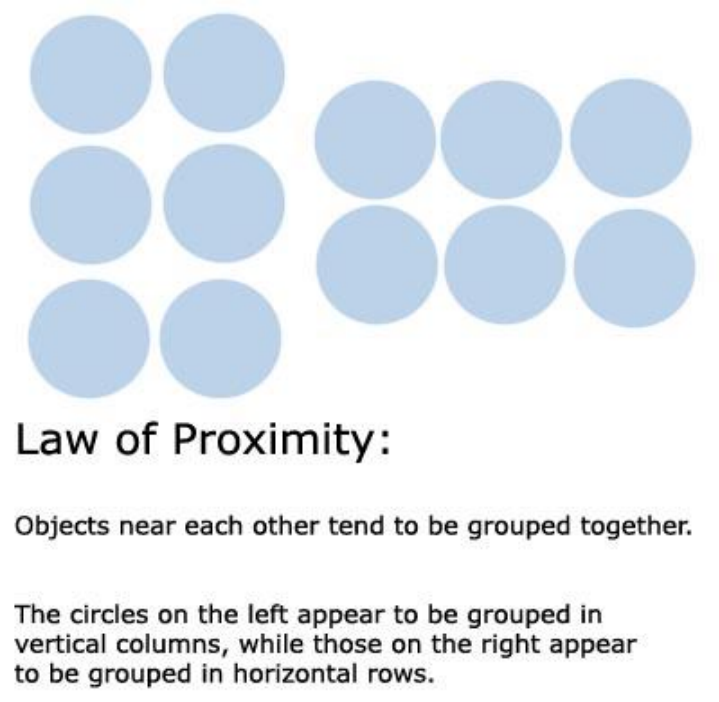
Closure

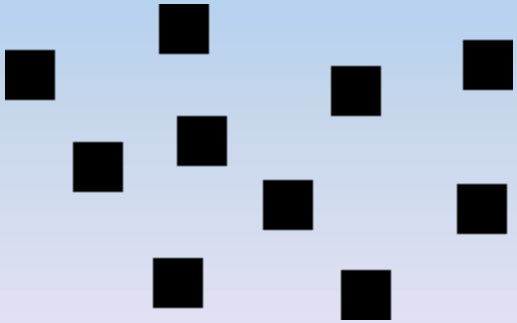
- **Automatically fill in parts (dot-to-dot, missing letters on a sign)**



Proximity

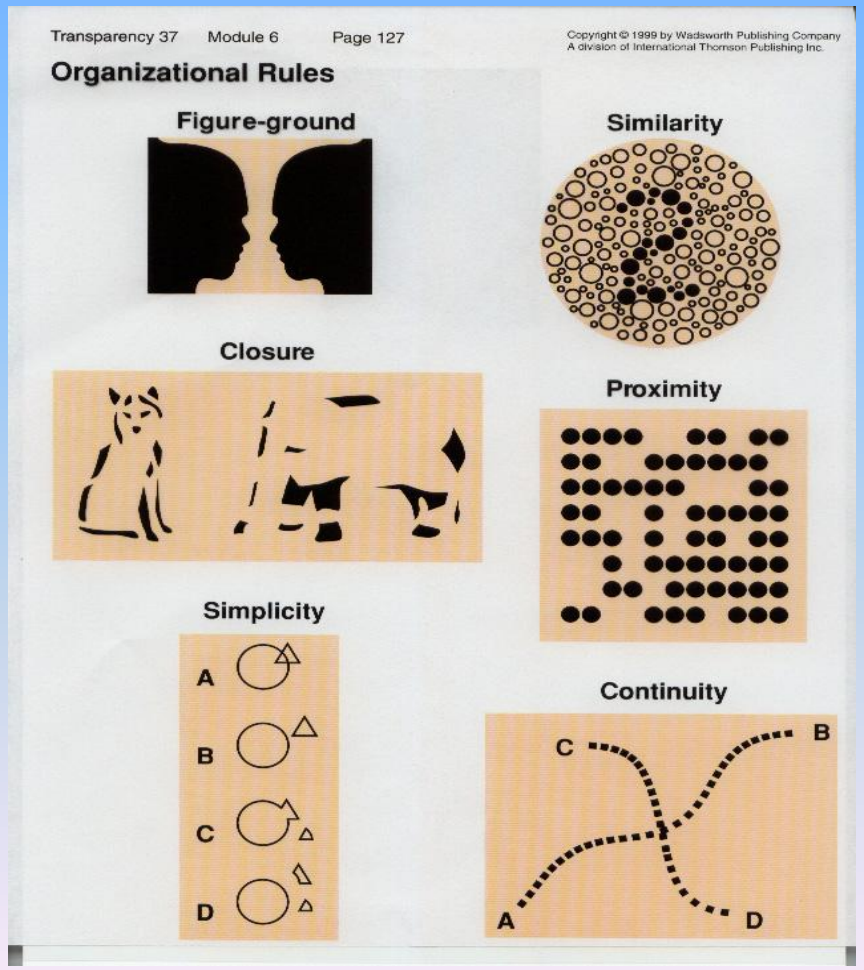
- **Objects that are physically close to one another are groups together**





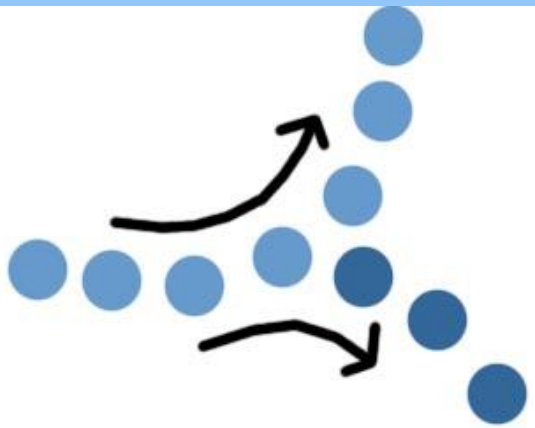
Simplicity

- **Stimuli are organized in the simplest way**



Continuity

- **Person tends to favor smooth or continuous paths when interpreting points or lines**



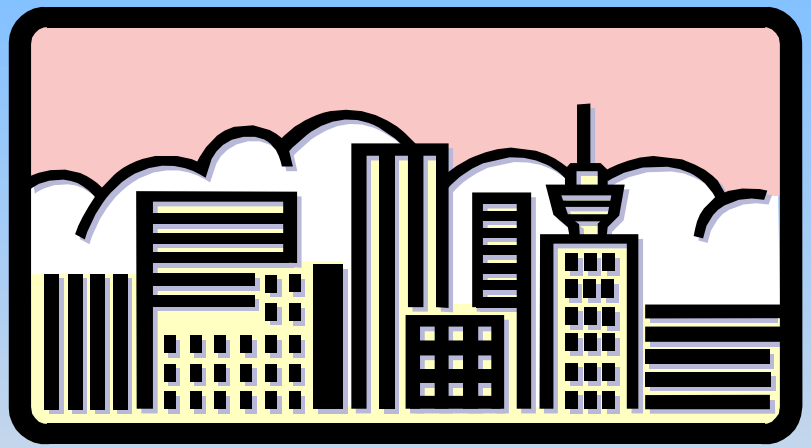
Law of Continuity:

Lines are seen as following the smoothest path.

In the image above, the top branch is seen as continuing the first segment of the line. This allows us to see things as flowing smoothly without breaking lines up into multiple parts.

Perpetual Constancy

- Perpetual constancy- tendency to perceive sizes, shapes, brightness, and colors as remaining the same even when their physical characteristics change.



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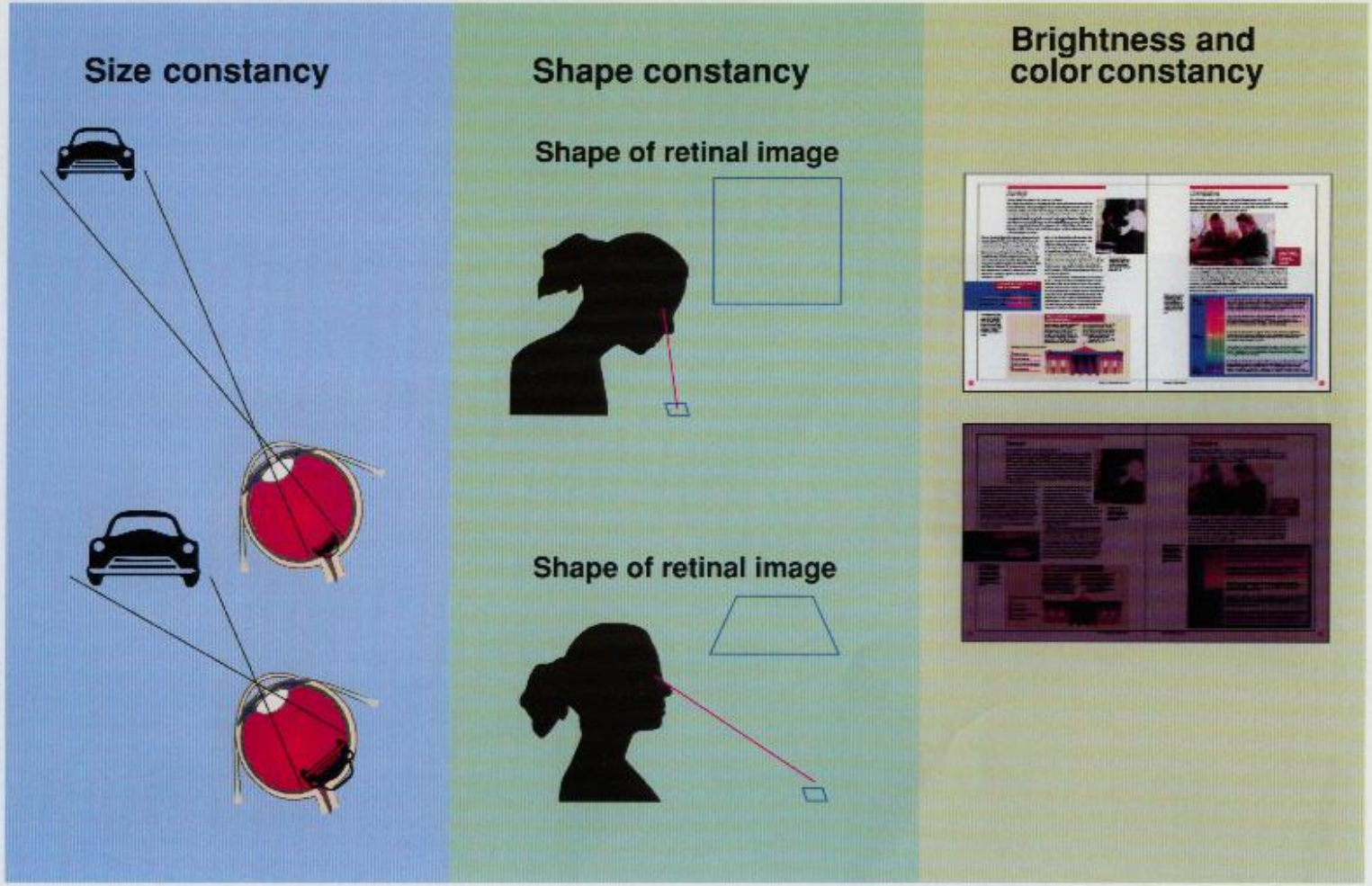
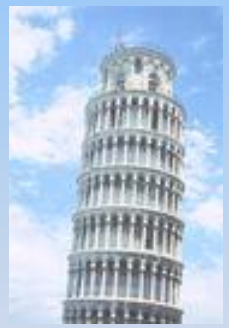
Perceptual Constancies: Size, Shape, Brightness, and Color



Constancy

- A. Size constancy- objects remain the same size even when their images grow or shrink (people and objects become smaller as they move away and bigger as they move closer- we know the object is still the same size).



Constancy

- B. Shape constancy- objects retain their original shape even when viewed from different angles (once a circle always a circle, once a square always a square)

Constancy

- C. Brightness and color constancy- brightness and color of an object remain the same even in lighting differences- if light is too dim, we lose color vision.

-

Depth Perception

Ability of the eyes and brain to add a third dimension to objects

Binocular Depth

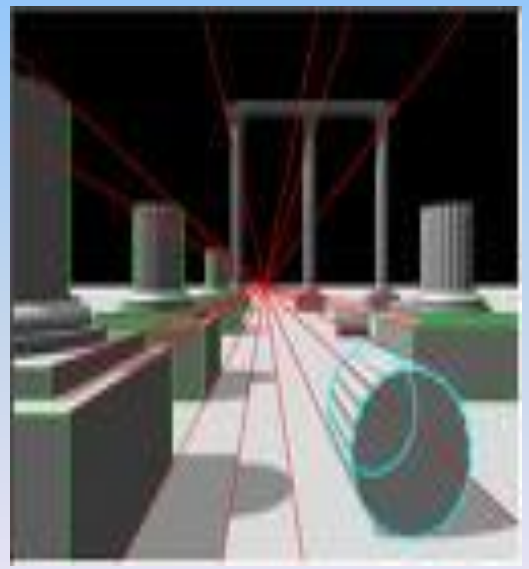
- **Convergence – focus on a near object the eyes turn inward**
- **Retinal Disparity – each eye has its own perspective / the difference between the two eyes is retinal disparity**

Monocular Depth Cues

Produced by signals from a single eye / the way objects are arranged in our environment

Linear Perspective

- **Parallel lines come together, or converge in the distance**



Relative Size

- **The larger of two objects will appear closer and the smaller will appear farther away**

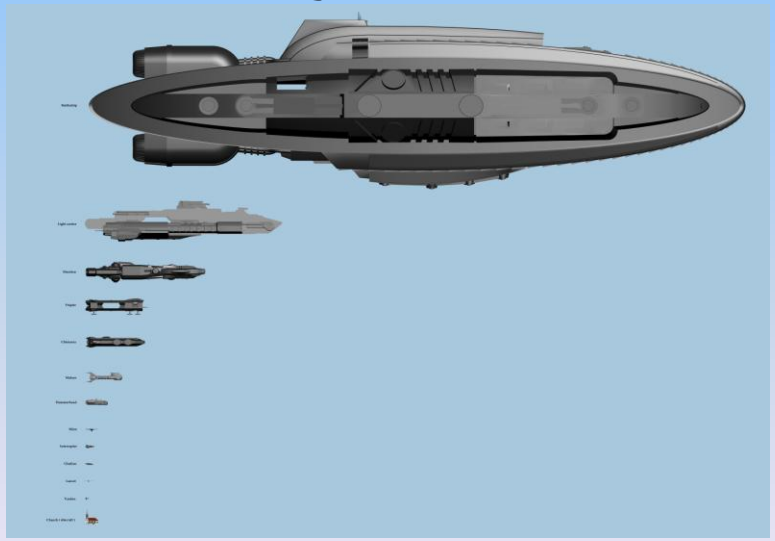
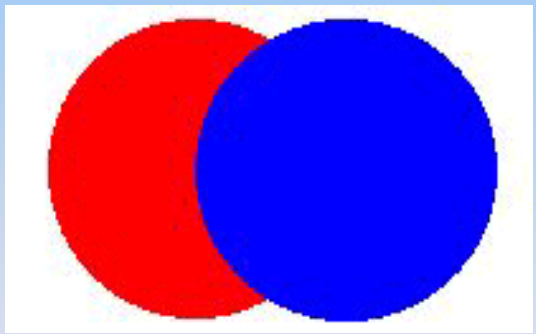
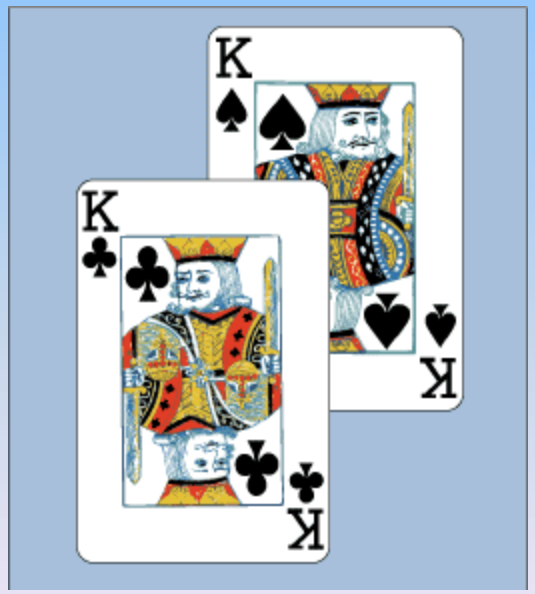


Figure 1. Relative size. A retinal image of a small car is considered to be distant.

Interposition

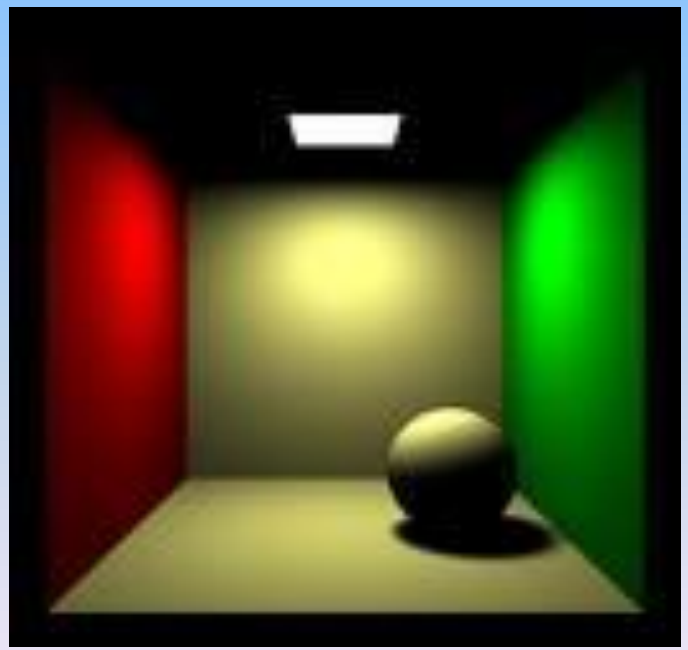
- **Overlapping object appears closer and the object that is overlapped appears farther away**





Light and Shadow

- **Brightly lit objects appear closer, while objects in shadows appear farther away**



Texture Gradient

- **Areas of detailed texture are interpreted as being closer and those with less detail are interpreted as more distant**

Atmospheric Perspective

- **Clearer objects are perceived as nearer and hazy or cloudy objects appear farther away**

Motion Parallax

- **Objects that appear to be moving at high speed are closer than those moving slowly or appearing stationary**

Extrasensory Perception

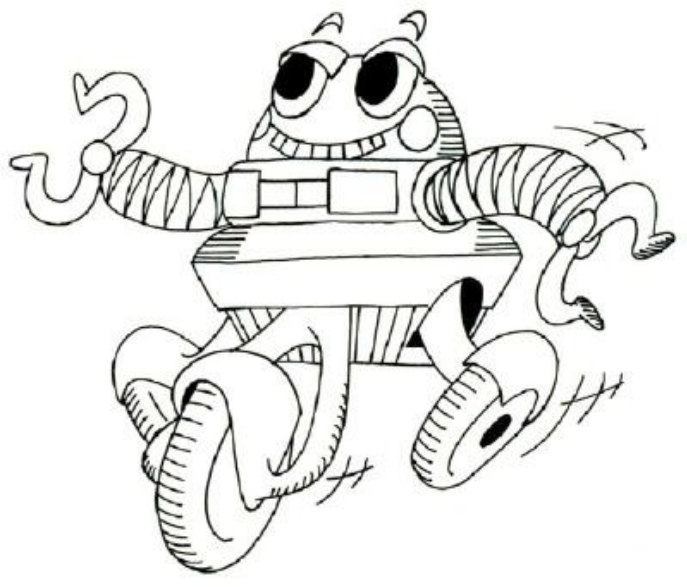
- **Telepathy – ability to read the minds of others**
- **Clairvoyance – ability to perceive events that are out of sight**
- **Precognition – ability to foretell the future**
- **Psychokinesis - ability to move objects**

Creating Movement

- **Phi Movement – Illusion that stationary lights are moving because they are flashing**

Creating Movement

- **Real Motion – object moving in space**
- **Apparent motion – Rapid motion of stationary objects (cartoons)**



Creating Movement

- **Virtual Reality – computer generated illusion**