General Psychology
Psy 100

Sensation

What We Will Cover in This Section

- Overview
- Psychophysics
- Sensations
  - Hearing
  - Vision
  - Touch
  - Taste
  - Smell
  - Kinesthetic
- Perception

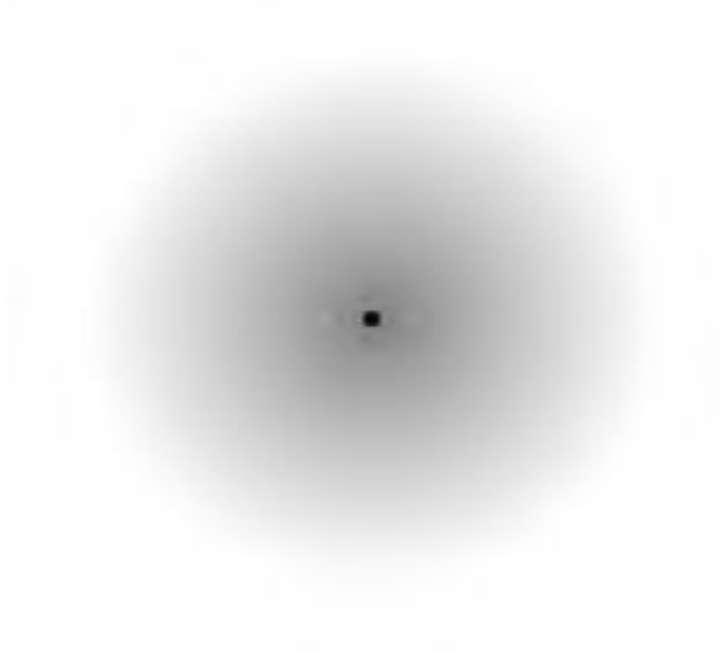
Sensation

The stimulation of a sensory receptor and the transmission of sensor information to the central nervous system.

Sensory Adaptation

Process by which sensory cells lose their power to respond after a period of unchanged stimulation.

Keep staring at the black dot. After a while the gray haze around it will appear to shrink.



Overview: Structuralist Background

- **Wundt (1907)**
  - Sensations and feelings are the elements from which experience and thought are formed.
- **Tichner (1890)**
  - Sensations are the basic aspects of consciousness.
- **Fechner**
  - Developed procedures to relate the intensity of a physical stimulus to the magnitude of psychological experience.

Psychophysics: What is it?

The study of the correspondence between physical stimulation and psychological experience.

How loud should a siren be before we can hear it over traffic noise?

How strong should an odor be in natural gas before we can detect it?

Absolute Threshold

The amount of stimulation necessary for the stimulus to be detected.

The stimulus strength at which a signal (stimulus) is detected half of the time.

Examples of Absolute Threshold

Sense	Detection Threshold
Light	A candle flame at 30 miles on a dark, clear night.
Sound	Tick of a mechanical watch at 20 feet.
Taste	One teaspoon of sugar in 2 gallons of water.
Smell	One drop of perfume in a three bedroom apartment.
Touch	The wing of a bee falling on your cheek from one centimeter.

Difference Threshold

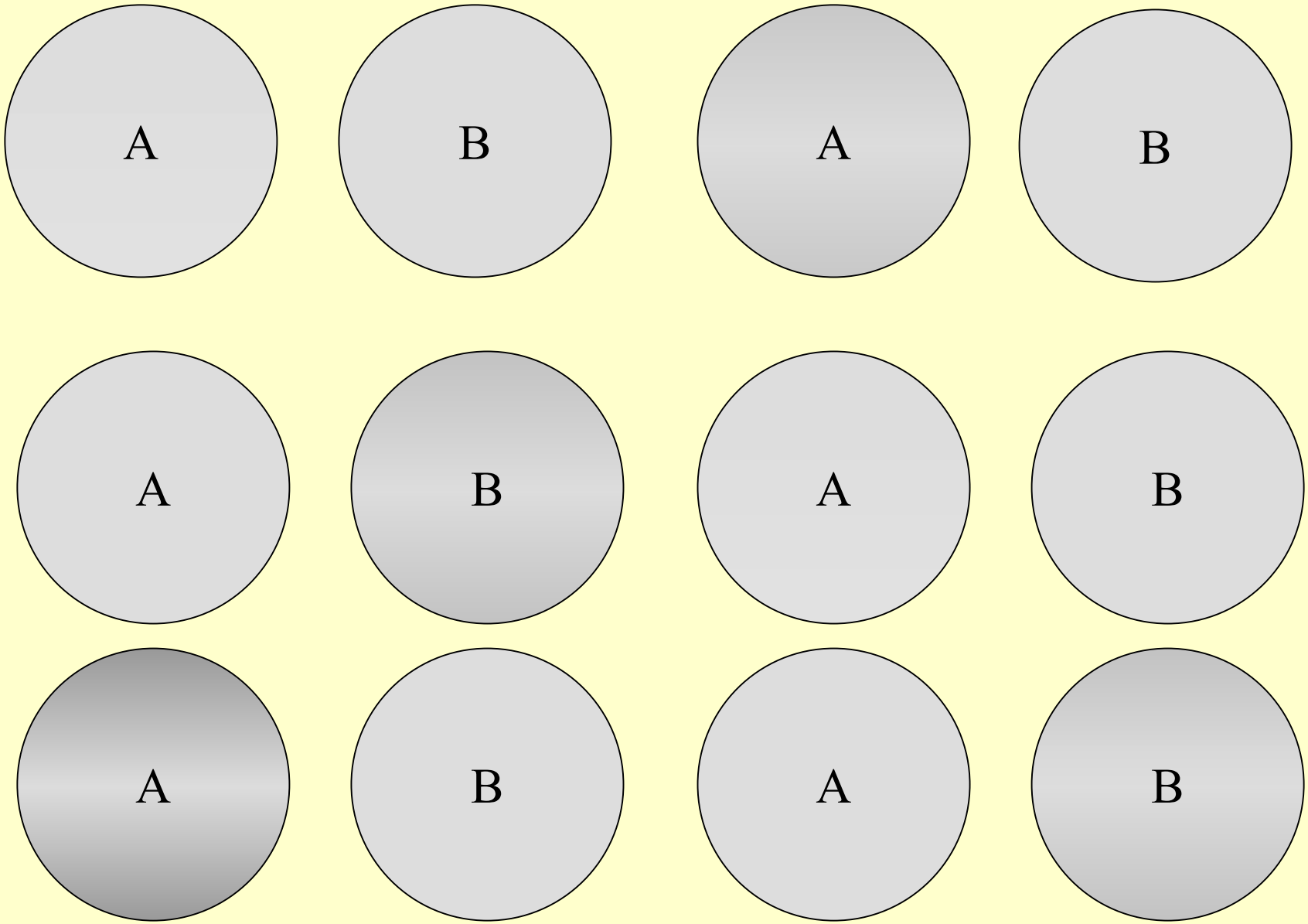
The smallest amount by which a stimulus can be changed and the difference (change) be detected half the time.

Kool Example

Write the following on a page

1. S A B
2. S A B
3. S A B
4. S A B
5. S A B
6. S A B

- **On the next slide I will show a series of six pairs of circles.**
- **Indicate if they are the same shade of gray (S) if A is darker, or if B is darker.**


A
B
A
B
A
B
A
B
A
B
A
B
A
B
A
B

Just Noticeable Difference (JND)

The smallest difference between two sensations that allows them to be sensed as being different.

Weber's Law

The size of a difference threshold is proportional to the intensity of the standard stimulus.

Weber's Constant

Pressure	△ p (.14)	JND pressure
10 oz.	1.4 oz.	11.4 oz.
20 oz.	2.8 oz.	22.8 oz.
50 oz.	7.0 oz.	50.0 oz.
100 oz	14 oz.	114 oz.

Signal Detection Theory

Our perceptual judgment is a combination of the sensation and our decision-making processes.

Another Kool Demonstration

- **Half of you will be group A.**
- **Half of you will be group B.**
- **Group B, please close your eyes.**

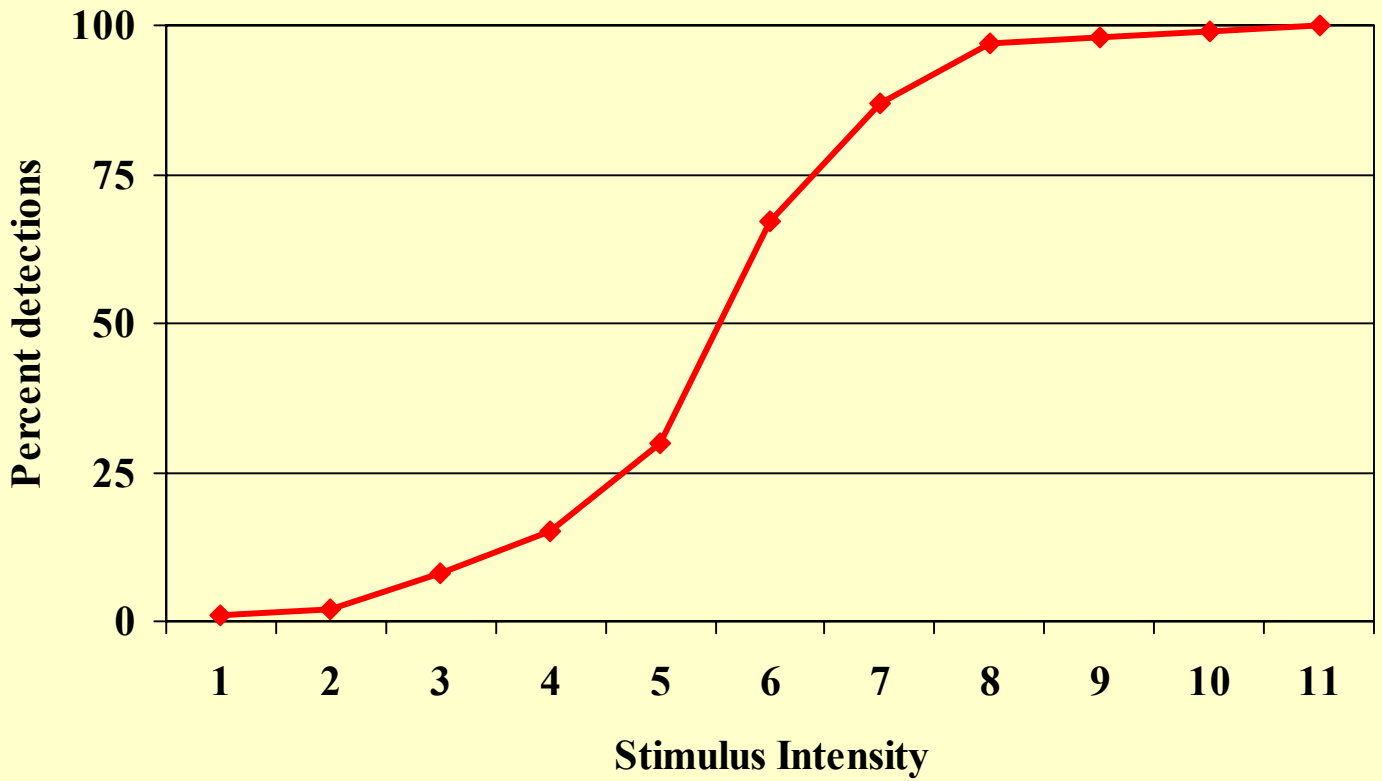
Group A

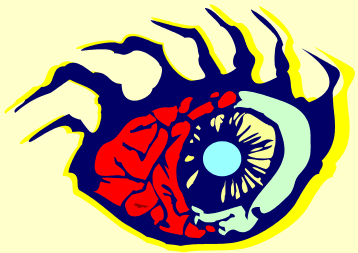
HORSES

Instructions

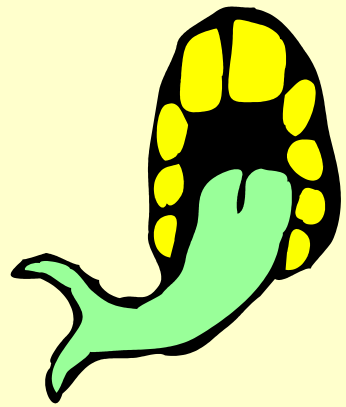
On the next slide I will show a picture. Quickly count the living objects in this picture.

Receiver Operating Characteristic Curve





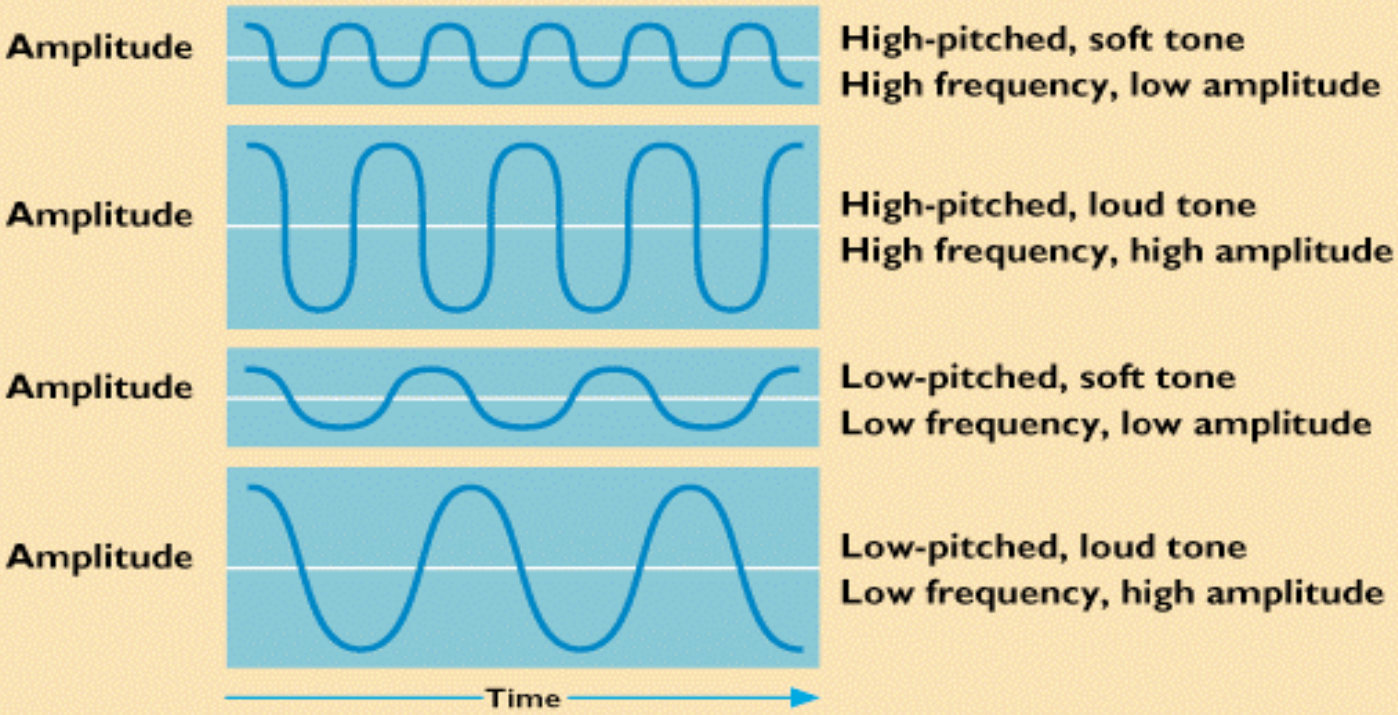
Human Sensing Systems

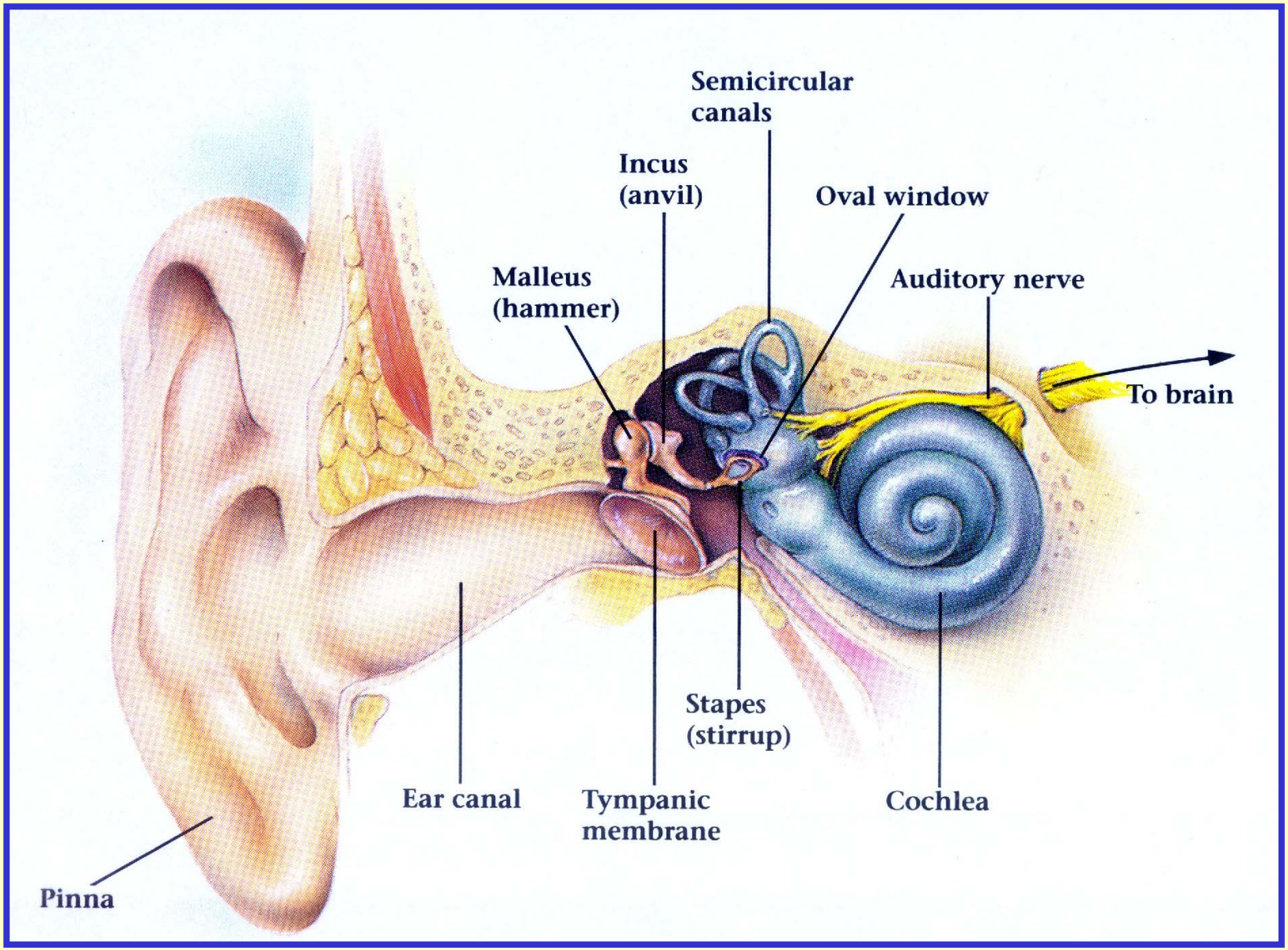


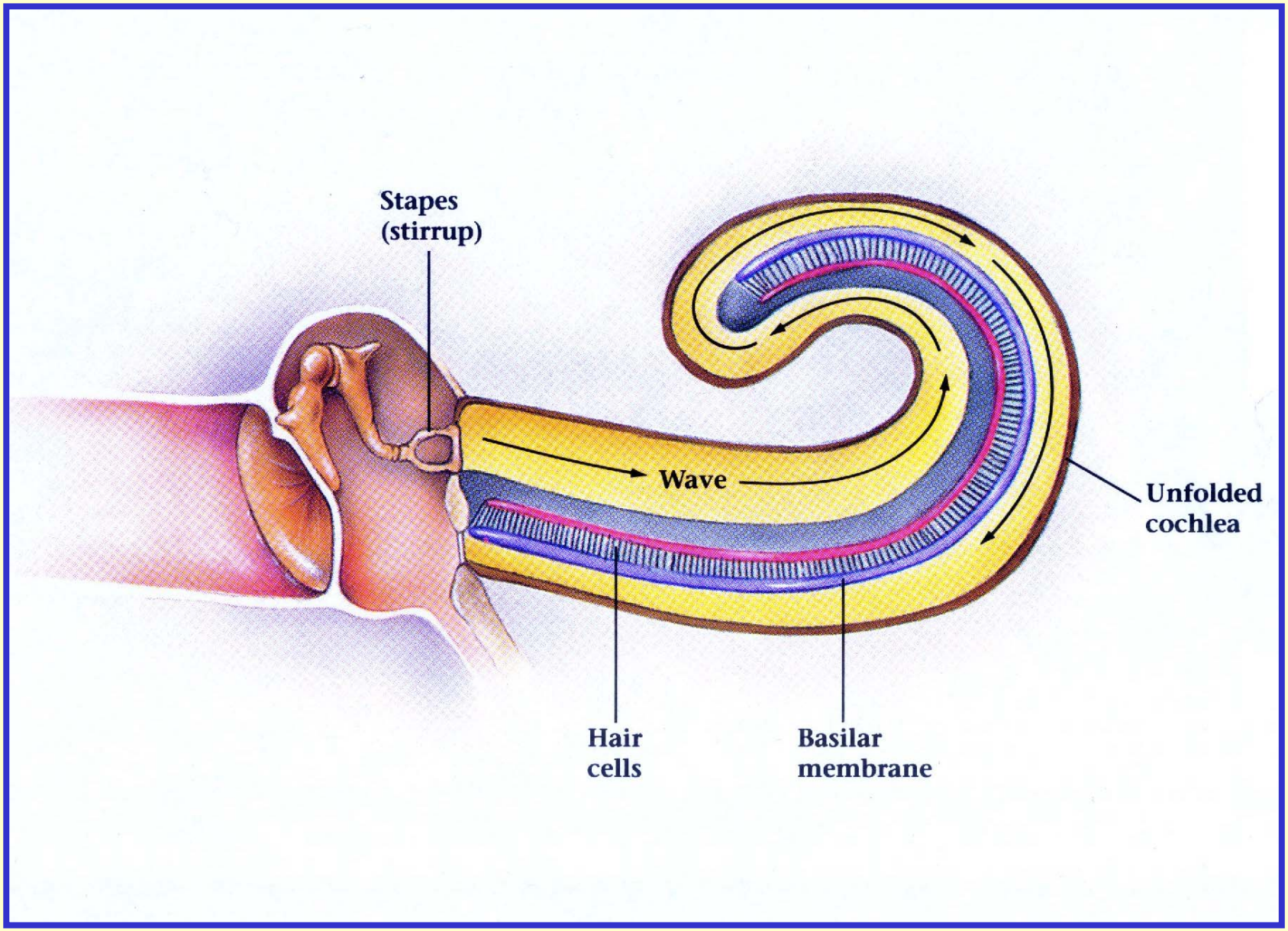
Hearing (Audition)

- **Pitch(Frequency)**
  - **The sensation of highness or lowness, depends on the frequency of the sound wave.**
- **Loudness (Amplitude)**
  - **The 'volume' of the sound; depends on the amplitude of the sound wave.**

Frequency and Amplitude of Sound Waves




Semicircular canals
Incus (anvil)
Oval window
Malleus (hammer)
Auditory nerve
To brain
Stapes (stirrup)
Ear canal
Tympanic membrane
Cochlea
Pinna


Stapes
(stirrup)
Wave
Unfolded
cochlea
Hair
cells
Basilar
membrane

Theories of Hearing #1

- **Place Theory**

  Different places on the basilar membrane give sense of hearing pitch.
  - **OK for high pitch**
  - **Not OK for low pitch**
- **Frequency Theory**

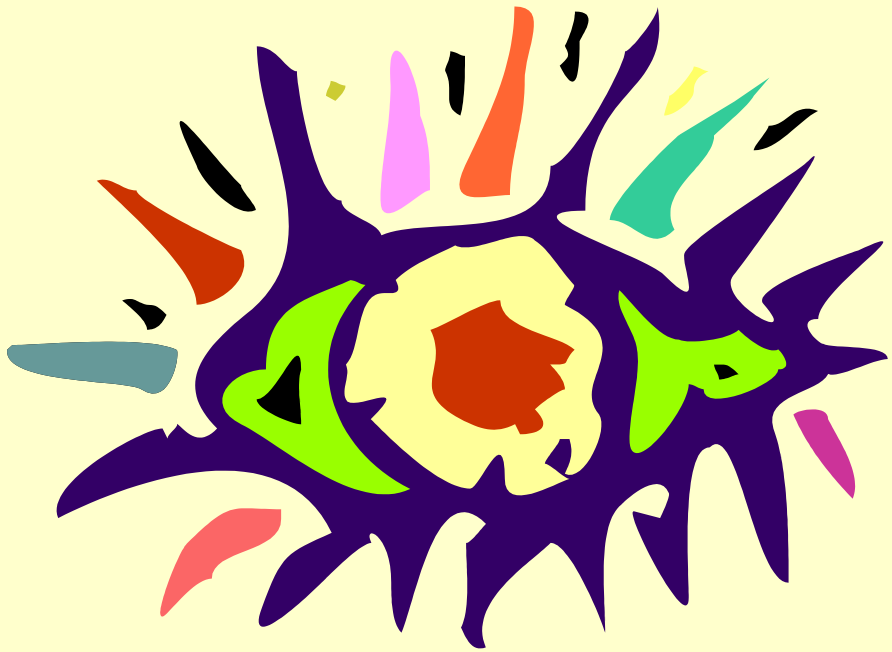
  The whole Basilar Membrane vibrates and these vibrations give the sense of pitch.
  - **OK for low pitch**
  - **Not OK for high pitch**

Theories of Hearing #2

- **Volley Principle**

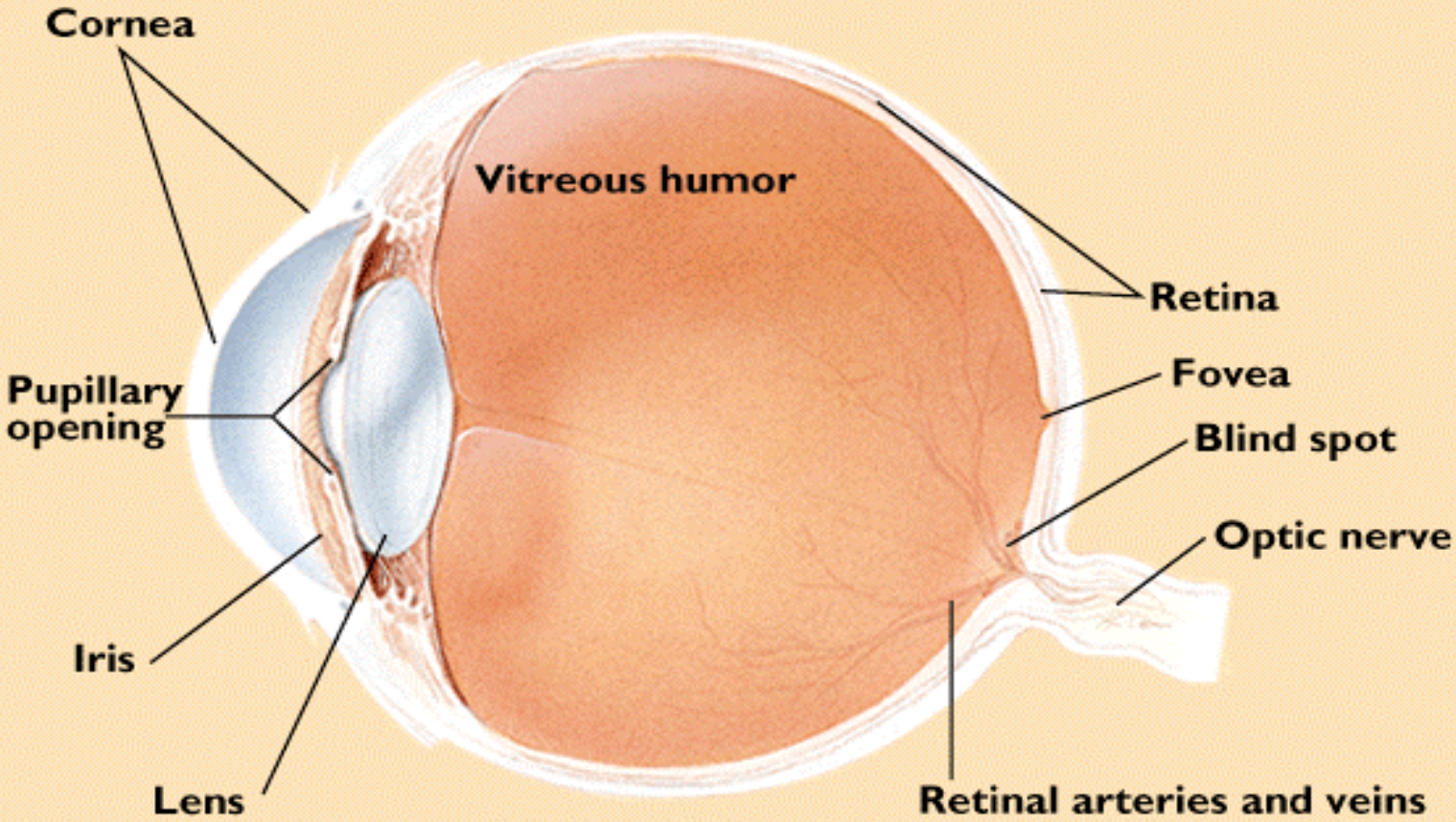
  When peaks in a sound wave come too quickly for a single neuron to fire, several neurons fire as a group at the frequency of the tone.

Vision



A Cross-Section of the Human Eye

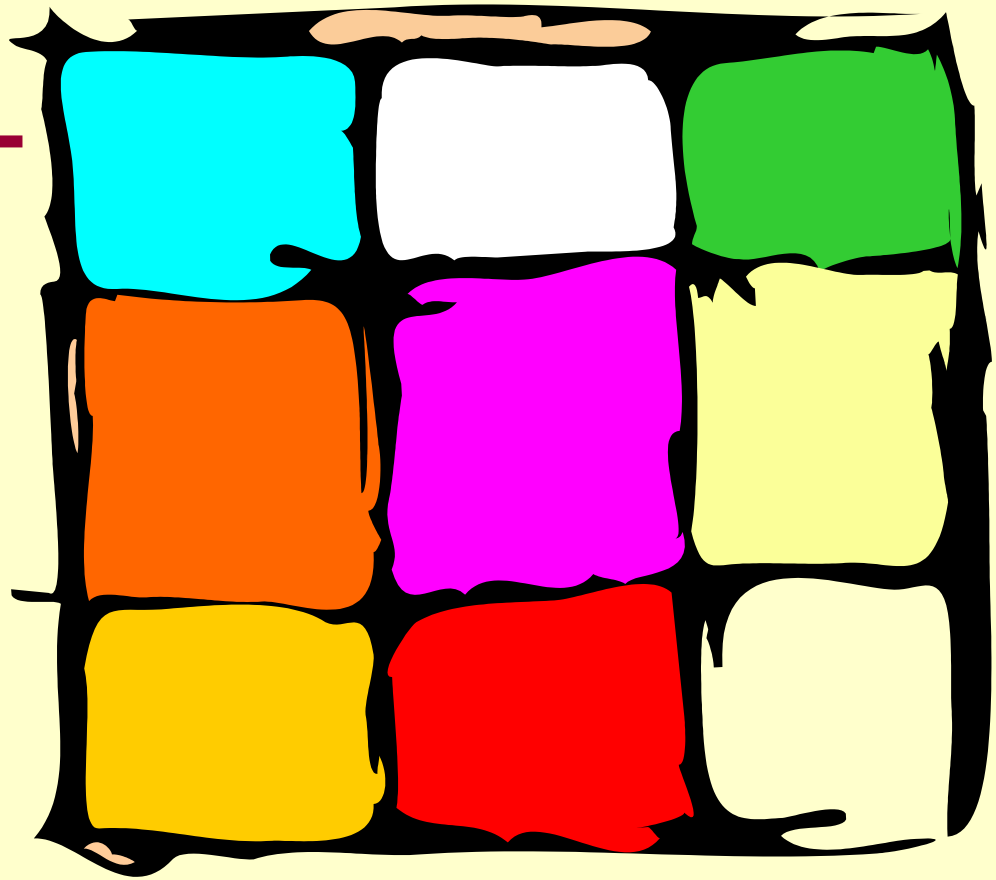
The Major Parts of the Human Eye

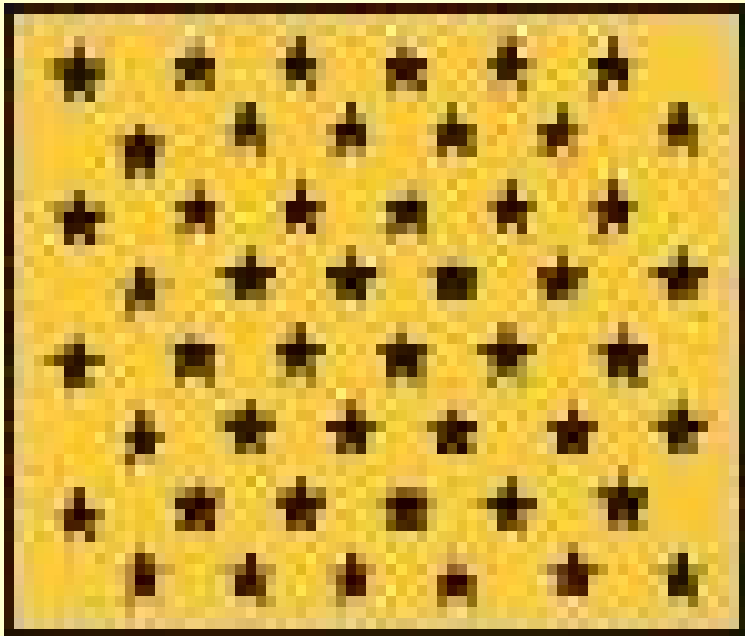


Visual Processes

- **Rods**
  - **Receptors that are located in the edges of the retina that are most active in dim light. They do not produce the sensation of color.**
- **Cones**
  - **Receptors in the central part of the retina that are most active during normal light. They produce the sensation of color.**
- **Dark adaptation**
  - **The improvement of the eye's sensitivity when going from light to darkness.**

Color Vision





Color Vision

- **Trichromatic Theory**
  - **There are three specialized receptors (red, green, blue) to code color.**
- **Opponent Process Theory**
  - **There are three 'systems' each specializes in a pair of colors (opponents) red-green, blue-yellow, black-white.**

Touch

- **Cutaneous senses.**
  - **Skin senses that register sensations of pressure, warmth, and cold.**

Taste

1. Sweet
2. Sour
3. Salt
4. Bitter
5. Umami

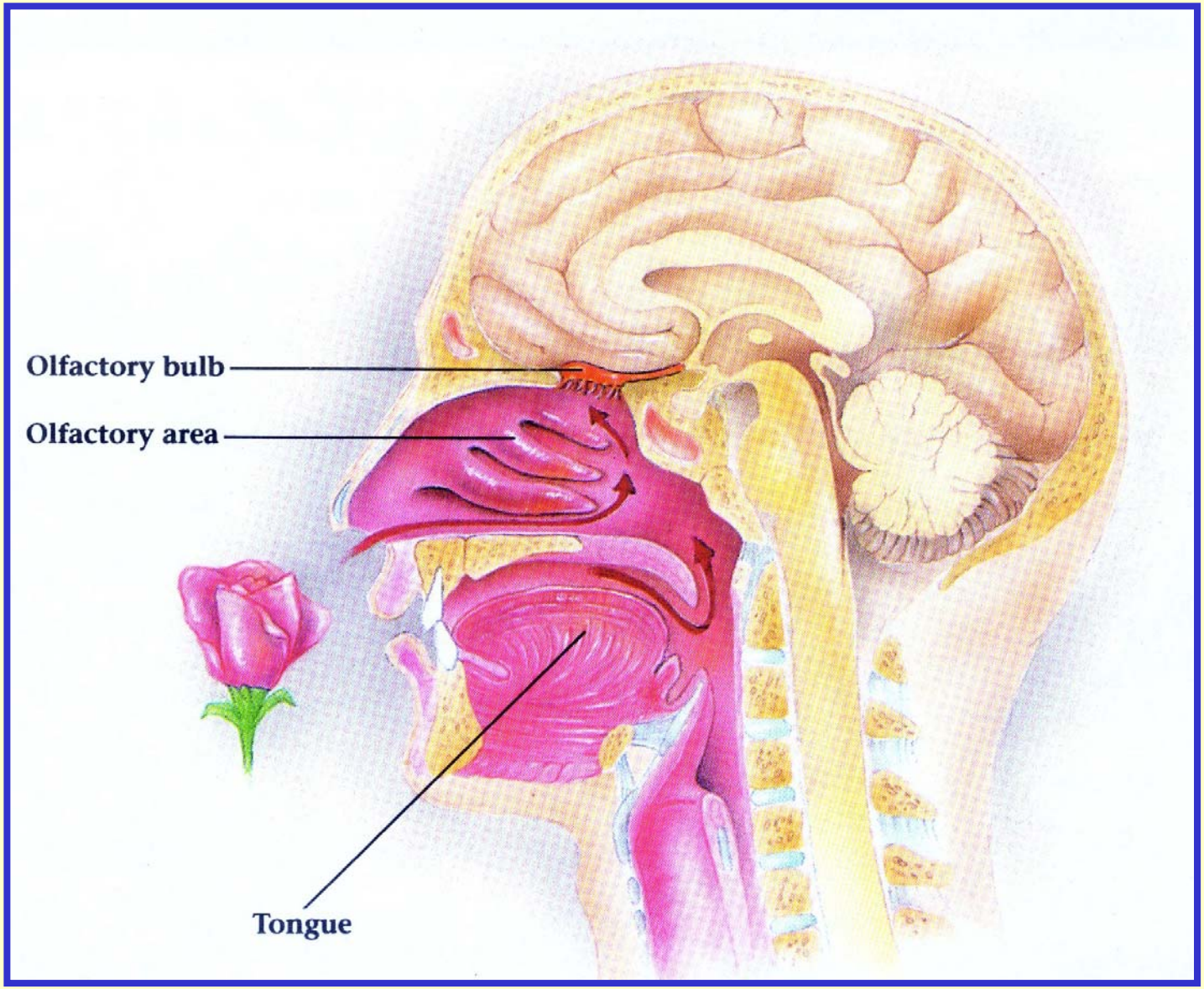
Smell (Olfaction)

- **Olfactory bulb.**

  The center where odor-sensitive receptors send their signals in the brain.

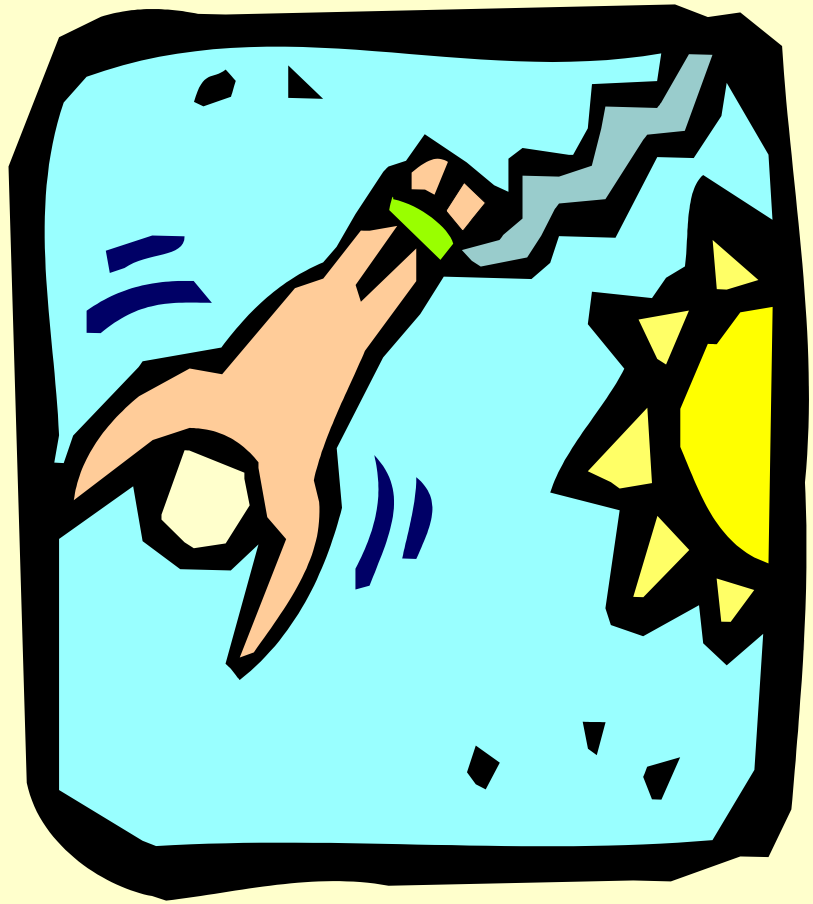
- **Pheremones**

  Chemical signals used to send scent signals to other members of the same species.


Olfactory bulb
Olfactory area
Tongue

Vestibular & Kinesthetic

- **Vestibular**
  - Sense of how your body body is oriented.
- **Kinesthetic**
  - Sense of how your body parts are positioned and movement of body parts.



Pain

The body's response to stimuli that are intense enough to cause tissue damage.

Gate Control Theory

Certain cells in the spinal cord act as gates to interrupt and block some pain signals while sending others to the brain.


The End
Perception