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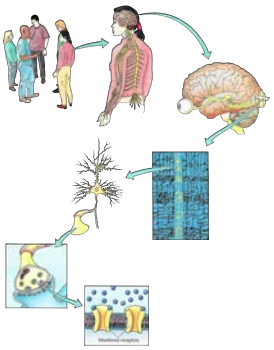
Sensory Enrichment Therapy™
Certification Course

Brain Map - Part 1

The Brain

- Affects every aspect of our lives
- Sensory Enrichment Therapy™ is based on a scientific understanding of how the brain functions



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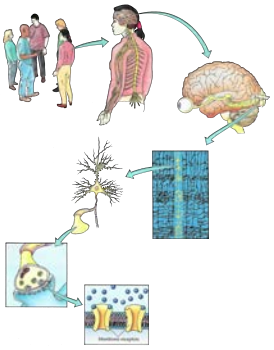
Brain Map

- Role of the brain
- Physiology and function of neurons
- Brain functions
  - Sensory processing
  - Motor skills
  - Feeding
  - Sleep
  - Memory
  - Speech
  - Emotions

Part 1

Part 2



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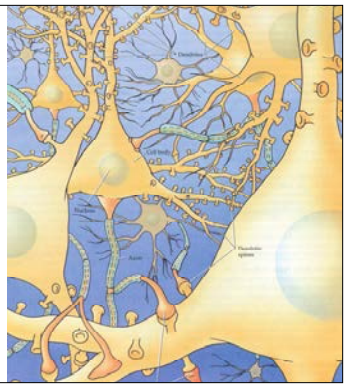
Brain structure



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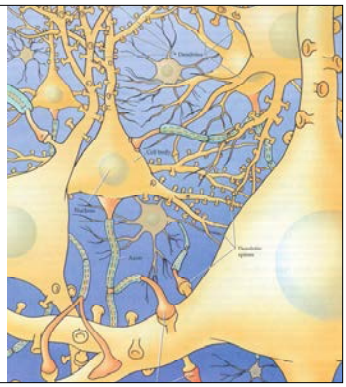
The Brain's key roles

- Protection
- Equilibrium
- Information storage



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Protection

- Protect the body from harm
- Example: Falling

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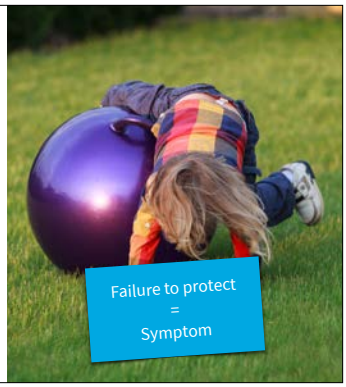
Protection 

- Protect the body from harm
- Example: Falling
  - Take a step forward
  - Bring hands forward
  - Close our eyes



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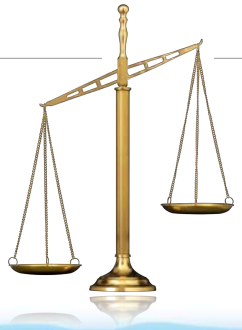
Equilibrium

- Homeostasis maintained for
  - Sugar
  - Fluids
  - Oxygen
  - Nutrients
  - Minerals, etc.



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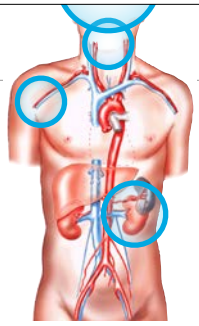
Equilibrium

- Homeostasis maintained for
  - Sugar
  - Fluids
  - Oxygen
  - Nutrients
  - Minerals, etc.

- Dry mouth
- Reprocess urine
- Constrict blood vessels
- Headache



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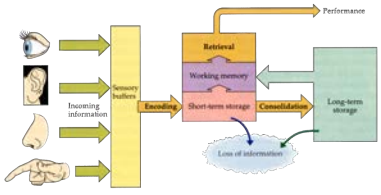
Information storage

- Strong experiences resurface when placed in similar circumstances.
  - A positive memory may inspire us to try to relive the same experience.
  - With a negative memory, we may try to prevent reliving the same experience.



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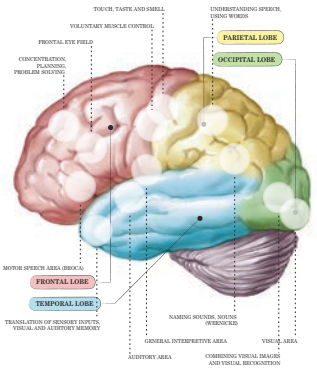
Main parts of the brain



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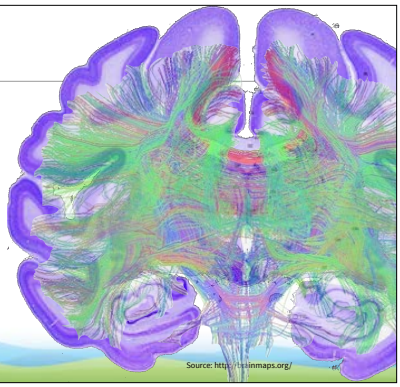
Cerebral cortex

- Layer of nerve cells
- Covers the entire outer surface of the brain
- 100 billion nerve cells
- Each nerve cell may be connected to up to 50,000 other nerve cells



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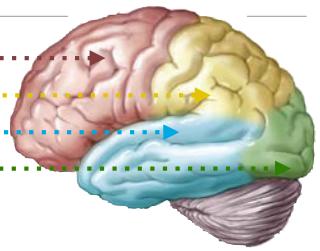
Source: http://brainmaps.org/

Cerebral cortex

- Frontal lobe
- Parietal lobe
- Temporal lobe
- Occipital lobe



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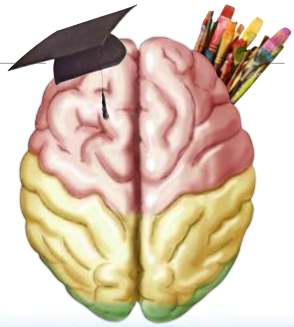
Cerebral cortex

- 2 sides of the brain
- 2 of each lobe
  - Each side can sometimes specialize in different roles
  - Left side is more academic and logical
  - Right side is more artistic and creative
  - Right side of the brain processes the left hand side of the body



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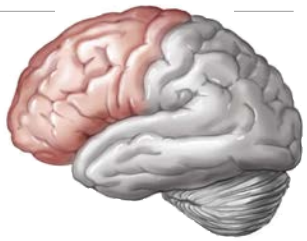
Frontal lobe

- Largest in size
- Highest level of neural evolution and larger in humans than all other species
- Involved in:
  - Personality
  - Emotions
  - Foresight
  - Complex decision-making
  - Voluntary movement
  - Motor speech control



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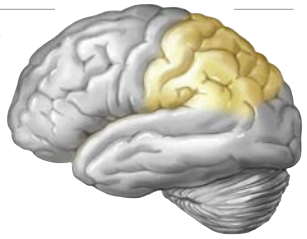
Parietal lobe

- Integrate information from multiple sources
  - Touch
  - Vibration
  - Pain
  - Position
  - Spatial awareness
  - Vision, etc.
- Hand-eye coordination



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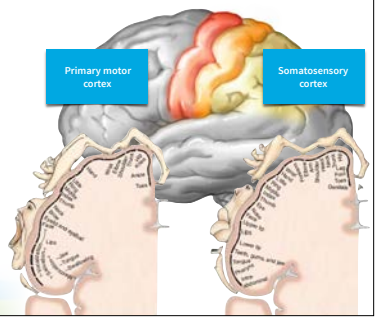
Cortical homunculus



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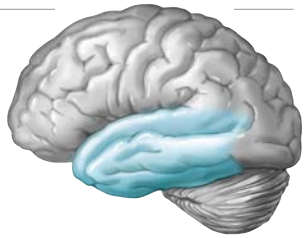
Temporal lobe

- Auditory processing
- Left side: Wernicke's area
  - Interpretation and organization of language
- Right side
  - Processing and interpreting non-speech auditory information, such as music.



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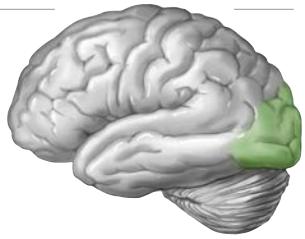
Occipital lobe

- Processing visual inputs
- Coordinating eye movement
  - Shape
  - Color
  - Movement, etc.
- Transmits visual information to the temporal lobe



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Limbic system

- Deep inside the brain
- Sometimes called the visceral brain
- Involved in coordinating:
  - emotional behavior
  - motivational behavior

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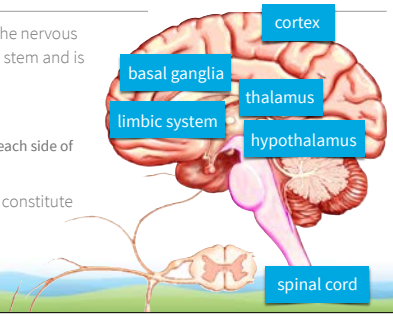
Brain stem

- Information from all parts of the nervous system converges in the brain stem and is projected back out.
- The spinal cord
  - Spinal nerve roots emerge on each side of the spinal cord.
- The spinal cord and the brain constitute the central nervous system.



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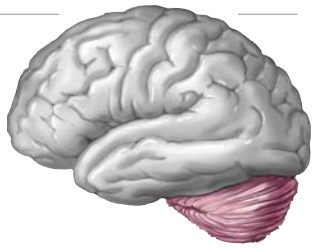
Cerebellum

- Accounts for 50% of the brain's neurons
- Involved in:
  - Balance
  - Coordinated movement
- May also be involved in:
  - Some cognitive functions such as attention and language,
  - Regulating fear and pleasure responses



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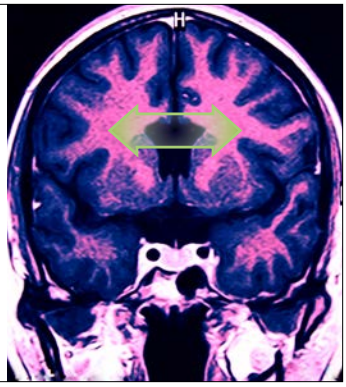
Corpus callosum

- Band of neurons linking the left and right hemispheres
- Most of what we do requires both hemispheres to work together
- Smaller corpus callosum:
  - Autism, ADHD, depression
- No corpus callosum
  - Aicardi syndrome, ACC
  - Epilepsy, Movement disorder, speech disorder



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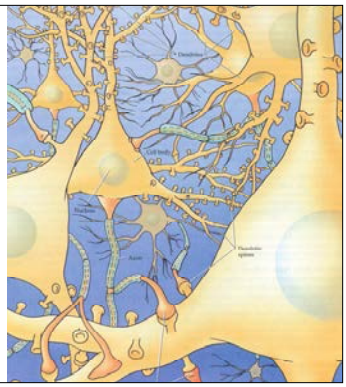
Neurons



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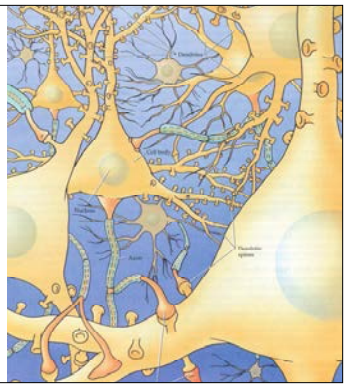
Neurons: Function

- Designed to transport messages
- Can connect to 10,000's other cells
- Different types of neurons
  - We will focus on the neurons in central nervous system



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Neurons: Function

- 100,000,000,000 (100 Billion) neurons in the brain
- 100 to 500,000,000,000,000 (100 to 500 Trillion) connections
- Pruning removes 1,000's of dormant neurons each day to conserve resources.

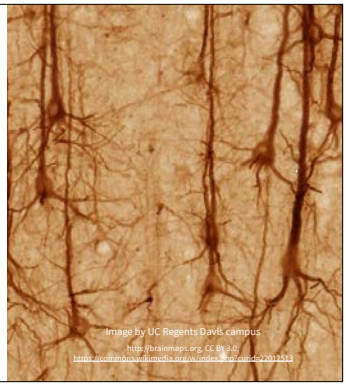

Image by UC Regents Davis campus
http://brainmaps.org, CC BY 3.0,
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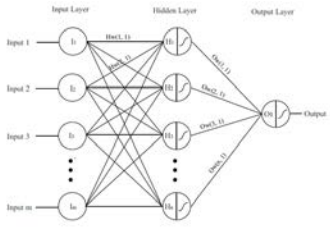
Feet
+
Cold
+
Humid



Model of neural functioning

Sit down, replace wet socks with dry ones

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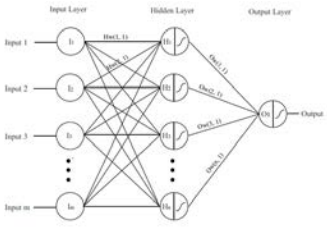
Neural network

- In certain neurological deficits messages may be:
  - transferred to the wrong area
  - transferred to a wrong degree

  ↳ which contributes to inappropriate responses

Soft touch on the forearm → Re-routed to pain center → Startled reaction



Model of neural functioning

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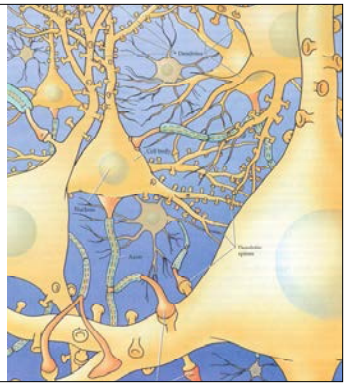
Neurons: Physiology

- Electrically excitable cells
  - Receive information
  - Integrate information
  - Send information
    - Generate electrical signals



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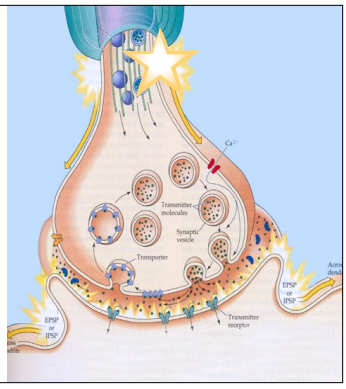
Synapse

- Connection point between 2 neurons
  - Electrical signal translated into a chemical signal



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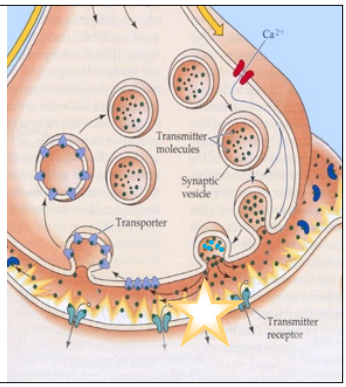
Brain Chemistry

- Connection point between 2 neurons
  - Electrical signal translated into a chemical signal
  - Transferred to the receiving neuron
  - Chemical signal translated back into electrical signal
  - Sent along to another neuron



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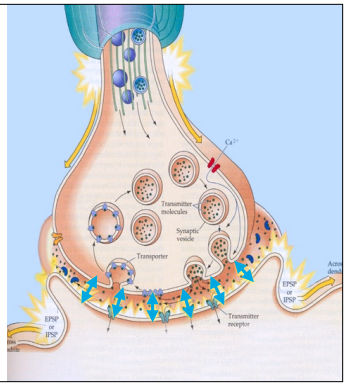
Neurons: Physiology

- Not attached
- Can have long dendrites
- Can have complex branches
- Form synapses (connections) and receive signals from a large number of other neurons



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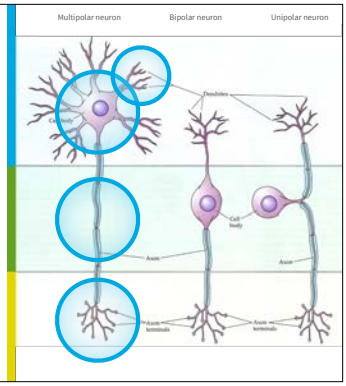
Neurons: Physiology

- **Soma** (cell body)
  - Contains the nucleus
  - Makes proteins and membranes
- **Axon**
  - Carry buds that can turn into new synapses within hours
  - Conducts electricity
  - **Learning delays linked to defects in dendrites**
- **Dendrites**
  - Branches where signals are received



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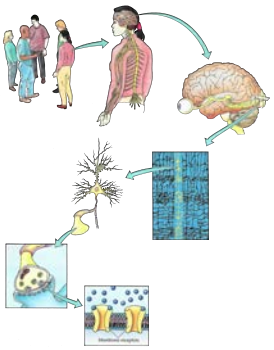

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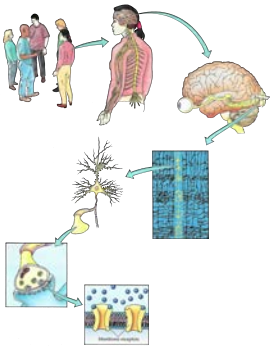

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