Brain Resource Creation Workshop: Chapter 6 - The Developing Brain

Created by: Phoebe

Edited by: Krish Shah, Prakrati Kadekar, Skyler Basco, Jed Quiaoit, Riya Patel

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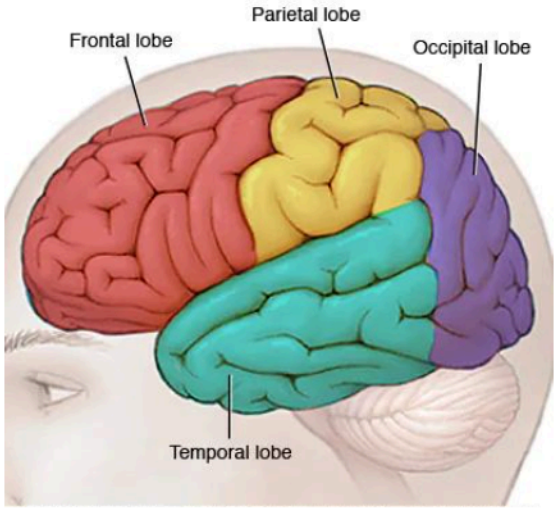
Important vocab

- **Frontal lobe** - front of the brain; responsible for voluntary movement, expressive language, and "higher level thinking" (planning, organizing, controlling one's responses, etc.)
- **Temporal lobe** - above the brainstem and cerebellum; auditory (hearing) stimuli, language, visual perception, memory, and emotion
- **Parietal lobe** - upper back area of the skull; sensory information: touch, taste, and temperature
- **Occipital lobe** - rear part of the upper brain; aspects of vision: distance, perception, movement, face recognition, and more



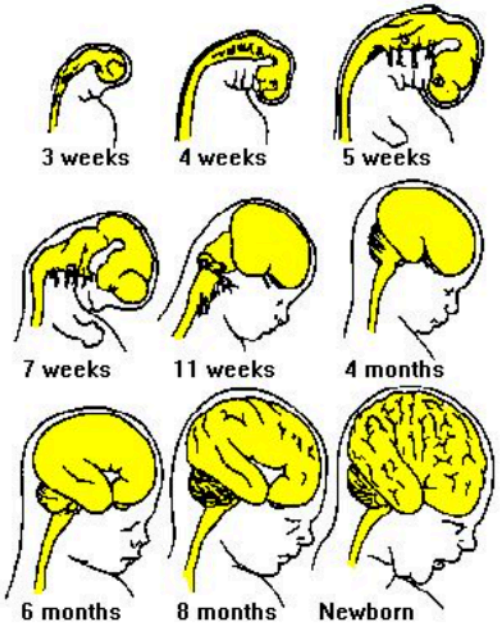
Source: Mayo Clinic

Synaptic Pruning

- **Synaptic pruning** - a natural process that occurs in early childhood and adulthood by which connections in the brain that are no longer needed are removed
- Occurs mostly in the **frontal lobe**, while synaptic growth spurts predominantly take place in the **temporal** and **parietal lobes.**
- A 3-year-old child possesses twice as many synaptic connections as an adult.
- By 10 years of age, we have nearly 500 trillion synapses, which is roughly the average amount of an adult
    - Between the ages of 2 and 10, synaptic pruning occurs very quickly

Infancy

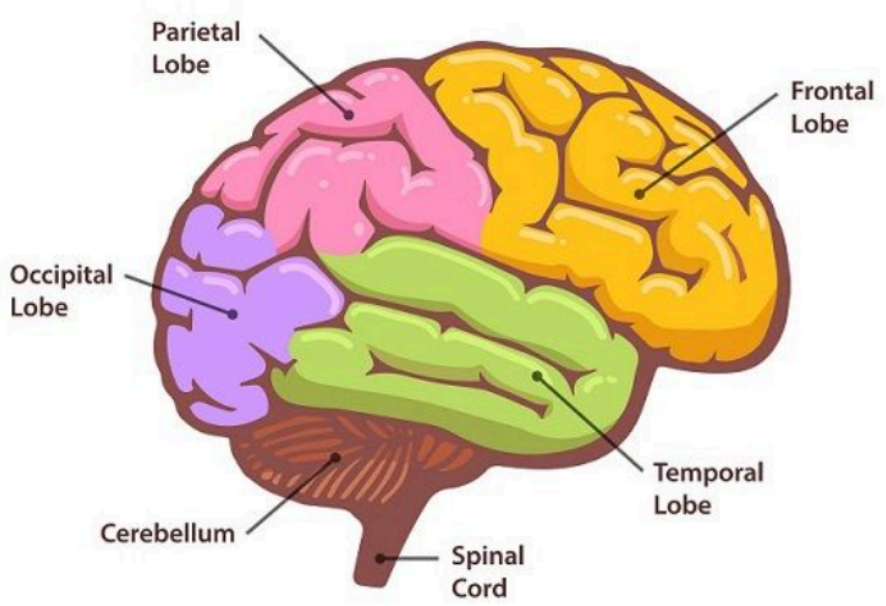
- At 5-months gestation, 80 billion neurons would have been created to help form the adult cortex.
- By infancy, that number reaches approximately 100 billion.



Source: University of Washington

Infancy

- Rapid growth begins to occur throughout the entire brain, with the exception of the **frontal lobe**.
- Progression is noted within the **occipital** and **temporal lobes**, while the sensory areas within the **parietal lobe** start to mature.



Source: Tutorialspoint

Early Childhood

- 90% of a child's brain development occurs before the age of 5.
- The first 3 years see the most rapid changes due to a bombardment of new life experiences.
- At this time, the brain is the most flexible and prepared to learn.
    - Languages are most easily acquired during this time period.

Source: SharpBrains

Early Childhood

- Brain development proceeds at an uneven pace between 3 and 10 months and 15 and 24 months of age.
- By 6 months old, the brain doubles in weight, while the neuron count remains constant following birth.
- Between 6 - and 8-years-old, the development of the **frontal lobe** and the **sensory** and **motor** areas are the primary sites for growth.

Source: SharpBrains

Middle Childhood

- 4 years old - the brain increases to 80% of adult size. In the **temporal lobe**, auditory myelination is complete.
- 5 years old - the **occipital lobe** reaches adult levels.
- 6-7 years old - maturation of the **occipital lobe**.
- 8 years old - maturation of the **temporal lobe**.
- Brain is flexible for future learning.

Source: SharpBrains

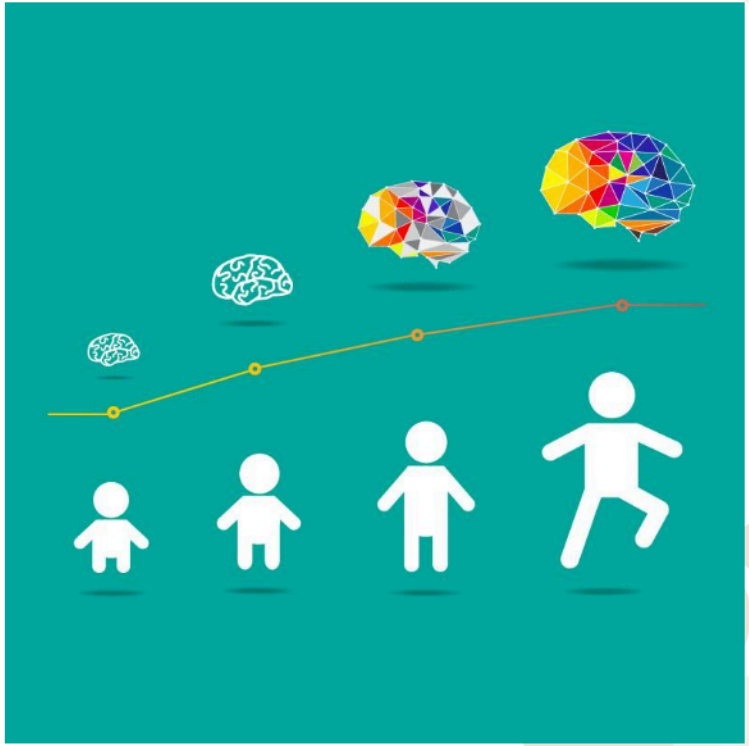
Middle Childhood

- 95% of brain growth is reached by age 5.
- Brain growth is characterised by interrelated processes such as **cell proliferation** and **cell pruning**.
  - **Cell proliferation** refers to the overproduction of neurons, while **cell pruning** is the elimination of extra synapses. (The latter is a continuous process in the childhood phase.)

Source: SharpBrains

Adolescence

- There are two major brain spurts
  - Between ages 13 and 15.
- During the first spurt, the **cerebral cortex** thickens and neuronal pathways become more efficient.
- In the second spurt, the **frontal lobes** of the cerebral cortex are the focus of development.



Source: SharpBrains

Overview of Brain Development

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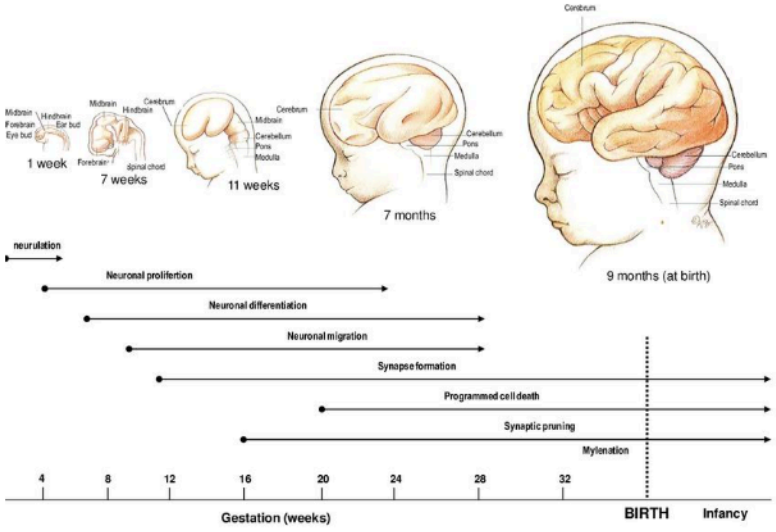
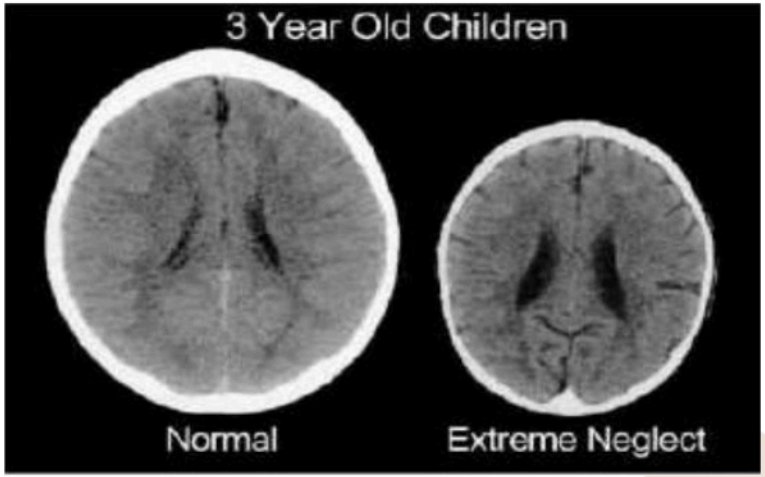


Source: ResearchGate

Effects of Neglect and/or Abuse

- The frontal lobe develops improperly when deprived of affection and positive emotional experiences.
- Lack of experience can cause the neurons in the brain to die off



Source: New York Post

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We hope you enjoyed the workshop!

Any questions?

You can email us at

krish@simplyneuroscience.org,

erin@simplyneuroscience.org,

pavan@simplyneuroscience.org