

It's All in the Brain!



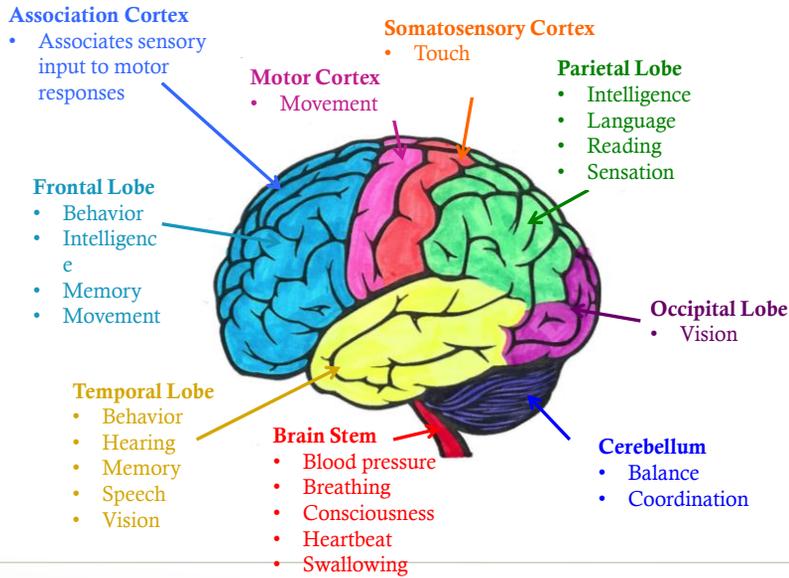
Presented by:
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What is the Brain?

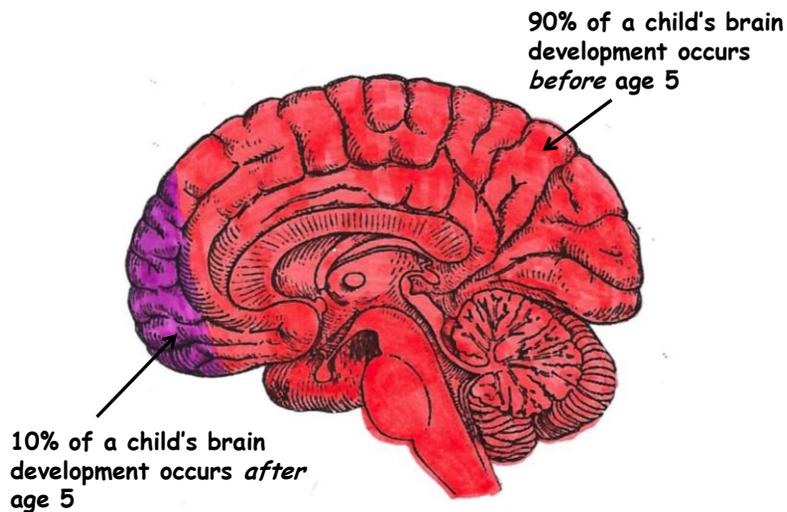
- The brain is a muscle
- In order to grow and flourish, the brain muscle needs to be exercised on a daily basis
- Think of the brain as a busy city:
 - Parts have different functions (jobs)
 - Made up of different types of cells (people)
 - Brain areas send messages to each other to keep the brain working (email)



The Parts and Function of the Brain

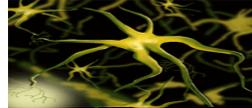


The Brain of a Child

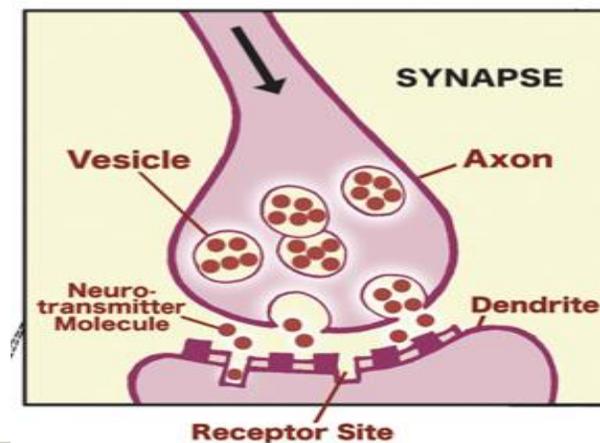


Making Connections

- As nerve cells begin to mature, they make connections with one another
 - Axons (send out information)
 - Dendrites (take in information)
- Neurons form trillions of connections and pathways
- At birth 50 trillion connections have already been made
- In the first 3 months connections multiply more than 20 times
- At one year the brain has approximately 1,000 trillion connections



Making Connections: A Brain is Born



Brain Facts



- People do, in fact, access up to 100% of our brains, just not all at the same time
 - The statement that "we only use 10% of our brains" was a statement from the 1950s that was not accurate but has been repeated ever since
- 97% of all learning is *unconscious*
 - Physical movement, emotional events, information gained through experience
 - We learn constantly without an actual plan to learn

The Brains of Babies

- By 5 months gestation, 80 billion neurons that will form the adult cortex have been created
- At birth, infants have most, if not all, of the brain cells they will ever have
- During the first 8 months, new connections are formed more quickly than they are broken
- Development requires not only synaptic connections but also selective loss or "pruning"
- Trauma, stress, and poverty adversely affect the growing brain.



Pruning the Brain



- Connections that are weaker, ineffective, or unused are removed by "pruning"
- Experiences determine which connections are pruned and which are strengthened
- After the first birthday, pruning occurs more quickly
- The pruning process allows the brain to adapt to its environment
- These adaptations allow the baby to continue to learn

The "Filing" System



- A child's brain is like a filing cabinet
 - Initially all new information goes into the cabinet
 - As new connections are made, the brain begins to organize the "files"
- With each new connection, the files become larger
 - Files and information are also rearranged to match with experiences
 - Some connections will be placed in multiple files as more connections are formed
 - Some files are deleted as time goes on (pruning) if they are underused or unused

Brain (Neuro)plasticity

- Neuroplasticity is the ability of baby's brain to change with learning
- The brains of young children are capable of receiving many different inputs and their brains make connections from these inputs
- The child's "filing cabinet" is fluid and can take in large amounts of information with ease
- As the brain ages, it becomes less "plastic" or easily modified

Auditory-Verbal Language Acquisition



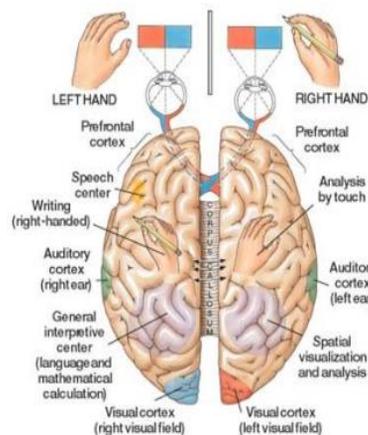
- Human brains are "wired for sound"
- At 3 months the brain has the potential to distinguish several hundred spoken sounds
- Infants and young children have a type of unconscious memory for detailed sound patterns
- For D/HH children who are well amplified, this offers an additional pathway (auditory cortex) to learning
- Development of listening and spoken language skills require ongoing effort and intervention to develop in a typical way

Sign Language Aquisition

- Brain is not stimulated in utero by typical sound
- Without consistent auditory input:
 - Brain reorganizes itself to maximize processing through vision
 - Brain begins pruning in the auditory brain centers
 - Visual centers in the brain will "take over" unused or underused auditory brain centers
 - Neural connections that support vision will be strengthened

Brain Hemispheres and Visual Language Development

Production of sign language



Perception of sign language



Processing of sign language also associated with areas that control reading

Play and the Brain

Play can:



- Require fast decision making
- Provide opportunities to read emotion and intent
- Enhance perception variety and speed
- Add skills
- Maintain emotions
- Encourage socialization
- Allow for learning without consequences (no "right" or "wrong")
- Lowers stress or distress levels

Areas that Benefit Brain Development

- Creativity
- **Use of colors**
- **Activity**
- Multi-sensory
- Time limits
- Random uncertainty
- Timing and structure
- Humor





I'm a Brain "Expert" - Now What?

- All areas of the brain need to be consistently stimulated for the entire brain muscle to grow and learn
- Early intervention services to children who are D/HH must be interdisciplinary
 - Consider all processes for each activity in order to stimulate multiple brain areas
 - Outcomes are for everyone - we all need to consider each other's outcome each time we provide service
 - Rely on the teacher for the deaf or hard of hearing for strategies, activities, and feedback on the child's communication and language development
- Children must have time to use their entire brains daily!



Contact Me!



- If you have questions or would like additional information, please feel free to contact me.
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Thanks For Tuning In Today!!!

References

- Jensen, Eric. (2000). *Brain-Compatible Learning Workshop: How the Brain Learns*. Jensen Learning Corporation.
- Myer, Martin, et al. (2007). Neuroplasticity of sign language: Implications from structural and functional brain imaging. *Restorative Neurology and Neuroscience*, Vol. 25, pp. 335-351.
- Papanicolaou, Andrew, et al. (2000). Brain Plasticity for Sensory and Linguistic Functions: A Functional Imaging Study Using Magnetoencephalography with Children and Young Adults. *Journal of Child Neurology*, Vol. 16, pp. 241-252.
- Williamson, G. & Anzalone, Marie. (2001). *Sensory Integration and Self-Regulation in Infants and Toddlers: Helping Very Young Children Interact with Their Environment*. Zero to Three: National Center for Infants, Toddlers, and Families
- Zero to Three, FAQ's on the Brain. (2014). Retrieved from <http://www.zerotothree.org/child-development/brain-development/faqs-on-the-brain.html>.