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POTENT OF THE INFANT BRAIN: BRAIN DEVELOPMENT AND LANGUAGE ACCRETION

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Abstract

Infancy is considered to be the most critical; hence highly important phase around the human brain development. Indistinct changes in this stage are thus escalated with various developmental processes, focusing on the far- ready consequences. Studies on the structural exemplification of the infant brain is highly prolific. Thus, at the infancy stage; language accretion is an instinctive process. Neurobiologist Dr. Lisi Eliot writes "the reason language is instinctive because it is to a large extent, hard wired in a brain, together with a sophisticated vocal apparatus, evolved a complex neural circuit for rapidly perceiving, analyzing, composing and producing language. (Eliot, 1999).

Keywords: Brain Development, Language Accretion, Infancy, Brain, Neuroscientists.

INTRODUCTION

Neuroscientists hold upon the view that when a baby is born; his/her brain is accompanied with millions and millions of brain cells, which stays with the particular child for his/her lifetime. Thus, more scientifically explained each brain cell is accompanied with the branching, called dendrites, that spread and reach out to make connections (i.e., where these brain cells are connected are called synapses.

Thus, the electrical signal transmits itself from the brain cell to another brain cell, crossing synapses between the cells. Thus, the infant brain is the critical period in which the brain development harbor the blossoming of the prominent skills; language being one of the. Thus, during the years of language accretion, the neuro structure focusing on the brain; undergoes the developmental changes storing the linguistic information and thus adopting to the grammatical regularities of the language.

Thus; the recent researchers and advances in the concept of neuroimaging have put fore math to the system- level analyzing of the evolution of the brain. Thus, the competence and knowledge of human language is grasped through different means and modes. The prime faculties of language such as speaking, comprehending; singing whether innate or acquired are major determinants of language accretion. Whereas; reading and writing are considered as secondary. The first or native language accretion is done by a child in the initial years of his/ her existences; primarily through the family and immediate relative and neighbor. Thus, we can say that focusing on the critical periods in brain development and language accretion is important.

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Thus, here comes the role of parents; who need to support their child in his/her brain development for language, during these times by exposing him/her to a diversity of experiences; allowing his/her skills to emerge. Researchers, have focused on the criteria showing that an infant as well versed and can respond to sound as early as in 10 weeks before birth; grasping the voice of his/her mother and the various patterns of sound; she speaks prenatally.

Evolution of the Brain

The human brain is the least developed organ at birth, with 100-200 billion nerve cells (neurons) equivalent to that of an adult brain. The majority of them are not yet linked. At birth, critical nerve cells in a baby's brain join. Nerves necessary for survival, such as breathing and cardiac regulation, are already linked at birth. The brain's "wiring" occurs primarily after birth. In infants, neurons' connections and myelin sheaths are not fully developed. During brain development, neurons form intricate synaptic connections, similar to scaffolding.

A baby's prenatal environment can influence the creation of these are synaptic connections. Exposing a growing fetus to starvation, infections, medications, or poisons might affect its development. Neurons might be badly impacted. Inadequate nutrition during pregnancy might hinder brain development. Malformed neurons disrupt the scaffolding process by preventing connections to neighboring neurons.

This can result in issues including mental retardation and disease. Ensuring healthy pregnancies can promote healthy brain development in newborns. By age 3, a child's brain has established about 1,000 trillion connections. Around 11 years old, a child's brain begins a process termed "pruning" to eliminate superfluous connections. Initially, brain cells generate an excessive number of connections. Neurons that are actively employed gradually strengthen, while those that are not are eliminated.

Only approximately half of neurons formed during development survive to maturity. This explains why the brain cell connections appear less thick at age 15. There are also key times when changes occur in babies' brains. During these periods, the brain needs certain experiences for proper development. A monkey raised with one eyelid closed from birth to six months may lose usable eyesight in that eye.

The neurons responsible for vision in that eye were not activated during a vital time of development. The neurons were "pruned," making it impossible for the monkey to have exceptional vision in that eye even after the eyelid was repaired. Babies born with eye impairments, such as crossed eyes, require rapid treatment to provide appropriate visual input and healthy brain connections. Later in the course, we'll delve further into these important times of brain development.

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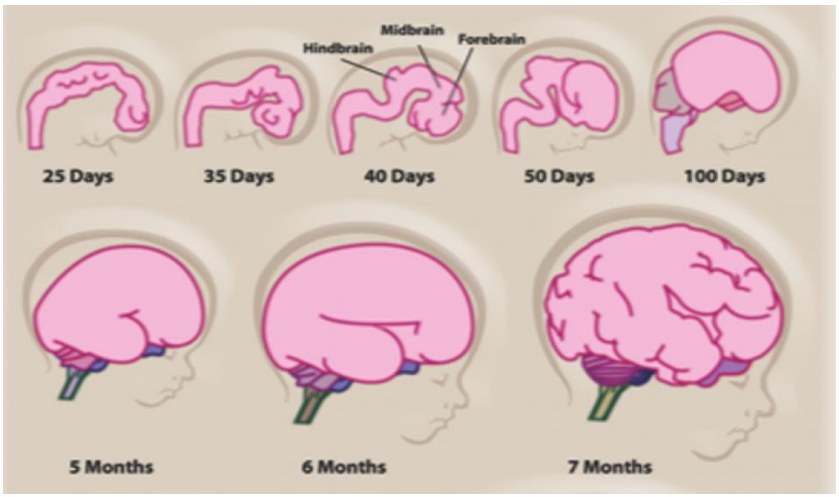

Figure 1: Development of an Infant Brain

Stages of Development of an Infant Brain

When your baby comes, a lot of effort and growth has already occurred. However, there is still much more growth to be done. Despite the fact that their brains are just 25% the dimension of brain of an adult, your child has practically summation of the neurons they will require for the leftover life at birth. Anyone who has children knows that they have their own personalities, but external factors may also have a significant impact on brain development. Thus, the fact about the nature vs. nurture is that genes drive bulk synapse expansion, but the environment fine-tunes the brain and helps it decide which path to preserve and which one to eliminate. The more frequently a synapse is in motion, or a skill or notion is practiced, the burly it becomes. This implies that things that are utilized frequently, like as speaking and walking, remain embedded in a child's brain, but items that are ignored fade. This procedure also occurs in adult brains, but at a very slow rate. The reason being that your infant is quickly forming and pruning synapses, hence an important time for learning. It also implies that with no practice, some talents would deteriorate. Thus, if we want our child to develop long-term abilities (such as a second language), it is critical that they receive consistent exposure and practice. Children's "flexible" brains provide a unique window to lay a strong bedrock for the rest of their life.

What is growing?

A much is running through that small brain! Here are some intriguing facts concerning your baby's brain development:

Visual Cortex

Your newborn is unable to see properly. The vision of the baby is blurry, and they can only identify a few hues. However, throughout the initial six months of growth, cells in their brain specialize to form and manipulate the visual cortex, neurons grow, and axons go under the process of myelination. Accompanying with physical improvements to their eyes, people will be now in the position to see things more clearly in the span of 03(three) months. At age lap of

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six months, fast progress adds depth insight and concentration to your child's arsenal, allowing them to see almost as well as adults. During the development of the brain ion the early stages, they notice vivid colors, intriguing and patterns of the dramatic nature, and human features, despite their limited vision. Peep into eyes of the infants, make humorous facial expressions, and expose them to various objects and design yardsticks to help them develop their visual sense.

Cerebellum

During a baby's first year, the size of the cerebellum gets tripled in size, allowing for fast expansion of motor abilities. Your youngster will swiftly develop from rolling around and over to crawling and eventually moving into their stage of taking their first steps. Encourage them to use their arms and legs when playing with them, and give them enough room, space and time to develop their new abilities.

Myelination

Myelination of the cells dealing with the neurons which we call as nerve cells facilitates the passage of electrical impulses, allowing the baby's brain to receive and send information quicker and cope with many signals more efficiently. Myelination is deficient in many areas of the brain at the time of the birth of a child, but it quickly grows and multiplies in the initial year of the growth and development. This justifies that older children have an easier time digesting and reacting to stimuli than young newborns, and it helps to decide what kind of strategies and techniques are age appropriate for these newborns.

Creating an Environment Enriched for Brain Expansion

- ***Social Interaction:*** Humans are the beings which are highly social in nature, therefore it's no surprise that social conduct has a significant impact on our brains and is essential for infant Expansion in terms of Growth. Societal activities in which a kid is engaged actively by their peers and parents or other beings of same age group promote healthy brain movement and expansion and social skills, and hence these are one of the most effective methods for these newborns to grown and learn. Directly talking to your child promotes growth and expansion in their language center, but it also helps children become better learners by creating and focusing on to greater bonds and connections in their brains.
- ***Diet:*** Although the brain's interaction with food is complicated, it is evident that nutrition which is required in the minimum amount as a standard during early life is essential for optimal brain expansion and growth. Our brains need enormous quantities of nutrients along with the amount of energy to grow and function correctly, and this is especially true throughout early life, when development is fast. Broad, balanced diet rich in irons, proteins, vitamins, and minerals have long-term benefits for your child's brain.
- ***Kindergarten Programs***: Many parents are on the verge of struggle to decide upon the notion whether to enroll their Toddler into a pre-kindergarten class or not (Pre-K or PK). Thus, it is highly personal decision with many things to consider, evidence collated by the Urban Child Institute reveals that children who attend pre-kindergarten enrolments have

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enhanced cognitive skills, have lowered the risk of developmental delays, and are better prepared for kindergarten.

- ***Novel Experiences:*** An environment which is creative in nature and in which children are thrown into exploring into a wide range of ideas, figures, patterns, and experiences promotes the expansion of healthy, inquiring infant brains. In experiments related to animals, the impact of a wide experience-rich stimulus in form of external environment was most noticeable when participants were introduced in the initial years of life. Face to Face conversations experiences tailored to a child's age are the most affective and enriched with overall development.
- ***Initiating a positive relationship and avoiding stress***: Constantly stimulates a child's stress reaction. Stress is a fundamental element of our nature that leads us to respond rapidly to possible threats; but, when the response in terms of stress is activated on a continuous basis, it begins to harm the overall growth of the body. Stress in the early life is highly toxic and is caused by factors such as poverty, exposure to violence, and societal neglection, and it genuinely toxic in the situation where the kid lacks resources and strong, reassuring family relationships.

Psychobiological Growth

Emotions are physiologically fundamental aspects of human functioning. They are based on intricately connected brain structures and hormonal factors. Organize the interaction of activation and control to create emotional reactions. Infants' ability to experience anguish, anxiety, surprise, delight, and wrath is a reflection of their biologically anchored psychobiological systems. Emotional development relies on fast changes in neurological, neuroendocrine, and other biological processes between infancy and childhood (LeDoux 1996; Panksepp 1998). For example, the evolving stability of sympathetic and parasympathetic nervous system functioning in individuals. It has been explained how infants' emotional responses become more predictable, manageable, and sensitive to their surroundings. As the frontal neocortex matures and integrates with the limbic system and other subcortical structures, emotions become more acute, complex, and self-regulating. Emotional growth involves developmental changes in numerous brain regions, hormone functioning, and neurotransmitter modulation, despite its seemingly basic nature.

Moral Growth

The literature on moral development in childhood focuses on three theories. The first, developed by Piaget (1965) and Kohlberg (1984), links moral development to cognitive development. Gilligan (1997) and Hoffman (2001) provide theories that prioritize emotional aspects over cognitive development and Anxiety/stress the principles of child care and parenting. Some theories suggest that moral growth is a mix of cognitive and emotional development, and that individuals' moral judgments can shift based on circumstances (Eisenberg, 1986; Rest, 1994).

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Language Accretion

The development of a child's speech and language proceeds rapidly with minimal support. Linguists believe that kids are born with grammatical "tools" and only needed to be introduced to a language to utilize them. This might also explain why languages have similar characteristics, such as sounds of the vowels. During the first year, it is thought that your child's brain develops "wired" for their native language. This is the most crucial moment to introduce your child to as much language as possible. If you're attempting to teach your child two or three languages, you should speak that language in front of them frequently throughout this period. Early childhood reading, such as board books and other amusing stories, is beneficial to your child's developing brain and capacity to learn language. Reading in the initial years to your child is often considered as an excellent approach to introduce them to language whether it be a mother language or a foreign language.

At the age of 18 months, your kid will have to undergo a rapid "growth spurt" of the language-related areas of their brain. They will move on to rapidly develop their vocabulary at this stage, so now is the time to expose them to new ideas as possible.

Bilingual Babies

There are many benefits of the child brain development related to exposing your little one to more than one language during infancy and early childhood. Here are just a few:

- Enriches cognitive skills.
- Allows for effective communication with more people.
- Provides a broader aspect for exploring and presenting a diversity of thoughts and ideas.

Factors Impacting Language Development Health

- ***Health:*** Children with great drive to interact into social groups and communicate with others tend to learn faster than those with limited communication skills. Children experiencing persistent discomfort throughout their first two years of life may have problems developing their talking skills. Intelligence
- ***Intelligence:*** Children with high intellect do better in learning, speaking, and language proficiency compared to those with lower cognitive levels.
- ***Family's Social and Economic Situation:*** Research indicates that children from low-income homes experience lower levels of language development compared to those from higher-income families. This problem may be attributed to learning difficulties or a lack of attention to second language acquisition in low-income households.
- ***Family Size***: Children from smaller homes tend to talk earlier and better than those from larger families. Parents can devote more time to teaching their children to talk.
- ***Relationships with Peers:*** Children who have strong relationships with their peers are more motivated to learn to talk and become accepted members of their peer group.

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CONCLUSION

In conclusion, over the past 30 years, we have made significant progress in understanding the fundamental principles of brain development. This development has transformed our basic models of brain development. Throughout development, both internal and external elements work together to support the brain's diverse structures and functions. During the embryonic phase, gene expression in one group of cells creates molecular signals that affect the development of another. During the embryonic brain's development, external forces have an important impact, at the early stage even. During prenatal and postnatal development, internal elements remain important, but extrinsic stimuli also play a significant effect. Learning a language is a natural method of speaking it. Language development occurs naturally in the child's head, rather than being intentionally constructed throughout schooling. Thus, the distinction between acquisition and learning is the same as that between a tree that grows, naturally in its native habitat, and a plainly constructed structure placed on an environment. Thus, childhood is the best age to learn a language. Acquiring a language led to greater fluency than simply learning it. Acquiring a second language after the critical period can be challenging due to interference from the learner's first language, which may be more comfortable than the target language. Childhood is the optimal time to learn languages since the language acquisition device is very active throughout this period. According to, individuals learn several first languages simultaneously, rather than just one or two. In contrast to the process of acquisition, when a child gradually acquires language competence, the learning process involves a student actively acquiring vocabulary and grammar in a controlled classroom setting. Typically, individuals do not reach the same degree of skill in the new language as those who learn it. This is in relation to the fact to influence from their original language. Some kids excel in reading and writing but struggle with speaking, a crucial part of language. Language acquisition theory and the crucial period suggest that full fluency cannot be achieved by language learners.

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