The Role of the Brain in Language Development

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Introduction

It has long been known that the brain plays a large role in language development; however, the amount of research in this field has increased exponentially over the past several years giving way to the creation of the new field of research cognitive neuroscience (Ansari, 2008). More and more studies are revealing the intricate relationship between brain development and literacy as children progress into their socio-cultural environments. Years of research have supported that positive reinforcements are directly related to the success of a child’s brain and overall behavioral development (Mann, 1999). Understanding the correlation between the brain and language development can give insight to the critical periods in a child’s life when the brain is biologically best equipped to learn language (Fleming, 2002).

Brain Growth and Development

The human brain is hard-wired for language. Babies are born with 100 billion brain cells and over 50,000 nerve pathways that can carry sounds from the human voice from the ears to the brain (Owens, 2000; Shiver, 2000). There are critical periods during a child’s life when the brain is active in forming connections for specific skills, language being one of these. Brain research clearly indicates that if language development is not encouraged and cultivated during these crucial times it can be greatly impaired. Furthermore, if a child hears little or no human sound, the brain will eventually retire these cells from this function and give these cells a different function (Fleming, 2002). While it appears this window of opportunity may have closed completely, not all hope is lost. Skills can still be learned, but with greater time and effort.

The brain is “constantly growing and making microscopic connections” (Owens, 2000, p. 111). This is why positive external stimulations to children during specific critical periods in their lives are of utmost importance. One of the first windows of opportunity for language...
occurs within the first six months of a child’s life. During this time the child begins to recognize
the patterns of sound in their own language. (Shiver, 2000). While children are born with the
capability of learning all languages, if they have not been exposed to a certain language by six
months of age it will be difficult for them to recognize sounds not in their now native tongue
(Shiver, 2000). Between 24 and 35 months of age the brain begins to form mental symbols for
people and objects. As a result, the child grows the ability to use many more words and
construct short sentences. (Shiver, 2000). Another study that scanned brain activity revealed that between the ages of four and twelve an enormous amount of brain restructuring
takes place. During this time, the brain decides whether to keep or eliminate connections.
If the child has received rich, sensory stimulations, a surge of learning takes place. On the other side,
if little encouragement has taken place, the connections are lost or re-wired for another task
(Fleming, 2002).

**Brain Physiology and Reading**

To better understand the role of the brain in language development, it is important to
become familiar with its pattern of growth, structure, and detailed functions. A delay or
abnormality in the rate and extent of brain maturation can have a significant effect on language
development (Paterson, 2006). For example, from birth to one year, myelination will
from the base of the brain all the way up to the frontal, parietal and occipital lobes. The
formation of certain cognitive abilities can be correlated to the degree and rate in which this
progression occurs (Paterson, 2006; Szafalarski, 2006). It has also long been known that the left
hemisphere is the side of the brain mostly responsible for language development (Owens, 2000).
However, advances in research have given us greater insight to specific brain activities during
language processing (Hoef, 2007). For example, studies have shown that specific areas of the
brain are activated when both children and adults read. People with dyslexia and other reading difficulties show abnormal activation in these same brain regions (Ansari, 2008). Other studies have linked more specific language abilities to certain areas of the brain. For example, the ability to make consonant-vowel contrasts and other phonetic processes is controlled by the temporal cortex. Moreover, rapid auditory processing, shown to have a great impact on later language, takes place in the left prefrontal regions (Paterson, 2006). Finally, Broca’s area is involved with the actual production of the language (Owens, 2000).

**Conclusion**

There is no question the brain plays a considerable role in the successful development of language. There are critical periods during a child’s life when windows are open for the brain to make necessary growths and connections. Failure to provide a child with positive stimulation during these periods can result in language impairment (Fleming, 2002; Shiver, 2000). Additional studies have shown that as different processes are learned, changes in the structure of these brain regions are observed (Owens, 2000; Paterson, 2006). However, when these brain regions stop being utilized, the increased brain volumes decrease back towards its pre-learning size (Ansari, 2008). On an optimistic note, studies have demonstrated that the brain remains changeable and adapts itself to the particular demands set by the individuals’ environment (Ansari, 2008; Szaflarski, 2006). As long as the brain is functioning properly, learning can always take place.
References


