

Research Article

NEUROLOGICAL ASPECTS IN THE ACQUISITION OF LANGUAGE IN THE TERMS OF HEALTHCARE

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ABSTRACT

With the proliferation in science and technology, an outstanding result has been found in the field of neuro-linguistics with respect to its varied theories in almost every field of the tertiary sector. The researcher investigates the significance of the word neuro-linguistics with the latest studies done on the language adaptations by the brain in terms of healthcare. Few decades before, a man was unaware about the place of language learning and acquisition in the brain. But with the development in technologies, it has become easier to locate different neurons of the brain and in addition to this; the different methods and techniques can be helpful for the people suffering from language disabilities in the context of healthcare. To speak a language fluently is an effortful task for some people as they cannot speak flawlessly due to neurological problems. Thus, this paper throws light on the neurological aspects in the acquisition of language. The present paper focuses on the theories related to the brain and the location of the ability to use the language.

Keywords: Language Acquisition, Language Disorder, Neuro-Linguistics, Memory Learning, Brocoa, Wernicke's and Supplementary Motor Area, Brain Theories.

INTRODUCTION

Language or prose is a theory of specific science that is set upon a lingual miniature. Afterward the middle of the 20th century, extremely worldly practical and critical ideologies has been simulated all over the world. From these theories, the term neuro-linguistics came into the beginning of 20th century and proves to be quite promising and comparatively new phenomena. Ostensibly, these ideologies and approaches have been simulated to analyze the conundrum about the language. Moreover, its main purpose is to find out the relationship between the human mind and language. Every human is endowed with linguistic abilities. Language is a cultural phenomenon as it changes from one society to the next. It is a supreme human achievement, which makes us what we are; it is the foundation of all other learning. It differentiates humans from animals. In support of this view, the brain plays an important role in acquisition of language. The young tiny tots acquire the system of language without any difficulty in a specific age and after this transitory period; they need to work hard to grasp the proficiency like an English speaker in speaking English as a second language.

The generation of every age is a bystander of periodic evolution in wisdom and research. It begins with the result to the obstacles heightened in the field of speech and hearing and later it is looked for and executed. Indeed every century has characterized its delinquency and trends in the advent times which leaves an enduring impact and expedite advanced information for the future generation. It has fabricated milestones notably in neuro-linguistics, as with the advancement in science and technology a man comes to know the place of learning and speaking in the brain. In addition, one can also know the reason for issues related to neurological aspects in the acquisition of language and so on. With the day to day, development, India is also progressing in the field of information and communication; moreover, requires radical changes from the ancient classical structure of literacy to the burgeoning Information and Communication Technology in triennial domain of education. In the

present day, student community is experiencing the smart classrooms where more learning is underway for the students in their classroom. As Krashen's structure advocates, the schoolroom is the only place where comprehensive learning is inculcated in the student's mind and the emphasis is on practical knowledge instead of form and structure. In the pursuit of the same, literature and research can be effortlessly taught and at the same time learnt with new amusing activities through burgeoning Information and Communication Technology especially for the children suffering from language disorders. It has been proven that the higher the students engage themselves in learning any language; the better they pickup linguistic and grammatical skills. Even many academicians like David Nunan assert that classroom is one of the best places to acquire the second language through communication in small groups and drill exercises.

REVIEW OF THE RELATED LITERATURE

Nick Elis from university college of North Wales conducted a study on the second language learning through conscious learning and mental and emotional perspectives in terms of conscious processes in vocabulary acquisition. His study includes the following points:

- He concluded that vocabulary acquisition in L1 and L2 plays a vital role in conscious and unconscious growth.
- After conducting research based on three areas i.e.: (i) the connection between glossary and scholar acumen, (ii) definite consciousness, (iii) global amnesia shows that vocabulary acquisition is an outcome of incidental learning. Moreover, there is a huge no relation or connection between recognition and production of the words with the cognitive learning of words in the conscious mind.
- He lays emphasis on the self-learning and a learner needs to practice within the semantic and syntactic framework.

The eighth paper of the book named The Handbook on Neuroscience and Multilingualism throws light on Brain Adaptations and Neurological Indices of Processing in Adult second Language Acquisition.

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- It has been examined that there are different AI technologies like event related potential which can further help in the location of second language acquisition related to mental processes.
- The paper is based on two protocols with regard to brain plasticity and processing i.e. structural scan and MRI which can give the details of functional brain and during rest.
- The studies conclude that the brain takes longer time in terms of second language learning and acquisition.

A study by Farita N F D'Souza done on The Effect of Neuro Linguistic Programming Strategies on the Dynamic Learning of Pupils of Class Nine with Different Levels of Self Esteem in August 2013. The investigator concluded the following points:

- It has been found that neuro linguistics programme related to instructional strategies proved to be competent in upgrading the continuous training of the students in the procurement of discipline after the correlation with the traditional strategies of teaching science.

In April 2017, Hema Banu endeavored to find the Impact of Neuro-Linguistic Programming and Meta Linguistic Strategies on Communicative Language Teaching towards communicative skills among under graduate students

- She has observed that the communication skills of the students can be improved with the help of neuro linguistic programming, Meta Linguistic and Communicative Language Teaching Strategies.

SIGNIFICANCE OF THE WORD –NEURO-LINGUISTICS

As the word Neuro linguistics defines the meaning of the word in itself. It has been made up of two words Neuro and linguistics. The word Neuro means nerve (Galen) which has been derived from Greek language. Linguistics means the science of a language which was renamed from comparative philology and derived from Latin language in the 14th century which means love of learning, love of letters, and love of study. But in Greek philosophy Philo means love and logos means word or speech. Thus it means love of discussion, learning and literature. (<https://www.etymonline.com/search?q=linguistics>)

Thus Neuro-linguistics suggests the functional aspects of the brain in terms of language and communication. It tells how the brain comprehends and perceives the notion of language and communication. Thus Neuro-linguistics particularizes the role of the brain with reference to the production of language and communication.

THEORIES RELATED TO BRAIN AND LANGUAGE

Underlying the connection between the brain and language such as localism and Associationism, there are diversified views regarding this conception. Localism defines the location of the different languages in the brain. However, Associationism defines how the brain perceives the concept and associates the language in the brain. In addition to this, Holistic theory deems the role of language maneuvered by all-inclusive areas of the association in the brain. Evolution based theories focus on the parallel link between the brain and language make a headway supplementing in varied species, the way they foster in children and the performance of the language functions in the brain by adults. Thus, in a nutshell we can say that these different theories define the place of the functioning of language in the brain. At the time of language development and even after brain gets damage; such systems are continuous, and thus they can be identified. Taking the cognizance of language functions which are handled through brain and different integrated theories supports their relationship. Evolution-based theories worked upon the accord

between how the brain and language evolved over time in different species, how they develop in children, and how adults perform language functions. (Ahlsen 2006:5)

PLACE OF LANGUAGE IN THE BRAIN

The place for language abilities in the brain has been found with the help of empirical studies and the research done on the brain through autopsies of some people suffering from some language disorder. If that particular area is damaged, the person is certain to have language disabilities. The same fact has been clearly stated by George Yule and Elizabeth Ahlsen, in their respective books, that they came to know about the areas of the language abilities in the brain through the autopsies and examination of the people suffering from the language disabilities. Thus how they were able to find out the location of language abilities in the intellect for the normal patients and patients suffering from language disabilities.

There are basically three main areas in the brain in relation to linguistic abilities:

- Broca's area
- Wernicke's area
- Supplementing motor area

Broca's area

This particular area is related to the expression of feelings in terms of language. It was named after Paul Broca who was a French surgeon and figured out the place for production of speech in the brain. Thus it has been apparently proved by Paul Broca and Wernicke the place for linguistics abilities in the figure mentioned below:

- visual area
- Somatosensory motor Area
- wernicke's area
- sensory area
- Auditory Area
- Motor Function Area
- Association Area
- Broca's Area
- motor Function Area
- Higher Mental function
- Cerebellum

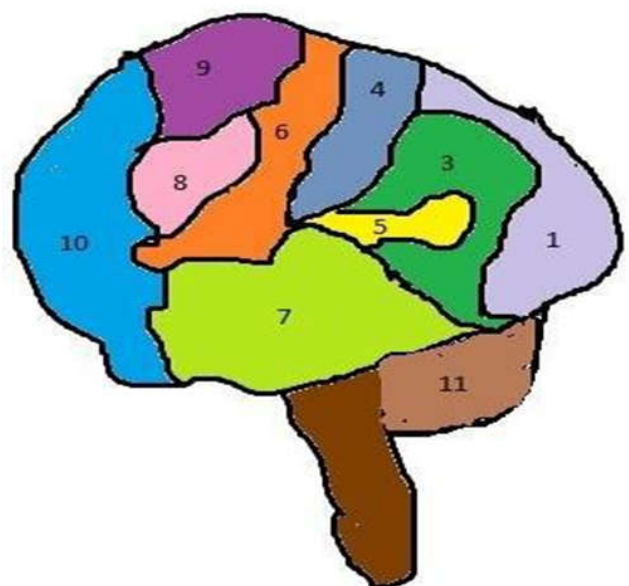


Figure1. Self- Created Functional Areas of Brain

Traditionally, the term neuro linguistics came into highlight in 1861, when a French surgeon named Paul Broca conferred his theory, underlying on a patient's syndromes and the anatomy of his brain. The patient had considerable complications while speaking since this was his only speech output. It was found that during a postmodern previous brain damage due to which his speech area got affected specifically known to be known as Broca's area.

According to the study reported in the eighteenth century that bruises to the particular area of the brain was somehow confronts hurdles in the production of speech. It was observed that damage to the other side of the brain remains unaffected. Thus, it had been proved that linguistic abilities certainly placed in the left side of the brain. (Yule 1985:125-126)

Wernicke's Theory

According to this theory, damage to the Wernicke's area would lead to the comprehension problem in patients. Wernicke's theory is related to the representation of the sound. For reference, Wernicke's area is clearly shown in the above-mentioned figure. He discovered that patients with less comprehensive skills had brain injuries in his area to Broca's area which could further cause aphasia. The same view has been clearly presented in Elizabeth Ahlsen's book Introduction to Neuro-linguistics:Wernicke's theory was complicated project exhibiting the connection between the language functions and brain structures than had never come into light before. It has been illustrated that the contusions in between Wernicke's and Broca's areas is also one of the reasons of syndrome in speech occurrence, since the input to Broca's area is disturbed. The main parts of Wernicke's theory are:

- The difficult testimony of syndrome structure
- The concept of the flow of information
- The interpretation of portrayal.

Broca's area is said to have a "motor representation" of speech, while Wernicke's area is said to have an "auditory sound representation." By assuming that aphasia could be caused by damage to the connection between Wernicke's and Broca's areas, Wernicke predicted the discovery of the type of aphasia now called "conduction aphasia" (Ahlsen 2006:20)

Supplementary area:

This theory recapitulates that motor skills play a significant role in speech production. It actually involves physical movement in the articulation of speech sound. Even Trembly and Steven Dick also observed the same point that there are limited spatial precision to test the particular hypothesis for brain and behavioral relationship. Moreover, it is based on two language regions and aims at cortical structures. In addition to this, due to its limited spatialextent and cortical focus, it is difficult to make the connectivity between speech and language function.

ARTIFICIAL INTELLIGENCE IN NEURO-LINGUISTICS

It has been observed that scholastic Walsenburg and McBride conducted an empirical study on linguistics and non-linguistics cognitive ability on the patients suffering from different kinds of aphasia in the 19th century. They used the modus operandi of test psychology by taking one experimental and control group. The perusal was primarily based on the substantial diversified group of aphasias patients as per the artificial intelligence in psychology and cognitive science. The same view has been beautifully mentioned by Elisabeth Ahlsen in her book *An Introduction to Neuro-Linguistics*:

In psychology, a considerable study shows that theories related to linguistics and non-linguistics have tremendous impact on the cognitive ability related to aphasics and experimental group and in addition to this methodology has been supported by Weisenburg and McBride (1935). Many studies have been conducted in group in the nineteenth century using empirical and statistical analysis in terms of brain related issues. This consideration was chiefly underlying on the considerable different groups of people with varied types of aphasia. (Ahlsen 2006:35)

There are many therapies like clinical work, VIC (Visual Communication), Visual Activation Therapy (VAT), Melodic Intonation Therapy (MIT), Promoting Aphasics' Communicative Efficiency(PACE) which are quite helpful for language disorders in the brain. The advancement in science and technology has made it possible to study the brain activities in terms of linguistics and cognitive abilities with the support of neuroimaging and psycholinguistic technologies like CT SCAN, MRI, SPECT, MEG and EEG etc. In terms of healthcare, the main spotlight of the paper is primarily on language acquisition and the loss of language which seems to be quite challenging. In addition to this, many new technologies like artificial intelligence linguistic models are providing new prospects. Even Mirmamet *al.*, noted that:

Modern approach of language and brain carries the significant inscription of functional neuroimaging and they disappear from the conventional view in some respects. It has been observed that brain has both primary systems from micro linguistics which however contributes both in the comprehension as well as production of speech. (Miram: 2015)

CONCLUSION

The burgeoning Information and Transmission technology has ventured into the triennial domain and thus the main criterion that the academicians are devising and outlining to apply in teaching Second Language (SL). Whatsoever, one cannot ignore the varied perquisite after experiencing such progressive technology. Because of the underlying elements, the wide cognizance of language, transmission of messages, acquisition and tutoring is the leading condition of guiding any language.

A survey done on learners divulge that if the learners are provided knowledge with the help of new emerging technologies with vastly furnished recent computers, they can get rid of linguistics problems and can accumulate respectable wisdom in the field of communication skills. In addition to this, software like PRAAT is helpful in neurological speech articulation disorder Dysarthria (difficulty in articulation), seen in various neurological diseases like stroke, Parkinson's disease, Ataxia etc.

The software like Sky Pronunciation Suite is used in a neurological speech disorder Aphasia, where patients have difficulty understanding (Sensory Aphasia) or producing speech (Motor aphasia).It has been observed that with the help of Information and Communication Technology, the patients suffering from Alzheimer's, Agrammatism can get some benefits in the context of language learning. Moreover, the use of ancient methods is limited to the schoolroom only and they find it difficult to inculcate good comprehensive abilities in everyday life. Thus, one can locate the area in brain for his linguistic problems which further aids in improving listening, communication, comprehension and inscription skills respectively.In a nutshell, all the neuro-linguistics issues related to language production can be easily sorted out with the proper guidance and direction of experts in speech therapy and Information

and Communication Technology. Thus, different aspects of Neuro-linguistics like phonology, semantics, and syntactic structures, lexical have been discussed with the help of many theories which have been related to certain brain disorders such as prototype theory and semantic distinctive features, used for language analysis. In addition to this, sensory and motor functions help to find out the reason behind the language disorder in the respective area. The paper investigates the different problems of language disorders in the terms of agrammatism, aphasia and paragrammatism and how the linguistic aspects get affected due to such disorders. The results related to cross linguistics phenomena were also discussed. Thus keeping in mind, the structuralism and generative linguistics, the neurologists and linguists have ascertained that the psychological test method to be quite helpful in Neuro-linguistics theories and experiments.

To sum-up, the paper considers the different models and framework adopted in neuro-linguistic research and medical healthcare, aroused from varied sections like micro and macro linguistics including psychology, moreover varied ways such as neuroimaging and computer simulation are integrative collection of repercussion can be helpful for the patients of language disorder. There is a wider scope of open research in the areas like sensory motor, production of speech, pragmatics, body language, picture communication, communication analysis and cognitive neuropsychology.

REFERENCES

- Ahlsen, Elisabeth 2006. Introduction to Neurolinguistics. Amsterdam: John Benjamin Publishing Company.
- Brady MC, Kelly H, Godwin J, et al. (2016). Speech and language therapy for aphasia following stroke. *Cochrane Database Review*.
- Catani M, Allin MPG, Husain M, et al.(2007) Symmetries in human brain language pathways correlate with verbal recall. *Proc Natl Acad Sci U S A*,104:17163–8.
- Crystal, David (2002). *Language and the Internet*. UK: Cambridge University Press.
- Fridriksson J, den Ouden D-B, Hillis AE, et al.(2018). Anatomy of aphasia revisited. *Brain*;141:848–62.
- Kumar, Jitender. (2010). ICT for Empowering Teachers: Technology Support for Quality Instruction. *The CTE National Journal* volume viii, no.2:
- Mirman, D., Chen, Q., Zhang, Y., Wang, Z., Faseyitan, O. K., Coslett, H. B., & Schwartz, M. F. (2015). Neural Organization of Spoken Language revealed by lesion-symptom mapping. *Nature communications*, 6, 6762. <https://doi.org/10.1038/ncomms7762>. Accessed on 13 June 2022
- Naughton, John (1999). *A Brief History of the Future: Origin of the Internet*. London:Weidenfeld and Nicolson.
- Nunan, David (1996). *The Learner -Centred Curriculum*. Cambridge: Cambridge University Press.
- Patricia K.Kuhl. (2010).Brain Mechanisms in Early Language Acquisition.*Neuron*, Volume.67, Issue 5
- Seghier ML, Patel E, Prejawa S, et al. (2016). The PLORAS database: a data Repository for predicting language outcome and recovery after stroke. *NeuroImage*.124:1208–12.
- Tremblay P, Dick AS. (2016). Broca and Wernicke are dead, or moving past the classic model of language neurobiology. *Brain Lang*, 162.
