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NEUROLINGUISTIC: HOW BRAIN INJURIES (LIKE STROKES) AFFECT LANGUAGE

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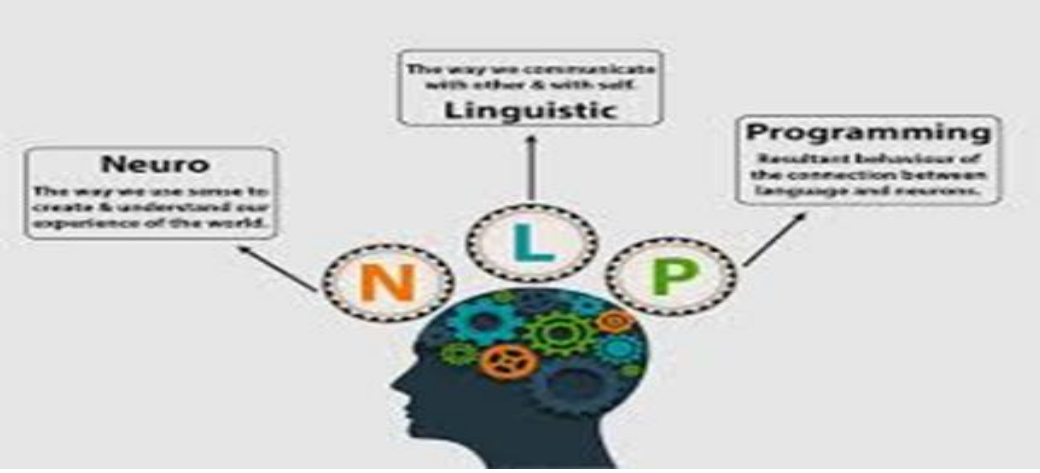
Abstract
Neurolinguistics is a field that looks at how our brain understands and uses language. When someone has a brain injury like a stroke it can damage the parts of the brain responsible for language. This can lead to problems with speaking, understanding, reading, or writing, a condition known as aphasia. In this article, we'll look at how language works in the brain, how injuries can affect it, and how the brain can sometimes recover through something called neuroplasticity-its ability to adapt and rewire itself. We'll also explore what current research and medical findings say about these topics.

Keywords: Neuro-linguistics, aphasia, stroke, brain injury, language processing, challenges in neurolinguistic research.

Introduction



Neuro linguistics is the study of how brain processes language. It also refers to how language (linguistics) and the brain (neuro) interact - in fields like cognitive science, linguistics, psychology, and therapy. Sometimes people also mean Neuro-Linguistic Programming (NLP), a self-help and communication method, but academically, "neuro-linguistics" focuses more on brain science and language.

Brain injuries can effect on language skills by affecting the brain areas which is responsible for the natural language generating, and conditions like aphasia, dysarthia, apraxia, dysphonia and many more.

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Neuro-linguistics also includes:

- How we understand words
- How we produce speech

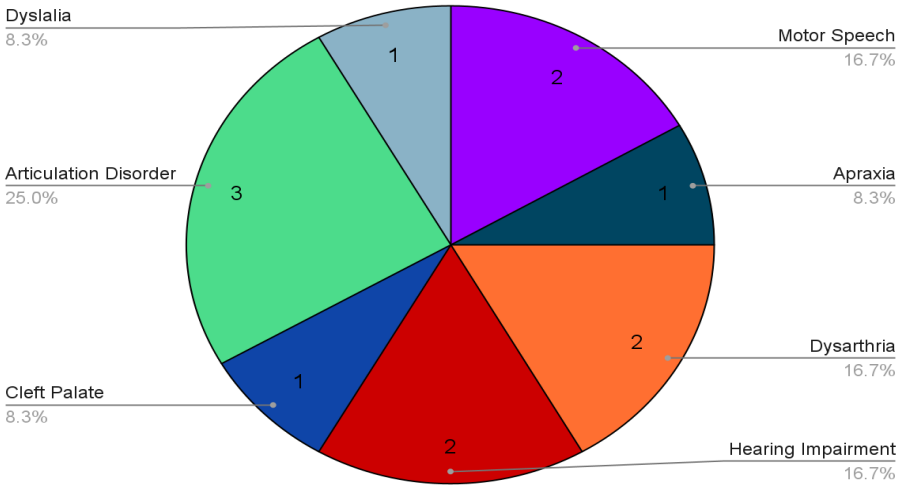
The brain has some territories that control distinct characteristics of language. According to the study these areas are located on the left hemisphere of the brain. The two key sections associated with language are:

BROCA'S SECTION: helps you talk and make sentences that follow the rules of grammar. It is located in the front part of the left side of your brain, close to the areas that control the movement of your mouth and tongue.

WERNICKE'S SECTION:

Helps us understand language and figure out what words and sentences mean. It's located toward the back of the left side of your brain, near the part that processes sounds.

If these areas or the connections between them get damaged, it can make it hard to understand or produce language properly.



DISORDERS OF NEUROLINGUISTIC:

Aphasia: It is a language disorder that often happens after a stroke. It means having trouble with language, but it doesn't affect how smart someone is. The kind and seriousness of aphasia depend on which part of the brain is damaged.

There are many types of aphasia:

- Broca's Aphasia: It happens when a stroke damages Broca's section. This makes it hard for the person to speak clearly and put sentences together.
- Wernicke's Aphasia: It happens when Wernicke's section is damaged. The person might speak smoothly and with correct grammar, but their words may not make sense or connect to what is being discussed. They also often struggle to understand language.

DYSARTHIA: It is caused by damage to the parts of the brain or muscles that control speech, like the vocal cords or tongue. This makes it hard to speak clearly.

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APRAXIA: It happens when the brain's motor areas (near Broca's area) are affected. This makes it hard for the person to control the muscles needed for speaking, so they might struggle to say words correctly, even though they understand language just fine.

DYSPHONIA: It is occurred when there are changes in the voice, like hoarseness or whispering, caused by weakness or paralysis in the muscles that control the vocal cords.

RIGHT HEMISPHERE LANGUAGE AND DAMAGE

According to the [Beeman and Chiarello] the left hemisphere plays a dominant role in language processing, damage to the right hemisphere can also affect communication, though in less direct ways. The right hemisphere is crucial for processing non-verbal elements of language, such as emotional tone, humor, and metaphor. Right hemisphere damage can result in pragmatic language deficits, such as difficulties interpreting sarcasm, understanding figurative speech, or maintaining appropriate conversational turn-taking.

TIMELINE OF NEUROLINGUISTICS:

In 1700 BCE: Ancient Egypt First recorded case: Egyptian papyrus describes a man unable to speak after a head injury.

In 19th century: Broca's Discovery (1861) Paul Broca finds a brain area responsible for speech. Patients could understand but not speak ("Broca's Aphasia").

In 1874: Wernicke's Discovery Carl Wernicke finds another brain area - patients could speak fluently but their words made no sense ("Wernicke's Aphasia").

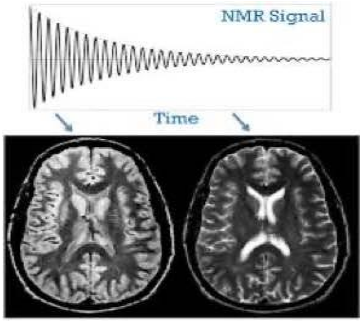
Early 1900s: Localization Theory Scientists believe specific parts of the brain control specific language functions. 1950s-1960s: Rise of Modern Linguistics Noam Chomsky introduces ideas about innate language ability ("Universal Grammar"). Neuro-linguistics starts connecting brain and Chomsky's theories.

In 1970s: Birth of Neuro-linguistics as a Field Scientists combine linguistics, psychology, and neuroscience to study how the brain processes language.

In 1990s: Brain Imaging Revolution Tools like fMRI and PET scans allow researchers to "see" language areas working live

METHODS USED IN NEUROLINGUISTICS:

FMRI: Brain imaging in which areas light up when talking or listening.



EEG: Brainwaves that shows timing of brain activity during language tasks.

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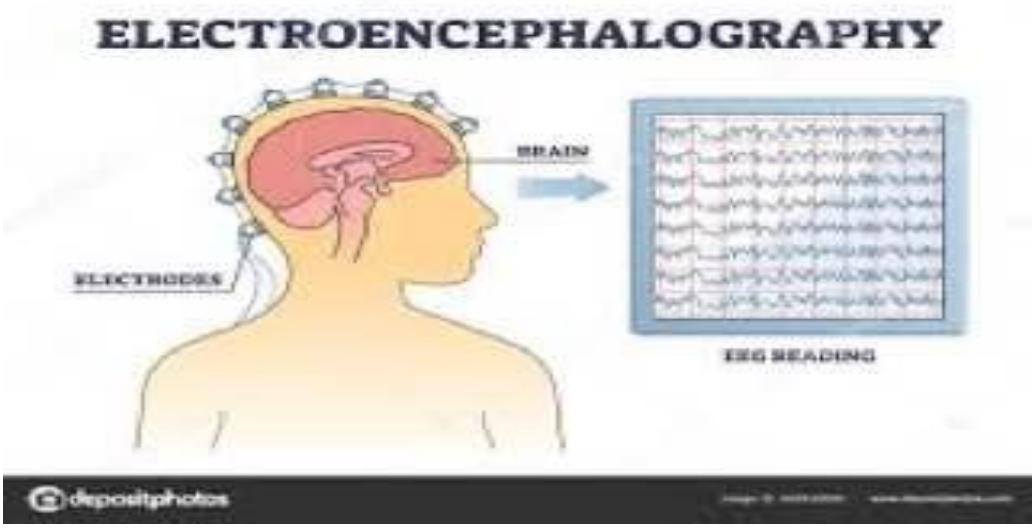

Challenges in Neurolinguistics Research and Future Directions

While we've learned a lot about how brain injuries affect language, there are still several challenges in this field. One major issue is the variety of language disorders. Every stroke is different, and the language problems that result can vary widely from person to person. This makes it hard to create one-size-fits-all treatment plans or predict how well someone will recover.

Another challenge is understanding neuroplasticity, or the brain's ability to heal and adjust. While there is hope that the brain can recover lost functions, we still don't fully understand how this process works. Some people recover well, while others show little progress, even with lots of therapy. Researchers are still studying what factors—such as the injury's location in the brain, when therapy starts, and whether there is other cognitive or physical challenges-affect recovery.

Conclusion

Neurolinguistics plays a crucial role in understanding how brain injuries, like strokes, impact language. Aphasia, which occurs when key brain areas responsible for language are damaged, can severely affect a person’s ability to communicate. However, the brain's potential to reorganize itself through neuroplasticity provides hope for recovery, with speech and language therapy being a key part of rehabilitation. Research analyses how the brain processes language, how neuroplasticity works, and how to improve rehabilitation methods will deepen our understanding of language disorders after brain injuries and help enhance the quality of life for those affected by different conditions.

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