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Redesigning the Brain: The Effect of Bilingualism on Neuroplasticity

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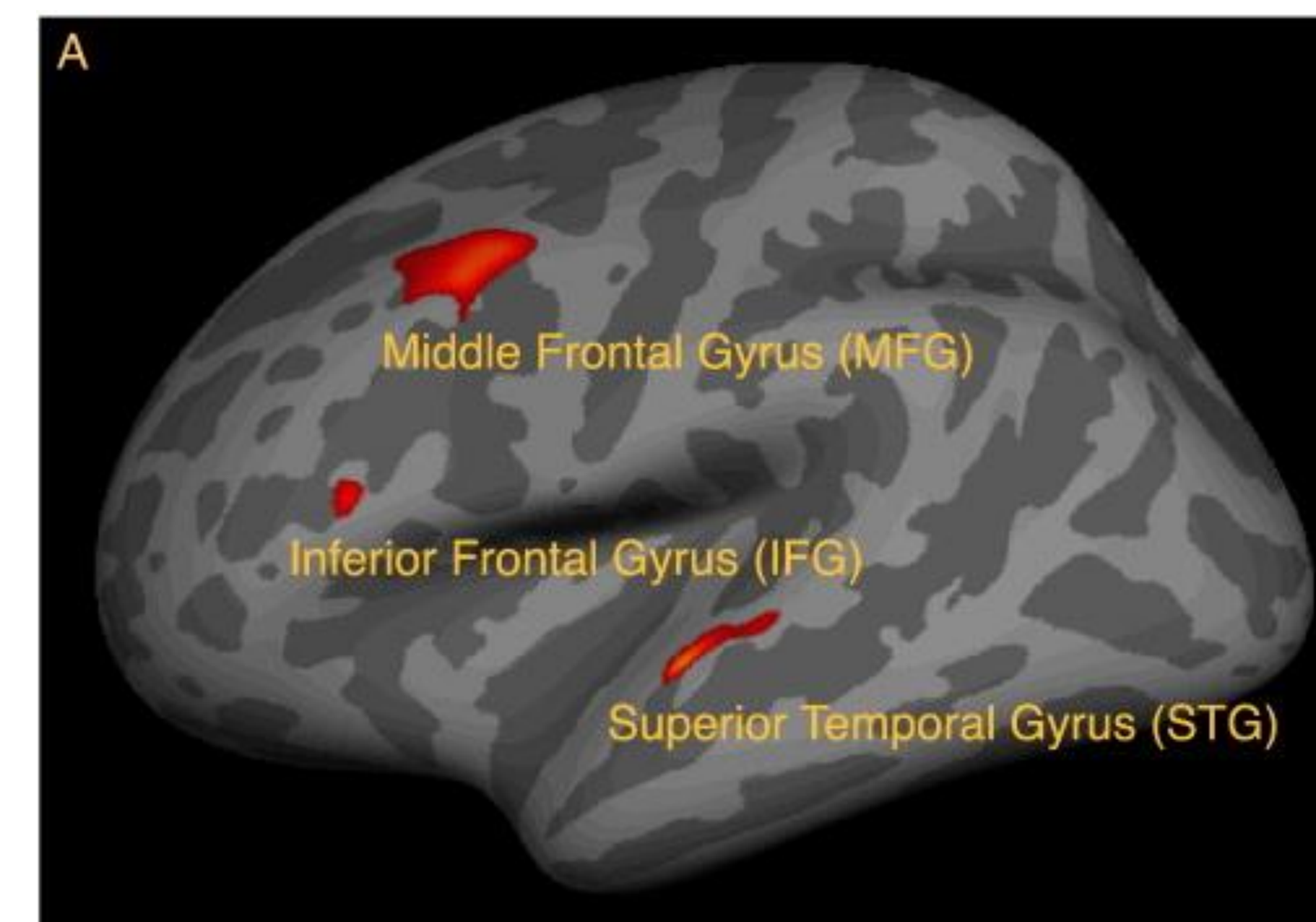
The Effect of Bilingualism on Neuroplasticity

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Abstract

Neuroplasticity is a relatively new subject of study in the past few decades. One's genetic background and environmental adaptations, are known to lay the foundation for one's capacity for neuroplasticity. This study focuses on bilingualism to examine the relative effects of genetic expression and environmental background on cognitive performance in those who are bilingual. Peer-reviewed scientific journals and recent studies were referenced to understand these correlations. Bilingualism has been found to have physiological effects that leads to greater connectivity in the brain, and ultimately, greater ability for cognitive development. Although concrete ratios of the influences of genetics to environment on neuroplasticity have not been found, future research on academic performance in relation to genetics and environment could help bolster current research findings on fostering neuroplasticity.



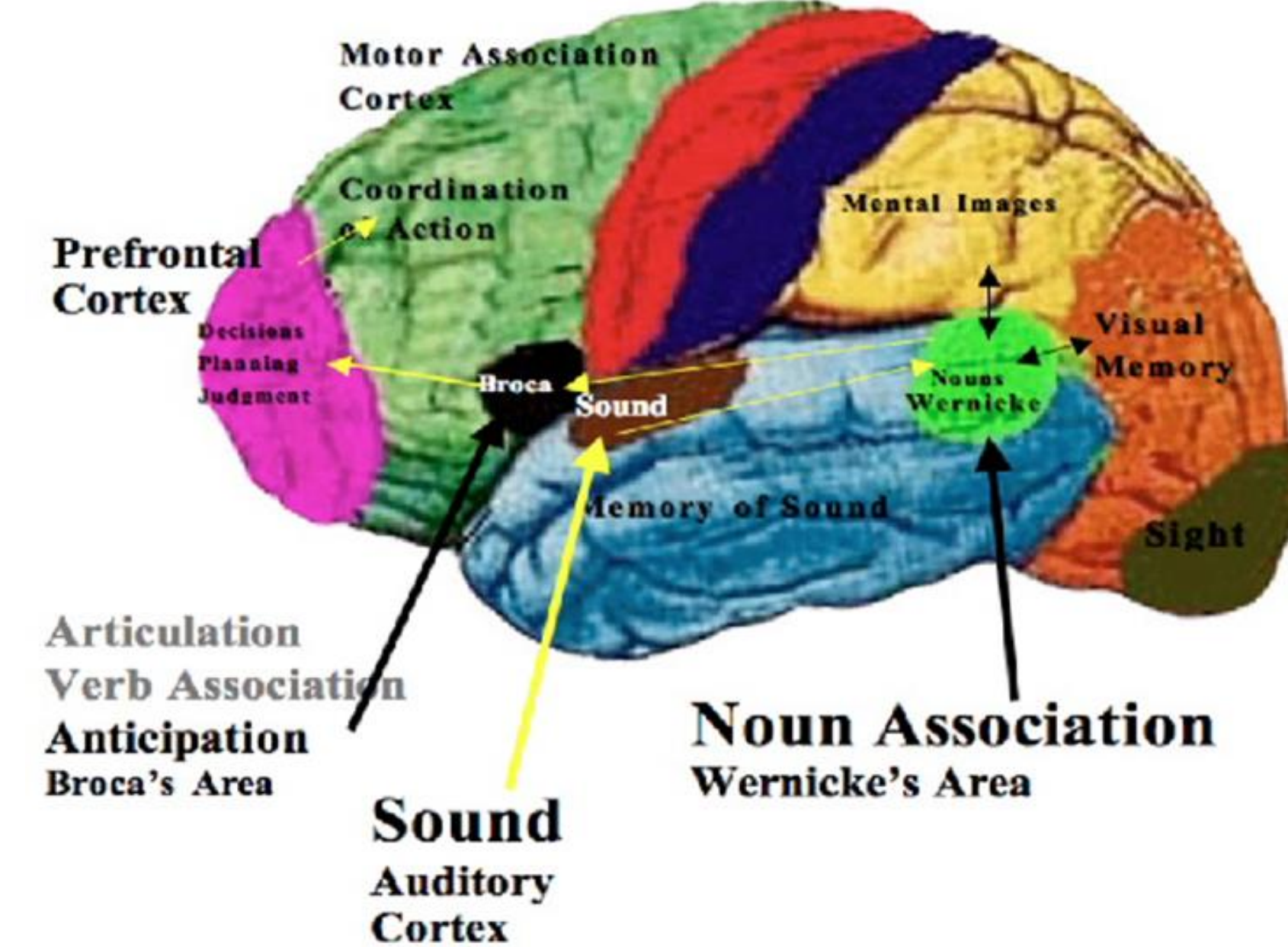
Cortical Thickness and Hippocampal Volume Associated with Foreign Language Acquisition.

Conclusions

Many believe that bilinguals have a disadvantage when it comes to social and thinking skills due to a bilingual's possible confusion between languages, but this arbitrary "social competence" is actually surpassed by bilinguals once they are proficient in both languages due to increased activity in the left lobe of their brains. Bilinguals are able to solve conflicts faster and perform cognitive tasks with more proficiency due to this increase in activity in the left lobe. Neuroplasticity, in turn, is fostered through cognitive performance based on the unique physiological effects of bilingualism. It would be of interest to investigate the impact of different types of languages, a one's second language, on levels of cognitive thinking, and ultimately neuroplasticity (i.e. Romance versus Germanic vs. Indo-European versus etc.) in future research.

Did You Know?

- While each study focused on a specific region of the brain, most studies pointed out that the left region of the brain showed more activation in a bilingual's brain than in a monolingual's brain during cognitive thinking tasks.
- The brain switching back and forth between two languages has been found to increase brain network connectivity.
- Bilingualism has been found, especially in adults, to increase white brain matter connecting the two hemispheres of the brain, which allows for greater area for brain connectivity.
- Bilinguals are better able to prevent dementia in old age and have a lower chance of contracting Alzheimer's disease than do monolinguals.
- Those who can speak more than one language are able to perform cognitive tasks and solve conflicts faster than monolinguals.



Regions of the Brain Involved in Language and Speech

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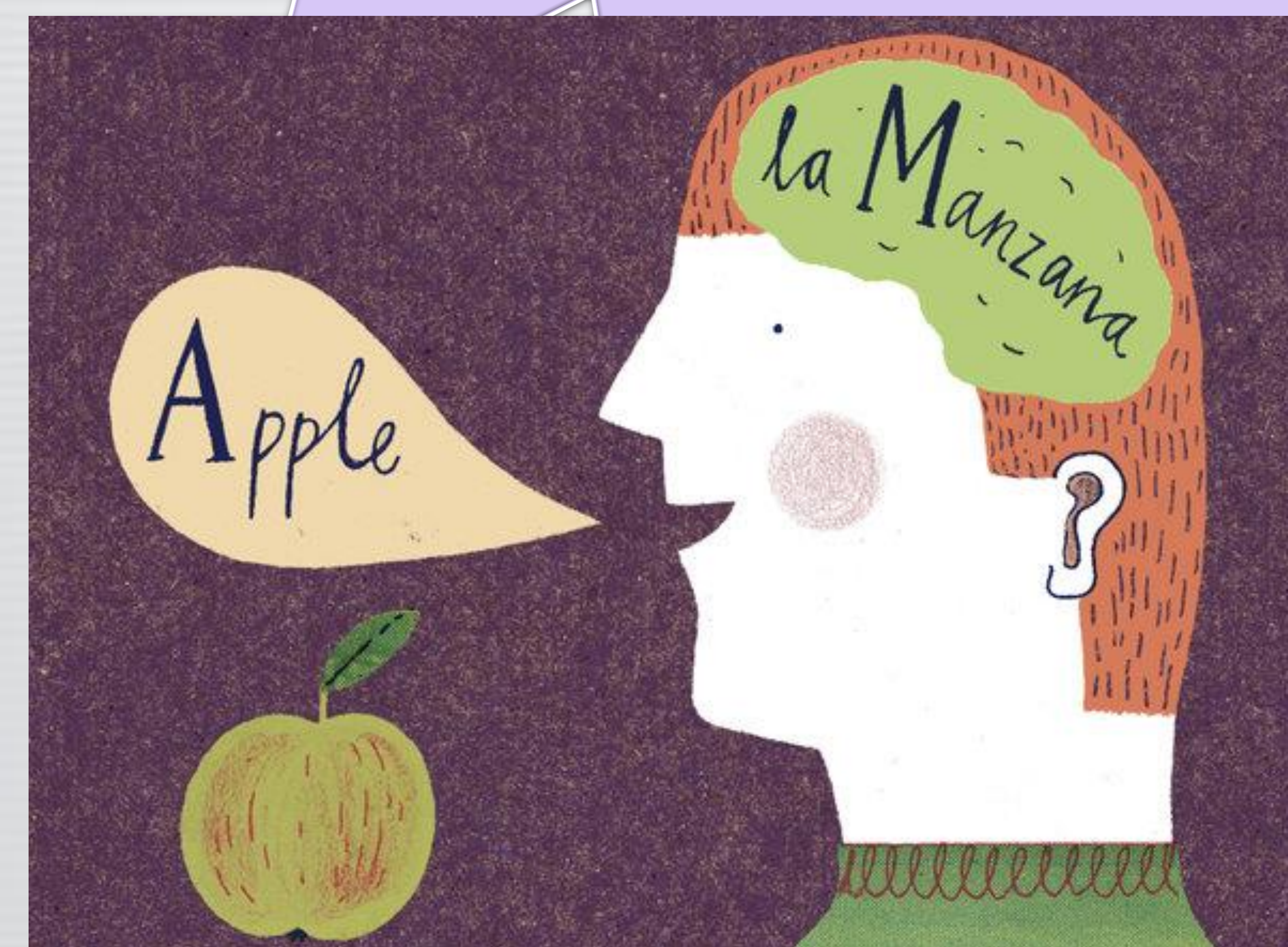
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Method

In order to understand the different types of effects bilingualism had on one's brain, I looked at various studies including French-English, Japanese-English and Spanish-English bilinguals. I primarily found that bilingualism had physiological effects on the different areas of the brain, including the Middle Frontal Gyrus, Inferior Frontal Gyrus, and Superior Temporal Gyrus. I also noticed that many studies did not discuss bilingualism's direct effect on neuroplasticity.

I had to start connecting different studies I found about neuroplasticity and those about bilingualism's effect on the brain to draw my own conclusions. The physiological effects of bilingualism were ultimately what I focused on as I researched how they affected neuroplasticity.

Based on the research thus completed, I found it necessary to focus on qualifying and quantifying the broad spectrum of neuroplasticity in terms of brain connectivity and cognitive thinking.



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For more information or a pdf version of my original paper and/or poster, please contact me:

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