Bilingualism makes the brain more efficient, especially when learned at a young age

MRI data from large sample shows increased whole-brain connectivity in people with a second language

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Source: McGill University

Summary:

A new study from The Neuro (Montreal Neurological Institute-Hospital) of McGill university, the University of Ottawa and the University of Zaragoza in Spain elaborates on bilingualism's role in cognition, showing increased efficiency of communication between brain regions.

Neuroplasticity is the brain's ability to build connections within itself, adapting to the surrounding environment. The brain is most plastic in childhood, forming new pathways in reaction to stimuli such as language.

Past research has shown that learning a second language may positively affect attention, healthy aging and even recovery after brain injury.

A new study from The Neuro (Montreal Neurological Institute-Hospital) of McGill university, the University of Ottawa and the University of Zaragoza in Spain elaborates on bilingualism's role in cognition, showing increased efficiency of communication between brain regions.

Scientists recruited 151 participants who either spoke French, English, or both languages, and recorded the age at which they learned their second language.

The participants were scanned using resting state functional magnetic resonance imaging (fMRI) to record whole-brain connectivity, rather than focusing on specific regions as was done in previous bilingualism studies.

fMRI scans revealed that bilingual participants had increased connectivity between brain regions than monolingual participants, and this connectivity was stronger in those who learned their second language at a younger age.

This effect was particularly strong between the cerebellum and the left frontal cortex.

The results mirror previous studies which have shown that brain regions do not work in isolation, but interact with others to understand and produce language.

Research has also shown that whole-brain efficiency aids cognitive performance.

This latest study reveals more about how bilingualism influences the brain connections we use to think, communicate and experience the world around us.

"Our work suggests learning a second language during childhood helps build a more efficient brain organization in terms of functional connectivity," says Zeus Gracia Tabuenca, the paper's first author.

"The results indicate that the earlier the second language experience, the broader extent of brain areas involved in neuroplasticity. That's why we are observing higher connectivity of the cerebellum with the cortex in earlier exposures to a second language."

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Story Source:

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Journal Reference:

1. Zeus Gracia-Tabuenca, Elise B. Barbeau, Shanna Kousaie, Jen-Kai Chen, Xiaoqian Chai, Denise Klein. **Enhanced efficiency in the bilingual brain through the inter-hemispheric cortico-cerebellar pathway in early second language acquisition**. *Communications Biology*, 2024; 7 (1) DOI: 10.1038/s42003-024-06965-1