# Brain response to a 'lost' first language

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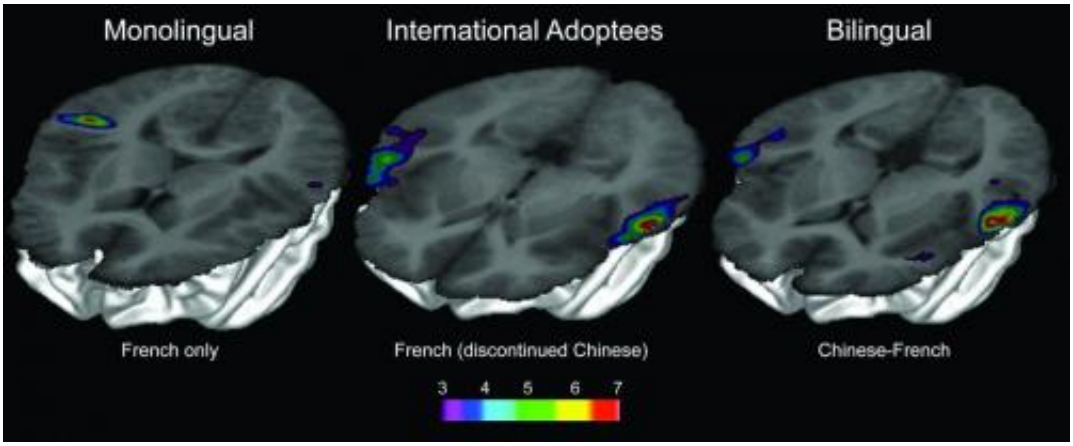


3-D rendered view of fMRI activation patterns for processing Chinese tones showing the unique pattern for the monolingual French group, and similarities in the patterns of activation for both the Chinese-French bilingual and the International Adoptee groups. Credit: Montreal Neurological Institute, McGill University

An infant's mother tongue creates neural patterns that the unconscious brain retains years later even if the child totally stops using the language, (as can happen in cases of international adoption) according to a new joint study by scientists at the Montreal Neurological Institute and Hospital - The Neuro and McGill University's Department of Psychology. The study offers the first neural evidence that traces of the "lost" language remain in the brain.

"The infant brain forms representations of language sounds, but we

wanted to see whether the brain maintains these representations later in life even if the person is no longer exposed to the language," says Lara Pierce, a doctoral candidate at McGill University and first author on the paper. Her work is jointly supervised by Dr. Denise Klein at The Neuro and Dr. Fred Genesee in the Department of Psychology. The article, "Mapping the unconscious maintenance of a lost first language," is in the November 17 edition of scientific journal *PNAS* (*Proceedings of the National Academy of Sciences*).

The Neuro conducted and analyzed functional MRI scans of 48 girls between nine and 17 years old who were recruited from the Montreal area through the Department of Psychology. One group was born and raised unilingual in a French-speaking family. The second group had Chinese-speaking children adopted as infants who later became unilingual French speaking with no conscious recollection of Chinese. The third group were fluently bilingual in Chinese and French.

Scans were taken while the three groups listened to the same Chinese language sounds.

"It astounded us that the brain activation pattern of the adopted Chinese who 'lost' or totally discontinued the language matched the one for those who continued speaking Chinese since birth. The neural representations supporting this pattern could only have been acquired during the first months of life," says Ms. Pierce. "This pattern completely differed from the first group of unilingual French speakers."

The study suggests that early-acquired information is not only maintained in the brain, but unconsciously influences brain processing for years, perhaps for life - potentially indicating a special status for information acquired during optimal periods of development. This could counter arguments not only within the field of language acquisition, but across domains, that neural representations are overwritten or lost from

the brain over time.

The implications of this finding are far reaching, and open the door for questions relating both to the re-learning of an early acquired, but forgotten, language or skill, as well as the unconscious influence of early experiences on later developmental outcomes.

**More information:** "Mapping the unconscious maintenance of a lost first language," by Lara J. Pierce, Denise Klein, Jen-Kai Chen, Audrey Delcenserie, and Fred Genesee.
www.pnas.org/cgi/doi/10.1073/pnas.1409411111

Provided by McGill University

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