

The Science of the Bilingual Reading Brain

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Educational Solutions

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Branches of Science that Give Emergent Bilinguals a Reading Advantage



Neurocognitive Functions & Diversity



Language development, applied linguistics & sociolinguistics



Bilingualism & Dynamic Transfer



Metalinguistics & Human Development



Culturally Responsive Teaching & the Brain



Trauma and the Brain



Psychology & Physiology

PARTS OF THE BRAIN THAT FUNCTION UNIQUELY IN EMERGENT BILINGUAL READERS:

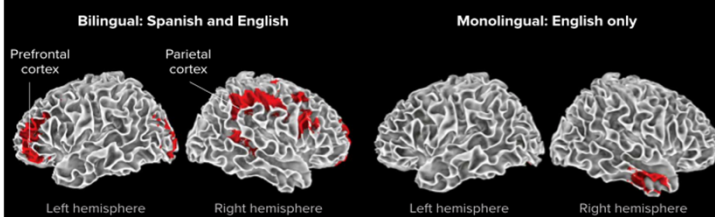
TEMPORAL LOBE (1) holds our semantic (facts) and episodic (events) memories that are often distinct from school background knowledge, driving students' fight-flight responses to teachers, texts, tools, and talk. (2) Holds Wernicke's (speech processing and judgment) and Broca's area (speech production) – critical in comprehension, inferences, and attaching meaning to what readers hear and what that means to each individual.

OCCIPITAL LOBE: (1) serves as the visual processing station, and (2) visual integration & interpretation (needed for comprehension) which is influenced by L1 episodic memories of visual information being interpreted.

FRONTAL LOBE: (1) serves as the executive center, controlling the phonological loop which takes visual information through the episodic buffer to match with stored graphemes (in student's L1 & L2). (2) It holds most dopamine-sensitive neurons that determine the reward of current actions based on how similar they are to prior reading activities and how motivated they should be to even engage. (3) Regulates visual search and gaze (scanning of words/texts) for all pertinent details removing unnecessary eye movement during reading, which is impossible if meaning isn't prioritized.

PARIETAL LOBE: critical in mapping the visual world, like in reading or when bilinguals must reason around what linguistic resources to deploy based on similar visual encounters.

Gray-matter volume in bilinguals vs. monolinguals



Credit: Adapted from O.A. Olulade *et al* / *Cerebral Cortex* 2016

Key Factors in an Evidence-based View of Biliteracy

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La comprensión lingüística + oralidad + el conocimiento fonético/decodificación + la transferencia =

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comprensión + lectoescritura tras dos idiomas

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Linguistic comprehension + oracy + explicit phonics/decoding + transfer = comprehension + biliteracy

Critical Components in Creating Access to Biliteracy Instruction

The Student Profile

- Who is the reader?
- What does the evidence detail about the nature of reading abilities and any challenges?
- What is the work that must be done to address it?

The Functions & Processes Involved in Reading

- Executive
- Linguistic
- Auditory
- Visual
- Perceptive

The Developmental Progression

- Oracy, vocabulary & translanguaging
- Phonological awareness
- Phonics
- Writing
- Complex words
- Opaque orthographic

Most Effective Strategies

- What are the most effective strategies for the specific skills being developed within that progression?

Agency & Motivation

- How does the teacher maintain energy, motivation, and agency for students that show atypical patterns when they arise?

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