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The Multidimensional Connection between Second Language Acquisition and Neuroscience: The Complex Relationship between Brain Hemispheric Involvement and Impact on Second Language Development

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GOAL AND RATIONALE

To present and analyze literature that addresses second language acquisition among adolescent and adult English language learners that answers the question, what does the current body of research say about the impact of neurological imaging on second language acquisition for adolescent and adult learners?

ABSTRACT

Introduction: Second language acquisition during adolescence through adulthood is significantly impacted by structures in both the right and left hemispheres that process language. An individual's degree of proficiency is achieved at least in part by language-related brain regions that are effective in processing language in order to achieve high levels of proficiency in the second language (L2). Neurological imaging studies such as functional magnetic resonance imaging (fMRI), magnetoencephalography (MEG), and electroencephalography provide essential information about how language changes in the brain regarding the language processing regions. Educators can use information obtained from these imaging studies to enhance their practice when teaching with adolescent and adult English learners, understanding both the right and left hemispheres are involved during language processing, will better assist educators in providing strategies that will meet their students' needs during L2 development.

Methodology: I conducted a literature review on research involving adolescent and adult hemispheric neuroimaging in order to gain insight into this growing research area. The purpose of the research was to collect and depict the current body of literature regarding the connections between brain language processing and hemispheric involvement throughout the lifespan during adolescence and adulthood. Most of the research used a clinical neuroimaging approach to determine the development and usage of language in the brain. This approach allows the clinical neuroscience and explores the integral role that neurological imaging serves in understanding the language processing centers in both the right and left hemispheres in the brain have proven to be activated during an individual's study of a second language. Second language vocabulary development during adolescence and adulthood indicates that the brain's grey matter impacts both the right and left hemispheres, therefore, second language acquisition is a highly complex process that involves several critical features that must align in order for successful learning of and ultimately measuring a second language.

The neurological imaging illuminates the exact regions of the brain that impact second language development. Therefore, the imaging provides critical insight into vocabulary development in adolescent and adult English learners. L2 vocabulary is learned through proficiency and language development in L1. Understanding how neuroscience explains the inner-working of second language acquisition provides key information knowledge about the acquired and native language acquisition in a second language. The relationship between neuroscience and second language development is therefore, multifaceted and complex.

RESULTS

Clinical neuroimaging and hemispheric involvement provide critical insight into vocabulary development in adolescent and adult English learners. L2 vocabulary is learned through proficiency and language development in L1. Understanding how neuroscience explains the inner-working of second language acquisition provides key information knowledge about the acquired and native language acquisition in a second language. The relationship between neuroscience and second language development is therefore, multifaceted and complex.

DISCUSSION

Relationship between Neuroimaging and Educational Implications

Educators can use the research explaining acquisition of L2 vocabulary when teaching English and the connection to the right hemisphere.

Integration between Clinical Neuroscience Imaging, Hemispheric Involvement, and Educational Implications

Defined relationship between the age of second language acquisition, socioeconomic status, and proficiency in L1 when striving to learn L2.

Bilateral lateralization of the brain

Left: monolingual activation

METHODOLOGY

SECOND LANGUAGE ACQUISITION DURING ADOLESCENCE AND ADULTHOOD

Clinical neuroimaging indicates that the language processing centers in both the right and left hemispheres in the brain have proven to be activated during an individual's study of a second language. Second language vocabulary development during adolescence and adulthood indicates that the brain's grey matter impacts both the right and left hemispheres. An individual's degree of proficiency is achieved at least in part by language-related brain regions that are effective in processing language in order to achieve high levels of proficiency in the second language (L2). Neurological imaging studies such as functional magnetic resonance imaging (fMRI), magnetoencephalography (MEG), and electroencephalography provide essential information about how language changes in the brain regarding the language processing regions. Educators can use information obtained from these imaging studies to enhance their practice when teaching with adolescent and adult English learners, understanding both the right and left hemispheres are involved during language processing, will better assist educators in providing strategies that will meet their students' needs during L2 development.

This fMRI study illustrates the relationship between an individual's age of second language acquisition and vocabulary proficiency.

The relationship between neurological imaging and hemispheric involvement during adolescence and adulthood is multifaceted and complex. The right hemisphere is involved during phonological processing of lexical tones and the left hemisphere serves an integral role during phonological processing of lexical tones. The bilateral lateralization of the brain involves several critical features that must align in order for successful learning of and ultimately measuring a second language.

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The relationship between neurological imaging and hemispheric involvement during adolescence and adulthood is multifaceted and complex. The right hemisphere is involved during phonological processing of lexical tones and the left hemisphere serves an integral role during phonological processing of lexical tones. The bilateral lateralization of the brain involves several critical features that must align in order for successful learning of and ultimately measuring a second language.