



NEUROLINGUISTICS IN THE PHILOLOGICAL CONTEXT: RESEARCH APPROACHES AND EDUCATIONAL PRACTICES

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Abstract: This article explores the integration of neurolinguistic research into the field of philology as a means of deepening our understanding of language processes and enhancing the effectiveness of language education. It analyzes key directions in neurolinguistics, research methods, and their applied value for language teaching, literary analysis, and the development of students' metacognitive skills. Educational strategies grounded in neuroscience are proposed, taking into account the cognitive characteristics of learners.

Keywords: *neurolinguistics, philology, language learning, cognitive processes, interdisciplinary approach, neuroeducation*

Contemporary philology is undergoing a re-evaluation of its methodological boundaries. In the age of digital technologies and interdisciplinary research, the need to integrate the humanities with advances in natural and cognitive sciences becomes increasingly evident. Neurolinguistics — the study of the neural mechanisms of human language activity — is one such point of intersection [Zhrebilo, 2019. 45].

Traditionally, philology has been associated with textual analysis, cultural interpretation, and historical-linguistic research. However, in today's educational landscape, there is a growing need not only for humanistic but also for cognitive literacy — the ability to understand how individuals process language, what occurs in the brain during reading, writing, or verbal communication, and what pedagogical conclusions can be drawn from this knowledge.

The aim of this article is to present neurolinguistics as a relevant field for philologists, to outline its main research approaches, and to examine educational practices based on neurolinguistic data.

Neurolinguistics as a Scientific Discipline: Theoretical Foundations and Methods

Neurolinguistics emerged at the intersection of linguistics, neurobiology, and psychology. It studies which areas of the brain are involved in language activity, how

information is encoded, stored, and retrieved [Friederici, 2017. 24], how speech develops in children, and how it is disrupted in pathologies.

Methods include fMRI, EEG, TMS, and behavioral experiments [Rodden & Stemmer, 2008. 57].

Key questions in neurolinguistics include:

- What are the neural bases of language comprehension and production?
- How does the brain distinguish and process phonemes, morphemes, and syntactic structures?
- What happens in the brain during second language acquisition?
- How are emotion, memory, and language interconnected?

Research methods include:

- fMRI (functional magnetic resonance imaging) – allows observation of brain activity during language tasks;
- EEG (electroencephalography) – records electrical brain activity in response to words and sentences;
- TMS (transcranial magnetic stimulation) – helps determine how specific brain areas influence speech;
- Behavioral experiments – assess speech responses and reaction times;
- Analysis of speech disorders (aphasia, dyslexia, alexia, etc.) – provides insight into “normal” language functioning through pathology.

One key finding has been the identification of specialized brain regions: Broca's area (speech production), Wernicke's area (comprehension), and temporal and frontal lobes responsible for semantics and syntax.

The Role of Neurolinguistics in the Development of Language Competence

Philological education has traditionally focused on mastering language as a system. However, understanding the cognitive and neurophysiological processes underlying speech activity allows educators to design more effective teaching strategies. Knowledge of how the brain processes language can enrich philological education. For instance, bilingualism influences the development of the prefrontal cortex, which is responsible for cognitive control [Kroll & Bialystok, 2013. 141].

Foreign Language Teaching

Neurolinguistics provides answers to many practical questions arising in second language instruction:

- Why is phonetic acquisition harder for adults?

- How does bilingualism affect the brain?
- What are the most effective vocabulary memorization techniques?

Studies show that multimodal stimuli (visual, auditory, motor) activate more neural networks, enhancing learning. Associative learning (linking new words with images, emotions, movement) improves long-term memory. Understanding learners' cognitive differences supports educational individualization. It is crucial to note that learning through multimodal stimuli improves retention [Shakhnarovich, 2018. 102].

Writing Skills Development

Developing written speech involves cognitive processes such as text planning, structure organization, and work with syntax, semantics, and orthography. Neuroscientific data offer new perspectives on common student errors, which may reflect immature neural pathways rather than mere carelessness.

Text Comprehension

The perception and interpretation of text are central to philological education. Neurolinguistics shows that understanding metaphors, irony, and figurative language activates not only language-related areas but also emotional and motor brain zones, supporting the concept of embodied cognition.

Neurolinguistics in Educational Practice: From Research to Methodology

Integrating neuroscience knowledge into pedagogy can revitalize philological education. Key areas where this is especially relevant include:

Individualized Learning

Neuroscience confirms that learning styles (auditory, visual, kinesthetic) have neural foundations. Recognizing these differences enables educators to build personalized learning trajectories, particularly in inclusive education settings.

Addressing Reading and Writing Difficulties

Understanding the neurophysiological causes of dyslexia and dysgraphia allows for effective correction strategies, involving collaboration among speech therapists, neuropsychologists, and philologists.

Use of Digital Technologies

Neurolinguistics informs the development of adaptive educational apps that monitor cognitive load, learning pace, and memory zones. These tools help automate feedback and increase student motivation.

The Interdisciplinary Future of Philology

Neurolinguistics offers approaches that make philology more practical and scientifically grounded. This supports the development of students' metacognitive strategies [Hasson & Small, 2008. 87].

Philology, while preserving its humanistic essence, gains new momentum through collaboration with brain and cognitive sciences. Such integrative approaches shape a new educational paradigm:

- Based on scientific data (evidence-based teaching);
- Aiming for conscious learning (metacognitive learning);
- Focused on students' neuropsychological well-being (neuroeducation).

To prepare a new generation of philologists, educational programs must include introductions to neurolinguistics, cognitive psychology, and neuro-pedagogy. This will not only broaden students' horizons but also allow them to perceive language as a living cognitive system.

Neurolinguistics provides philologists with new tools for analyzing language, literature, and speech activity. It bridges traditional humanistic approaches with precise neuroscientific data, paving the way for more effective, research-based education. Integrating neurolinguistics into philological knowledge fosters interdisciplinary thinking — a quality increasingly valued in today's academic and educational communities.

This integration opens new horizons in both research and education, shaping a new type of philologist: an interdisciplinary specialist equipped with both linguistic and cognitive tools for language analysis.

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