

## Abstract

Neurolinguistics is a young and dynamic subject. It has become one of the fastest developing neuroscience subjects during its 40 year history. It is also probably the most dynamic linguistic discipline. It is quite uneasy to keep track of all (though often partial) important studies in this area because there are approximately 2000 new studies published every year. It is also quite difficult to evaluate and align these studies into a broader development context. The aim of this work is to accomplish this formidable task. It provides a basic insight into the history and current development of the subject with regard to related neuroscience interdisciplinary fields of study. It particularly stresses Czech language, local research environment and theoretical continuity (or better local discontinuity) of the inquiry.

This work – as a first more complex publication in the Czech language – should serve as a basic commented overview of neurolinguistic issues. Theoretical knowledge is interconnected with clinical aphasiology field experience (including examples of language-disabled speech) and also general linguistic views of language system. Specific issues described by each subject are mentioned in the chapter introductions.

Neurolinguistics is a part of cognitive science (humanities) as well as neuroscience (natural science). This seemingly inorganic connection is a source of conflicts among theoreticians, who study the correlation between neural and linguistic structures. On the other hand, this is the reason why current issues in neurolinguistics have become more popular among linguistic disciplines during the last ten years. It brings really empirical, proof-supported knowledge of how the language structures and processes in the human body work.

Some of this acquaintance is so fundamental that it stimulates restructuring of theoretical approaches to language processing. Due to the methodological problems of imaging techniques (a necessary tool for neurolinguistics work these days) neurolinguistics is still criticized by the linguistic “humanities”. Some older theoretical proposals on functional anatomy of language were (with the use of neuroimaging) confirmed while some others were refuted. Many new opinions appeared in response to current discoveries of neuroimaging. Rapid development in this field of study was so far only partially reflected by the theory. Description of neuroimaging techniques: their classification, interpretation of their functioning, highlighting of their advantages and disadvantages, review of actual results and expected future in related linguistic research are an integral part of this work.

As more and more confirmed it is not possible to examine language functions without regard to other cognitive domains. Following the summary of actual consensus on functional language anatomy this work also introduces selected non-language cognitive domains: memory, attention, emotions and unconsciousness – always in relation to language processing.

During last ten years general neuroscience gave us a set of important suggestions: in genetics (language gene FOXP2), comparative research of neuroanatomy and neurophysiology of animals and humans (mirror system hypothesis) or in memory research. These findings are the source of newer hypothesis (for example the proximity principle or a theory of two language streams). Clinicians working with language disordered patients also play an important role in shaping the framework of neurolinguistics. *Clinical aphasiology* as a healthcare discipline (as well as other related neuroscience subjects such as neuropsychology) was a predecessor of neurolinguistics and has incited its inception. *Linguistic aphasiology* - philological discipline dealing with language disorders, its diagnostics, classification and therapy in the framework of applied linguistics - is a rich splinter of neurolinguistics, which derives its benefits from clinical aphasiology, a science of much richer and longer history. Language disorders can be viewed through the prism of fields which followed them significantly earlier than linguistics (traditional aphasiology classification: aphasic syndromes, the view of medicine: congenital disorders or general mechanism of their formation and development). Another approach is purely linguistic:

organization according to language symptoms with regards to formal and content aspect of production and comprehension of language.

Applied linguistic aphasiology should pay much higher attention to diagnostic and therapeutic aids: test batteries, isolated tests and therapeutic aids for speech disabled, especially local or adopted tests require linguistic corrections.

Psycholinguistics is probably the closest discipline to neurolinguistics. It tries to model language processing based on the concept of mind and by utilizing behavioral experimental methods. Language production, perception and comprehension are viewed somewhat differently in its scope. These two fields of study only meet in some aspects. When developing new hypothesis about functional language systems in the brain, neurolinguistics should consider both states: "healthy" and impaired. These states and differences between them must be defined first (to set-up a norm). At the same time all means of expression shall be taken into account: verbal (spoken, written, read, inner speech) and nonverbal language (gestures, facial expressions), spoken, written, read and inner speech modality, all language channels (oral-auditory, visual, manual). Also all language plains (phonetics, phonology, morphology and syntax, discourse) as well as lateralization of language functions and means of its detection shall be included.

Interconnection of theoretical and practical opinions of linked neuroscience disciplines is demanding. This work tries to summarize all the mentioned views in their historical continuity, emphasize important findings of particular theoretical schools and directions and question their contribution to actual neurolinguistics. Historical overview also points out at competing evolution lines. They have appeared mainly in the last two centuries under different names but often with the same content and focus. The ongoing and constant updating of the results of my own experimental work, both group and individual, are included as an integral part of the work: *Test of the idiomatic comprehension* aimed at language functions of the right hemisphere with regards to processing of lexicalized metaphor and *Longitudinal DTI study of the subject with mixed language disorder and other cognitive deficits*. Section dedicated to the testing of communication competence presents pilot test battery A08-09 and the results of its application on a selected sample of subjects with different language disorders of language perception and comprehension.