COGNITIVE PROCESSES IN LANGUAGE, LANGUAGE ACQUISITION, SPEECH COMPREHENSION AND PRODUCTION, AND THE MENTAL MODEL OF LANGUAGE IN THE BRAIN

OLTINOY SULTANBAYEVA OMONBAY QIZI
Uzbekistan State University of World Languages
Teacher-trainee

ABSTRACT

This article provides a theoretical analysis of cognitive foundations of language, language acquisition processes, mechanisms of speech comprehension and production, as well as the formation of the mental model of language in the human brain. The research is based on modern approaches in psycholinguistics and cognitive linguistics, aiming to explain the interconnection between brain activity and language.

The study explains that language acquisition occurs in a step-by-step process, including listening, perception, comprehension, and speech production, and highlights the interdependence of these stages. It also emphasizes the role of cognitive processes such as memory, attention, thinking, and perception in speech production.

Furthermore, the research analyzes the mental model of language in the brain, i.e., the encoding and processing of linguistic units in human cognition. This model is scientifically justified as a key mechanism ensuring fast and efficient language comprehension and speech formation.

Overall, the topic contributes to understanding the complex relationship between language and thought and the internal mechanisms of language acquisition.

Keywords: *cognitive language processes, language acquisition, speech comprehension, speech production, mental model, psycholinguistics, cognitive linguistics, brain-language interaction, perception, cognition.*

INTRODUCTION

Language is one of the most important tools of human thought and social life. It is not only a means of communication but also a product of complex cognitive processes. In modern linguistic and psycholinguistic studies, language acquisition, speech comprehension, and production are closely linked to brain activity. Therefore, language should not only be viewed as a grammatical system but also as a complex mental system interconnected with cognitive mechanisms.

The relevance of this topic lies in the fact that cognitive processes such as perception, memory, attention, and thinking actively participate in language acquisition. Speech comprehension and production emerge as a result of the coordinated functioning of these processes. Moreover, the formation of a mental model of language in the brain enables fast, accurate, and efficient language use.

The aim of the research is to analyze the cognitive processes of language, mechanisms of language acquisition, speech comprehension and production, and to explain the formation of the mental model of language in the brain.

The objectives include identifying the relationship between cognitive processes and language, analyzing stages of language acquisition, studying mechanisms of speech comprehension and production, and revealing the linguistic significance of the mental model.

MAIN PART

Grammatical aspects of the language system are directly associated with complex processing mechanisms occurring in the human brain, as studied in cognitive linguistics and psycholinguistics. Grammar is not merely a set of rules but

an internal cognitive mechanism that regulates language acquisition, comprehension, and production.

In modern linguistics, Noam Chomsky's theory of generative grammar plays a central role. According to this approach, the human brain contains an innate linguistic system responsible for grammatical structures, known as Universal Grammar. From this perspective, grammatical processes are not simply learned externally but are activated internal mental structures.

One of the key stages of grammar is syntactic structure. Syntax defines the arrangement of words in a sentence and their grammatical relations. In speech production, a semantic structure is formed first, which is then encoded into grammatical form. This process is explained by psycholinguistic models, especially speech production models.

According to Lev Vygotsky's sociocultural theory, grammatical structures first develop in external speech and are later internalized. This demonstrates that grammar is not a ready-made system but is gradually internalized through communication.

Morphology is another important aspect of grammar. It studies word structure, morphemes, and word formation processes. During language acquisition, individuals first recognize lexical units and then automatically learn to apply their grammatical forms such as tense, number, case, and person. This process occurs at a subconscious level and ensures speech fluency.

In psycholinguistic research, Stephen Krashen's Input Hypothesis emphasizes the importance of comprehensible input in acquiring grammar. According to this theory, grammatical structures are not learned through memorization but through contextual understanding.

Grammatical processes also play a crucial role in speech comprehension. During comprehension, the brain first processes phonetic signals, then converts them

into lexical units, and finally reconstructs meaning based on grammatical structures. This process is extremely fast and closely linked to working memory.

Alan Baddeley's working memory model explains that grammatical processing relies on temporary storage and manipulation of information during speech production and comprehension.

Overall, grammatical processes are the central cognitive mechanism of language, governing both production and comprehension.

From the perspective of cognitive linguistics, language acquisition, speech comprehension, and production, as well as the mental model of language in the brain, are key areas explaining linguistic activity in human cognition. Language is not merely a grammatical system but a complex cognitive mechanism functioning in the brain.

Language acquisition is one of the most important cognitive stages in human development. The child first perceives spoken language, stores it in memory, and gradually constructs an internal grammatical system. For example, early utterances such as "child play" or "I go" gradually develop into grammatically correct forms like "The child is playing" and "I am going to school." This shows that language acquisition is based on cognitive processing and generalization rather than memorization.

Speech comprehension is also a complex cognitive mechanism. When hearing a sentence such as "The student is reading a book," the brain automatically identifies grammatical roles such as subject, object, and verb, forming meaning accordingly. Speech production is the transformation of thought into linguistic form. For example, the thought "I need to prepare my lesson" may be expressed as "I am preparing my lesson" or "I need to prepare my lesson," depending on grammatical selection.

The mental model of language refers to the structured storage and processing of linguistic units in the brain. Words and grammatical rules are stored in an interconnected system, allowing rapid retrieval during speech.

From a cognitive linguistic perspective, language and thought are deeply interconnected. Language serves not only as a communication tool but also as a means of thinking.

Overall, language acquisition, speech comprehension, production, and mental model formation are the result of continuous cognitive and grammatical processing in the human brain.

TABLE (PROCESS DESCRIPTION).

Stage	Cognitive Process	Grammatical Process	Example	Result
1	Formation of thought	No linguistic form yet	“reading a book is ongoing”	semantic idea
2	Structuring meaning	subject, object identified	I book reading	basic structure
3	Lexical selection	word retrieval	I, book, reading	lexical items
4	Grammatical mapping	tense/person selection	present continuous action	grammatical clarity
5	Syntactic formation	sentence structure	I am reading a book	full sentence
6	Morphological adjustment	grammatical markers applied	case/tense agreement	correctness
7	Phonological preparation	speech sound planning	prepared utterance	ready speech
8	Speech production	articulation	I am reading a book	spoken output

CONCLUSION

The study of cognitive processes in language, language acquisition, speech comprehension and production, and the mental model of language shows that language is not merely a means of communication but a complex and dynamic cognitive system. Grammatical processes serve as the central mechanism of this system, regulating the transformation of thought into language and vice versa.

Findings indicate that language acquisition is not limited to memorizing rules but involves cognitive stages such as perception, comprehension, generalization, and automation. In speech comprehension, the brain rapidly analyzes grammatical structures to reconstruct meaning, while in production, semantic ideas are encoded into grammatical and phonological forms.

The mental model of language ensures structured storage and efficient retrieval of linguistic information. This model significantly enhances both speech production and comprehension.

Overall, modern psycholinguistic and cognitive linguistic approaches interpret language as an active and dynamic system of human cognition. Therefore, studying language requires not only linguistic knowledge but also a deep understanding of cognitive mechanisms.

REFERENCES

1. Academy of Sciences of the Republic of Uzbekistan. *Uzbek Grammar (General and Theoretical Issues).* Tashkent: Fan Publishing, 2016.
2. National University of Uzbekistan. *Introduction to Linguistics* (textbook). Tashkent: University Publishing, 2019.
3. Sodiqov, Q. *Modern Uzbek Literary Language.* Tashkent: O‘qituvchi Publishing, 2014.
4. Mahmudov, N. *Language and Thought (Linguocognitive Approaches).* Tashkent: Fan Publishing, 2020.