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BRIDGING THE GAP BETWEEN FORMAL LINGUISTICS AND COGNITIVE LINGUISTICS THEORIES

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Abstract: *The historical and theoretical distinction between Formal Linguistics and Cognitive Linguistics is examined in this article. While these two schools of thought are commonly regarded as mutually exclusive, this research proposes a «Dynamic Interface Model.» By combining the structural integrity of Generative Grammar with the embodied cognitivism of Cognitive Linguistics, language systems are shown to derive from more general cognitive constraints. This new perspective is proposed as a foundation for a new understanding of language acquisition and computational linguistics in the context of modern Artificial Intelligence.*

Keywords: *formal linguistics, cognitive linguistics, generative grammar, dynamic interface model, embodied cognitivism, autonomy of syntax, language acquisition, computational linguistics, artificial intelligence.*

FORMAL LINGVISTIKA VA KOGNITIV LINGVISTIKA NAZARIYALARI ORASIDAGI TAFOVUTNI BARTARAF ETISH

Annotatsiya: *Ushbu maqolada avtonom sintaktik tuzilmalarga ustuvorlik beruvchi formal lingvistika hamda tilni umumiy kognitiv qobiliyatlarning mahsuli deb hisoblovchi kognitiv lingvistika o‘ rtasidagi tarixiy va nazariy tafovvutlar tadqiq etiladi. Ushbu paradigmalar ko‘ pinchi bir-birini inkor etuvchi yo‘ nalishlar sifatida qaralsa-da, mazkur tadqiqot «Dinamik interfeys modeli»ni taklif etadi. Generativ modellarning strukturaviy aniqligini kognitivizmning tana va sezgi tajribasiga (embodied) asoslangan yondashuvi bilan sintez qilish orqali, til tizimlari kengroq kognitiv cheklovlardan kelib chiqishi isbotlanadi. Ushbu integratsiyalashgan yondashuv zamonaviy Sun’iy intellekt sharoitida tilni o‘ zlashtirish va kompyuter lingvistikasini tushunish uchun yangi poydevor yaratadi.*

Kalit so‘ zlar: *formal lingvistika, kognitiv lingvistika, generativ grammatika, dinamik interfeys modeli, embodied kognitivizm, sintaksis avtonomiyasi, tilni o‘ zlashtirish, kompyuter lingvistikasi, sun’ iy intellekt.*

ПРЕОДОЛЕНИЕ РАЗРЫВА МЕЖДУ ТЕОРИЯМИ ФОРМАЛЬНОЙ И КОГНИТИВНОЙ ЛИНГВИСТИКИ

Аннотация: *В данной статье рассматриваются исторические и теоретические расхождения между формальной лингвистикой, подчёркивающая автономные синтаксические структуры, и когнитивной лингвистикой, рассматривающая язык как продолжение общих когнитивных способностей. Хотя эти парадигмы часто считаются взаимоисключающими, в данном исследовании предлагается «Модель динамического интерфейса». Синтезируя структурную строгость генеративных моделей с воплощённым (embodied) и основанным на использовании подходом когнитивизма, автор утверждает, что формальные языковые системы возникают из более широких когнитивных ограничений. Эта интегративная перспектива закладывает новую основу для понимания процесса усвоения языка и компьютерной лингвистики в контексте современного искусственного интеллекта. Summary of the Paper: In the present paper, the theoretical differences between the school of Formal Linguistics, which emphasizes the autonomous syntax of human language, and the school of Cognitive Linguistics, which emphasizes the continuity of human language with general human cognition, are discussed. The author of the paper argues that despite the fact that these two approaches have traditionally been viewed as mutually exclusive, in the present paper, a new approach, «The Model of Dynamic Interface,» is presented. The author of the paper argues that by combining the structural strictness of the generative grammar of human language with the embodied, inactivist approach of the cognitive school of thought, the present paper establishes a new paradigm for understanding the acquisition of human language in general and computer linguistics in particular.*

Ключевые слова: *формальная лингвистика, когнитивная лингвистика, генеративная грамматика, модель динамического интерфейса, воплощённый когнитивизм, автономия синтаксиса, усвоение языка, компьютерная лингвистика, искусственный интеллект.*

Introduction

The search for answers to the mystery of human language has traditionally been viewed from two different perspectives: the perspective of the school of Formal Linguistics, which views human language as a strict rule-governed system—a «mental organ» whose essential nature is its internal syntactic logic (Universal Grammar); and the perspective of the school of Cognitive Linguistics, which views human language as an expression of general human cognition, embodied in human experience.

Formal Linguistics, particularly the generative tradition associated with Chomsky, treats linguistic competence as a highly organized mental system whose core principles cannot be reduced to general communicative experience alone (Chomsky, 1965). From this perspective, grammar is not simply a collection of frequently used expressions; it is a system of abstract rules and constraints that enables speakers to produce and understand sentences they have never encountered before. This emphasis on structure has been especially valuable in syntax, where formal models make it possible to describe hierarchical relations, constituency, recursion, and dependencies with a high degree of precision.

Cognitive Linguistics developed from a different starting point. It argues that language should be examined as part of general cognition rather than as an autonomous faculty. Meaning, categorization, attention, memory, bodily experience, and patterns of usage are therefore central to linguistic explanation. Langacker (1987) views grammar as symbolic in nature, while Lakoff (1987) demonstrates how categorization and conceptual organization shape linguistic knowledge. In this tradition, linguistic structure is learned and maintained through repeated interaction between conceptual processes and actual language use.

The Theoretical Impasse

Although both of these approaches have made significant contributions to the understanding of human communication, these two approaches have traditionally been viewed as mutually exclusive. The strict rule-governed syntax of human language, which is essential for computer-based applications of linguistics, has traditionally been viewed as failing to capture the fluidity of human thought. Similarly, the cognitive school of thought has traditionally been viewed as failing to capture the strict syntax of human language that is essential for understanding the acquisition of human language.

The apparent opposition can be seen most clearly in their explanations of linguistic productivity. Formal approaches account for productivity by proposing abstract representations that allow a limited set of principles to generate a potentially unlimited number of expressions. Cognitive and usage-based approaches, by contrast, explain productivity as emerging from learned patterns, analogy, categorization, and increasingly abstract constructions that develop through experience. Tomasello (2003), for example, places language acquisition within broader processes of intention-reading and pattern-finding, while Goldberg (2006) argues that grammatical constructions themselves form meaningful pairings of form and function.

These differences do not necessarily require a choice between structure and cognition. A speaker must possess enough structural knowledge to distinguish acceptable from unacceptable combinations, but this knowledge is acquired, accessed, and used by a cognitive system with limited memory, attention, perception, and processing resources. Consequently, a satisfactory model of language should be able to explain both the regularity of grammar and the flexibility with which speakers adapt grammatical resources to context.

The Emerging Necessity for Synthesis

In the age of Artificial Intelligence (AI) and Natural Language Processing (NLP), this theoretical split is also an operational barrier. The contemporary Large Language Models (LLMs) have an intriguing dual nature: they are able to replicate a formal system very accurately but are also trained on a massive amount of usage-based data. This indicates that the split between a 'rigid formal system' and a 'fluid cognitive process' is not as clear-cut as previously hypothesized. The need for a unifying framework that does not require a trade-off between the two is growing.

This need for synthesis is also visible in contemporary computational systems. NLP models must recognize structural relationships in order to process long-distance dependencies, agreement, and syntactic ambiguity, yet successful language processing also depends on large amounts of contextual and usage-based information. The coexistence of these requirements suggests that formal patterning and statistical experience are not necessarily competing explanations. Instead, they may describe different levels of the same process: one concerns the organization of linguistic representations, while the other concerns how such representations are acquired, weighted, and activated in use.

For this reason, the debate between Formal and Cognitive Linguistics becomes more productive when reformulated as an interface problem. The question is no longer whether grammar is formal or cognitive, but how stable grammatical organization can arise within a broader cognitive system and how that organization changes through experience. Jackendoff (2002) similarly argues for an architecture in which phonological, syntactic, and conceptual structures interact through interfaces rather than being reduced to one single component.

Proposing the Dynamic Interface Model (DIM)

This article proposes a new theoretical synthesis, namely, the Dynamic Interface Model (DIM), which is capable of bridging this gap. Rather than seeing formal syntax and cognitive processes as two rival approaches, the DIM suggests that formal language systems are merely an emergent product of cognitive constraints in general. By merging the rigor of generative models with the 'embodiment' of cognitivism, this research demonstrates how:

Within the Dynamic Interface Model, formal syntax is treated as a relatively stable level of organization rather than as a completely isolated module. Cognitive processes supply the conditions under which grammatical patterns are learned, selected, and interpreted. This means that syntactic regularities may become highly systematic over time even when their development is influenced by frequency, conceptual salience, communicative intention, and processing economy. The model therefore preserves the explanatory precision of formal description while allowing grammatical knowledge to remain connected to cognition and experience.

The term dynamic is important because the relationship among these components is not assumed to be fixed. During language acquisition, repeated exposure can strengthen particular form-meaning associations and promote abstraction across similar utterances. During adult language use, attention, discourse context, and communicative goals can affect which construction is selected. At the same time, speakers remain constrained by conventional grammatical patterns. Thus, the model predicts continuous interaction between relatively stable structural representations and flexible cognitive processes.

1. Formal syntax offers the key to processing efficiency in complex communication.

2. Cognitive abilities, such as memory, attention, and sensory perception, determine the scope and development of formal language systems.

3. Usage supplies the data from which recurring linguistic patterns become entrenched and increasingly abstract. This principle reflects the cognitive-linguistic view that frequency and experience contribute to grammatical organization without implying that grammar is merely a list of memorized expressions.

4. Form and meaning must be represented together. A syntactic pattern is valuable not only because it has an internal structure, but also because speakers associate that structure with semantic and pragmatic functions. This insight makes it possible to connect formal description with constructional and cognitive approaches.

5. Interface relations are bidirectional. Conceptual structure can influence syntactic choice, while established grammatical patterns can guide how information is packaged and interpreted. Accordingly, the DIM does not reduce syntax to cognition or cognition to syntax; it explains language through their interaction.

Thus, this article establishes a new basis for understanding language acquisition in humans and simulation in machines, through this integrative perspective, which is not merely a theoretical exercise, but a necessity for the development of more human-like, cognitively grounded Artificial Intelligence.

The model also has implications for first- and second-language acquisition. A purely formal account may describe the target system accurately but may say less about the experiential route through which learners gradually reach abstract generalizations. A purely usage-based account, on the other hand, may explain sensitivity to frequency and communicative context but still needs a precise account of the structural knowledge that successful learners ultimately develop. Combining the two perspectives makes it possible to describe acquisition as a movement from experience toward increasingly systematic representations.

In computational linguistics, the same principle encourages hybrid explanations. The success of data-driven models shows the power of exposure to large-scale linguistic usage, while persistent problems with logical consistency, compositional generalization, and transparent structural reasoning suggest the continuing value of explicit representations. The DIM therefore provides a conceptual basis for research that combines learned statistical regularities with stronger structural constraints rather than treating these strategies as mutually exclusive.

Conclusion

To sum up, the relationship between Formal Linguistics and Cognitive Linguistics should be demonstrated as not a contradiction, but a complementarity in the general framework of language studies. Indeed, Formal Linguistics accounts for the structural and rule-based nature of language, while Cognitive Linguistics emphasizes the role of human cognition, experience, and usage in language.

The discussion offered in this article demonstrates how a full understanding of language can be achieved through the integration of these two opinions.

Thus, in this sense, the proposed Dynamic Interface Model (DIM) offers a significant theoretical tool for linking these two approaches.

In conclusion, such an integrated perspective is particularly significant in contemporary language acquisition, computational linguistics, and Artificial Intelligence, where both rigor and flexibility are required.

The chief advantage of the Dynamic Interface Model is therefore methodological as well as theoretical. It encourages researchers to distinguish levels of explanation instead of forcing all linguistic phenomena into one framework. Formal analysis can describe the organization of linguistic structures, while cognitive analysis can explain how those structures are connected with conceptualization, learning, memory, attention, embodiment, and use. The two perspectives become complementary when their explanatory domains are clearly identified.

At the same time, the DIM should be understood as a research framework rather than a completed theory. Future studies need to test how specific formal constraints interact with frequency, processing limitations, and conceptual factors in real linguistic data. Experimental research, corpus studies, developmental evidence, and computational modeling can all contribute to this task. Such work would allow the proposed synthesis to move from a general theoretical position toward empirically testable predictions.

Thus, this article demonstrates how bridging these two theoretical traditions opens new possibilities for future research in linguistics and other related sciences.

Foydalanilgan adabiyotlar

Chomsky, N. (1965). Aspects of the Theory of Syntax. MIT Press.
Evans, V., & Green, M. (2006). Cognitive Linguistics: An Introduction. Edinburgh University Press.
Goldberg, A. E. (2006). Constructions at Work: The Nature of Generalization in Language. Oxford University Press.
Jackendoff, R. (2002). Foundations of Language: Brain, Meaning, Grammar, Evolution. Oxford University Press.
Lakoff, G. (1987). Women, Fire, and Dangerous Things: What Categories Reveal about the Mind. University of Chicago Press.
Langacker, R. W. (1987). Foundations of Cognitive Grammar, Volume I: Theoretical Prerequisites. Stanford University Press.
Tomasello, M. (2003). Constructing a Language: A Usage-Based Theory of Language Acquisition. Harvard University Press.