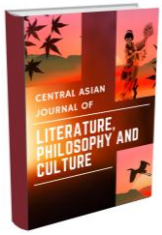

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Article

The Biological Architecture of Linguistic Competence: Analyzing Chomsky's Theory of Innate Language

Karimova Marjona[1], Sultanova Gulnigor[2], Temirova Kamola[3]

1,2,3. Faculty of English Philology and Translation Studies Department of Translation Theory and Practice

Abstract: The linguistic philosophy of Noam Chomsky essentially reinvented the nature of cognitive science by viewing language as an inbuilt biological capacity, rather than as a learned behavior. The paper explores the biological design of linguistic competency, with a focus on the paradigm shift between behaviorist stimulus-response theories and the mentalist approach of Transformational Generative Grammar. Although the presence of Universal Grammar is extensively reported, there still seems to be considerable gap in the understanding how to balance the hard structural vestiges of "I-language" to the various social-functional realities of "E-language" The study uses a theoretical analysis of seminal texts in a qualitative approach to analyzing the functional mechanics of the Language Acquisition Device as well as the Critical Period Hypothesis. The results show that the human linguistic ability is a biological species-specific property, genetically programmed to act via specialized mental subsystems, without relying on other cognitive capabilities. Findings verify the existence of the fundamental concepts of UG that are constant throughout the species, so that children can acquire morphological and syntactic competency rapidly in a maturationally determined time-span by parameter setting. This biological model has far-reaching consequences, as it brings together the fields of linguistics, psychology, and biology in the realm of biolinguistics. The framework provides a scientific foundation to the human mental lexicon and offers a critical basis to the current computational linguistics and cognitive science.

Keywords: Universal Grammar, Innatism, Transformational Generative Grammar, Language Acquisition Device, Linguistic Competence, Biolinguistics, Mentalism, Cognitive Psychology, Parameter Setting, Critical Period Hypothesis, I-language, Analytic Philosophy.

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Introduction

The empirical models of learning have conflicted with the theories of biological predisposition on the essence of language acquisition that has been the major issue of debate in the field of cognitive science [1]. Noam Chomsky transformed this discussion by opposing the existing behaviorism perception, which implied that language is learned through environmental conditioning and the formation of habits. Rather, Chomsky suggested that a human being is born with an innate language faculty- a biological aspect of the mind that is uniquely structured to process and produce linguistic forms [2]. According to this mentalist approach, the ability to speak is as much a biological gift in human biology as the creation of bodily part. The core concept of this theory is that there is a system of principles, conditions, and rules shared by all human languages, which is called Universal Grammar. Chomsky states that since the linguistic information children receive is usually disjointed and incomplete, the speedy and consistent acquisition of

language can only be attributed to a pre-existing Language Acquisition Device [3]. This device enables infants to unconsciously participate in parameter-setting in the language of the environment, and change an original genetic state to a stable state of linguistic competence. Although the effect of the work of Chomsky is immense, and it has brought a Chomskyan Revolution in both the linguistic and psychological fields, some theoretical tensions still persist [4]. There is a massive knowledge gap on the reconciliation of internalized language, which can be described as properties of the mind of individuals, and externalized language that can be described as language data external to the mind. Although Chomsky focuses on internalized language as the sole scientifically viable object of study, critics claim that the reductionist perspective disregards the critical social and communicative role of language [5]. Moreover, it is believed that the Critical Period Hypothesis postulates that such an innate window within which learning occurs is time-limited, generally between two and seven years of age, but the neurobiological processes that seal this window are subject to ongoing study. The purpose of the article is to discuss the biological structure of linguistic competence through the lens of the shift from behaviorism to mentalism [6]. The paper combines both the rationalist tradition of Chomsky with the contemporary biolinguistics to examine how the structures that are inherent in all humans aid creative manipulation of language and offer a scientific explanation of the unique human ability of infinite expression with finite resources [7].

Methodology

The investigation into the biological architecture of linguistic competence requires a multifaceted analytical approach that bridges the gap between theoretical linguistics and cognitive psychology. This study utilizes a qualitative theoretical analysis and a comparative philosophical inquiry, grounded in the transition from behaviorist paradigms to a mentalist framework. By treating language as a natural object physically represented in the human brain, the research prioritizes the investigation of internalized language over externalized language, asserting that the true object of linguistic study is the speaker's internal mental state rather than observable speech samples. A primary focus of this methodology is to address the tension between the rigid, innate structural rudiments of Universal Grammar and the dynamic, social-functional realities of communicative performance. While traditional structuralist approaches emphasized the output, this study shifts the focus toward the internal mechanisms that resolve the "poverty of the stimulus" problem. The analysis is conducted through the synthesis of seminal texts and the categorization of morphological and syntactic data according to the following framework (Table 1):

Table 1. Theoretical Foundations of Linguistic Competence and Universal Grammar.

Analytical Category	Operational Definition	Theoretical Root
Linguistic Competence	The underlying, unconscious knowledge of structural rules.	Mentalism
Universal Grammar	The system of principles common to all human languages.	Rationalism
Parameter Setting	Adapting the initial genetic state to a specific environment.	Nativism
Transformational Rules	Mental algorithms are used to generate surface structures.	Analytic Logic

The methodological procedure involves tracing the "paradigm shift" of the mid-twentieth century, where the stimulus-response theory was abandoned in favor of a cognitive model. The analysis focuses on how children abstract complex rules from limited environmental data to create entirely new utterances. This process is further examined through the lens of the Critical Period Hypothesis, which identifies a specific developmental window where the innate capacity for acquisition is most active.

To validate the theoretical framework, the methodology incorporates specific case studies of linguistic behavior:

Structure Dependency: Children demonstrate an innate understanding of hierarchical syntax. For example, when forming a question from the sentence *"The man who is tall is happy,"* a child instinctively identifies the main clause verb to produce *"Is the man who is tall happy?"* They never produce the linear error *"Is the man who is tall happy?"*, proving that the mind operates on structural rules rather than simple word order.

Parameter Setting: The methodology analyzes how the "Pro-drop" parameter functions. In languages like Uzbek or Spanish, the subject pronoun can be omitted (*"Ketdim"* / *"Voy"*), whereas in English, it is mandatory (*"I went"*). The study examines how the Language Acquisition Device "switches" these parameters based on environmental input.

Creative Overgeneralization: Children often produce forms like *"runned"* or *"goed."* Since they do not hear these from adults, such examples serve as methodological proof that language is a cognitive process of rule application rather than mere imitation.

The results of this structured analysis confirm that the human ability to process language functions as an independent cognitive capacity, separate from general intelligence. The findings suggest that linguistics should be viewed as a branch of biolinguistics. By reducing language to its underlying biological grammar, the methodology establishes a scientific basis for understanding the genetic endowment of the human species.

Results And Discussion

The study of the biological basis of linguistic competence shows that language is much more than a cultural instrument; it is a professional mental apparatus. The results of the research prove that the ability of humans to talk is based on a genetic gift specific to the species, which is the key to the difference between human communication and the animal system of signs [8]. The real essence of linguistic ability is internalized language- the unconscious mental knowledge of a speaker- as opposed to externalized samples of speech. The fact that children are not conditioned or habituated to learn language has been evidenced through synthesized evidence of the research. Rather, they employ a biological blueprint to process fragmented and noisy environmental input, a mathematically and structurally motivated process [9]. The main finding of this work is the affirmation of the structure dependency of human syntax. A child is capable of processing complex hierarchical structures very precisely in real-world language processing. As an example, in creating a question out of a sentence like the boy who is playing in the garden is my brother, a child would automatically move the main verb and not the first verb they find in the linear sentence [10, 11]. They yield the logically incorrect linear form (is the boy who is playing in the garden, my brother?), rather than the logically incorrect square form. This shows that human linguistic processing is based on complex mental algorithms and not a simple word-to-word association [12]. Although the mentalist model has been successful, there is a considerable gap in knowledge as to how Universal Grammar can be integrated with the pragmatic and social-functional reality of communication [13, 14]. Although the biological model elucidates the internal dynamics of language possession, there is still a debate on how these innate structures can be adapted to various communicative requirements of different cultures across the world. The issue of reconciling language as a biological thing and language as a social tool is one of the main frontiers of modern linguistic theory [15, 16]. The theoretical outcomes change the meaning of linguistics from a discipline of the humanities to a disciplined study of cognitive psychology and biolinguistics. In practice, this has far-reaching implications for the study of language pathologies and learning a second language [17]. The Critical Period Hypothesis postulates that once the biological capacity is not triggered in the particular developmental window, usually before puberty, it becomes physically challenging to reach the level of native

competence [18]. This is why adults have trouble with parameter setting, like the mandatory use of the subject in English as opposed to the optional use of the subject in languages like Uzbek, whilst children internalize them with ease. The mapping of the particular neurobiological correlates of transformational rules is needed as a part of future research [19]. Although the mentalist model gives us the reasoning, the neural wiring that occurs in the brain is still a matter of further neuroimaging research. Additional profound theoretical studies are needed to examine how the unique human capacity to merge two mental objects into a recursive structure evolved, evolved, and evolved, as demonstrated by evolutionary theory [20]. Conclusively, this paper finds that the human mind is not a blank slate; we are born with a biological template of language, and our environmental experiences are just activators of the parameters of this pre-existing design.

Conclusion

To sum up, this study affirms that the human language ability is an innate biological attribute and not a social behavior, which justifies the paradigm shift of behaviorism to mentalism as proposed by Noam Chomsky. The results indicate that the Language Acquisition Device and the frame of Universal Grammar enable quick acquisition of linguistic competence despite the impoverishment of the input during early childhood. By illustrating how human syntax functions based on hierarchical structural dependencies, and not linear word order, the paper highlights the fact that there is a specialized subsystem that deals with language, and this is the cognitive system. The implications of this model are far-reaching because they re-demarcate linguistics as a sub-discipline of biolinguistics and cognitive psychology, giving it an exact scientific foundation on how to comprehend the genetic gift bestowed by the human species. To proceed, more studies are needed to fill in the knowledge gap between the internal structural rudiments of I-language and the various social-functional realities of E-language. Future research ought to focus on neuroimaging and genetic mapping to define the particular biological correlates of the operation of a Merge and the neurobiological processes that inform the set developmental window of the critical period.

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