

## *Original Paper*

# A Brief Analysis of Chomsky's Transformational Generative Grammar

Qianhong Jiang

School of Foreign Languages, Hubei University of Technology, Wuhan, China

### **Abstract**

*Chomsky is a famous American philosopher and linguist. Chomsky combined language research with mathematical logic and put forward a new linguistic theory and idea, namely transformational generative grammar. Transformational generative grammar is one of the most influential linguistic theories in Western linguistics. Generative grammar is a set of explicit rules for how language is used and for the mind of the person who uses a particular language. It not only injected a fresh force into the field of linguistics, but also had a profound impact on a range of disciplines such as psychology and philosophy. In this study, we interpreted Chomsky's transformational generative grammar, and further elaborated the significance and influence of transformational generative grammar, and finally made a comment on it.*

### **Keywords**

*Chomsky, Transformational Generative Grammar, Chomsky revolution*

## **1. Background**

The origin of human language is one of the important issues commonly concerned by linguistics, philosophy, psychology, and education. It can be said that structuralist descriptive linguistics dominated the field of linguistics before the emergence of transformational-generative grammar (Chan, 2020). The linguistic world was dominated by American structuralism represented by Bloomfield and behaviorism represented by Skinner in the 1950s. Structuralism and behaviorism both observed language from its external environment. However, Chomsky broke with this tradition and made a systematic analysis of the internal structure and operation of language (Yu, 1994). The theory of transformational-generative grammar, grounded in human cognitive capacities, repudiates the externalist structuralist approach to linguistics. It shifts the focus from descriptive methods to explanatory frameworks, positing an innate language acquisition device (LAD) that endows humans with an inherent capacity for language learning.

This theory introduces a novel analytical paradigm to contemporary linguistic studies. Specifically, transformational-generative grammar emerges from two intellectual currents. First, it is influenced by

the innateness hypothesis, which contends that the capacity for language is intrinsic to human cognition. Prior to this theory, modern linguistics predominantly adhered to an environmentalist perspective, suggesting that humans are "undifferentiated, malleable material shaped by the environment" (Xu, 1994). Language acquisition was thus regarded as a behaviorist process, driven by environmental stimuli and learned through a "stimulus-response" mechanism. Second, the theory addresses the "Orwellian problem," which highlights the paradox that "despite so much evidence, we still know so little" (Liu, 2010). Epistemologically, this problem underscores the discrepancy between the complexity of the real world and the limited human capacity to comprehend and articulate it comprehensively. It reflects the challenge of capturing the multifaceted nature of reality through language, despite the wealth of available information.

For more than 60 years, Chomsky's transformational generative grammar has not only penetrated into philosophy, linguistics, psychology and cognitive science, but also influenced the whole intellectual world. Lyons called Chomsky "the master of modern thought" and called his *Syntactic Structure* "a revolutionary shift in the scientific study of language," He called this shift the "Chomskyan revolution" (Lyons, 1977). Berlinski described him as "as great as Galileo" (Berlinski, 1988). In the introduction to his edited *On Chomsky - Critical Essays*, Gilbert Harman declared that "no theory of language has had a greater influence on contemporary philosophy" (Gilbert Harman, 1974).

## **2. The Definition of the Transformational Generative Grammar**

Transformation-generative Grammar was first proposed by the famous American linguist and philosopher Avram Noam Chomsky (1928- ) in his book *Syntactic Structure* which was published in 1957 (Chan, 2020). He contended that language is not acquired through conscious learning, but rather it organically develops within the mind. The ability to acquire language is an inherent gift bestowed upon humanity. Humans are endowed at birth with a genetically programmed aptitude for language learning and a universal grammatical framework, which constitutes a predisposed "language faculty" within the brain and cognitive system. This faculty has evolved over time and is transmitted genetically. Subsequently, linguists centered at Massachusetts Institute of Technology further developed and refined this concept, culminating in the establishment of a comprehensive system of transformational generative grammar theory. This marked a pivotal shift in linguistic theory since the era of Ferdinand de Saussure.

The concept of "generative" in generative grammar was borrowed by Chomsky from mathematics. In mathematics, the meaning of "generative" is that a functional expression is given and then to find whether a certain natural number can be generated from it. Then this can be deduced. Chomsky thought that the mathematical meaning of "generative" could be borrowed to describe people's creativity in language ability (Yang, 2008). The theory of *Syntactic Structures* asserts that transformation serves as a bridge, converting descriptive linguistics into explanatory linguistics, thereby illuminating the intricate process by which human linguistic thought traverses from deep structure to surface structure. This

pivotal shift enables modern linguistics to evolve from structuralism to generativism. Chomsky's generative grammar theory delves into the mechanisms of the brain that underpin language production, and it explores the intricate relationship between language and the neural substrate.

The contemporary linguistic perspectives on the human mind trace their origins to Descartes, who contended that the human mind is distinguished by its capacity for understanding and willpower, attributes that transcend mere automatic mechanisms, unlike the structuralist school espoused by Saussure. Chomsky's theory of universal grammar redirects the focus of linguistic inquiry away from mere description of human language towards an explanation of the human brain and mind. In doing so, it lays the cornerstone for modern cognitive linguistics, which seeks to unveil the essence of language generation within the brain and the fundamental nature of linguistic cognition.

Moreover, the theory of universal grammar maintains that the language acquisition mechanism is uniform across all humans. Variations in environmental factors result in diverse manifestations of language modules, giving rise to the appearance of different acquisition mechanisms. Yet, beneath these variations, all languages share a common, universal grammatical framework that can be systematized and standardized. Chomsky treated linguistics like any other science and he attempted to establish an interpretative theory of human knowledge or capacity for language. Generative grammar is a model of language capability. It does not take the description of specific language as the destination, but takes specific language as the starting point to explore the universal rules of language, and finally clarify the cognitive system, thinking rules and essential attributes of people (Feng, 2006). The language of generative grammar refers to the language that is internalized in the mind or brain, and the object of its study is such internalized language.

### **3. The Stages of Chomsky's Transformational Generative Grammar Theory**

Chomsky's theory of language was not formed all at once, it has been modified several times in the nearly thirty years, and it continues to develop. The first stage from the early 1950s to 1965 is called the first linguistic model. The period from 1965 to 1970 is the standard theory. The period from 1970 to 1979 is the extended standard theory. The period from 1980 to 1993 is the period of Government and blending theory. And the period from 1993 to the present is the minimalist program. And then I will summarize these five stages below.

#### *3.1 The First Linguistic Model*

The main content of the first language model is embodied in the book *Syntactic Structures*. During this period, Chomsky was directly influenced by two linguists, one is Jacobson, and the other is Harris. Chomsky, inspired by Jacobson's phonological theory, tried to find universal phenomena in syntax. Chomsky used mathematical principles to study language. He believed that a limited set of rules could be set out syntactically, generating only grammatical sentences and not ungrammatical ones. In addition, Chomsky found that Harris' component analysis could be changed to formalized syntactic rules. Based on these considerations, Chomsky proposed transformational generative grammar. In order to achieve

the ideal goal, the rule must meet the following six conditions: be generative, simple, explicit, formal, exhaustive and recursive.

In his book *Syntactic structures*, Chomsky proposed three types of grammar: finite state grammar, phrase structure grammar and transformational grammar. Phrasal structure grammars are more productive than finite-state grammars, but they also have limitations. And the conversion rules are complicated. Chomsky listed 16 kinds of English conversion rules in *Syntactic Structure*. Chomsky's first language model was the beginning of the formal description of language, only the formal description and analysis can be simple, clear, recursive, circular. The theory and grammar rules of the first language period were not perfect, and there were some serious problems.

### 3.2 The Standard Theory

After the publication of Chomsky's *Syntactic Structures*, Chomsky found several serious problems that had to be solved. The first problem was that there was too much power to switch rules. The second problem was that Chomsky's rules could produce both correct and substandard sentences. The third problem was that passive conversion rules cannot be applied arbitrarily. During the standard theory period, Chomsky overcame these shortcomings.

The representative work of the standard theory period is *Aspects of the Theory of Syntax*. In this work, Chomsky proposed a new grammatical model. Generative grammar should consist of three parts: syntactic part, phonemic part and semantic part. The syntax part was also called base component. It included rewriting rules and dictionary. Rewriting rules generated the deep structure of the sentence, and converting rules transformed the deep structure into the surface structure. The set of rules in the foundation section was different from the phrase structure rules of the first language pattern period. The present rule was ordered and produced a limited list of base tokens. Due to the introduction of the concept of complex symbols and the special treatment of vocabulary, the standard theory was different from the first language model.

The standard theory had been improved, but there were still many problems. Especially in the semantic part, there were many facts that cannot be included, and some phenomena cannot be explained. In the late 1960s, a debate began around the issue of semantics, so different factions emerged.

### 3.3 The Extended Standard Theory

The Standard Theory had improved the First Language Model, but there were still many problems unsolved. There were several serious shortcomings. First, the conversion rule was still too powerful, and the conversion part still occupied a central position. Second, standard theory held that derived nouns had the same semantic properties as related verbs. However, it was later found that the relationship between derived nouns and verbs was irregular. Third, the standard theory held that semantic interpretation depended on the deep structure, and the conversion process kept the meaning of the sentence unchanged. But this was later found to be impossible. Any transformation can change the meaning, especially in sentences with finite quantities of words. Fourth, Standard Theory cannot account for gapped structure. Fifth, with the development of generative grammar, more types of

structures had been investigated, and it had been found that many conversion rules must have extremely complex restrictions, otherwise ungrammatical sentences would appear.

From the early 1970s to the early 1980s, the Standard Theory was gradually revised to form the revised extended standard theory, which was also known as the Revised Extended Standard Theory. The patterns of grammatical organization in this period included category rules, moving  $\infty$  rules, trace theory, restriction rules, the rule of reflexive deletion, the rule of recoverability rule, the rule of reflexive deletion, the filter principle, the case determination principle, the theory of control and the theory of constraints. From these theories, we can see the research direction and theoretical development of Chomsky. After the 1970s, Chomsky greatly weakened the generative power of grammar, so he set various conditions for the application of rules.

### 3.4 Government and Binding Theory

Generative grammar was at a low ebb in the late 1970s. Due to the lack of a powerful new core theory of generative grammar, the generative grammar camp split once again, resulting in many schools that were more mature and influential than the previous split to face severe challenges. Chomsky did not give up his pursuit of theoretical innovation and tried his best to create a new theoretical model. Lectures on Government and binding published after finishing is of epoch-making significance to generative grammar theory, and it is also a landmark work. It marks that generative grammar is more mature in philosophy and research direction, and has entered a new period since then.

The epoch-making significance of *the Treatise on Jurisdiction and Constraint* (1981) lies in the "principles and parameters" theory proposed in the book. Universal grammar consists of two main parts: principles relates to the common phenomena of human language, which help explain the phenomenon of mother tongue acquisition in children. The other part is called parameters, which related to language-specific phenomena. The variation of different languages was explained by using parameters. In the stage of generating the principles and parameters of grammar, Chomsky proposed the grammar rule system. This system of grammatical rules consists of lexicon, syntax, generating phonics (PF-component) and logics (LF-component).

### 3.5 The Minimalist Program

Chomsky published *the Minimalist Program* in 1995. The book consists of four separate parts. Chapter one is The Theory of Principles and Parameters, and Chapter two is Some Notes on Economy of Derivation and characterization Representation. Chapter three is A Minimalist Program for Linguistic Theory. Chapter four is about Categories and Transformations.

After the publication of *the Simplest Solution*, generative grammar continued to develop. The theory of "phrase" deduction was developed by Chomsky in the past two years. It is a concrete syntactic theory proposed according to the simplest scheme. Secondly, under the framework of the latest minimalist scheme, spout-out is carried out multiple times according to "paragraphs". Under the framework of the new minimalist scheme, the generating process is called "external merging". The conversion process is called "internal merging." After the simplest scheme came out, there were not only some praises, but

also a lot of criticism. This criticism cannot be said to be without merit. But that didn't make the simplest solution collapse.

#### **4. The Significance of Transformational Generative Grammar**

The theory of transformational generative grammar is the inheritance and development of Cartesian rationalism. At the same time, we must clearly recognize that the theory of transformational generative grammar is not a simple inheritance, but a contemporary linguistic theory developed on the basis of sublation and relying on the epistemology and methodology of Western philosophy and natural science in the middle of the 20th century (He, 2000). The main reason why the transformational generative language view has a place in modern linguistics is that it studies language from the latest discoveries of natural science, and it starts to study from the human brain mechanism, builds on the support of powerful computer data model analysis, and constantly revises and improves itself with mathematical logic formulas (Chan, 2020).

In a certain sense, transformational generative grammar has set off a theoretical revolution in linguistics, overturning the dominant position of descriptive empiricism in linguistics. Pure empiricism emphasizes descriptive and narrative-telling methods to describe the structure of language by gathering vast amounts of information. Moreover, the research object is simply limited to "language itself", and a large amount of human language information is collected and studied only through long-term observation. However, Chomsky's transformational generative grammar theory added the analysis and explanation of internal mechanism on the basis of empirical description, and he tried to explain the whole process of human language thinking through intuitive disclosure. Moreover, the object of generative grammar research is to combine external language with internal grammar, consider the inherent language rules in human brain, and distinguish and analyze the differences in language ability and language use. The study of transformational generative grammar adopted the method of analysis and interpretation. The presentation from the deep structure to the surface structure was a process of human thinking and language generation, which combined mathematical formulas and grammar theories to intuitively and clearly deduced the process of human language thinking and better explained human language ability. The theory of Chomsky's creation of transformational generative grammar has set off a profound revolution in modern linguistic theory, as Neil Smith said: "Chomsky has won the position of Darwin and Descartes as important in thought" (Cai, 2006). Chomsky's theory of language has many enthusiastic supporters and many opponents. But whether the other scholars were for or against his opinion, no one dared ignore its influence. At the very least, his theory opened a new horizon for linguistics, causing many linguists to reconsider the nature of language and the task of linguistics.

#### **5. The Influence of Transformational Generative Grammar**

Chomsky's transformational generative grammar is actually not perfect. Since its birth, Chomsky has

been constantly challenged by other linguistic schools, but in the process of its development, Chomsky has constantly perfected and improved his own theory. Many linguists believe that transformational generation theory not only has a profound influence on linguistics, philosophy, psychology and other disciplines, but also has a different degree of influence on all fields of foreign language teaching.

### *5.1 The Influence on Linguistics*

In a sense, transformational generative grammar has sparked a theoretical revolution in the field of linguistics, overthrowing the long-standing dominance of descriptive empiricism. Chomsky's creation of transformational generative grammar opened a new window for modern linguistic research, shifting the focus of linguistics from the study of linguistic phenomena to the essence of language generation and development, as well as human linguistic competence itself. This can be seen as an inevitable requirement of the development of linguistics and philosophy to a certain level, and it has ignited a profound revolution in modern linguistic theory. Many Second Language Acquisition researchers, interested in theoretical linguistics, hold universal grammar in high regard because it created a close link between second language acquisition and mainstream linguistics. The proposal of universal grammar met the needs of many SLA researchers who attached importance to theoretical research, because it not only had a relatively complete and solid theoretical system, but also found evidence that universal grammar was directly accessible to adult SLA learners in specific teaching research (Wei, 2022). Since the theory of universal grammar has a solid foundation and can make relatively accurate predictions, it has considerable advantages to conduct in-depth research on language acquisition under this theoretical framework. With the continuous improvement of the *Minimalist Program* by Chomsky in the mid-1990s, the Universal Grammar theory itself was also undergoing great changes, which posed a greater challenge to second language acquisition researchers.

### *5.2 The Influence on Psychology and Philosophy*

There is a close relationship between universal grammar and second language acquisition. We can explain why children have an advantage over adults in learning language from the perspective of universal grammar. This is due to the influence of Universal Grammar on native language acquisition, resulting in the open parameters of adult universal grammar being fixed. Therefore, it is a hindrance to foreign language learning. But children have less trouble learning a new language than adults. Chomsky believes that language is an innate ability. Children are born with a language acquisition device (LAD) that enables them to learn language. This language acquisition device provides them with unique knowledge for language learning, including basic grammatical relationships and categories that are universal. It is a genetically inherited mechanism in the human brain, allowing people to understand and create sentences. It is the foundation of language knowledge development and a common feature of all human languages. Chomsky also argues that children's language is creative. They can learn complete linguistic structures from limited exposure and express arbitrary ideas with finite means. Specifically, the language acquisition device is based on innate universal grammar. It makes initial hypotheses about specific individual grammars in a given environment, compares and tests these

hypotheses against linguistic input, and continuously revises and retests them until a complete individual grammar system is established. The language acquisition device thus explains the accuracy and speed of children's first language acquisition (Zhang, 2014).

Chomsky, on the basis of adhering to the philosophical standpoint of rationalism, processed and transformed the traditional rationalism with naturalism, endowed rationalism with scientific connotation and intrinsic connotation, and made it a new theory to explain language and its related cognitive problems--naturalized rationalism. Naturalized rationalism was established as the philosophical basis of Chomsky's view of language, and it did not deviate from rationalism in its basic position. Its achievement was to provide an entrance for the study of language and related cognition issues by using all modern scientific research results and research methods. Finally, on the basis of natural science, Chomsky realized the unification of the "body-mind" issue again (He & Sun, 2023). In the process of theoretical construction, Chomsky deeply realized the theoretical deficiency of the two traditional linguistic views based on empiricism and rationalism, and then he devoted himself to overcoming the empiricism and rationalism traditions to solve the problem of human language knowledge acquisition.

### *5.3 The Influence on Foreign Language Teaching*

Chomsky's transformational generative grammar not only provided a new research direction for linguistic research, but also had many implications for foreign language teaching. Although many scholars were clearly skeptical about the application of Chomsky's research to language teaching. These doubts were mainly a misreading of Chomsky's language theory, which was hard grafted into the teaching process. This is because they do not make it clear that Chomsky's research is a theoretical grammar study, which cannot be directly used by teachers as grammar teaching. Although Chomsky's grammar cannot directly affect teaching, its methodology verification process is worthy of reference, which is of great significance to the cultivation of learners' thinking quality. The theoretical schools of linguistics shape the development and evolution of second language teaching methodologies. Each grammatical theory gives rise to corresponding teaching approaches.

In contrast to behaviorism, Chomsky rejected the "stimulus-response-reinforcement" model of language acquisition. He argued that language learning is not simply an accumulation of habits through imitation and memorization, but is instead governed by underlying rules—grammar. These rules enable people to construct an infinite and complex linguistic system from a finite set of basic units. Language learning, therefore, is not about memorizing specific sentences, but about mastering the rules to create and understand new sentences. This perspective became the linguistic foundation for the cognitive approach. The cognitive approach emphasizes the active engagement of learners' intellectual capacities, encouraging them to internalize grammatical systems through perceptual, memory, cognitive, and imaginative processes. It aims to enable learners to use language creatively and proficiently in listening, speaking, reading, and writing, thereby achieving true linguistic competence (Su, 2014).

Therefore, Transformational generative grammar makes it easier for teachers to explain sentence



structure to students. By analyzing deep structure, students can better understand ambiguous sentences. The generative rules also make language learning easier, allowing students to create an infinite number of sentences with a finite set of rules. Chomsky used transformational rules to explain different sentence transformations and set certain constraints. In language teaching, these constraints become special rules that enable the conversion of sentence patterns, such as active and passive voice, declarative and interrogative sentences.

## 6. Evaluation of the Transformational Generative Grammar

Chomsky's generative grammar theory has gone through five stages. Throughout its history, we can find that one main line has never changed. This main line can be broken down into several core topics. The first one is that language essence determines language universality. Chomsky's theory is known for criticizing the stimulus-response theory of structuralist and behaviorist, and it follows in the tradition of Plato, Descartes, Galileo, Humboldt, and Russell, which explain the creativity of language and the "logical problems of child language acquisition" from the perspective of innate talent. This also becomes the central basis for the theory of bio-linguistics that has evolved since the 1970s. The second one is the principle of simplicity of language system (Si, 2022). Influenced by Goodman's constructive nominalism, the principle of minimalism has always occupied a core position in Chomsky's academic thought.

It is generally believed that Chomsky is not only a linguist, but also an important (language) philosopher, he put forward "innate theory", "universal grammar", "mental analysis" and so on more than half a century ago, which were very important philosophical propositions. In addition, He has another important contribution: in the era of logos and scientism, lots of philosophers of language constructed formalist semantics, and Chomsky pioneered a new strategy of "closing the door syntax" along with Sassure's idea-closing the door, and strongly advocated the idea of formal parsing. And Chomsky attempts to use a few simple formulas (phrase structure, transliteration formula) to explain the origin of human language (Wang, 2015).

Chomsky himself thinks that the difference between generative grammar and other linguistics is primarily one of discipline, not of school. The view that linguistics is divided into humanities and social sciences and natural sciences due to different research goals and methods is more in line with the reality of linguistics than the radical view that it is fixed in a single subject field, and it is also consistent with Chomsky's own understanding of the attribution of linguistics.

Lyons (1991) stated: "Chomsky's theory of grammar, right or wrong, is undoubtedly the most dynamic and influential; Any linguist who wishes to keep up with current developments in linguistics cannot ignore Chomsky's theoretical claims." This clearly shows that the influence of Chomsky's grammar theory in the field of linguistics cannot be underestimated. Therefore, Chomsky's great contribution is very worthy of our learning.

## 7. Conclusion

Chomsky's Transformational Generative Grammar (TGG) has had a profound impact on the field of linguistics and remains a significant area of study and debate. There are some contributions and Innovations. Chomsky's TGG marked a revolutionary shift from the behaviorist view that language is learned through imitation and reinforcement to the innatist perspective that humans possess an innate language acquisition device (LAD) and universal grammar (UG). This change reframed language as a cognitive phenomenon rather than a set of external behaviors. Besides, Chomsky introduced the concepts of deep structure (the underlying meaning) and surface structure (the actual form of a sentence). This distinction allowed for a more nuanced understanding of how different sentence forms can convey the same meaning. The idea that a finite set of rules can generate an infinite number of sentences emphasized the creative aspect of language. This theory highlighted the human capacity to produce and understand novel sentences.

Although there are some contributions, there are still some critiques and Limitations. Some critics argue that Chomsky's theory overemphasizes innate linguistic knowledge at the expense of environmental and social influences on language acquisition. And the distinction between deep and surface structures can sometimes lead to ambiguity, especially in cases where multiple interpretations are possible. This has led to debates about the clarity and applicability of these concepts. Additionally, it also lacks of Focus on Discourse and Pragmatics. TGG has been criticized for focusing primarily on syntax and grammar while neglecting other aspects of language use, such as discourse analysis, pragmatics, and the social functions of language.

Despite these critiques, Chomsky's TGG remains relevant in contemporary linguistics. It has inspired further research into the nature of linguistic competence and the cognitive mechanisms underlying language acquisition. Additionally, the theory continues to influence psycholinguistics and the study of language disorders.

In summary, Chomsky's Transformational Generative Grammar has fundamentally reshaped our understanding of language as an innate cognitive capacity. While it has faced significant criticism, its influence on linguistic theory and practice remains substantial.

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