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An Overview of Biolinguistics-Related Investigations

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Abstract:

Jenkins wrote the article "Biolinguistics: Structure Development and Evolution of Language" in 1997 to commemorate the 40th anniversary of transformational-generative grammar. The article was influential in the production of a large number of scholarly monographs and papers on the subject of biolinguistics in the following years. A number of relevant international academic seminars were successfully held at the same time as the conference. According to the description of the current research status quo in biolinguistics, this work looks forward to the future development of biolinguistics in order to aid in the prediction of future developments in biolinguistic research.

Keywords: Linguistics; Biology; Transformational-generative grammar; Theory & Body Language

Introduction

"Fictional names," which are meaningful but lack referents, have been a major concern of linguistic philosophy, and even of philosophy as a whole.

Language exploration has revealed that it is not only an outward physical prospect, but also a subjective human construction and consequence. Nonetheless, linguistic philosophy study has never reached a consensus regarding the nature of language. It might be beneficial to incorporate biology into linguistics in order to shed insight on the nature of language and advance the field. Biolinguistics seeks to explore languages from a biological perspective and emphasizes the fact that humanistic linguistics derives its driving power from biology (Yuan & Liu, 2008).

Biolinguistics can be interpreted in a variety of ways. Biolinguistics in a restricted sense refers to the study of grammatical qualities proposed by Chomsky's school of generative grammar, which views languages as natural objects and views linguistic organic function as an innate biological organ of the human brain.

In a broad sense, biolinguistics is the study of language from the viewpoints of evolutionary biology, neuroscience, genetics, psychology, and even the physiological basis for language studies (Wu, 2012a).

Although biolinguistics is a relatively recent field of study, it has a lengthy history. Leonardo da Vinci mentioned the concept of biolinguistics in the 15th century, albeit he did not give it a formal name.

Following the publication of Charles Darwin's theory of evolution, numerous linguists attempted to investigate languages through the lens of evolution theory in the goal of determining the evolutionary stamp of language. Among the researchers were some of the most obscure names in psychology, such as August Schleicher and Sigmund Freud (Wu, 2012b). Jenkins (1997) wrote the essay "Biolinguistics: structure development and evolution of language" in 1997 to commemorate the 40th anniversary of transformational-generative grammar. This work contributed to the publication of a significant number of scholarly monographs and papers on biolinguistics. Simultaneously, a successful series of pertinent international academic seminars was held. Although biolinguistics research has been conducted outside of China for a long period of time, only a few Chinese scholars have been particularly interested in this field of study. This article analyzes

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pertinent literature and quickly explains the state of biolinguistics research outside of China with the expectation that it will be advantageous for Chinese scholars to gain an understanding of the current state of biolinguistics research.

1. BIOLINGUISTICS LITERATURE STATISTICS

The publication of the book Handbook of Biolinguistics by Clarence and Muyskens in 1959 is credited with the introduction of the word "biolinguistics" (Tang, 2004). For the first time, the findings of scientific research in biology and linguistics were brought together to form the term "biolinguistics." In 1974, experts such as linguists, biologists, and neuroscientists who were interested in the common topic of linguistics and biology came together at an international academic conference organized by the Rom. Institute of Research in Paris and the American Massachusetts Institute of Technology. The conference was convened by Massimo Piattelli-Palmarini and brought together experts from around the world (MIT).

At the meeting, the word "biolinguistics" was offered, which implied that biolinguistics was a cross-disciplinary field involving both biology and linguistics, which was clearly the case. The concept of "biolinguistics," which is discussed in this paper, is thought to have originated at that academic meeting. The Harvard University molecular biology laboratory sponsored the establishment of a research group known as "biolinguistics" in 1980. Its fields of study included theoretical linguistics, molecular biology, language learning barriers, neurology of animal communication, neurolinguistics, aphasia, computer linguistics, babies' pre-language perception, the origin and evolution of linguistics, and the field of biolinguistics evolved into an inter-discipline worthy of its name (Wu, 2012c).

From 1950 to 1997, there were only four biolinguistics-related bibliography entries, three of which were monographs and one of which was a research paper published in an academic journal.

However, it was not until 1997, when Jenkins published the article "Biolinguistics: structure development and evolution of language" in commemoration of the 40th anniversary of transformational-generative grammar and the Ricken Brain Science Institute established the "Laboratory for Biolinguistics" that the field of biolinguistics truly took off.

Encouraged by Jenkins' seminal piece, thirty-five bibliographical entries on biolinguistics surfaced all of a sudden between 2000 and 2010, accounting for 71.4 percent of all biolinguistics literature, including the nine articles published in 2011.

2. ASSOCIATED WITH BIOLINGUISTICS IS A COMMUNICATIONS PLATFORM

Additionally, researchers in biolinguistics from around the world have convened seven large-scale international academic seminars since the "Conferencia Inaugural Del Grup De Biolinguistica (GB)" was held in Barcelona in 2004. These seminars have served as a complement to relevant academic literature. Further, four influential international conferences on biolinguistics were held between 2007 and 2008, including "Biolinguistics Investigations" in Domingo, "Biolinguistics: Language Evolution and Variation" in Venice, "International Network in Biolinguistics, First Meeting" in Arizona, and "Biolinguistics: Acquisition, Language, and Evolution" at York University, all of which were held between 2007 and 2008. After a hiatus in 2009, the international seminar "The Language Design," organized by biolinguistics scholars at the University of Quebec in Montréal, was revived in 2010. The seminar focused on Chomsky's Three Factors in Language Design (TFLD), which was published in 2005, and had discussions on the specific topic of language design. The seminar "Graduate workshop of biolinguistics" hosted at the University of Groningen in 2011 provided an opportunity for biolinguistics scholars to collaborate and communicate with one another (Elisa, 2011). In addition, since 1996, the "International Conference on the Evolution of

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Language, EVOLANG" has been held every two years in a different location throughout the world. It investigates the questions surrounding the origin of human languages and the evolution of their bio-mechanics, and it contributes to the advancement of biolinguistics to a certain level.

In addition, the worldwide linguistic magazine *Biolinguistics*, founded by Boeckx, Kleanthes, and Grohmann in 2007, has provided a forum for academic discussion and has helped to propel the development of biolinguistics as a new area of science even farther ahead of the curve.

3. AN INTRODUCTION TO BOOKS ON BIOLINGUISTICS IN A SHORT SESSION

The researcher for this paper discovered, through careful reading of the literature on biolinguistics, that academic papers titled biolinguistics can be roughly divided into three categories, the majority of which are concerned with the significant correlations between transformational-generative grammar and the minimalist program. The writers of the publications that follow believed that biolinguistics was a synonym for transformational-generative grammar, which they explained in more detail in the following section.

The following papers are included in the collection: In Viva Origino, Fujita's (2003) article "Progress in Biolinguistics-Geneses of Language-A View from Generative Grammar" was published, as was Bird's (2006) article "Biolinguistics: what is it, who does it, and how should it proceed" in *Chomskyan Studies*; Lee's (2006) article "Chomsky and biolinguistics" in *Chomskyan Studies*; Epstein and Seely's (2007) article "The anatomy of biolinguistics minimalism

In addition, other works sought to investigate the fundamental concerns of biolinguistics, such as the structure of language, phylogenetic language evolution, and ontogenetic language development, among others. Jenkins' (1997) "Biolinguistics-structure, development, and evolution of language,"

published in *Web Journal of Formal, Computational, and Cognitive Linguistics* and in memory of the 40th anniversary of transformational-generative grammar, Chomsky's (2007a) "Biolinguistics explorations: Design, development, and evolution," published in *International Journal of Philosophical Studies*, and Di Sciullo & Boeckx's (2011) *The Biolinguistics Enterprise*, are examples of works that represent the field.

Finally, there were academic studies, such as Chomsky's (2004) "The biolinguistics perspective after 50 years," which discussed the origins of biolinguistics and its growth through the years. The authors listed above are concerned with the history, current state, and future prospects of biolinguistics.

4. DISCUSSION OF THE REPRESENTATION OF BIOLINUISTICS AND THEIR IDEOLOGY

4.1 Initator in the field of Biolinguistics

Before biolinguistics was recognized as a separate study and before Darwin established his theory of evolution, some researchers began conducting systematic investigations into the field. Of the researchers, August Scheilurer (1821-1868), a German linguist who studied language evolution from the perspective of Darwin's theory of evolution, was the most influential. He was considered to be the most representative pioneer, who investigated language primarily through the lens of biological science. Following the release of Darwin's book *The Origins of Species* in 1859, Scheilurer made an earnest comparison between language and plants and other animals. A linguist, in his opinion, should be considered a naturalist, and the relationship between the linguist and language should be considered similar to the relationship between a planter and a plant. He also believed that the method of linguistics should be closely associated with the methods of other natural sciences.

Furthermore, he observed that what the naturalists referred to as "relatives" was referred to as "language system" or "language family" by linguists (Yao, 2007). In the case of some cousins who are

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considerably more intimately related with one another, linguists refer to them as relative languages of the same language family or system, respectively. In terms of linguistics, the variety of relatives found in biology can be referred to as the "language of a system." While the language's dialect or local dialect are sub-branch types, the smaller dialect or local dialect are equal to variety and variance in a language. Then there's the individual in accordance with his or her own distinctive speech way, and so on.

Individuals who belong to the same type will not be completely the same, and this is also true when it comes to language differences between individuals. Even if people speak the same category of a language, their speech manners have more or less their own unique qualities, regardless of where they come from.

Sigmund Freud was a well-known pioneer of psychological analysis who lived from 1856 to 1929. In 1890, on the other hand, he published a book titled *Auffassung Zur Aphasie*, which was devoted to the topic of aphasia. He observed numerous disruptions in the semantic system in the cases of aphasia. Afterwards, he elevated the semantic transfer to the level of the entire culture, transformed it into a cultural image, incorporated his own analysis of unconsciousness, and finally turned it into the theory of psychoanalysis. When viewed from this perspective, even though Freud was not a trained biologist, he expressed tremendous concern about the subject, which involved both biology and linguistics, despite his lack of formal training. In a pathological sense, Freud's research set the groundwork for effective practice in biolinguistics, which was influenced in part by his work.

In addition, in 1941, Roman Jakobson published a book titled *Kindersprache, Aphasie, and Phonologische Universal in Germany*, in which he explored the issues of children's language, the historical evolution of language, and language pathology, among other subjects. In addition,

Lorenzo felt that every species have a unique hereditary aptitude to gain specific skills and knowledge.

In addition, he proposed the notions of genetics, physiology, evolution, and individual behavior cognizance, all of which are related with the adaptation of species behaviors to the survival value of the species. A wide range of Lorenzo's methodologies and concepts have been widely used to human biolinguistic study since his death (Wu, 2012c).

4.2 Representatives of Current Biolinguistics in Practice:

Chomsky was deserving of his position as the world's foremost authority in the field of biolinguistics. Early in the twentieth century, long before biolinguistics became a popular topic among relevant researchers, Chomsky (2007b) outlined the five fundamental concerns that should be addressed in biolinguistic research:

- (i) What exactly is the knowledge of a foreign language?
- (ii) How does one come to know something? In what ways does the knowledge get put to use? The underlying brain mechanisms are discussed in detail in (iv).
- (v) What is the process by which this information evolves (within the species)?

After discovering that language had its own physiological foundations and that there were specific parts of the human brain responsible for linguistic function, Lenneberg (1967) initiated the study of biolinguistics, which led to the discovery of other scholars who were also interested in the subject. In addition, Chomsky had been saying that the history of biolinguistics was just the history of transformational-generative grammar, which he believed to be correct.

The five questions that Chomsky posed are also the foundations for biolinguistics, and the first three of these were addressed in Chomsky's book *The*

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Logical Structure of Linguistics Theory (1975), while the fourth and fifth questions were addressed in Lenneberg's book *Biolinguistical Foundations of Language*.

The perspectives of Aniela Improta Fraca (2004), Lorenzo Messeri (2006), and Luigi Rizzi (2004) on biolinguistics are in total agreement with those of Noam Chomsky (2004). Fraca asserted in her book *Introduction to Neurolinguistics* that the biolinguistic trend in language research may be traced back to Chomsky's transformational-generative grammar, which was developed in the 1950s. He mentions several times in his book that Chomsky's transformational-generative grammar dealt with the nature of linguistics and biology, and that this was the case in his book. Rizzi believed that, despite the fact that biolinguistics had a long theoretical underpinning, its historical development was limited. One of the reasons for the former was that Rene Descartes' linguistic philosophy provided extremely fruitful ground for it in terms of theoretical development. Because Chomsky's transformational-generative grammar was developed concurrently with Lenneberg's *Biological Basis of Linguistics*, it had a brief historical period.

Similarly, Di Sciullo et al. (2010) observed that the rise of biolinguistics was an inevitable outcome of the inter-disciplinary research of biology and linguistics in the 1950s-1960s, whereas Jenkins (1997) believed that biolinguistics, transformational-generative grammar, and inner speech were not synonyms, but that the birth of transformational-generative grammar in the late 1960s meant a new discipline produced by human linguistic and biological mechanisms, which transformational-generative grammar was one of the first to recognize. The research of Cedric Boeckx and Norbert Hornstein (2003) was inspired by Jenkins' findings, and they divided the study of transformational-generative grammar into three stages: the combinatorial stage, cognitive stage, and minimalist stage. Cedric Boeckx and Norbert Hornstein (2003) divided the study of transformational-generative

grammar into three stages: The onset of the cognitive phase may be dated back to the end of the 1960s, while the late phase can be traced back to the 1980s. According to Boeckx and Hornstein, only the research conducted during the early phases of the cognitive was comparable to that conducted in biolinguistics, and the later research conducted in biolinguistics went far beyond the theoretical framework and practice domain of transformational-generative grammar.

Martin Nowak (2002) and Charles Yang (2002), on the other hand, asserted that biolinguistics began in the 1970s and was developed from there. Rather, they argued that biolinguistics was not a new wine and transformational-generative grammar was not an old bottle, but rather that biolinguistics represented a new turning of the linguistics-biology research paradigm, which had been launched by transformational-generative grammar. In the 1970s, transformational-generative linguists asserted that human language possessed biological qualities, and this scholarly belief was endorsed and supported by many geneticists and module biologists, leading to the establishment of the field of biolinguistics in the 1980s. As a result, the establishment of biolinguistics signified the beginning of the end of the biological paradigm as it applied to linguistic research.

Specifically, in recent years, the dispute between Hauser et al and Pinker & Jackendoff, which was sparked by the study "The faculty of language: what is it, who has it, and how does it evolve," has attracted a lot of interest. Laut Hauser et al. (2002, 2002), language research is defined as linguistic function research when viewed through the prism of biolinguistics. This means that language functions, like any other organ of man's body, are determined by genetics but can also grow, develop, and mature if exposed to the appropriate environment.

Both sides of the discussion came to some degree of agreement on the biological qualities of languages, which was a major sticking point in the debate (Fitch, Hauser & Chomsky, 2005). The

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importance of testing linguistic biological property hypotheses through empirical research, the importance of extracting contrastive data from various biological species through the use of a biology research method, and the trend toward inter-disciplinary cooperation between linguistics and biology were all recognized by both of them, among other things. Following a series of arguments, the field of biolinguistics has increasingly shifted its attention to the study of linguistic recursion (Wu & Zheng, 2012). The study of linguistic recursion from a biolinguistic perspective is primarily concerned with three aspects: the testing of linguistic recursion existence through experimental psychology (Devries, Christiansen, and Petersson, 2011; Poletiek, 2011), the significant role of linguistic recursion in linguistic theories (Zwart, 2011; Roeper, 2011), and the location of linguistic recursion in the human brain nerve area (Friederici, Bahlmann, 2011)

Conclusion

Biolinguistics appears to be a young discipline with a long history, with relevant research being conducted both within and outside of China still in the early stages. The author of this paper discovered, through a review of the literature, that current research on biolinguistics is primarily concerned with three aspects: (a) the definition of "biolinguistics" and the scope of its research; (b) the most frequently discussed issue: the reason and motivation for the rise and dominance of biolinguistics; and (c) linguistic researchers' knowledge and understanding of the opportunities and challenges that language research must face in the future.

According to the author of this paper, biolinguistics is an inter-discipline that was created through the integration of biology and linguistics and that encompasses a wide range of subjects and scopes, including linguistics, biology, anthropology, psychology, neuroscience, and others (Wu, 2012b). Because language can be considered a natural phenomena, biolinguistics considers the human brain/mind as the primary topic of study and suggests

that a naturalist methodology be used in order to better understand it. It aspires to find solutions to the questions of the nature, origins, and application of human language knowledge, among other things. Based on his research into relevant literature both domestically and internationally, the author of this paper has discovered that discussions involving an understanding of biolinguistics in a broad sense are restricted to reference books such as encyclopedias and dictionaries, rather than actual discussions. Furthermore, an examination of academic articles demonstrates that biolinguistics research is more concerned with the contents of biolinguistics in a limited sense than with the general field of biolinguistics. In other words, academic papers tend to place the emphasis of biolinguistics on the grammar properties proposed by the generative grammar school of thought represented by Chomsky, who considered language to be a natural object and linguistic functions to be the innate biological organ of the human brain, rather than on the linguistic functions themselves (Wu, 2012b). The author of this paper believes that the primary reason for the aforementioned phenomenon is that encyclopedias or dictionaries used as reference books are supposed to provide an overall definition of biolinguistics in both broad and narrow senses, because reference books are designed to elaborate biolinguistics from a comparatively broad perspective, which is the nature of reference books, as explained above.

However, in terms of academic study, it turns out that it is impossible for any linguistic scholars to be so well-versed in biology and linguistics that they are able to perform equally well in both fields. Because of this, it is unavoidable that they are always looking for opportunities to further their own academic interests within the confines of biolinguistics.

Chomsky's generative linguistics is credited with the success of biolinguistics, which dates back to its inception. In the 1970s, generative linguists discovered that human language has biological aspects, and this scientific belief has since been

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endorsed and acknowledged by a large number of geneticists and module biologists, among other scientists. As Chomsky has pointed out in recent years, sooner or later, people will be able to discover the genetic variant foundation for language competence and that once scientists discover the variations, human beings will be able to seek other brand new methods to study the inner properties of language competence (Chomsky, 2007b). Thus, man's brain or mind becomes the primary research subject in biolinguistics, and language research can be carried out at the levels of both physiology and psychology, which mutually support and direct each other in their efforts. Once upon a time, Chomsky borrowed from scientific history to illustrate the unity of physics and chemistry in order to illustrate the oneness of brain scientific research and linguistic research. Zhang et al. (2004) conducted a parallel comparison between the perspectives of the hard sciences and the perspectives of linguistics, and they demonstrated that research methods developed in the hard sciences could be applied to biolinguistic study in order to bring natural science and mind science together. Language research has thus become one part of biology, which has enabled the birth of the field of biolinguistics, when viewed from an internalistic perspective. Furthermore, the advancement of biolinguistics is directly influenced by new findings in biology, the neuropsychological system, and other fields, particularly in the following areas: (i) The development of a new synthesis and the expansion of the biological domain. Hence, biological study must be diversified, internalized, and structured; internalism, on the other hand, is precisely the anti-behaviorism advocated by Chomsky's linguistics, and thus is incompatible with the scientific method. Therefore, Chomsky introduced Evo-devo into biolinguistics in the first place, which opened a sky window for language research to look at the stars in the distance for the first time (Wu, 2012b); (ii) Understanding the central problem of inter-disciplinary research in relation to language (Wu, 2012c).

A important issue emerged in the field of neurolinguistics, namely that, as compared to unitary disciplines, inter-discipline lacks a common characterisation level; and, thirdly, the finding of the FOXP2 gene. According to current research, FOXP2 is not a one-of-a-kind gene. For the sake of ethics, it is not permissible to undertake a portion of relevant research with human subjects as experimental subjects. As a result, studies on the FOXP2 gene were conducted using various species as experiment samples, including rats, birds, and bats; (iv) the creation and development of the minimalist program, which is related to linguistics. linguistics has become strongly intertwined with cognitive science and other disciplines of biological science since the appearance of the minimalist program; (v) the transition from a comparative psychology approach to a cognitive science perspective. Early comparative cognitive research used a top-down approach, but as more and more people have realized that cognitive factors may be shared across species, a bottom-up approach is becoming more popular. This approach is consistent with the approaches used in neuroscience and evolutionary biology research (Boecks, 2011).

For linguistic scholars working in the field of biolinguistics, there are both possibilities and problems to consider. As previously stated, the so-called opportunities relate to the construction and development of a basic programming strategy. In spite of this, a large number of researchers who claim to support the minimalist program are instead preoccupied with the description of individual languages and the explanation of the differences between languages, rather than demonstrating genuine concern for the universal properties that allow human languages to evolve. As a result, there is still much work to be done in linguistic study. The ability to be open-minded and to find a method to diversify are the two most important problems that linguistic scholars must encounter, and they are the ones that are the most difficult to overcome. Different theoretical assumptions are not diametrically opposed to one another. Language study based on various ideas, on the other hand, is

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advantageous for the discovery of the intricacies of human organs (Boecks, 2011). Biolinguistics, on the other hand, is a cross-disciplinary field that includes both linguistics and biology. Linguists and biologists who want to be experts in both fields will find it extremely difficult to do so. As a result, future study must rely on the collaboration of biological and linguistic scholars; otherwise, it may be difficult for biolinguistics to make significant advances in the field.

As a result of the foregoing review of important literature in the field of biolinguistics, it is possible to conclude that future biolinguistic research will be conducted in three areas: (2) Ontogenetic genesis of language; (3) Language mechanism and faculty of language; (4) Language evolution and evolution of language (Wu, 2012c). Language researchers are expected to begin with biolinguistics in a narrow sense, such as the mechanism of language recursion and its physiological foundation, the process of language acquisition in children, and so on. Biolinguistics in its broadest meaning, on the other hand, can be left to biologists, allowing linguistic researchers to fully use their advantages while also promoting the peaceful and healthy development of biolinguistics as an inter-discipline of biology and linguistics.

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