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An Overview of Researches on Biolinguistics

WU Jieqiong[a],*

[a]School of Foreign Languages, Hubei Engineering University, Xiaogan, China.
*Corresponding author.

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Abstract

In 1997 in memory of the 40th anniversary of transformational-generative grammar, Jenkins wrote the article "Biolinguistics: Structure development and evolution of language", which helped produce a large number of scholarly monographs and papers with respect to biolinguistics. Simultaneously, a series of relevant international academic seminars were successfully held. This paper, based on the summarization of research status quo on biolinguistics, looks forward to the future development of biolinguistics so as to help predict the development of biolinguistic researches.

Key words: Biolinguistics; Transformational-generative grammar; Linguistics; Biology

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INTRODUCTION

"Fictional names" which are meaningful but without referents have been one of the important focuses of linguistic philosophy and even the whole of philosophy. Exploration of it has found that language is not only the external physical prospect, but also human subjective creation and result. Nevertheless, researches with respect to linguistic philosophy have never arrived at unanimous conclusions as far as the nature of language is concerned. It might be of great help to introduce biology into linguistics so as to bring the nature of language to light and promote the further development of linguistics. Biolinguistics aims to study languages from the perspective of biology and highlights the fact that humanistic linguistics obtains motive force of development from biology (Yuan & Liu, 2008). Biolinguistics can be interpreted in both narrow and broad senses. Biolinguistics in narrow sense mainly refers to the study on grammar attributes proposed by school of generative grammar represented by Chomsky, who studies languages as a natural object and regards linguistic organic function as human brain's innate biological organ. In broad sense, the study of biolinguistics means language research from the perspectives of evolutionary biology, neuroscience, genetic science, psychology and even physiological basis for the research of languages (Wu, 2012a).

Although the discipline of biolinguistics is a new branch of science, it has a long history. As early as the 15th century, Leonardo da Vinci mentioned the concept of biolinguistics, although he did not give it a formal name. After the appearance of Charles Darwin's evolution, many linguists attempted to study languages from the angle of evolution theory in the hope to find out the evolution mark of language. Among the researchers were the most unknown ones such as August Schleicher and Sigmund Freud, etc. (Wu, 2012b). In 1997 in memory of the 40th anniversary of transformational-generative grammar, Jenkins (1997) wrote the article "Biolinguistics: structure development and evolution of language", which helped produce large number of scholarly monographs and papers with respect to biolinguistics. Simultaneously, a series of relevant international academic seminars were successfully held. Although researches on biolinguistics had been going on well outside China, for quite a long time simply a few Chinese scholars were very much concerned with this research field. This paper analyses relevant literature, briefly summarizes the research status quo on biolinguistics outside China in the hope

that it will be beneficial for Chinese scholars to get to know the current situation with regard to researches on biolinguistics.

1. LITERATURE STATISTICS ENTITLED "BIOLINGUISTICS"

The emergence of the term "biolinguistics" can be traced back to 1959 and the book *Handbook of Biolinguistics* written by Clarence and Muyskens (Tang, 2004). For the first time the book combined the research findings on biology with linguistics to define "biolinguistics". In 1974, called together by Massimo Piattelli-Palmarini, experts such as linguists, biologists and neuroscientists who paid close attention to the mutual topic of linguistics and biology attended the international academic conference held by Rom. Institute of Research, Paris, and American Massachusetts Institute of Technology (MIT). At the conference the term "biolinguistics" was proposed, which obviously indicated that biolinguistics was inter-discipline of biology and linguistics. The concept of "biolinguistics" mentioned in this paper is supposed to stem from that academic conference. In 1980, sponsored by molecular biology laboratory at Harvard University, a research group of "biolinguistics" was set up, whose research fields involved theoretical linguistics, molecular biology, language learning barriers, neurology of animal communication, neurolinguistics, aphasia, computer linguistics, babies' pre-language perception, the origin and evolvement of linguistics, and biolinguistics became an inter-discipline worthy of its name (Wu, 2012c).

From 1950 to 1997, there were only four bibliography entries about biolinguistics, among them were three monographs and one academic paper. Nevertheless, it was not until 1997 when Jenkins wrote the article "Biolinguistics: structure development and evolution of language" in memory of the 40th anniversary of transformational-generative grammar, and "Laboratory for Biolinguistics" was set up at Ricken Brain Science Institute that the spring for biolinguistics came. Encouraged by Jenkins' symbolic article, from 2000 to 2010 abruptly appeared thirty-five bibliography entries on biolinguistics, taking up 71.4% of all literature entitled biolinguistics, including the nine published in 2011.

2. COMMUNICATIVE PLATFORM ASSOCIATED WITH BIOLINGUISTICS

In addition to the relevant academic literature, researchers of biolinguistics from all over the world held seven large-scale international academic seminars since "Conferencia Inaugural Del Grup De Biolinguistica (GB)" which was held in Barcelona in 2004. To be more specific, from 2007 to 2008, four influential international conferences were held with respect to biolinguistics, including "Biolinguistics Investigations" held in Domingo, "Biolinguistics: Language Evolution and Variation" in Venice, "International Network in Biolinguistics, First Meeting" in Arizona and "Biolinguistics: Acquisition, Language, Evolution" held in York University. In 2010 the international seminar "The Language Design" held by scholars of biolinguistics at Université du Québec à Montréal resumed to focus on Chomsky's *Three Factors in Language Design, TFLD* which was published in 2005 and had discussions on the special topic of language design. In the year 2011 the seminar "Graduate workshop of biolinguistics" held at University of Groningen also provided an opportunity of cooperation and communication for researchers of biolinguistics (Elisa, 2011). In addition, "International Conference on the Evolution of Language, EVOLANG" has been held every two years since 1996. It explores the issues concerning the source of human languages and their bio-mechanism evolution and promotes the development of biolinguistics to some extent.

In addition, the international linguistic journal *Biolinguistics* created by Boeckx, Kleanthes & Grohmann was published in 2007 and has supplied a platform of academic communication and further pushes forward the development of biolinguistics as a new branch of science.

3. BRIEF INTRODUCTION TO BOOKS ON BIOLINGUISTICS

By means of careful reading of literature on biolinguistics, the researcher of this paper has found that academic papers entitled biolinguistics can be roughly sorted into three categories, most of which focus on the significant correlations between transformational-generative grammar and the minimalist program. In other words, the authors of the following papers believed that biolinguistics was the synonym of transformational-generative grammar. The papers include the following: Fujita's (2003) "Progress in biolinguistics-Geneses of language-A view from generative Grammar" published in *Viva Origino*; Bird's (2006) "Biolinguistics: what is it, who does it, and how should it proceed" published in *Chomskyan Studies*; Lee's (2006) "Chomksy and biolinguistics" published in *Chomskyan Studies*, Epstein & Seely's (2007) "The anatomy of biolinguistics minimalism" published in *Biolinguistics* and Lebelle's (2007) academic paper "Biolinguistics, the minimalist program and psycholinguistic reality" published in *Snippets*.

Besides, some literature aimed to explore the core problems of biolinguistics such as structure of language, phylogenetic language evolution and ontogenetic language development. Among them the representatives were Jenkins's (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 transformational-generative grammar, Chomksy's (2007a) "Biolinguistics explorations: Design, development, evolution" published in *International Journal of Philosophical Studies* and Di Sciollo & Boeckx's (2011) *The Biolinguistics Enterprise: New Perspective on the Evolution and Nature of the Human Language Faculty* published by Oxford University Press.

Finally, there were academic papers represented by Chomsky's (2004) "The biolinguistics perspective after 50 years" which dwelled upon the emergence of biolinguistics and its development. The above authors focus on the history, current situation and anticipation of biolinguistics.

4. REPRESENTATIVES OF BIOLINGUISTICS AND THEIR IDEOLOGY

4.1 Pioneers of Biolinguistics

Some scholars had begun to make systematic researches on biolinguistics before it became an independent science and when Darwin proposed his theory of evolution. Among the researchers the most influential one was the Germany linguist August Scheilurer (1821-1868) who discussed about the evolution of language from the perspective of Darwin's theory of evolution and proved to be the most representative pioneer, who examined language mainly by means of biology. After the publication of *The Origins of Species* written by Darwin in 1859, Scheilurer earnestly compared language with plants and animals. He believed that linguists were naturalists, the relationship between a linguist and language was simply like the one between a planter and a plant, and that the method of linguistics was closely associated with the methods of other natural sciences. In addition, he observed that what the naturalist called "relatives" was named by linguist "language system" or "language family" (Yao, 2007). As for some relatives who are comparatively more closely associated with each other, linguists also call them relative language of the same language family or system. The variety of relatives in biology can be called the language of a system in terms of linguistics. The dialect or local dialect of a language is sub-branches of a type, while smaller dialect or local dialect is equal to variety or variation. Then there is individual in accordance with personal speech manner. Needless to say, individuals who belong to the same type will not be completely the same and that is also the case with languages. Even if people speak the same category of a language, their speech manners have more or less their own individual characteristics.

Sigmund Freud was a well-known pioneer of psychological analysis. In 1890, however, he wrote a book entitled *Auffassung Zur Aphasie* which focused on the problem of aphasia. From the cases of aphasia, he saw many semantic system breakdowns. Then he enlarged the semantic transfer to the level of the whole culture, changed it into cultural image, added his own analysis of unconsciousness and at last developed it into the theory of psychoanalysis. Seen from this angle, although Freud was not a professional biolinguist, he showed great concern about the issue which involved both biology and linguistics. Freud's research in some degree laid a good practice foundation for biolinguistics in a pathological sense.

In addition, in 1941 Roman Jakobson wrote a book entitled *Kindersprache, Aphasie, and Phonologische Universal* in Germany, exploring the issues of children's language, the historic evolution of language and language pathology. Besides, Lorenzo believed that every species had its own hereditary ability to learn specific things. He also proposed the concepts of genetics, physiology, evolution and individual behavior cognizance that is associated with the adaptation of species behaviors to the survival value. Lorenzo's various methods and ideas have been widely applied to human biolinguistic researches (Wu, 2012c).

4.2 Representatives of Current Biolinguistics

Chomsky was worthy of the leading authority in the field of biolinguistics. In the early 50s of the twentith century, long before biolinguistics became the hot topic for relevant scholars, Chomsky (2007b) had put forward the five core questions with regard to biolinguistic research: (i) What constitutes the knowledge of language? (ii) How is the knowledge acquired? (iii) How is the knowledge put to use? (iv) What are the relevant brain mechanisms? (v) How does this knowledge evolve (in the species)? Lenneberg (1967) observed that language possessed its own physiological foundations and that in man's brain there were some specific parts in charge of linguistic function, which involved the research of biolinguistics before other scholars. In addition, Chomsky had been claiming that the history of biolinguistics was simply the history of transformational- generative grammar. Foundations for biolinguistics are also the five questions that Chomsky raised, and the first three were dwelt upon in Chomsky's book *The Logical Structure of Linguistics Theory* (1975), while the fourth and the fifth ones were touched on in Lenneberg's book *Biolinguistical Foundations of Language*.

The viewpoints of Aniela Improta Fraca (2004), Lorenzo Messeri (2006) and Luigi Rizzi (2004) about biolinguistics completely coincide with Chomsky's. In her book *Introduction to Neurolinguistics*, Fraca claimed that the biolinguistic tendency in language research originated from Chomsky's transformational- generative grammar which came into being in the 1950s. In his book Messeri mentioned many times that Chomsky's transformational- generative grammar actually dealt with the nature of linguistics and biology. Rizzi believed that

although biolinguistics had long theoretical foundation, its history was short. The reason for the former lied in that Rene Descartes' linguistic philosophy provided deep fertile soil for it in terms of theory. It had short history because Chomksy's transformational-generative grammar was produced along with Lenneberg's *Biological Basis of Linguistic*.

Di Sciullo et al. (2010) observed that the rise of biolinguistics was the inevitable outcome of the interdiscipline research of biology and linguistics in the 1950s-1960s while Jenkins (1997) believed that biolinguistics, transformational-generative grammar and inner speech were not synonyms, but the birth of transformational-generative grammar in the late 1960s meant a new discipline produced by human linguistic and biological mechanism which transformational- generative grammarian had studied for many years.

Cedric Boecks and Norbert Hornstein (2003) followed Jenkins' research and divided transformational-generative grammar study into three stages, namely the combinatory stage, the cognitive stage and the minimalist stage. The early phase of the cognitive can be traced back to the end of 1960s while the late one to the 1980s. According to Boecks and Hornstein, nothing but the research of the early phase of the cognitive was equal to that of biolinguistics and the later researches on biolinguistics were far beyond the theoretical framework and practice domain of transformational- generative grammar.

On the other hand, Martin Nowak (2002) and Charles Yang (2002) deemed that biolinguistics originated in the 1970s. They believed that biolinguistics was not the new wine and transformational-generative grammar was not the old bottle but that biolinguistics was a new turning of linguistics-biology research paradigm initiated by transformational-generative grammar. In the 1970s, transformational-generative linguists held that human langauge possessed biological properties, and this discipline belief was approved and accepted by many geneticists and module biologists, thus biolinguistics came into being. Hence the foundation of biolinguistics also marked the turning of biological paradigm with regard to linguistic researches.

In recent years, in the debate between Hauser et al and Pinker & Jackendoff, elicited by the paper "The faculty of language: what is it, who has it, How does it evolve?" (Hauser, Chomaky and Fitch, 2002), Hauser et al believed that the nature of language research in view of biolinguistics meant linguistic function research, while linguistic functions, just like other organs of man's body, were determined by inheritance and might grow, develop and become mature in appropriate environment. Both sides of the debate reached an agreement to some extent with regard to biological properties of linguistics (Fitch, Hauser & Chomsky, 2005). For example, both of them recognized the necessity of disintegrating linguistic component mechanism, the significance of testing linguistic biological property hypothesis through empirical researches, the value of extracting contrastive data from various biological species by means of biology research method and the tendency of inter-discipline cooperation between linguistics and biology. After a series of debates, the research focus of biolinguistics has gradually turned to linguistic recursion (Wu & Zheng, 2012). Linguistic recursion research from biolinguistic point of view mainly involves three aspects, namely the testing of linguistic recursion existence by experimental psychology (De vries, Christiansen & Petersson, 2011; Poletiek, 2011), the significant role of linguistic recursion in linguistic theories (Zwart, 2011; Roeper, 2011) and the position of linguistic recursion in human brain nerve area (Friederici, Bahlmann & Friedrich, 2011; Russo & Treves, 2011).

CONCLUSION

Biolinguistics proves to be a young discipline with long history and relevant researches both inside and outside China are at the initial stage. By means of analysing literature, the author of this paper has found that the current research with regard to biolinguistics mainly discusses the topic from three aspects: (a) The definition of "biolinguistics" and its research scope; (b) The most frequently discussed issue: the reason and motivation for the rise and prevail of biolinguistics; (c) Linguistic researchers' knowledge and understanding of the opportunities and challenges that language research has to face under the background of biolinguistics.

The author of this paper observes that biolinguistics is an inter-discipline produced by the integration of biology and linguistics which involves relevant disciplines and scopes such as linguistics, biology, anthropology, psychology and neuroscience (Wu, 2012b). Biolinguistics takes human brain/ mind as the main object of research and proposes that naturalist methodology should be adopted, as language can be regarded as a natural phenomenon. It strives to find the answers to the questions of the nature, origins and usage of human language knowledge. By searching the relevant literature both at home and abroad, the author of this paper has found that discussions with an understanding of biolinguistics in a broad sense are simply limited to reference books such as encyclopedias and dictionaries. In addition, analysis of academic papers reveals that biolinguistics research shows more concern about the contents of biolinguistics in a narrow sense. In other words, academic papers tend to put the focus of biolinguistics on the grammar properties proposed by generative grammar school of thought represented by Chomsky, who took language as a natural object, and linguistic functions as human brain's innate biological organ (Wu, 2012b). The author of this paper believes that the main reason for the above phenomenon lies in that encyclopedias or dictionaries as reference books are supposed to offer an overall definition

to biolinguistics in both broad and narrow senses, since to elaborate biolinguistics from a comparatively broad perspective proves to be the nature of reference books. Nevertheless, as far as academic research is concerned, it turns out to be impossible for any linguistic researchers to be so learned that they not only have a good command of biology, but also linguistics. Hence it is the inevitable outcome that they are always seeking their own academic interest within the narrow framework of biolingustics.

The origin of biolinguistics attributes success to generative linguistics represented by Chomsky. In the 1970s generative linguists observed that human language possessed biological properties and this scientific belief has been approved and accepted by many geneticists and module biologists. In recent years Chomsky has explicitly pointed out that people would find sooner or later the genetic variant foundation for language competence and that once scientists discovered the variations, human beings would be able to seek other brand new methods to study the inner properties of language competence (Chomsky, 2007b). Accordingly man's brain or mind becomes the main study subject of biolinguistics and language research can be made at the levels of both physiology and psychology which support and direct each other. Chomsky once borrowed the unity of physics and chemistry in scientific history to illustrate the unity of brain scientific research and linguistic one. Jenkins made a parallel comparison between standpoints of hard sciences and linguistic ones and proved that research methods in hard sciences could be also applied to biolinguistic study so as to unify natural science and mind science (Tang, 2004). Hence seen from the angle of intemalism, language research has become one part of biology, which enables biolinguistics to come into being. In addition, the rise of biolinguistics directly benefits from the new discoveries of biology, neuropsychological system, etc. mainly in the following aspects: (i) The new synthesis and expansion of biology domain. This demands that biology research should tend to be diverse, internalized and structuring, while intemalism exactly conforms to the anti-behaviorism followed by Chomsky's linguistics. Accordingly Chomsky introduced Evo-devo into biolinguistics in the first place, which opened a sky window for language research to look at the stars far away (Wu, 2012a); (ii) Knowledge of the key problem of inter-discipline related to language. The problem appeared to be significant in the field of neurolinguistics, namely compared with unitary discipline, inter-discipline lacks a common characterization level; (iii) The discovery of FOXP2 gene. Research indicates that FOXP2 is not a unique gene. For the sake of ethics, part of relevant researches can not be conducted with human being as experimental subjects. Hence researches related to FOXP2 gene were made with other species such as rats, birds and bats as experiment samples; (iv) The formation and development of the minimalist program related to linguistics. It is the appearance of the minimalist program that has made linguistics closely associated with cognitive science and other branches of biological science; (v) The transition of comparative psychology perspective. The early comparative cognitive research adopted the top-down method but more and more people have realized that cognitive factors may be shared with other species, so bottom-up method is to be required, which accords with the research approaches of neuroscience and evolutionary biology (Boecks, 2011).

Under the background of biolinguistics, opportunities and challenges coexist for linguistic researchers. The so-called opportunities refer to the formation and development of the minimalist program. Nevertheless, large number of researchers who claim to approve the minimalist program actually are still struggling with description of individual language and explanation of the differences between languages instead of showing sincere concern for the universal properties which make it possible for human languages to evolve. Hence linguistic research still has a long way to go. The most serious challenges that linguistic researchers have to face turn out to be the fact that whether they are open-minded or able to find a way of diversification. Different theoretical assumptions do not repel each other. On the contrast, language researches based upon different theories are beneficial for the exploration of human organs' complexities (Boecks, 2011). Besides, biolinguistics is an interdiscipline of linguistics and biology. It is very difficulty for linguists or biologists to possess professional knowledge of both disciplines. Hence future research has to rely on work in cooperation of biological and linguistic researchers, or else it may be hard for biolinguistics to make a breakthrough.

Based on the above analysis of relevant literature with regard to biolinguistics, it can be concluded that future biolinguistic researches will be made in three aspects: (1) The evolution of language; (2) Ontogenetic language development; (3) Language mechanism and faculty of language (Wu, 2012c). Language researchers are supposed to start with biolinguistics in narrow sense, such as language recursion mechanism and physiology basis, children acquisition mechanism, etc. On the other hand, biolinguistics in a broad sense can be left to biology researchers, which makes it possible for linguistic researchers to exploit their advantages to the full and is also favorable to the harmonious and healthy development of biolinguistics as inter-discipline of biology and linguistics.

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