Linguistics and Language Development

Naoki OBA

Now the whole earth had one language, and one speech.....

-Genesis: 11: 1

The formation of different languages and of distinct species, and the proofs that both have been developed through a gradual process, are curiously parallel...

Darwin (1871)

Language is a computational cognitive system, which is innately hard-wired in the human brain.

Berwick and Chomsky (2016)

Keywords: I-language/E-language, Formalism/Functionalism, Language Acquisition, Language Variation, Universal Grammar, Parameter, Communication, Language Evolution, Noam Chomsky, Steven Pinker

This paper reviews some of the remarkable discoveries about language which linguists have made within modern linguistics over the past half century. In an overview of some of the central issues of the current linguistic theory, I shall consider the kind of implications that these discoveries bear on some of the most important language-related issues−language function, language acquisition, and language evolution --- which represent some of the most current topics in theoretical linguistics. In considering some of the most important issues, I shall also discuss what exactly the nature of Universal Grammar (UG) is, what parameters are, why there are parameters, and what interaction exists between invariant principles and variant parameters. Finally I shall conclude with a discussion of the most current topic of language evolution: how language has evolved.

1. Language as a biological instinct

A few simple but remarkable facts about language are that every society has a language and every normal child in every society acquires the language of that society. Under normal circumstances, a child develops any one of the natural languages spoken in the home or the local area in which the child interacts on a regular basis. Furthermore, all normal children develop language at roughly the same speed, along much the same schedule. A child develops a very complex communicative system by the age of 6. This process of a child's language acquisition is remarkable for the speed and uniformity with which it takes place. Language seems to be a universal property of human beings, and human beings are distinct from all other animals in this respect.

A simple conundrum is the problem of how we get to know things that we have never been taught and have never heard (Plato's problem). This is also called the Poverty of the Stimulus problem. Despite the limited exposure to a language, a child acquires a language by the age of about 6. Human language is creative, for virtually every sentence that a child (and an adult) speaks or understands has never been heard or spoken before. The child eventually comes to be able to speak and understand an infinite number of sentences and expressions, without formal instruction. Similarly the child comes to have a very rich and complex capacity that goes far beyond what he can derive from his or her experiences.

The paradox of language is the diversities and the similarities among languages. While languages are very different from one another, they are also similar at a deep level. Linguists have been puzzled for a long time by the fact that languages of the world (about 4000 to 6000 languages) are actually much more similar to each other than one might expect. For example, in the 1960s, Joseph Greenberg, originating the typological approach to language, compared a variety of languages from different language families and different parts of the world, and discovered striking similarities in those languages that had nothing to do with any historical and cultural relationship. Greenberg (1963)

found forty-five universals of language. There are striking similarities among human languages, even those which are historically and geographically unrelated. Languages, no matter where they are spoken, or by whom, share many specific structural properties.

These fundamental facts and the inquiry into the conundrum and paradox of language have led to the belief that language springs from something that all humans have in common, which is something biological – innate linguistic knowledge that is rooted in common to all humans. Noam Chomsky called this ability 'Universal Grammar (UG).' And later, Steven Pinker, the cognitive scientist and psycholinguist, named it 'Language Instinct' in his illuminating book of the same name. Noam Chomsky has initiated the most famous argument in the mid 20th century that language is a genetically determined property of the human mind, and he has brought the modern revolution in linguistics and cognitive science. Steven Pinker is perhaps the most responsible person for the new development and directions in cognitive science and linguistics by combining the fields of psycholinguistics, neuroscience, evolutionary biology and genetics.

Pinker contended a quarter century ago, with an interdisciplinary approach and careful observation, that the language instinct was an example of what Charles Darwin called 'natural selection.' Pursuing the ideas of Darwin and Chomsky, Steven Pinker offers a view on why we use language and where this ability comes from. Rather than being an acquired cultural artifact, he vigorously argued that language is a biological adaptation to communicate information. He concludes that if language is an instinct as other organs are, it probably evolved by natural selection, the only successful scientific explanation of complex biological traits.

A theory of UG is frequently referred to as part of biology. The biological theory, postulating an innate capacity for language, attempts to explain how children acquire their native languages. One of the remarkable facts about language that linguists have discovered over the past century is that all languages are constructed fundamentally in the same way. If the basic shape of language is genetically determined, there would be no language variations and no differences among languages. Yet, obviously, languages exhibit extensive

variations. The theory of UG solves this problem by allowing language particular options (or parameters) of variation. In other words, the differences among languages seem to reflect a limited menu of options, from which languages pick and choose.

The biological view is that our environment interacts with our innate capacity for language, so that children acquire any particular language from the surrounding environment. The child would, on the basis of particular data he encounters, set values for particular options. But the key discovery of modern linguistics is the fact that the influence of the environment is so limited. Basically our linguistic environment helps our language instinct figure out which items from those options available are going to be used. Then, the Tower of Babel could be reinterpreted in linguistic terminology as: God has created a single human language with a set of selections to compound the language of Noah's descendants. Because of this set of selections, languages have changed and diversified within recorded history, without the direct intervention of God.

2. The Nature of Language

Let us start with the most fundamental question about language: what is language? This question is one of the main themes explored explicitly and implicitly throughout our discussion in this paper. It is no exaggeration to say that the definition of language has been one of the essential concepts in modern linguistics. Shaping our understanding of the nature of language enables us to be explicit about the current linguistic theory. The definition of language is not a thing of the past but continues to be explored. It has been contended more recently that because language is not always clearly defined, the question of where human language comes from, namely the question of language origin, could not be properly posed until recently (Berwick and Chomsky 2016).

Although the term 'language' is frequently used, it is also frequently confused. One of the well-known definitions of language can be found in the classic book of Sapir (1921), which defines language as 'a purely human and non-instinctive method

of communicating ideas, emotions and desires by means of voluntarily produced symbols.' The problem with this definition is that it fails to account for the important distinction between language and speech. It is quite common to blur the distinction between language and speech, but they are not the same. Language and speech are not synonymous. The distinction was developed most clearly by Ferdinand de Saussure, who is widely considered one of the founders of 20th-century linguistics. Language, *la langue* in Saussure's terminology, is a social thing, possessed by the entire community. Speech, *la parole* to Saussure, is an individual product. That is, language is the potential vehicle, whereas speech is the actual activity of communication.

The definition of language depends, to a great extent, upon what the word calls to mind to an individual. More specifically, if someone were to inquire – for sake of example - what Japanese is, how would you respond to the question? You might respond to the question by demonstrating some oral examples of Japanese words, expressions, sentences, or even reading texts. You could also introduce examples of the Japanese writing system. This represents the explanation by the physical manifestation of language. This would be an extensional characterization of Japanese. Another perspective of defining the Japanese language in response to the question is to provide the questioner with some examples of basic grammar by introducing rules and principles for constructing words into simple sentences. A recurring sentence patterns begins to emerge such as the verb comes after the object, not before. The preposition comes after the noun phrase. The adjective comes after the complement. Based upon these rules, the questioner can master the basic sentence construction in Japanese and apply those rules to form more complicated sentences. The questioner may eventually be able to yield an infinite number of sentences with a finite set of rules. This would be an intensional characterization of Japanese.

Chomsky (1986) introduced the terms, E-Language and I-Language to refer to external/externalized and internal/internalized language, respectively. The external and internal are to be interpreted with reference to the individual speaker. E-language represents an extensional notion of language, and it is a collection of examples

understood independently of their properties of the mind. I-Language is, in contrast, an intensional notion, representing the linguistic knowledge that is in the mind of the speaker. This distinction is important in order to clarify the notion of language because language is pluralistic by nature. We might provide an answer to the question of what language is: language can be defined, tentatively, as a system of symbols (E-language) and the ability to use such a system (I-language), and a language is any specific example of such a system. Thus, two different approaches to the study of language are possible, either from the point of E-language or from the point of I-language. E-Language is now understood to be the real object of study, and E-language linguistics was known as American structuralism (Bloomfield 1933).

Modern linguistics has shown a move from an E-language approach to an I-language approach, which views language as a system represented in the mind/brain of a particular individual. This distinction is also crucial for understanding the paradox of language: namely, language diversities and language similarities. When we are asked to compare two historically unrelated languages, such as Japanese and French, they are mostly different or mostly the same, depending on viewing them externally or internally. Thus the notion of I-language can reveal the hidden similarities among languages. It is clear that children learning a language from the environment around them are clearly but unconsciously engaged upon the problem of I-languages. They are trying to discern the menu for the language, so they will be able to produce and understand new ones. Knowing a language, then, is knowing how to map I-language into E-language. The notion of I-language is the central topic of contemporary linguistics.

Particularly relevant to the nature of language is the issue of language and its relation to other aspects of human cognition. This is the crucial issue. The human language capacity is just one component of the human mind. Other components include perceptual mechanisms and conceptual knowledge. The fundamental question is whether the genetically determined language capacity is uniquely linguistic and independent of all other human capacities, or it is part of a more general cognitive capacities. Chomsky's

position is directly related to his notion of language, namely the innate linguistic capacity does not relate to any aspect of human capacity or cognition outside language. Accordingly it is an independent organ in the mind which interacts with other mental organs only in the actual use of language.

It should be pointed out that confusion exists regarding the relationship between language and thought. Again, it is common to blur the distinction between language and thought. At one extreme is the belief that language and thought are completely separate and independent, that the language one speaks does not have influence on thought. At the other extreme is the belief that language and thought are essentially one, that the language one speaks determines thought or the way of thinking. Each of the extremes is incorrect. As regard to the second belief, however, people tend to believe that thought is the same as language, or that language determines thought, at least to some extent. The linguistic determinism, known as Sapir-Whole hypothesis, is the idea that language shapes human knowledge or thought. The linguistics relativity, which is a form of linguistic determinism, is also the view that individuals experience the world based on the structure of the language they habitually use. A similar line of view can be found in Wittgenstein, feminism where feminists blame sexist thinking on language, or in the assumption about language rooted in Post-Modernism.

These claims are not attainable from the linguistic point of view that language is a human instinct. It is a simple fact that we can think without a language, as aphasics do. Some individuals may be unable to use or comprehend certain types of grammar due to injury or developmental disabilities, but still have normal intelligence. People without a language would still have language (I-language). A child who was born deaf, for instance, can develop a level of perfect language ability with sign language. If language does influence thought at least to some extent, then it should be possible to find cognitive differences among persons speaking different languages. The fact is that our cognitive life (perception, memory, thought, and action) is basically the same and we all exhibit similar cognitive capacities regardless of the languages we use. The processing involved for

language and thought has to be different. We do not think in a language. 'The language of thought' is distinct from E-language. In other words, the capacity for thought and comprehension is not a function of E-language such as Japanese or Chinese or English; rather the thought process is governed by I-language skills or logically distinct kinds of concepts. Therefore, language differences do not represent different views or adaptations to different environments.

2.1 The View of Language-as-Communication: Form and Function

For the further clarification of the notion of language, let us turn to another fundamental question: why does language exist? This question might be equivalent to the question of what the function of language is. The most likely and popular answer to this question is: the function of language is communication. It is natural to think that language exists because people want to communicate, and hence that language serves the purpose of communication. This is a plausible and common answer. In this view, communication is one of the main uses to which we assign language. Language is, then, a useful tool for communication, and this leads to, furthermore, the belief that we acquire language as a deliberate, social act, rather than as a human instinct.

The popular and prevalent view emphasizes that communicative function determines the form of language. In other words, pragmatics of discourse factors - such as a set of communicative needs, or discourse principles - explains the form or structure of language. The theme unifying the various functional approaches is the belief that language must be studied in relation to its role in human communication. The theory in linguistics may be divided into two broad schools of thought which may be labeled formal versus functional approaches. The two distinct views about language are that one is a formal view where language is an infinite set of structural descriptions of sentences, and the other is a functional view where language is a system of human communication which is constructed by some general principles governing human communication.

There may be variants within the functional approach to language concerning the

extent to which function dominates linguistic form. At one extreme is the view that form essentially follows function. That is, the basic form of language is determined not by genetic principles but by its communicative function and discourse-pragmatics, therefore there is no need to attribute a highly structured language faculty to the innate linguistic knowledge. At the other extreme is the weak claim on which linguistic forms are historically associated with communicative functions.

Newmeyer (1998) overviews various functional approaches in modern linguistics and discusses the difference between functional approaches and formal approaches. It is not clear if there is a logical conflict between the two approaches. The difference between the two approaches can be viewed at different levels of description. The formalists and the functionalists differ in how they explain differences among languages. Formalists are typically concerned with what are called internal explanations, where one feature of a language is explained in terms of another feature of the same language. Functionalists, in contrast, use external explanations, in which features of languages are explained in terms of other aspects of human cognition that do not necessarily have anything to do with language.

It seems clear that if the study of language is about E-language, the view stresses communication and behavior, and accordingly the interaction of linguistic forms and communicative functions. But, if the study of language is about the knowledge of human language, i.e., I-language, then the function of communication is not the main concern. Then, functional approaches and formal approaches are insufficient by themselves: each must be linked to the other in order to attain significant generalization about human languages. One major difference between the two concepts is that functional approaches are not primarily concerned with explaining language acquisition. Because of the level of E-language description, functional explanations based on communicative function or cognition principles fail to account for the simple fact that a child can attain any particular language. The child does not acquire the linguistic form by virtue of its function any more than he learns to have an eye because of the advantages of sight (Chomsky 1980).

The child acquires language, because he or she is designed to do so, not because of the advantages of its functions. An analogous view of a physical organ goes like this: the heart, for example, serves the function of pumping blood, but a heart does not just happen to develop in each individual because it would be useful to pump blood. A heart develops because the genetic program determines that it will develop as it does. Thus, language develops in the same way as a physical organ does.

If linguistic form were a direct reflection of extragrammatical principles, then there would be no need at all for language-particular grammar. The view that grammatical forms are derivable from nonlinguistic principles fails to explain the diversity of grammatical structures among the languages of the world. None of the functionally oriented studies so far proposed are primarily concerned with explaining language acquisition. What this means is that the functionally oriented studies are not psychological theories, and accordingly they are not about I-languages. This view also fails to provide the answers to such questions as: how do universal communicative functions allow language to evolve into different languages, and what functional demands determine that different languages evolve? The plausible answers to these questions are not able to be provided by the functional view.

Apparently, language has many uses, and communication is one of many functions of language. It is a plain fact that language is used in many ways such as for thought, for problem solving, for lying, for playing, for dreaming, for displays of group solidarity, and so on. Above all, language can be used for talking about language, which is called a metalanguage. In fact, language plays an integral role in virtually every conceivable human activity. Certainly there is no reason to regard one particular function as essential. Nevertheless, such a functional view on language as a useful tool is appealing because aspects of language look like this. It may be true that some of the linguistic forms are associated with one or more communicative functions, and certain forms evolved from cognitive, social, perceptual, and production factors. In fact, a large number of research studies show apparently that some of the syntactic devices may have their origins in

the structure of discourse, evolving in the service of communicative functions. Yet, just because some aspects of language are rooted in the communicative function, we cannot conclude that all aspects of language are rooted in communication. The function of language is not communication, while communication is a function of language, its important function.

We have started this section with the questions of why language exists and what the function of language is. A simple fact about language should be noted, regardless of its characterization, language is to be used to communicate with other people. It is useless if you are the only one possessing it. Language is useful because people learn to share a set of rules, the grammar of language, in the community or society. Pinker confidently believes, without much positive evidence, that language arose to fulfill a need to communicate and has evolved to adapt for communication. Hence, for him the function of language is communication and thereby language exists for communication. In this sense, the structure of language cannot be fruitfully studied, described, understood, or explained without reference to its function in communication (Givon 1979a, Newmeyer 1998). The formalism vs. functionalism is not an old issue in the linguistics literature, but, in fact, it is one of the most debated arguments in contemporary linguistics with regard to the issue of the language origin and the language evolution. We will discuss this issue in the final section. In the following section, let us consider further the functional view and its implications.

2.2. Implications of the Functional View of Language

The belief about language as a communicative tool is immensely popular, probably because we tend to believe that language is mainly to be used to communicate with other people. What would the implications of this view be? First of all, and most importantly, if language were just a means of communication, there would be no clear boundaries between language and other means of communication. It blurs the distinction between language and other communicative means. It also obviously obscures the definition

of language. As noted in Section 2, language is pluralistic by nature. If the function of language were communication, then language is just an external object. Externalized language may be used for communication, but language cannot be equated with a particular function, language-as-communication.

Furthermore, the belief of language as a communicative tool leads to the claim that all communication systems would be equal and should be treated in much the same way, thereby all communication should be learnable in the same way. Consequently, learning to read and learning to write should be a lot like leaning to talk. Literacy can develop in the same natural way as spoken language when the conditions for learning are comparable. The view eventually leads us to believe that all aspects of language development, including speaking, reading, and writing, are equal and learnable in much the same way. This is simply not true.

Why should children have difficulty learning to read when they don't have any difficulty learning to talk? The most straightforward answer to this question is that speaking is the result of innate capacities, and written language, unlike speaking, is a skill that makes use of this instinct. Children are born knowing the sounds of the world's languages, but they are not born knowing any letters of writing systems. We have no writing instinct, as well as no reading instinct. Children need to learn systematically or explicitly how to read and write. Children need not learn how to produce speech sounds or how to talk. Very young infants are born with an innate ability to distinguish a distinctive feature of sounds (phoneme) from any language when they hear them. They do not learn even the sounds in their native language by listening to their parents' speech. Producing or understanding sounds as well as speaking are human instincts. There is no evidence, however, that writing and reading are human instincts. Writing was invented. Children must be taught to read and write. Thus, speaking, which is one instance of communicative means, is essentially different from other communicative means, such as writing and reading.

It would be useful to clarify what is meant by human communication. Communication

is, in a narrow sense, construed to mean 'conveying information from one person to another'. But communication is much more than such simple linguistic behavior. Other types of verbal behavior, e.g. asking questions, making wishes or requests, making promises, or giving commands, should be considered part of communication. As noted above, language is useless if you are the only one possessing it, and if people do not share it. For the same reason, we do not communicate with each other in the air but rather socio-culturally. There are also linguistic behaviors for communication like writing and reading. Furthermore even non-linguistic aspects of the activities, like the display of group solidarity can be communication. Hence, all these activities are construed in a broad sense as communication. When it is claimed that the function of language is communication, this 'communication' is meant in a narrow sense, or a broad sense. Probably it is in a broad sense, because there is little reason to believe that the conveying of information is a central function of language. The claim of language-as-communication treats language as a form of communicative social action. But this is problematic. Every use of language is not reducible to an instance of communication. There may be instances of verbal behavior which are non-communicative.

It has been often pointed out in the literature on linguistics that speech is clearly the primary form of communication while writing is a secondary and derived system. Although speaking and writing have great similarities and the same language may be spoken or written, these two modes of communication must not be regarded as synonymous manifestations of language. There is a fundamental difference between speaking and reading/writing regarding their origins, i.e. where linguistic knowledge of speaking and reading/writing come from. That is, speaking is the result of innate capacities, a language instinct, while reading/writing is a skill which is learned by making use of the instinct. Children need not be taught to talk, nor even how to produce speech sounds. Our knowledge of speech sounds and talking is innate in the sense that we are designed to talk. Oral or spoken language is an instinct and hence is acquired in a scheduled and automatic manner. However, there is no evidence that children are born

with knowledge of written symbols. Writing was invented as a communicative tool. In other words, there is an essential difference between spoken language and written language. Thus, if language were just a means of communication, the view obscures a clear line between language and other means of communication.

2.3. The Distinction between Speech and Language, and the Notion of Grammar

As noted in Section 2, an important boundary between language and speech was developed most clearly by Ferdinand Saussure. Chomsky (1965) draws an original distinction between competence and performance. Performance is essentially the same as Saussure's *parole*, which refers to the actual utterances of the language. However, competence is different from Saussure's *langue* in one crucial respect: Whereas *langue* is an abstract linguistics system that comes to exist between individuals, competence is defined as the abstract knowledge about language that is contained in the mind of individual native speakers. That is, *langue* is about system, while competence is about living minds, the generative engine for yielding infinite expression by finite means.

Many of Saussure's observations about language are valid at the level of lexicon, or word categories. However, words are not all there is to language: there is also syntax, the principle of how the words in the lexicon are combined and how these syntactic combinations get to be more complex (which is missing from Saussure's observations). It is obvious from the previous discussion that this distinction between performance and competence corresponds to that of E-language and I-language. The grammar of competence describes I-language in the mind, which is distinct from the use of language, E-language.

Thus, language is, in modern linguistics, defined as a psychological entity, which is manifested as E-language. With this definition language is cleanly distinguished from speech. People, who fail to develop speech due to some physical or psychological reasons, nevertheless possess language. People who, due to some physical or psychological reasons, fail to develop speech nevertheless possess language. For

example, deaf children still develop language (sign language) and learn to write even though they fail to develop speech. That is, the ability to speak presupposes knowledge of language, but knowledge of language does not presuppose the ability to speak. Speech and language then may serve different functions and may be used on different levels of abstraction.

For, what we are seeking to describe is the native speaker's linguistic knowledge, which commonly has two physical manifestations in the form of spoken language or written language. The characterization of the linguistic knowledge of a mature native speaker is grammar. This definition is a move away from the ordinary sense of the word 'grammar.' It should be clear that the term, 'grammar', which is used in the field of the theoretical linguistics, differs from the ordinary use of grammar. In the ordinary usage, grammar refers to the rules of the language which tell us how the sentences of the language are constructed, such as the correct combinations of words, listing construction types, or informally describing parts of speech, the sentence patterns such as SVO, or the adjective precedes the noun in English. These rules are taught in school while we learn the subject of language, in particular a foreign language. The concept of grammar in modern linguistics, e.g. a generative grammar, on the other hand, provides a different perspective. A generative grammar, including the rules of language, is what enables us to put words together into sentences, specifying all possible grammatical sentences. In this notion of grammar, language as a general concept is in effect reduced to grammar, and accordingly the study of language is reduced to the study of grammar. The study of generative grammar in modern linguistics is marked by a significant shift in focus from language to grammar, while the study of functional theories is concerned with language rather than grammar, a set of structural description of sentences.

3. A Theory of Principles and Parameters

It was stated in the opening section that a few simple facts about language and

paradox/conundrum of language lead many linguists in modern linguistics to believe that children are equipped with an innate faculty or blueprint for language (UG), and UG helps the child in constructing a grammar for a particular language. In a highly idealized picture of language acquisition, UG is taken to be a characterization of the child's pre-linguistic state.

The Principles and Parameters (henceforth P&P) theory, first proposed by Chomsky (1981), (1986), has its origin in the two fundamental questions of modern linguistics:

1. What exactly do you know when you know your native language?
2. How did you come to know your native language?

A satisfactory answer to these questions must address the paradox and conundrum of language acquisition and the linguistic diversity. Within the framework of this theory, UG is elegantly reformulated as a system of P&P, where the parameters express the limited range of possible variation associated with each principle. A language is no longer a system of rules, but a set of specifications for parameters in an invariant system of principles of UG. Principles of UG have different parameter settings for different languages, thereby typological variations among languages. Thus, on the one hand, the system is restrictive enough to account for the fact that the child arrives at a particular grammar. At the same time, UG is sufficiently open to allow for the range of possible human languages.

Thus the question concerning knowledge of language, posed above as Question 1 becomes the problem of knowledge of a system of principles and parameters. The next step is to address Question 2, how does a person come to know this highly complex formal system. The goal of the P&P theory is to identify all of the principles and parameters that are universal to human language.

A theory based on parameters could, first of all, explain the paradox of language, namely languages look very different in terms of E-language but can nevertheless be very similar in terms of I-language. The theory explains that languages are different but their underlying principles are the same. Secondly, this theory also explains the more

fundamental paradox of language acquisition. A child comes to be able to develop a very complex communicative system. Why is it that children, whose contacts with the language are so limited, are able to know as much as they know? The issue of the poverty of the stimulus can be explained in terms of parameters.

A theory based on parameters could explain the fact that languages can change or evolve. Over a period of time, languages change or evolve and the process by which languages change is reasonably well known and described in the related literature. A language like English, for instance, undergoes several changes. Old English was, like modern German and Dutch, a mixed SOV language with rich case marking. But by the Middle English period, English lost its case marking and changed its word order and now it is a head-first language with a strict word order of SVO. The changes that languages undergo involve changes in the setting of parameters. The change could happen if the settings for parameters change. Thus, parameters could provide explanation for the language change.

However, this framework is considerably general, and hence there are many open questions which arise about the nature of principles of UG. It gains elegance in the context of syntactic structure by imposing much different burdens on syntax and less or least in other components, in particular the lexicon and morphology. Since it was first clearly articulated in Chomsky (1981, 1986), the P&P theory has undergone several revisions, such as in Minimalist Program (Chomsky 1995) and Optimality Theory (Prince and Smolensky 2004), and Lexical Parameterization Hypothesis advanced by Borer (1981) and Borer and Wexler (1987). The arguments are all related to the nature of I-language, or more narrowly the nature of UG, which still remains a topic of lively debate. One of these metrological considerations eventually leads to a total reconfiguration of UG. We are still far from understanding the full nature of the principles of UG. In what follows we will consider the nature of UG.

3.1. The Conception of UG

Let us look at how UG has been characterized. It should be noted that the notion of UG is not an established fact. In fact, describing the character of UG has been one of the main issues of linguistic theory and language acquisition research over the past half century. The notion of UG focuses to answer three basic questions about human language:

1. What constitutes knowledge of language?
2. How is knowledge of language acquired?
3. How is knowledge of language put to use?

The answer to the first question is given by a particular grammar. The answer to the second question is given by a specification of UG. And the answer of the third question would be a theory of how the knowledge of language attained enters into the expression of thought and communication, and other uses of language.

UG is an expanded conception of 'Language Acquisition Device (commonly referred to as LAD). LAD was derived from the Poverty of the Stimulus argument and the assumption that all languages are essentially the same structure. It is defined as a set of language learning tools, intuitive at birth in all children. It is also a pre-programmed box, which explains human language acquisition of the syntactic structure of language. This box has been reformulated within the P&P theory, as a set of principles and universal parameters. In this sense, UG is a highly structured box based on a number of fundamental principles that sharply restrict the class of attainable grammars and narrowly constrained their form, with parameters that have to be fixed by experience. Thus, LAD, thereby UG, is a distinctive hallmark of human language

There are a number of problems with this notion of UG. UG is a pre programmed device (switchbox), denoting the initial state of the language learner, and it is also an organ, which is postulated in the brain. The pre-specification makes it possible for a human child to learn any of the languages of the world. So, this ability to acquire language is innate. Where is it in the brain architecture? Where does it come from? Within the framework of a theory of P&P, the box contains principles and parameters.

The contents of UG explain the nature of syntax and language acquisition, and the description of the grammar and the explanation of how it is learnt are unified in this theory. Furthermore, this theory assumes that the contents of UG include all the principles and parameters for all languages in syntax. According to the P&P theory, UG is a fixed and discrete grammar box which does not interact with other levels of grammatical components. It cannot be decomposed into parts, hence it is an all or nothing, in some way, a null hypothesis (Jackendoff 2002). However, this is not the only way to look at UG, and therefore there are different views about exactly what UG is. The contents of UG must be rearticulated in accordance with empirical issues about how linguistic phenomena are to be described.

The description of UG concerns the proper notion of parameters. The proper notion of parameters can be attained by defining the exact nature of parameter, or more specifically, by answering the question of how variation is built into UG. There are many possible ways that parameters could work. In the P&P literature, three approaches have been proposed. One proposal holds that the principles of UG define the parameters of possible variation among languages. This view, i.e. the original way of looking at parameters, is that a parameter is a syntactic rule which works on a particular language but not on another language, and that it is a binary switch which is either on or off for particular languages. This is the original proposal made in the P&P approach (Chomsky 1981, 1986). Yet, this is not the only way that parameters could work.

The second way of looking at parameters, developed within Optimality Theory (Prince and Smolensky 1997, Prince and Smolensky 2004), is to say that parameters operate in all languages, and that languages differ not because of parameters which work in languages, but because of the priorities of parameters which work in all languages. In this theory, language particular differences are captured, not by parameter setting, but by the different ranking of universal constraints. P&P theory and Optimality Theory both regard UG as containing all the principles necessary for all languages and for language acquisition. The third way is in the Minimalist Program (Chomsky 1995),

a revised version of the Principles and Parameter theory, where a distinction is made between lexical and functional categories, and where parametric variation occurs within the functional category. The two theories, Optimality Theory and Minimalist Program, still crucially assume the P&P framework in the broad sense that they post universal principles and narrowly restricted parameters for cross-linguistic variation, although the Minimalist Program represents an important shift in other conceptions.

Another way of looking at parameters, advanced by Borer (1981) and Borer and Wexler (1987), is to connect parameters to the lexicon. On this view syntactic variation arises from the syntactic requirements of lexical items. This is called Lexical Parameterization Hypothesis, and it may be conceptually attractive because the lexicon is not simply specified in UG, and it is independently needed as a repository of information. The lexicon, which is not specified in UG by nature, is definitely one of the parts the child has to learn during the period when language acquisition takes place. In other words, learning a language must involve learning the words. There is no escape from this. Since children have to learn words, the arbitrary sign of Saussure, it would make more sense to claim that learning the grammatical properties of a language would be carried out by the task of learning of the word.

Thus, there are several views of how variation is built into some aspects of UG, yet it is not entirely clear what aspects of UG are subject to variation. We have also seen that there is a way to build the parameters of possible variation in lexicon rather than syntax. As noted in the beginning of this section, UG is not an established notion and there is no logical necessity for the specification of UG. The form of UG is an empirical question.

There are some conceptual problems with the specification of UG within the P&P framework. The main premises of this theory are innateness of the principles of UG and their possible parameter settings. UG does not apply to E-language that we actually use, but is a feature of I-language and is in the mapping of I-language onto E-languages. The system of this theory claims that the principles for UG and their possible settings are part of the role of UG. Everything is prepared innately in syntax as a complete set

of UG. The question is whether the innateness of both UG and parameterization of UG can be maintained simultaneously. In other words, a fundamental question is that we can argue that some, but not all, parameters are innate, or we can argue that parameters can be linked to other components, such as lexicon. Why does the generative capacity, the expressive engine of language lie only in syntax (Jackendoff 2002)?

In the mid 1990s, Chomsky revised his theory of UG, adding one concept of Minimalist Program to the P&P theory. In Minimalist Program lexical category is distinguished from functional category, and parametric variation occurs within functional category, not syntax. He basically found that language learning is concerned with the properties of vocabulary, and hence learners need to learn only the lexical information of the words. Syntactic function develops automatically. In Minimalist Program, parameters are linked to the lexicon, especially its functional features – e.g. such as various word orders, morphology, auxiliaries etc. This means determining which parameter a language takes depends on knowing some of its lexicon. The new approach is lexical in the sense that the morphsyntactic features are listed in the lexicon. Thus, where earlier work has posited a switch–like parameter, Chomsky instead posits a choice between a strong feature and a weak feature of parameter. The generative capacity, the expressive power of language, is considerably reduced from syntax and lies outside syntax. This new development seems to reflect Lexical Functional hypothesis, and it is a welcomed revision in the sense that it has both empirical advantage and greater evolutionary plausibility. Within the Minimalist Program, language is I-language, as a state of Faculty of Language (FL), and UG is reinterpreted as the theory of the initial state of FL.

4. Language Acquisition and Parameters

The theoretical debate over the setting of parameter also concerns the issue of child language acquisition. Language acquisition, or more narrowly grammatical development, involves 'setting' parameters, the issue of what types of parameters and when the child

is required to set in the grammatical development of the language being acquired. The fundamental questions which arise within the P&P theory are

1. What does the initial state of language acquisition look like?
2. What does the final state of language acquisition look like?
3. Are the intermediate states relevant to language acquisition?

With regard to the question 1, UG constitutes the child's initial state (S_0), the knowledge that the child is innately equipped with. The primary linguistic data are critical for the child to determine a particular grammar. As the child takes account of the input, a language-specific lexicon is built up, and parameters of UG are set to values appropriate for the language in question. The grammar may be reconstructed over the course of time, as the child is exposed to different properties of the input. In due course, the child arrives at a steady and final state (S_S). If we view language acquisition, or more narrowly grammatical development, as a set of successive grammars G_0, $G_{1,,,,,,,,,,,}$, G_n, Gs, where Gs is the adult grammar or steady state (Chomsky 1975), then, G_0 is the initial state, a set of principles which constitute the child's a priori knowledge of human grammars, namely UG. Then, a central question is whether the interaction of UG and the input data are sufficient to determine the particular intermediate grammars.

The goal of a theory of language acquisition is, therefore, to uncover the universal principles which constrain the possible grammar and thereby make language acquisition possible. In other words, the questions are which aspects of linguistic structure are given and which aspects must be learned on the basis of exposure to a particular language. This approach to the question of language acquisition is sometimes referred to as the logical problem of language acquisition (Hornstein and Lightfood 1981, Pinker 1981). In addressing the logical problem of language acquisition, it has been idealized as an instantaneous model of language acquisition. The reason for doing so is the assumption that the significant insight into the properties of UG can be attained by investigating only the final stage in the acquisition process – the adult grammar. This idealization obviously ignores the intermediate stage. Within this approach, S_0 is provided with all the principles

UG and G_n is irrelevant to the language acquisition.

It is an open question in terms of development whether the child starts with all the principles of UG available, or whether they gradually unfold as part of maturation. It is not clear whether UG is available to the child immediately at birth. It might be possible that UG could develop at some considerably late stage after birth, just like walking or teething. Are children grammars constrained by the principles and parameters of UG, just as adult grammars are? If so, it means that grammatical development is in a continuous process. These have been the issues of the language acquisition theory. Broadly speaking, there are two general approaches to the problem of language acquisition. The first approach is, as noted above, an instantaneous mode of acquisition. In this approach, one investigates properties of adult grammar in order to uncover principles of UG, and moreover, only the actual idealized moment of acquisition is considered. Consequently, within this framework S_0 includes all principles and their range of possible variation.

In the second approach, which is adapted mainly in the field of psycholinguistics, one considers acquisition data in order to describe the linguistic knowledge of the child at various stages (S_0 to S_s). Within this framework, S_0 is provided with an incomplete grammar to be elaborated by learning G_n. The second approach is now the dominant view in linguistic development, and most linguists and psycholinguists currently assume this view. According to this approach, UG is provided with incomplete grammar to be elaborated by learning. But Chomsky takes an instantaneous mode of acquisition, which presupposes that UG contains a full range of possible principles necessary for all languages from which we select one on the basis of environmental input.

These differences concern the proper conception of parameters. Children with an innate knowledge of language would learn a language by establishing which of the parameters are present in that language. Children would, on the basis of particular data, set the values for particular parameters. One of the major claims in P&P theory is that a great deal of grammatical information must already be present in the child's brain at birth and the options for grammatical variation are extremely limited. This makes a

child's task of acquiring a native language enormously easier. Parameter setting is what a child has to work for once exposed to a particular language. Children eventually come to be able to utter and understand an infinite number of sentences and expressions, with innate knowledge of parameters, by setting up which of the parameters are present in the particular language being learned.

One of the main issues in a theory of language accusation is how the parameter setting takes place during the acquisition process. There seem to be many possible ways that parameters could work. However, given the fact that the innate endowment for language does not specify one language for all human languages, there are only two logical possibilities. The first is that UG contains a set of specifications for parameters variation, and the second is that it does not contain such parameter settings and they are learnable. In other words, the first is that every parameter is initially set, and the second is that initially parameters are in an unset state. The first one can be an arbitrary setting or pre-specified, i.e., default setting. The second one permits everything that any of the potential values of parameter allows, including resetting of parameters. Obviously, it is in a classic conception of parameters that every parameter is already set, simply because parameter settings are innate and only a particular set of value for parameter has to be learned. That is the reason the language acquisition in this framework is referred to as the Logical Problem of Language Acquisition. In contrast, the second prediction is that parameters are initially unset. This view can be found in the Lexical Parameterization Hypothesis, for example, in which parameters are connected to the lexicon.

A classic conception of parameters is, so to speak, the switchbox to set a particular language from I-language, which belongs to the syntactic component. Each parameter is like an electrical switch, with a small number of possible settings. A parameter is a syntactic rule of sentence formation that holds in one language but not in another. Yet, this is not the only way that parameters could work. As pointed out above, language development involves an ordered sequence of learning phoneme – lexicon – syntax. Language acquisition takes place with this order. Children have to learn words to

construct a sentence. It is not until the age of 2 when children begin to use two-word phrases. Syntax begins after the age of 2. Within the P&P theory, children do not interact with parameters until they reach at the age of 2, because the switchbox parameters are linked to syntactic constructions, although every parameter is already in a set state. Within the lexical parameterization hypothesis, however, parameters would be initially in an unset state, but available to children as soon as they start to use words, because parameters are linked to the lexicon.

With regard to the issue of how the parameter setting takes place during the language acquisition, a number of explanations have been offered. We consider here the proposal made by Pinker (1994), Pinker and Bloom (1990). Pinker and Bloom (1994). According to Pinker and Bloom (1994), parameters of variation and the learning process that fixes their values for a particular language are not individual explicit devices (or boxes) in the human brain. Instead, they should fall out of the interaction between UG and the learning mechanisms. Newmeyer (1998) and Jackendoff (2002) also take this view. This view contrasts with the view of the Principles and Parameter approach and the Minimalist Program, in which languages may select from among the devices of UG, setting the parameters in one or another.

In Pinker's view, UG does not contain every necessary grammatical information to construct a particular language. Parameters are not given as choices, but they interact with the learning process to fix their values for a particular language. The grammatical information, or more specifically parameters for the choice of the grammatical information, is not given as part of UG, but something to learn in language development. Thus, the child's task is seen as filling in what is left open in the derivation of grammatical development. This means that individual parameter setting is learnable rather than innately specified.

In contrast, within the P&P theory and Minimalist Program, UG specifies every parameter available initially, with the result that young children 'know' every possible grammar from the beginning. Thus, on this claim, UG contains more information than

is needed for the language acquisition of a particular grammar. Thus, grammatical development can be regarded as identifying which parameters characterize the particular language and discard the rest. Accordingly, the child's task is seen as choosing among several specified parameters.

The choice between the two possibilities is an empirical one, which is decided by the facts. It should be noted that there is no necessity for the set of parameters of variation to be innate. There are different possibilities to capture the notion of parameters based on typological variation among languages. It might be possible to assume that some parameters are innate, while others are not. From the perspectives of typological variation among languages, there is no compelling reason to choose from different possibilities for the set of variation. On the grounds of the language acquisition theory, however, it is quite difficult to maintain the original version of the P&P theory. All principles and their range of possible parametric variation are not innate.

If UG were to take care of our whole language development, or if we were given a completely innate knowledge of language, we would be born talking at birth, or we would suddenly begin to talk complex sentences right after birth. This does not happen. Why is that the way it is? We are born with incomplete grammar. Language development involves an ordered sequence of learning phoneme – lexicon – syntax. Children have to learn words to construct a sentence, more specifically the conventional pairing of a sound with a meaning of a word which is developed by Saussure as 'the arbitrariness of the sign', and then parameter setting for a particular language. The fundamental question is: why are there parameters? To put it simply, why not just UG? Pinker (1994), and subsequently Baker (2001) posed the question that if the development of language is innate and fixed across humans, why doesn't the innate endowment take care of our whole language development? In other words, why does language development include parameters? Theoretically, there would be only one single language on earth without parameters.

According to Pinker, the only possible answer we can think of is evolution. Human

language has evolved, and diversified in the process of evolution, just as a species has evolved and diversified. In other words, the diversification of both languages and species has been developed through a gradual process of evolutionary history. Acknowledging that 'we can only offer the most tentative of speculation', Pinker suggests taking parameters to be a kind of accident of evolutionary history. Pinker also offers a second hypothesis: parameterization might have arisen so that learning can keep the speech of one person sharing with the speech of other people. Language inherently involves sharing a code with other people. An innate grammar is useless if you are the only one possessing it. Through the evolution history, humans have developed the ability to learn the variable parts of language as a way of synchronizing their grammars with that of the community. Or parameters might have a biological explanation. Rather than an adaptation, parameters might have been a biological accident, which is proposed by Chomsky. Baker (2001) claims that it is plausible to think that the existence of linguistic variation (parameters) could be a design feature of language rather than an evolutionary accident.

5. Language and Evolution

We have begun our discussion with the question of what language is. Now we proceed to the last question, where does language come from? The origin of language in Homo sapiens is a widely debated and controversial topic. It is not quite certain if language is as old as humans, but it is definitely true that language and human society are inseparable. Wherever humans exist, language exists. Many societies believed that language is a gift to humans. It is uncontroversial that language has evolved, just like any other trait of living organisms. There is considerably less agreement as to how language evolved, because written records of language do not go back far and hence there is no evidence for the evolutionary history. We can only infer some of the historical developments of language by investigating the pattern of similarities and differences among languages. There are many speculations concerning the origins of language (Yule 2010, Fromkin,

Roman & Hyams 2011). Three main hypotheses about the origin of language, each of which is quoted in the very beginning phrases of this paper are:

1. Belief in divine creation
2. Natural evolution hypothesis
3. Innateness hypothesis

A divine source gives language to humans. The most familiar passage is found in Genesis 2:2, which tells us Adam gave names to all living creatures. This belief predicates that humans were created from the start with an innate capacity to use language. There was a single language, and then it developed into diversification, as described in the Tower of Babel. The second is natural evolution hypothesis, which is based on Darwin's evolution hypothesis. That is, human language has evolved from other animal communications, just as other body organs. The third is the innateness hypothesis, which claims that humans are all born with an innate knowledge of grammar that serves as the basis for all language acquisition. In other words, for humans, language is a basic instinct, which is genetically hard-wired in humans.

These three hypotheses differ in how language has evolved, but what is common to all these hypotheses is the implications of the single language claim. Within these hypothese, language is an instinct and presumably it evolved, like other instincts, through the evolutionary process. The second hypothesis says that language is a part of human biology, an instinct, and it is an evolutionary adaptation. At some point in the evolutionary development humans acquired a more sophisticated brain (instinct) which made language learning possible. The third hypothesis does not accept the natural and adaptive development of language instinct. Although how language evolved is pretty mysterious and is not much known, it is uncontroversial that language has evolved, just like any other trait of living organisms.

Just over 150 years ago, Charles Darwin famously discussed the striking parallels between the forces that govern language change and the evolutionary processes underlying species formation. As quoted in the beginning of this paper, the conception

of language as a kind of instinct was first articulated in 1871 by Charles Darwin. In chapter 4 of *On the Origin of Species*, Darwin hypothesizes that his theory of natural selection could account for the evolution of instincts as well as bodies. As well known in Darwin's Theory of Evolution, the cause of evolution is natural selection. He concludes that if language is like other instincts, presumably it evolved by natural selection. Many researchers of the studies in the fields of cognitive science, biology, anthropology, genetics, have adapted the approach of evolutionary theory, and believe that language has been shaped by natural selection. On their view, certain random genetic mutations were selected over many thousands of years to provide certain individuals with a decisive adaptive advantage.

Among linguists, however, the claim that language evolved by natural selection has always been dubious. Chomsky argued that human language evolution cannot be explained by Darwinian natural selection. According to Chomsky (1968), 'It is perfectly safe to attribute this development to natural selection, so long as we realize that there is no substance to this assertion, that it amounts to nothing more than a belief that there is some naturalistic explanation for these phenomena.' Chomsky himself was skeptical about whether Darwinian natural selection can explain the origins of the language organ. He first dismissed natural selection as having no substance, as nothing more than a belief that there is some naturalistic explanation for a trait. Chomsky argues that it would be a serious error to suppose that properties of the structures that evolved can be explained in terms of natural selection (Chomsky 1975). He takes the position that UG is not something that natural selection directly shaped. What he has in his mind for the possible alternative to natural selection is 'principles of neural organization that may be even more deeply grounded in physical law.' Under the strong and dominant influence of Chomsky, the interest on the evolution of language diminished considerably, at least within the field of modern linguistics.

One of the major shifts on the issue of language evolution came in 1990, when Steven Pinker and Paul Bloom published the groundbreaking paper: *Natural language and*

natural selection. Pinker and Bloom (1990) argue that language shows signs of 'adaptive complexity' and natural selection is the only plausible and scientific explanation for the development of such complexity, which could only have evolved gradually. Their claim is that the language instinct is no different from other biological functions, and that language has evolved from other animal communications just as other body organs. Language has developed in response to natural selection, which is motivated by communicative advantages of human language. The evolution theory has shown that there is a selective pressure for the communicative abilities to become increasingly innate. The function for which language evolved is communication. According to their claim, language is derived from a biological adaptation to communicate information. Pinker and Bloom also suggest that parameters should be taken as a kind of accident of evolutionary history. On their claim, language has been diversified because of its communicative functions, not because of an internal setting of parameters.

Pinker and Bloom (1990) resulted in a tremendous impact on modern linguistics in that UG on Chomsky's conception has become seriously challenged. As they themselves point out, their article does not much present a new theory of language evolution. The importance of this article and subsequent works of Pinker and Bloom (1994), Pinker (1994), lies in the fact that they brought attention to the issue of language evolution and argued against the lack of interest in language evolution in modern linguistics. It is interesting to note here the running joke (Fitch 2010) that the Paris Linguistic Society banned discussion of language evolution in 1861 because speculation flourishes without evidence, and the ban remained in force until 1990, which is the year of the publication of Bickerton (1990) and Pinker and Bloom (1990). Pursuing the idea of Darwin and Chomsky, Pinker offers a view about why we use language and where this ability comes from, in arguing that language is a biological adaptation to communicate information. Since the publications of Pinker and Bloom (1990) and Pinker (1994), and also Bikerton (1990), the topic of language evolution has been one of the major arguments in contemporary linguistics (Jackendoff (2002), Pinker and Jackendoff (2005), Fitch,

Hauser, and Chomsky (2005), Berwick and Chomsky (2016), among others).and its related fields.

As we know few details about how the language instinct evolved, it might be quite conceivable to hypothesize that a language faculty, or UG evolved by the same process as the other organs, namely by Darwin's theory of natural selection. A potential but plausible answer to the question of how there could be such a thing as innate knowledge of language available to the child (before learning) is genetic transmission through the medium of brain structure. A subsequent question which arises is how the genetic instinct could exist in the first place. Again, the answer would be evolution, more specifically natural selection. According to Pinker and Bloom, it is the only answer anybody thinks of to the question of the origin of human language. The human language has evolved from other animal communications through natural selection. Natural selection is, in some sense, an alternative to divine creation, explaining the evolution process of the human language. This is a sort of a null hypothesis. Such hypothesis is unlikely to be resolved empirically due to a lack of relevant data. Pinker and his associates are hasty when they draw a conclusion that natural selection is the only solution, and moreover that communication is motive for natural selection. Evolution and natural selection are, however, not the same thing. Natural selection is a mechanism to explain why evolution takes place. Natural selection is a particular cause of evolution. Different views about how natural selection operates could be possible.

Note that the view that language develops primarily in the interest of enhancing communication is the functional approach to language, which we have discussed in Section 2.1 and 2.2. Recall that the functional approach to language shares a conviction that the structure of language is the consequence of some general principles governing human communication. The function of language is communication, and grammatical forms are derivable from communicative function. Therefore, communicative function explains linguistic forms. Within the functional approach, the claim of diachronic correlation is that linguistic form evolved from extralinguistic principles such as

communicative function. It has been discussed throughout this paper that language can be defined externally or internally. We have argued in Section 2.1 and 2.2 that language has many uses and communication is one of the functions and hence there is no reason to regard one particular function as essential. We have also argued that the view of language as communication blurs the boundaries between language and other communicative systems. Our conclusion is that language cannot be equated with communication.

Pinker and Bloom (1990) expressed the view that language has developed in response to Darwin's natural selection. All they argue is that language is no different from other complex abilities and that the only way to explain the origin of such abilities is through the theory of natural selection. This means that language is innate in language acquisition, but it is functional on the evolutional level. Therefore, they have a nativist view on the language acquisition but a functionalist view on the evolution of language. Their approach is to view the functional approach as a particular type of nativism, namely to view certain universal aspects of grammar as indirectly innate. They explicitly argue that language evolution and language acquisition differ. Evolution has had a wide variety of communicative standards to choose from, but children in language acquisition have no such flexibility. They conclude that the functional view on language evolution can be true while the functional view on language acquisition can be false.

There are a couple of reasons we can think of why Chomsky does not accept the position of evolutionary argument of language. The first one is his strong belief that there is a huge gap, or to put it precisely, discontinuity between human language communication and other animal communication systems. There is nothing remotely like human language anywhere in the animal world, there is not anything halfway resembling human language and other animal communication. If language exists only in the human species without a precedent elsewhere, then it did not evolve from some simple form of communication. According to Chomsky, it is hard to believe that human language has evolved from primate communication.

Another reason against the evolutionary argument presumably lies in his conception

of UG. In the basic framework of the generative grammar, UG has been conceived as containing all the principles necessary for all languages. All grammatical variation among languages is localized in a set of universal parameters. Every possibility of grammatical variation is contained in UG, and the assumption is that children are born with a highly structured UG in their brains. It is hard to believe that this UG, which is conceptualized as a completely abstract hard-wired switch box, has evolved through natural selection. It is Chomsky's strong belief that UG must be innately pre-programmed in human brains.

Hauser, Chomsky, and Fitch (2002) examine and reject many proposals for antecedents of human language in animal communication. Hauser, Chomsky and Fitch (2002) present the three leading hypotheses for how language evolved and brought humans to the point where we have UG.

Hypothesis 1

FLB (the Faculty of Language in the broad sense) is strictly homologous to animal communication. This means homologous aspects of the Faculty of Language exist in non-human animals.

Hypotheses 2

FLB is derived, uniquely human adaptation for language. It believes that individual traits were subject to natural selection and came to be very specialized for humans.

Hypothesis 3

Only FLN (the Faculty of Language in the narrow sense) is unique to humans. It believes that while mechanisms of FLB are present in both humans and non-humans, FLN --the computational mechanism of recursion -- is recently evolved and unique to humans.

The first and second hypotheses support the natural evolution of human language, as discussed above. At some point in the evolutionary development, humans acquired language abilities. According to the first hypothesis, human FLB is composed of the same functional components that underlie communication in other species. The second hypothesis holds that FLB is a highly complex adaptation for language. Because natural selection is the only known biological mechanism capable of yielding such functional complexes, proponents of this view conclude that natural selection has played a powerful role in shaping many aspects of FLB. This second one is the claim, which is speculated

first by Darwin and adapted by Pinker, Bloom, Jackendoff, Newmeyer, among others, that language has evolved adaptively in response to natural selection.

The third hypothesis is based on the genetic source, the so-called innateness hypothesis, which means that language is innately hard-wired, and pre-programmed in the human brain. Hauser, Chomsky and Fitch (2002) claim that the one which gives support to the typical theory of UG, the faculty of language, is Hypothesis 3. They argue that FLN only includes recursion and is the only uniquely human component of the faculty of language. They further argue that FLN may have evolved for reasons other than language; hence comparative studies might look for evidence of such computations outside of the domain of communication. If FLN is restricted enough, this hypothesis has the interesting effect of nullifying the argument from design. In other words, FLN is an all or nothing, and hence only the third hypothesis gives support to the theory of UG, the faculty of language.

According to Hauser, Chomsky and Fitch (2002), recursivity –the ability to embed one clause inside- originally developed not to help us communicate, but rather to help us solve other problems connected, for example, with numerical quantifications and social relations. Humans were not capable of using complex language until recursivity was linked with other motor and perceptual abilities. Furthermore, according to them, there is nothing to indicate that this linkage was achieved through natural selection. They believe that it might simply be the result of some other kind of neuronal reorganization.

Chomsky has been working on a simplified version of UG. In the recent formulation, the so-called 'Minimalist Program', Chomsky has speculated that UG might be extremely simple and abstract, for example only a mechanism for combining symbols in a particular way, which he calls Merge. It allows words to be combined in recursive fashion to create structures of any level of complexity. Chomsky (1995) claims that the only pure linguistic component of language could be Merge, the simplest recursive procedure that was basic to syntax. This recursive operation is the one which generates hierarchical structure as well as infinite expression.

Why is a simplified version of UG necessary? Chomsky was willing to concede that other components of language could have been derived for non-linguistic purposes through natural selection, but UG, according to Chomsky, is not something derived by non-humans but innately endowed with humans and internally developed. To salvage UG, it is necessary to redefine it for a simplified version. Chomsky would like to address precisely the question of how language evolved. Berwick and Chomsky (2016) explain that the evolutionary question could not be properly posed until recently, because 'language' i.e. I-language, hence UG, has not been clearly defined. He believes that only a simplified version of UG will explain the origin of language.

The explanation goes like this. In order for early modern humans to have developed language, the genetic jump that made it possible must have been as simple as possible. That is, as language exists only in our species without precedent elsewhere, then it did not evolve from some simple form of communication. Hence, it must have evolved fairly quickly and in one discontinuous jump. Because no other animal has Merge, and because Merge is simple and the essence of language, the evolutionary process may have occurred rapidly in only one species, modern humans. The simple version of UG is what would have enabled early humans to make a revolutionary and genetic jump from animal communication to human language. This is the argument and the fascinating idea of how language could have evolved, provided by Hauser, Chomsky and Fitch (2002), Berwick and Chomsky 2016).

One of the essential moves in Berwick and Chomsky (2016) is to revise the notion of UG as MERGE. They argue that MERGE −the simplest recursive operation − is the core of our linguistic capacity for infinite expression by finite means, one that yields hierarchical structures. Then, hierarchical recursive is a distinctive feature of human language (I-language). Because the recursive is simple, and furthermore because there is no evidence that any other animal displays such recursive powers, they conclude that the evolutionary process may have occurred rapidly, appearing suddenly on only one species, modern humans. Thus, they reached this conclusion from the premise that Merge

is simple and the essence of language, and no other animals has Merge. This is their argument. What is not quite clear about their argument is how they reach the conclusion that the evolutionary process may have occurred rapidly, appearing suddenly on only one species, modern humans. Suppose we accept the premise that Merge is the essence of human language and no other animals has Merge, and Merge is as simple as possible. Then, why would it possible to get the conclusion that Merge could evolve quickly, perhaps due to mutation? This needs more clarification.

The question of where language comes from is conceptually equivalent to the question: why do humans have language at all? More specifically, how did UG get there in the first place? Chomsky and his followers take a position that language evolved and is designed primarily as an instrument of thought. In fact, Berwick and Chomsky (2016) dedicate most for the argument about the evolution of thought itself, with language being one form of thought. Thus, it provides a framework for thinking about the evolution of thought and a challenge to Darwin's claim that the human mind is only quantitatively different from other animals. Communication is secondary and, therefore, there is to be no searching for social evolutionary pressures (Berwick and Chomsky 2016). Acceding to Hauser, Chomsky, and Fitch (2002) and Berwick and Chomsky (2016), language must have evolved fairly suddenly and in one discontinuous jump. They claim that language did not evolve for communication, but rather for internal thought. As noted in Section 2, thought and language, in particular E-language are not the same thing. We don't think in E-language, but rather we think in a logic of thought, or language of thought, which is conceptually equivalent to I-language. Then, language could be understood as a particular cognitive system, which is a domain derivable in origin from knowledge.

Communication is the meaningful exchange of information between two or more people through sounds, gestures, movement, etc. There is little reason to believe that the conveying of information is a central function of language. Language is used for many different functions rather than for the exchange of information. In verbal interactions the exchange of information is minimal but the social aspect is more significant. There is

no reason to redefine it to include all modes of language use, which results in losing all content of communication. It is not quite clear what exactly Pinker means by the concept 'communication', since he has not provided the clear definition of communication (Pinker and Bloom 1990, Pinker 1994, Pinker and Jackendoff 2005). It seems plausible that he means by communication in a broad sense, as noted in section 2.2. As discussed throughout this paper, language cannot be equated with communication. Language changes or evolves internally as well as externally. Natural selection is one of the causes of evolution. There must be different factors, or mixed factors which motivate language evolution. Communicative function alone cannot be the motivation for natural selection. This view does not preclude the possibility that the functional explanation applies on the evolution of language and language has evolved to adapt for communication and enhance it furthermore, once language has appeared (Bolhuis,JJ., I. Tattersall, N. Chomsky, R.Berwick 2014). In brief, the argument is whether there is continuity in mental thought between humans and other animals. Is language (of thought) uniquely humans?

References

Baker, M. (2001). The Atoms of Language: The Mind's Hidden Rules of Grammar. Basic Bks.

Baker, .L.and A, McCarthy (eds.) (1982). The logical problem of language acquisition. Cambridge, Mss.: MIT Press.

Berwick, R and N. Chomsky (2016). Why only us Language and Evolution. MIT Press.

Bickerton, D. (1990). Language and Species. University of Chicago Press.

Bloomfield, Leonard. (1933), Language New York: Holt, Rinehart and Winstone.

Berwick RC, Friederici AD, Chomsky N, Bolhuis JJ (2013). Evolution, brain, and the nature of language. Trends Cogn Sci 17: 89–98.

Bolhuis, JJ., I. Tattersall, N. Chomsky, R. Berwick (2014). How Could Language Have Evolved? http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001943

Borer, H. (1983). Parametric Syntax. Dordrecht: Foris.

Borer, H., and K. Wexler. (1987). The Maturation of Syntax. Dordrecht: Foris. In T. Roeper and E. Williams, Eds., Parameter Setting. Dordrecht: Reidel.

Chomsky, N. (1965). Aspects of the theory of syntax. Cambridge MA: MIT Press.

Chomsky, N. (1968). Language and Mind. Harcourt Brace Jovanovich, New York.

Chomsky, N. (1975). Reflection on Language. New York: Columbia University Press.

Chomsky, N. (1980). Rules and Representations. Oxford: Basil Blackwell.

Chomsky, N. (1981). Lectures on Government and Binding. Dordrecht: Foris.

Chomsky, N. (1986). Knowledge of Language: Its Nature, Origin, and Use. Praeger.

Chomsky, N. (1995). The Minimalist Program. Cambridge, MA: MIT Press.

Chomsky, N. (2007). Approaching UG from Below. In Hans-Martin Gärtner; Uli Sauerland. Interfaces + Recursion = Language? Chomsky's Minimalism and the View from Syntax-Semantics. Studies in Generative Grammar. Berlin: Mouton de Gruyter.

Darwin, C. (1859). On the Origin of Species. John Murray, London,

Darwin, C. (1871). The Descent of Man. London: Murray.

Fitch, T. (2010). The Evolution of Language. Cambridge: CUP.

Fitch, T., M. Hauser, and N. Chomsky (2005). The Evolution of the Language Faculty: Clarification and Implications. Cognition, Volume 97, Issue 2, Pages 179-210.

Fromkin, V., R.Roman and N. Hyams (2011) An Introduction to Language. Thomson, Wadsworth.

Givon, T. (1979a). Syntax and Semantics. Vol.12. New York: Academic Press.

Givon, T. (1979b), On Understanding Grammar. New York: Academic Press.

Given, T. (1994). Functionalism and Grammar. John Benjamins Publishing Company.

Greenberg, J. (1963). Universals of Language. Cambridge: MIT Press.

Hauser M.D, Chomsky, N., and Fitch, T. (2002). The faculty of language: what is it, who has it and how did it evolve? *Science*, 298, 1569-1579.

Hornstein, N. and D. Lightfood. (eds). (1981). Explanation in Linguistics. London: Longman.

Jackendoff, R. (1994). Patterns in the Mind: Language and Human Nature. New York: Basic Books.

Jackendoff, R. (2002). Foundations of Language. Oxford Univ. Press, New York.

Jackendoff, R. and S. Pinker, (2005). The nature of the language faculty and its implications for evolution of language Cognition Volume 97, Issue 2, September 2005, Pages 211–225.

Newmeyer, F. (1998). Language Form and Language Function. MIT Press.

Newmeyer, F. (1991). Functional explanation in linguistics and the origins of language. Language and Communication 11, 3-114.

Pinker, S. (1981). Comments on ‘Some Issues in the theory of language’ in Baker and Kaplan (1981).

Pinker, S. (1994). The Language Instinct. Morrow.

Pinker, S. and P. Bloom (1990). ‘Natural language and natural election.’ *Behavioral Brain Sciences* 13: 707-784.

Pinker, S. and P. Bloom (1994). Humans did not evolve from bats. Behavioral and Brain sciences, 17.

Pinker, S. and R. Jackendoff (2005). The faculty of language: what‘s special about the language faculty? Cognition 95 201-236.

Prince, A. and P. Smolensky (1997). Optimality: From neural networks to universal grammar. Science, 275.1604-1610.

Prince, A. and P. Smolensky (2004). Optimality Theory: constraint interaction in generative grammar. RuCCS technical report 2. Piscataway, N.J.: Rutgers University Center for Cognitive Science.

Sapir, E. (1921). Language: An Introduction to the Study of Speech. New York: Harcourt, Brace and World.

Saussure, F. de. (1959). Course in General Linguistics, ed. C. Bally and A. Sechehaye, trans. Wade Baskin. New York: Philosophical Library.

Yule, G. (2010). The Study of Language. Cambridge University Press.