

# ARE MODERN LINGUISTIC THEORIES A USEFUL TOOL FOR UNDERSTANDING LANGUAGE AND LANGUAGE EVOLUTION? **Opinion article**

Svetlana T.Davidova

## ABSTRACT

Language is a unique phenomenon, a multifaceted complex : it has a physical component ( sound waves), biological component ( it is represented in some way in the human organism) and socio-cultural component . This makes it difficult to define and study. Modern linguistics is an internally fractured field with a multitude of alternative visions of language , the generative/biolinguistic and the functionalist perspectives being the most prominent, where each focusses on a single aspect of language while ignoring the rest. The article argues that linguistic theories borrow theoretical machinery from hard sciences and life sciences, fields only partially implicated in language, and as a result none of them has a complete and full understanding of language as a hybrid and multifaceted phenomenon. This makes modern linguistic theories inadequate for the task each in their own ways and demonstrates the need for a new theoretical framework to faithfully reflect the nature of the object of study. The theoretical pluralism prevalent in the field contributes to the challenges of evolutionary linguistics for which theory of language is foundational.

Keywords: linguistic theory, language evolution, generativism, biolinguistics, functionalism, emergentism, Language Faculty, UG

## 1.INTRODUCTION

Language is a very complex phenomenon. It has proven to be elusive to define and a controversial subject to study. This is because it is a multifaceted and multidimensional complex. Language has unique properties: it is a complex composed of multiple components of different ontological types : material: physical ( sound waves), biological and cognitive ( structures and systems in the human organism which participate in language-related activities ), as well as non-material ( concepts and abstract ideas ), all of which interact and change as they adapt to one another and form a unique complex.

The fact that language is all of that, a hybrid , has been and still is, a source of difficulty in understanding and defining language throughout the centuries. This heterogeneity of language is reflected in linguistics as a field populated by numerous competing theories of language. Each of these theoretical alternatives is formed by transplanting theoretical machinery from other , unrelated fields. As these, predictably, reflect the nature of the respective objects of study for which these are designed, I argue , this make them inadequate for the study of language. Thus, language is studied with inadequate theoretical tools which hampers the success of empirical inquiries.

In the following paper I will offer a brief overview of each of the major alternative theoretical perspectives in modern linguistics and point at the strengths and the deficiencies of each, while advocating against the theoretical diversity and for a unified theory of language. Moreover, I argue that inadequate theorizing of language is a significant obstacle for the study of language evolution.

---

# 1. THE GENERATIVE PARADIGM AND ITS BIOLINGUISTIC APPROACH

## 1.1. Language, the mind and artificial systems

The generative paradigm has been dominant in modern linguistics. Its fundamentals are furnished by Chomsky's views of language outlined in *Syntactic Structures* and its subsequent versions. A central tenet of generativism is a mentalist perspective on language, defined as a cognitive property of the human brain and linguistics as a natural science, a branch of biology. A new branch of scientific inquiry, biolinguistics, has emerged in this context with the goal of identifying the content, functioning and location of the Language Faculty.

Paradoxically, the generative approach understands the biological foundations of grammar in terms quite incompatible with the fundamental principles of biology as it introduces concepts from mathematics and computation in its quest for understanding the human mind and the Language Faculty. The generative argument presents the digitalization of language not just as a characteristic of the formalism, but as “psychological reality” as real patterns of brain connectivity with the characteristics and functions equal to artificial systems.

In fact, artificial systems are behind Chomsky's hierarchy of formal languages which, while describing patterns of organization found in a wide variety of domains, is used for understanding natural language. (Chomsky, N. 1956). The generative perspective defines the human brain in terms of digital technology, borrowing terminology from computer science and artificial systems, e.g. the human brain is defined in terms of working memory, online processing, interfaces, on- and off-line brain systems (in D. Bouchard 2013) etc. In analogy with artificial systems, it is hypothesized as highly abstract, inward-looking systems designed to function in isolation from human experience.

“As with other symbolic systems that encode logical information, such as arithmetic, logic and computer programming, it is essential to get the parentheses right, and that's what phrase structure in grammar does” (S. Pinker, 2003, p.18)

The human mind is defined in terms of principles of computation: the human brain is understood as hardware while the mind is defined as software, a bioprogram (D. Bickerton 1984; Chomsky, 1972, 1980, 1986, 1988 and elsewhere). The Language Capacity is defined as algorithm by borrowing theoretical tools from Turing's theory of computation. The influence of artificial intelligence is, in addition, made explicit in the dichotomy of well-formed/grammatical and ill-formed/ungrammatical linguistic forms, and the binary values of parameters, reflecting the binary nature of artificial systems represented in 1s and 0s. Although the generative paradigm claims to describe natural language, it consistently has ignored studies on natural languages which show no resemblance to the “machines” for grammar. Surely, programming languages are termed languages, but they bear very little resemblance to the natural languages used by human populations to justify borrowing of theoretical machinery. For one, grammars in Chomsky's formalisms are abstract hierarchies of abstract symbols, i.e. empty shells, devoid of meaning, ignoring the fact that in natural languages grammar is a reflection of semantics. It contradicts both experience and research in

---

language development and language diversity, which demonstrates that learning of grammar is highly dependent on semantics and the encapsulation of concepts in semantic categories and, ultimately, in grammatical categories reflects idiosyncratic choices of communities and explains the diversity of grammatical systems. It defines language and the Language Capacity in terms of bio-computations performed by cognitive entity with highly unusual characteristics, i.e. some kind of a hybrid of biological matter and a man-made computing machine. It is said to automatically construct hierarchically organized structures, i.e. phrases and sentences, from abstract, digitalized and a-priori determined primitives, assembled by pre-set ordered rules, assumed to be universal and part of the innate human endowment.

Adhering to these principles, biolinguistics aims to uncover the characteristics of the human Language Capacity as identified by the generative formalism. The hypotheses of a Language Faculty have changed significantly over time.

An attempt to bring the hypothetical language bioprogram to resemble a biological entity the distinction between a core syntactic component, or a Faculty of Language in the Narrow sense (FLN) and a Faculty of Language in a Broad sense (FLB), a collection of cognitive capacities, participating in some role in various language-relevant tasks along with various other cognitive functions, e.g. memory, general learning, socialization, was proposed (M. Hauser, N. Chomsky, T. Fitch, 2002; see C. Boeckx 2013 for a review.) And although the latest version of the biolinguistic paradigm, the Minimalist Program purports to have reduced to a minimum the computational complexity of the FLN, its description includes a long list of very specific features (see N. Hornstein, 2018). Moreover, it reaffirms the understanding of bio-computations in terms of artificial systems as it identifies discrete infinity and perfection of linguistic computations in the FLN, where perfection is defined as utmost computational economy. (Chomsky 1995 and elsewhere). Both “perfection” and “computational economy” are highly abstract concepts with no foundation in real biological matter. Thus, despite the efforts to bring the generative/biolinguistic argument closer to material and biological reality, the FLN is still devoid of biological characteristics and becomes another theoretical abstraction because infinity and perfection are not among the characteristics of biological matter. In fact the label “biolinguistics” is misleading and hides an inherent contradiction between goals and methods: it purports to study life forms as “bio-” means “life form” while it purports to understand life forms with principles and concepts foreign to biological matter.

It is crucial to point out that the formalization of a cognitive capacity in terms of artificial systems with the properties of a biological organ, i.e. a language organ or UG, is a logical deduction from a chain of logical arguments, starting from the argument for “poverty of exposure” to adequate linguistic experience and the conceptualization of language attainment as language acquisition as a purely biological process of growth, induced by innate predispositions for language. It is not a culmination of a chain of procedures, standard for science where a conclusion is reached from empirical testing and analysis. It is not a coincidence that after 60 years of history of the concept after intense research and dedication by a number of brilliant intellectuals there is no clarity neither in theoretical nor empirical grounds what the properties of such entity are, by what methods to prove it and where to find it. Moreover, the hypothetical Language Faculty/language organ, UG, as articulated in the

---

Minimalist program is by definition only a guideline for future exploration and not a statement of knowledge based on empirical testing.

The influence of modern cultural constructs permeates also conceptualization of meaning in linguistics in continuation of a tradition, inherited from Structuralism which defines meaning as system-internal and autonomous, that is, independent of outside reality and speaker interpretation. In generativism principles of computation have been co-opted for understanding linguistic meaning, defined in terms of artificial systems and semantics as a scientific discipline is understood as a branch of formal logic, i.e., a set of criteria for rational thinking and a product of advanced stages of human civilization. In this context meanings of linguistic forms are represented in terms of stable, timeless and objective ( disembodied) basic concepts, or meaning primitives, which are discrete, object-like entities. They combine by predetermined rules of well-formedness and form hierarchically organized semantic structures. That is, semantics is compositional and computational. Word meanings are defined as literal meanings and are fixed one-to-one mappings of meaning and form. They are stable, finite and timeless sets of discrete semantic features. (J.Katz, J. Fodor, 1964)

In propositional semantics the meaning of a sentence is analyzed in terms of fixed semantic categories the most basic of which are agent, object, action, location, property, etc. These form semantic structures by an algorithm which produces statements expressed in linguistic forms by sentences. The meaning of a sentence is a statement and is defined in binary features as either true or false evaluated in terms of truth conditions, i.e. the conditions under which the statement expressed by the sentence is true, that is, corresponds to some fact of extralinguistic reality.

In the theoretical machinery of the generative paradigm the semantic portion of the algorithm is located in Logical form. This conceptualization of linguistic meaning reflects the underlying understanding of language as rule-governed, combinatorial system with mainly ( if not exclusively) intellectual functions.

The understanding of linguistic meaning in terms of artificial systems demonstrates misrepresentation of the semantics of natural language in various ways, e.g. it only studies thought encoded in statements, while questions are not entertained. In addition, natural linguistic communication is not always rational and not always meant to be truthful.

The interpretation of linguistic meaning is that of the ideal speaker and the expert observer as the generative perspective understands the primary function of language to be logical reasoning, communication being secondary and from evolutionary viewpoint, merely an evolutionary afterthought.

This complicates the work of neuroscientists in their attempt to understand the relationship between brain activity and semantic and syntactic computations postulated by linguists (L. Pylkkanen, J.Brennan, D.Bemis, 2013, chap, 16). At the same time the experimental literature in cognitive science has found no evidence of innately pre-specified “ symbolic systems that encode logical information, such as arithmetic, logic and computer programming “ ( ibid. ) in the human brain.

To the contrary, it has been determined that not abstract hierarchies but lexical words are stored in memory as rich descriptions of concrete examples of use, including the

---

representation of the phonetic properties of words. The ingredients of such representations are very concrete : the idiosyncrasies of the speaker's voice, and other sensory representations. And as biologists have explained to me, perception is never abstract or discrete and there are no straight lines in biology. The vocal representation of a word in memory is shown to be articulation - based , not abstract features-based. That is, words are stored in memory as embedded in specific events with idiosyncratic details, not as structured combinations of abstract prototypical categories. So, language is stored in memory in terms of detailed description of individual perceptual experiences which include non-linguistic contextual details . This process is subconscious and universal. The way language is processed by the human mind is not different from the way any other perceptual experiences, e.g.visual, etc. are processed. ( R. Port, 2007) .

In addition, the argument for processing mechanisms for grammar, divorced from processing of lexical words is invalidated by empirical studies in language disorders, language use and development which have demonstrated that the human mind treats lexicon and grammar as a continuum ( E.Bates, J.Goodman, 1997). More recent inquiries confirm that both lexical words and grammatical structures are processed, stored and retrieved by the same mechanisms in the same regions of the brain (E. Kaan, 2009).

Assumptions of universality of the language bio-program also reveals inconsistencies with stipulations of its biological nature. The claim for universality of the language organ/language capacity is based on assumptions about the nature of the human brain and cognition challenged by findings in brain sciences which reveal that : 1. brain weight, 2. neurovascular organization, although not directly linked to cognitive abilities, differences in vascular patterns can lead to different outcomes in cases of brain damage. 3. variation in the structure of Wernicke's area corresponding to differences in sex, education and profession, 4. individual brains are shaped differently, influenced by multiple factors , sex and hand preference being of primary importance. These facts point at the conclusion that : “ ... there is no universal pattern and many variables lead to a broad spectrum (of variation, emphasis SD ).” ( R.A.Muller, 1996; J. Hurford , D. Dediu , 2009). And given that the Language Faculty is a biological entity , it is by definition subjected to evolution by natural selection which has diversity at its foundation.

“ ...If the language faculty evolved by natural selection of advantageous variants, there must have been variability in the evolutionary precursors of the language faculty. One possible variable is the different dispositions of individuals to innovate linguistically. “ (J.Hurford, D. Dediu, 2009, p. 178).

Variation in individual language capacities are demonstrated by studies of language development ( Dabrowska, E. 1997, 2012). Thus, an identical language faculty is a biological impossibility.

Moreover, biological bodies are integrated complexes with interacting and interdependent components , not a collection of independent parts assembled and connected in some way. Human body components or cognitive capacities cannot be equated with computers or any type of machine-like entities as what you do and what you are depends on the stuff you are made of, on the ' building materials '. Biological beings live, reproduce, die, dominate, fear,

---

experience pain and pleasure, adapt and change. Human beings, in addition, love, hate, imagine, take pride and shame. Computers don't do any of this.

The criticism of the vision of language as a Turing machine comes not only from biologists and psychologists, but from some fellow generative linguists.

“...the functional state-space in language is usually taken to be discrete or categorical. A phoneme is a b or a p, but not something in between, a syntactic category is an NP or an AP, but not something in between. By contrast, neural computation appears to be somewhat graded, a matter of degree of activation and synaptic strength.” (R. Jackendoff, 2002, p. 25).

The generative paradigm follows the principles of classical science in its attempt to understand complex phenomenon by simplification and reduction to static, eternal primitives and simple general rules through introducing formalisms tailored for idealizations, not natural phenomena. The Minimalist program is a poster child for a formalism resulting from the dominance of the physicalist approach to nature in classical science. It fully reflects the shortcomings of the ancient dogma of inherent, predetermined and static simplicity of nature by applying it to the study of language, a highly multifaceted phenomenon, by misrepresenting it through extreme simplification and excluding key components. Most importantly the goal of such endeavour is theoretical parsimony, not a contribution to knowledge. In this sense, one has to remember that idealizations are not more than tools whose existence is predicated on their epistemic usefulness. They do not have independent existence and must not be mistaken for facts. And most importantly, they should not be made the goal of any intellectual work. The abstract construct of ideal speaker and the human individual are different ontological categories. One is an idea, the other, a material entity and a biological and social being. One is not a substitute to the other. This suggests that the hypothetical cognitive abilities of the ideal cannot inform about the cognitive and/or linguistic abilities of the flesh and blood human individual. In this sense the hypothesis of ideal linguistic competence becomes untestable and, thus, unscientific.

In short, the idea of equalizing human cognitive functions with artificial intelligence is misleading and does not contribute anything to understanding language. Moreover, attempts to transplant concepts from formal linguistics into neuroscience has so far had little contribution in understanding human brain, mind and the Language faculty. This suggests that biolinguistics and its embrace of artificial systems as a platform for understanding human cognition has an uncertain future.

## 1.2. Generative biases towards written language

The generative paradigm's vision of language inherits Saussure's dichotomy of *langue* and *parole* and the focus on *langue* as object of scientific inquiry. Moreover, the study of *langue* has been done with theoretical tools which reflect the properties of written texts as these are determined to exhibit the main characteristics of language as defined by modern theories: compositionality and situation-independence. The structure of language is understood as discrete, object-like abstract entities which stand in fixed relations with one another and have existence independent of their users. These consist of equally discrete and finite component

---

parts. So sentences are decomposed into clauses, phrases, words, morphemes, syllables, phonemes, phonological segments.

In Saussurean linguistics the visualization of the linguistic structure is achieved by the use of the Roman alphabet. Phonological segments, vowels and consonants, are marked by letters of the Roman alphabet. The graphic representation of the word in morphology and syntax is marked by Roman letters and their boundaries are marked by empty spaces and the boundaries of the sentence are marked by capital letters and punctuation marks. Moreover, the view of language as represented in terms of spatially arranged discrete characters clearly reflects the influence of writing as technology on linguistic theorizing.

To the contrary, research has shown that the ability of the human mind to process discrete and highly abstract linguistic commutations, said to be an innate and universal property of human cognition, is proven to be influenced by the individual's education and literacy.

“...we know that the brains of literate persons are substantially rewired compared to that of their illiterate siblings” ( S. Levinson, 2012, p. 397).

Literate individuals are more inclined to form abstractions which reflects the influence of literacy on perception. English speakers vary significantly in their proficiency , correlated with their level of education. Highly educated speakers rely more on grammatical information in comprehension, as opposed to less educated ones who rely to a significant degree on semantics Dabrowska ( 1997)

In short, the formalization of natural language and its representation in human cognition based on fruits of modern civilization is highly biased and inaccurate.

#### 1.4. Generative biases towards modern English language

The generative vision exposes additional biases based on the individual experiences with language of generative scholars most of whom are monolingual native speakers of English. As such they fashion the universal categories and rules purported to represent human language to the grammar of modern English. For example, the focus of the generative perspective is syntax, thus, grammatical relations and hierarchies are made explicit by word order, which is a defining characteristic of English grammar, as opposed to morphology, which is a dominant characteristic of many languages in the world. Moreover, some aspects of English grammar which feature prominently on the list of postulated universals, e.g. subject -auxiliary inversion in yes/no questions, is a feature unique to modern English , demonstrably missing at earlier stages in its history.( A. Goldberg , 2016, p. 83)

The postulation of the Theta -criterion, stating that there is a one-to-one correspondence between Theta-roles and arguments of a predicate, i.e., that there is a one-to-one mapping between meaning and grammar, ( Chomsky, 1981) and claimed as universal, although holds for English, is not demonstrated in many languages ( A. Goldberg, 2016, p. 85). In fact, the explicit expression of the agent in passive constructions, a computational procedure which produces English passives by demoting the agent to object position, in Ute produces a malformation as in Ute passives the agent is routinely left unexpressed. (T.Givon 1979, p. 30-)

---

Importantly, linguists are human beings and their experiences. If one has experience with vanilla ice cream alone, one's concept of ice cream is vanilla ice cream. In a similar vein linguists' experience as language speakers' monolingual linguists' experience is limited by their experience with a single language and these limitations influence their views as linguists. And given that most generativists are monolingual speakers, mainly, although not exclusively English, the limitations in experience with more than one language, it is not surprising that their professional views of human language are informed by their knowledge of English and their interest in other languages is reduced to looking for similarities between the grammar of English and a particular language, i.e. the study of language is reduced to comparative studies. In generative context arguments for Universal Grammar are justified with occasional examples from languages other than English based on highly restricted second hand information. Speaking from experience which, I suspect, many colleagues share, no amount of second hand knowledge by description is a substitute for real experience. Moreover, the comparison of grammars ignores the influence of semantics on structural properties as languages differ widely in encoding semiosis in linguistic forms.

This explains the fact that, although very many languages base their grammar on extensive use of morphology, it does not feature at all in hypotheses for UG, articulated in the Minimalist Program (Chomsky, 1995) and there are no attempts to look for some kind of innate factors as explanation for morphology, on par with syntax. Instead, morphology and the lexicon are placed outside UG and explained with glossogenetic processes of grammaticalization. (M. Tallerman et al., 2009).

Linguists with first-hand experience with multiple languages have a very different understanding of language as a human trait as experience allows one to identify the commonalities as well as idiosyncrasies. As an example, the 6 year experience of D. Everett learning Piraha language in situ, in my mind, makes his views as a linguist on Piraha language and on human language in general highly reputable.

Thus, the generative approach to natural language is biased as modern English grammar is taken to represent universal properties of human language and, by extension, of human mind.

### 1.5. Generativism and biolinguistics, philosophical incompatibility

From a philosophical perspective the integration of generativism and life sciences in biolinguistics exposes an inherent contradiction. The generative perspective adopts the rationalist principles of Descartes and Plato of universal order of eternal truths, innately available to the human mind and independent of experience. In essence, knowledge is defined as instinct. In fact, the open dismissal of the role of facts and experience espoused by the generative theorists culminates in the attitude which could be succinctly characterized as 'facts which do not confirm my preconceptions do not exist.' This explains the rejection of diversity of languages, hypothesizing computations which can never be detected by testing and the postulation of which is purely theory-dependent, e.g. covert movement and its implementations in verb raising, subject raising, etc. concepts and stipulations rejected not only by scholars espousing alternative views of language, but also from fellow generativists (see D.

---



Bickerton 2014 for discussion and critique)

The biolinguistic perspective understands linguistics as a natural science and a branch of biology, i.e. a science which studies life forms through observation and experimentation, and purports to define language in terms of a Language Faculty, a bio-cognitive entity, i.e. biological material. On the other hand, Chomsky has suggested that in order to properly understand the nature of the Language Faculty biology must be rebranded as science of abstractions, i.e. lifeless life forms and Mendivil-Giro (2014) has proposed to reinterpret the theory of evolution to exclude the environment, and thus, natural selection. Thus, in order to understand the Language Faculty, a bio-cognitive entity, one must rebrand biology as science of lifeless life forms which evolve without living.

Generative anti-realism goes as far as introducing idealized representations of the mind and the notion of the ideal speaker, i.e., an idealized version of a human being with idealized linguistic abilities. Empirically these are determined by the impulsive judgements of linguists who are said to be the humans most closely resembling the ideal speaker and revealing capacities for language emblematic of the innate Language faculty, the hallmark of the human species.

Thus, the challenges of the biolinguistic project begin and end with the adoption of the generative paradigm and its roots in the anti-empiricist philosophy of Plato and Descartes in addition to Turing's theory of artificial intelligence for the study of biological matter. And although abstractions have and always will have a prominent role in any scientific inquiry, they are tools and their epistemic value is tied to service in solving an empirical problem, i.e. abstractions have no independent existence.

These are ontological and philosophical discrepancies and contradictions which involve conceptual and methodological inadequacies.

Nevertheless, the generative/biolinguistic perspective has brought some valuable contributions to linguistics by focussing the attention to the biological foundations of language and the role of the individual organism as body and mind in language learning and use.

## 2. LANGUAGE AS A LIVING ORGANISM : the usage-based/functionalist perspective

As the label suggests, the functionalist approach is based on the premise that language function determines its properties. To remind, the generative /biolinguistic approach is functionalist in the sense that it attributes to UG the function of organizing thought. The alternative the usage-based/functionalist theories offer is the focus on communication as the primary function. The usage-based/functionalist/ approach unites various theories by the view of language based on the following general principles :

\* The ideas of scholars in the usage-based /functionalist paradigms are in unison with the empiricist tradition in philosophy. They form their generalizations from electronic data base which contains naturally occurring examples of language use as factual support. Individual utterances are regarded as potential sources for the formation of abstract representations through generalization. The idealized representation of a category in terms of the best example is a prototype. The degree of membership in a category is defined based on similarity to the prototype.

---

\*It defines language as a system of symbolic signs i.e. social conventions, grounded in the speakers' concrete experience with the world and with language. All types of linguistic signs, from lexicon to the highly abstract grammatical categories and rules for their combinations, derive from concrete examples of experience in communication.

\* The language system is viewed as emergent and periodically altered by language use.

\* The usage-based/functionalist approaches understand the formation of grammar as a result of compact packaging of information for the purpose of efficient communication. And given that communication implies meaning, grammar is viewed emergent as adaptation for effective transfer of meaning. The philosophy of linguistic functionalism is most clearly articulated by Du Bois:

“Grammars provide the most economical coding mechanism...for those speech functions which speakers most often need to perform. More succinctly: Grammars code best what speakers do most.” ( Du Bois 1985 referenced in F. Newmeyer, 2003, p. 693 )

\* Categorization, prototypes and gradience are key concepts. Language as described as a continuum of lexical and grammatical forms in both synchronic and diachronic contexts. A category is formed on the basis of the commonalities among individual tokens, i.e. family resemblance. As tokens also have individual differences, a membership in a category is a matter of degree. Moreover, some units of linguistic structure do not fit into any standard category. Thus language is understood in gradient terms mimicking the continuity of life forms.

\* The theoretical approaches in the functionalist framework see language as a cultural invention adapting to the architecture and functions of the brain during language processing and learning and the social and cultural idiosyncrasies of the communities which act as selective factors.

\* The usage-based/functionalist paradigm defines the cognitive representation of language in terms of a number of physiological and cognitive traits of the human organism which, although not specific to language processing, participate in language-related functions in conjunction to other functions. These include capacity to perceive and produce speech, capacity to form categories, capacity for socialization, episodic memory, capacity for mind reading ( theory of mind), joint attention, capacity for symbolic representation. In short, a mosaic of interacting human traits emerges thanks to the initial plasticity of the young brain and the initial flexibility in its neuronal connectivity. ( J. Bybee, C. Beckner, 2009; T. Givon, 2013 and elsewhere ).

The usage-based /functionalist paradigms have significant contributions to the scientific study of language. By relying on observable examples of linguistic output of average language users as instances of communicative linguistic interactions as well as real human brains it offers a solid basis for testable hypotheses. They offer explanation for a broad variety of facts, e.g. the observable diversity of language systems both in space and in time.

That said, the usage-based perspective is not without its own internal contradictions. For example, it defines language as a communicative technology, i.e., a product of cultures, while attributing it traits of a biological entity and it is common for the functionalist perspective to analogize language with a living organism (B. Comrie. 2006; W. Croft, 2013 ) or with species ( Mufwene, S. 2002 and elsewhere ) and for that matter to attempt to explain language origins and evolution with Darwinian principles and processes of variation and natural selection

---

similar to those in biological organisms.

Paradoxically enough, the usage-based perspective rejects the notion of innateness and instead, envisions a Language Faculty as a property of the mind of the adult language user, emergent from communicative experiences during language attainment. In this sense, the possibility that language, as one of the most distinctive behaviours of the human species, could have some specific adaptations by which evolution must have prepared the human organism for the inevitability of language use, is ignored.

Nevertheless, empirical studies by Ph. Lieberman (2002, 2007, and elsewhere, T. Fitch 2010, P. MacNeilage 1998) demonstrate that the physiology and the neuronal connectivity of the human supra-laryngeal vocal tract develop without the influence of experience. In fact, individuals with congenital deafness grow a vocal tract of normal size and proportions, although unable to use it for speech. Thus, the development of speech capacities appears to be as innate as the development of the heart or any other biological organ or system in the body. In addition, infant babbling is a developmental instinct, clearly evolved to facilitate speech. A capacity for ostensive communication, a uniquely human aspect of theory of mind, demonstrated by pre-linguistic infants can only be explained with their relevance to language (M. Donald, 1993; M. Tomasello, 2008; T. Scott-Phillips 2015). In addition, predisposition for learning words, (P. Bloom, 2000) demonstrated by pre-linguistic infants, also display some aspects of instincts. Thus, the fact that the functioning of language is predicated on some innate and specific aspects of the human organism must be acknowledged.

The paradox here is that the functionalist perspective adopts theoretical machinery from biology on the premise that languages resemble biological entities while misunderstanding the biological aspect of language, thus misunderstanding the role of human biology in linguistic behaviour.

In sum, neither of the perspectives on language discussed above can offer a complete understanding of language as each focusses on some aspects of it while ignoring others. One studies the human body, another, human behaviour. The biolinguistic approach is focussed on discreteness, stability and universality of linguistic elements, while disregarding the magnitude of diversity and flexibility of language. The usage-based/functionalist perspectives are concerned with the flexibility and adaptability of languages as they cope with changing individuals and communities, while ignoring the specificity, stability and universality of human bio-cognitive traits which underly language learning and use.

Each relies on metaphors which by definition are based on partial resemblance, mistaken for equivalence. The human mind is attributed properties of a computer, language is mistaken for a living organism. Although it is true that no theory can explain everything, a theory must reflect the defining properties of the object of inquiry and aim at explaining as many of these as possible.

### 3. LANGUAGE ORIGINS AND EVOLUTION IN LINGUISTIC THEORIZING

The study of language evolution begins with a theory of language. The diversity of theoretical approaches in linguistic theorizing, inevitably, reflected in diversity in theorizing of language

---

evolution. Thus, language evolution is approached with theoretical machinery borrowed from hard sciences by some and from life sciences by others.

### 3. 1 The Language Faculty and evolutionary principles in biolinguistics

Darwin's theory is evoked by some scholars to account for the Language Faculty, an idea initially introduced by S. Pinker and P. Bloom (1990) who talk about the Language Faculty as a product of standard evolutionary processes of variation and selection. The authors envision a cognitive entity with the function of processing grammar, or a grammar organ, as the product of a protracted, incremental evolutionary process initiated as a mutation in a single individual. The linguistic abilities of the mutant, being superior to the rest of the population, are said to have afforded him a clear reproductive advantage, which resulted in spreading of the mutated gene in the population. Further, a cascade of small mutations, each of which being adaptations to the environment of pre-existing language systems, after providing selective advantage to its bearers are gradually incorporated into the genome, resulting in respective intermediate steps of successive increases of grammatical complexity. This explanation for the evolution of UG has been questioned as it fails to convince that the use of grammar increases survival chances and provides reproductive advantage.

Further misunderstanding of evolution was revealed as the Language Faculty was defined as instinct by S. Pinker (1994) by evoking individual genes as explanation for complex innate behaviours, e.g. language, despite well recognized pervasive pleiotropy of individual traits. The FOXP2 gene in its human version is featured as responsible for the linguistic abilities of sapient species. The argument for a “hopeful monster” proposed by Pinker, which, generally speaking, may be a valid explanation for species' diversification in cases of genetic isolation, is not considered a likely scenario as explanation for the the birth of the first language speaker/genetic founder of the human species. Given the postulated computational complexity of the grammar algorithm, the likelihood of a felicitous mutation initiating the birth of such highly complex and highly unusual behaviour and especially its successful propagation despite that it defies the general principles of evolution, e.g. demonstrable lack of reproductive superiority, is extremely low.

The argument for “grammar gene”, which initially gained attention after a study by Myrna Gopnik and colleagues (1996) of the KE family, was later refuted by findings that the FOXP2 gene has influence on a number of cognitive and physiological traits. (F. Vargha-Khadem et al., 2005; Ph. Lieberman 2007, p.52). Subsequently various genes were identified, e.g. ROBO1, ROBO2 and CNTNAP2 which increased in frequency after the speciation of anatomically modern humans, were determined to be implicated in language-relevant functions, among various others (D. Dediu, V. Levinson, 2018). A more detailed understanding of the role of the genome in the formation of the organism revealed that genes influence only indirectly the properties of the phenotype, which, in turn, suggests that the evolution of these cannot be explained by genetics alone. (E. Jablonka, M. Lamb, 2006).

A different explanation for UG is offered by R. Jackendoff (1999, 2002; P. Culicover, R.

Jackendoff 2005 ) who understand phylogenesis of language as a gradual multistage process where the biological and cognitive changes in the homo lineage give rise to language systems of gradually increasing grammatical complexity. Contrary to Pinker and Bloom's hypothesis (1990) that phylogenesis of language is a consequence of series of biological adaptations of the Language Faculty to the pre-existing language systems , Jackendoff argues for the reverse causation , i.e. that glossogenesis is a consequence of phylogenesis. He states that all the stages in the evolution of the language faculty are not adaptations to linguistic environment but the cause of it. By this line of reasoning it is difficult to understand how can Darwinian principles can be evoked as possible explanation.

From a different perspective, it is well known that linguistic communication, successful enough to be useful , is very much possible without the full range of grammatical details offered by UG or with the bare minimum of these as demonstrated by Piraha, Riau, , etc. In addition, studies in language disorders have demonstrated that the impaired individuals, although may not be superb communicators, are capable enough to understand and make themselves understood as their communicative capacities are only partially reduced , not completely eliminated. If adequate communication is possible without UG , which the said gene encodes, it is not clear where is the selective advantage of an innate UG which would justify an evolutionary explanation.

### 3. 1.3. Biolinguistics 2.0: evo-devo, internalism meets externalism

The evo-devo paradigm is a meaningful departure from some of the foundational tenets of classical generativism and its earlier convictions about human cognition and the nature of the language faculty, i.e. universality, modularity, domain specificity and uniqueness. It also rejects genocentrism in its evolutionary explanation. ( A. Benitez-Burraco, C.Boeckx 2014; C.Boeckx, K. Groghmann, 2013; C.Boeckx 2013 ). Here principles and concepts from biology are introduced as these replace the conceptual instrumentarium of artificial systems which has for decades defined the generative tradition. In this conceptual rapprochement of linguistics to biological sciences in biolinguistics the stipulation of universality of Universal grammar , explicable by its genetic underpinnings, is rejected. A recognition of the pervasive pleiotropy of the genome and the contribution of epigenetic factors leads to the conclusion that “ ...different cognitive phenotypes can emerge from the same genotype and ...the same phenotype can emerge from different genotypes” ( A. Benitez-Burraco, C.Boeckx 2014 ).

Recognition of variation is also based on a novel understanding of the participation of both genomic and extragenomic factors in the formation of phenotypic traits under the influence of the environment during development. Given the diversity , i.e. lack of uniformity, of environmental factors and their influence on language development , diversity in language attainment is the natural outcome. That said, despite the divergence of developmental trajectories, convergence on typical cognitive profiles across normal populations is recognized .

In addition, the statement of modularity of human cognition and a language module is viewed as simplistic in unison with that of life sciences which find it “ ...quite difficult to draw a precise map of the neural substrate of language, since the limits of the brain areas involved are quite changeable from one person to another.” (Benitez-Burraco, Boeckx 2014 )

---

The evo-devo paradigm defines the language faculty as the totality of language-relevant aspects of the human organism as a “mosaic” of various cognitive and physiological mechanisms with different evolutionary histories, some of which much older and evolutionarily stable, others recent evolutionary innovations. This heterogeneous nature explains why some cognitive capacities withstand damage while others are easily disrupted. In this context, although variation of genotypes and phenotypes and developmental plasticity is recognized, the limits of variation and adaptability are acknowledged as the robustness and the near universality of the language faculty is underscored.

In addition, by defining the Language Faculty in terms of development the role of experience in interaction with innate factors is acknowledged.

In short, biolinguistics 2.0 is a rejection of earlier nativist visions of the Language Faculty in terms of innateness, autonomy, universality and offers an alternative perspective labeled as evo-devo and focusses on canalization, evolvability, developmental plasticity, adaptive landscape, i.e. adopting terminology from evolutionary theory.

From a different angle, if one defines language in biological terms, the issue of function comes into focus. The generative perspective in all its versions defines language in terms of its cognitive function of providing internal organization of concepts in the individual mind and evokes “inner speech” or self talk, i.e. internal monologue as its demonstration. Thus, the use of the language system for reflection for which vocalization is unnecessary is identified as the primary function of language while its application in communicating ideas by vocalizations is secondary. This explains why language is defined as syntax and justifies relegating phonology and the lexicon, the other fundamental aspect of language, to the periphery of interest for biolinguistics, leaving a significant gap in its evolutionary explanation.

That said, “inner speech” is essentially silent linguistic communication conducted in one's native language, the same one used in overt dialogues, and as such reflects the idiosyncrasies of the particular language. As “inner speech” is conditioned on proficiency in a language, this suggests primacy of communication in language development and evolution.

In this sense the biolinguistic perspective in all its versions focuses on the individual human, disregarding the fact that the use of images for reflection is, as experience suggests, broader in scope than linguistic forms. In addition, individuals do not use or create languages unless they are members of communities. Two individuals are not enough either, as demonstrated by the cases of homesigners and twin 'languages' show, i.e. that two individuals, biologically and cognitively fully equipped for use of complex language, create only a simple rudimentary language-like communication system. Assuming some form of innate predispositions, these can only be implemented in behaviour by converging on conventions formed and altered by social agreement in a community of speakers.

Despite the many deficiencies of standard generativism various students of language evolution still choose the generative paradigm as a theoretical foundation for understanding the language-relevant properties of the human individual, implying that the generative paradigm has been developed and perfected over multiple decades, suggesting longevity and accumulated experience inspires trust and confidence to be the firm foundation for future progress. That said, keeping an idea alive, despite that the entire architecture of the generative argument, from

---

assumptions to conclusions, have repeatedly been questioned and refuted by solid empirical evidence, only because of time and energy invested in it, or out of nostalgia, is an obstacle to progress. By the same token, the idea of slavery cannot be perpetuated in a modern society despite its longevity.

### 3.2. Darwinian evolution and glossogenesis

The term glossogenesis stands for language change under Darwinian principles, thus, language as a communication system undergoes constant change which is argued to adhere to the same general principles of variation and natural selection found in biological evolution, that is, linguistic forms compete and evolve under the selective pressures for some function.

Linguists of the usage-based persuasion understand language evolution as analogue to biological evolution in continuation of a long tradition in defining language diversity in biological terms as diversification of languages from a common ancestor, initiated by Darwin himself who has written about the analogy of languages to species ( Darwin, 1871).

Contemporary usage-based perspectives adopt D. Hull's generalized theory of evolutionary change ( D. Hull, 1988 ) where the principles of Darwinian evolution, originally intended to explain processes in biological forms, are reinterpreted and incorporated in an overarching general theory of evolution, which aims to understand processes of change in various contexts.

D. Hull applies the principles of variation, natural selection and inheritance to understand change of any entity in any field in a generalized theory of evolutionary change .With the discovery of the genome the Darwinian theory was reinterpreted in terms of genetic evolution.

Various scholars have proposed an abstract version of the gene-centred theory of biological evolution as a theoretical platform in attempt to understand changes of behavioural patterns in culture and language. R. Dawkins ( 1976) identifies the “ meme” as the unit of cultural transmission , defined as a unit of information analogue to the gene, as a replicator where minds are vehicles, multiplying individual memes by imitation/learning.

“ Cultural transmission is analogous to genetic transmission in that, although basically conservative, it can give rise to a form of evolution. “( Dawkins, 1976, e-book v1.0. p. 169 ).

In the usage-based/functionalist approach language systems are defined in terms of constructions of various types and sizes. The concept of function as a fit between the environment and a life form is borrowed as analogue to the functionality of a linguistic form to understand historical changes in languages. (B. Heine, T. Kuteva 2007; S. Kirby, 2007 )

Thus, a language form is selected among alternatives as the most adequate label for a piece of human semiosis. Language change is explained as adaptation of linguistic forms to changes in function. In this context the changes in language systems at any historical period are explained as adaptations to changes in communicative function, driven by historical, cultural, social changes in attempt to strike a balance between maximum expressivity and minimum processing cost.

Different scholars adopt different versions of the evolutionary theory.

#### 3.2.1. Languages and genes: Mendelian genetics and language evolution in historical linguistics

---

In unison with Dawkins' interpretation of principles and methods of modern genetics in cultural contexts, some linguists have attempted to explain change in language systems by adopting concepts from Mendelian genetics as linguistic forms are likened to genes and language systems to genomes. In this way modern language families are said to be descendants from the ancient original language of the first population of human speakers, i.e. protoworld, or “mother tongue”, whose traces, i.e. linguistic forms or language genes, are said to be preserved in modern languages ( M. Ruhlen 1992, 1996).

The argument for unbroken chain of descent connecting the putative “ mother tongue” with modern languages is contradicted by creole languages which are formed by contributions from languages of different language families. In addition, the sudden formation of sign languages with no ancestry puts in even more doubt the family tree model. Moreover, the reality of language change in language systems makes the likelihood of identifying ancient linguistic forms in modern languages a remote possibility.

Some of the problems of the genealogical model of language change comes from the methodology of comparing the etymology of individual lexical words, cognates, looking for semantic and phonological similarities across languages and language families, while rarely mentioning grammatical elements ( although see J. Nickols, 1995; B. Heine, T. Kuteva 2007). In addition, some similarities in word forms are found to be accidental and to result not from common descent but from language contact through borrowing (L. Campbell, 2008). In general the quest for global etymologies in search for traces of protoworld are found unconvincing by evolutionary linguists and of little value for understanding the origin of language.

That said, looking for clues of descent with modification in the lexicon might not be so unreasonable given that variation in rates of change is well known to exist inside the lexicon as some lexical words consistently resist change, e.g. basic vocabulary, while others change frequently, e.g. vocabulary of cultural concepts. Moreover, under the assumption that the symbolic nature of the Saussurean sign, a defining characteristic of modern languages, has its deep historical roots in iconic representation of natural sounds, including non-linguistic sound making, similar to writing symbols with proven history in pictographic representations. In this sense one can expect that some lexical words with concrete meanings, encoding the basics of human existence and known to resist change, may provide transparency of their ancient iconic roots and possibly the earliest linguistic forms.

### 3.2.2. Grammaticalization, a window into language evolution

Most historical linguists base their arguments on the assumption of the uniformity principle, i.e. that linguistic structure, although superficially changing, in fact remains the same through space and time. In this context change is detected in individual linguistic forms while the overall language system remains the same. Each individual linguistic entity has its own evolutionary path, although most follow a general pattern : lexical ( content ) word>grammatical word> clitic>inflectional affix, a process of grammaticalization by which the original function of lexical words, i.e. encoding of concepts as part of the lexicon, is

---



gradually replaced by grammatical functions of providing internal structure and become part of grammar. Grammaticalization is a change in all aspects of a linguistic form: semantic, structural, phonological ( Hopper, Traugott, 1993 Grammaticalization, Cambridge Univ. Press). The change is unidirectional: from lexical to grammatical.

The theory of grammaticalization outlines the commonalities in typical cycles of grammaticalization prompting the argument that these offer a window into earlier stages of the language system and even its origins because the same forces which shape and reshape languages today have been at play since the beginning. That is, the recent past is a repeat of the distant past which can be inferred through reverse engineering( Heine and Kuteva 2007) In this sense one would expect that, if all languages change following a universal pattern of grammaticalization and , given that all human brains and bodies are the same , language attainment follows the same patterns and all human populations have the same types of communicative interactions, over time all languages to have zeroed on the same type of highly regular language structure.

Moreover, glossogenesis is hypothesized by some as an evolutionary process of constant and evenly spaced small changes, occurring with every new generation as a result of iterated learning (S. Kirby 1998 and elsewhere ).

Nevertheless, the facts on the ground clearly contradict such prospects as languages with long histories , which presumably have had allowed the regularization process to play out, continue to have highly irregular forms. Nettle (1999 ) argues that rates of change vary and are influenced by community size and other historical and geographical factors. Dixon (1997) argues against the model of language family trees and invokes the punctuated equilibrium model by Gould and Eldridge (1972) , a challenge to Darwin's model of evolution, as analogy for language change. He attributes the uneven and unpredictable pace of language change to influences external to language, e.g. historical events of social upheavals etc. Languages evolve with uneven speed as periods of slow and gradual quantitative changes alternate with sudden leaps. ( D.Nettle, 1999). Language change can be regular and incremental, as abundant examples of grammaticalization of lexical items have been shown to take centuries. It can also happen in spikes. Very often a long period of stability is replaced by a spike of innovation and originality, usually triggered by historical factors . Some of these innovations fade away, others are selectively perpetuated, to gradually become stabilized as norms.

Others ( Trudgill, 2009 ) argue for the influence of population size on the form of languages as small and closed populations develop more structurally elaborate grammars with liberal use of irregular grammatical forms. In contrast, languages spoken in large communities with complex social stratification, open to migration and composed of multiethnic communities with varying linguistic backgrounds, are found to develop simpler morphology and complex syntax, transparency of word formation, catering to the communicative demands of adult second language learners. Given that human populations have evolved from small closed isolated communities into large multiethnic societies, one would expect this trajectory of increased regularization and decrease of irregular forms to be a universal pattern.

The argument for the role of community size and social structure is confronted by multiple examples to the contrary as small and closed communities of Pirahas, Hawaiian etc. have extremely simple languages while Quechua, spoken by millions of Incas was highly complex

---

as is Georgian spoken by millions. ( see Campbell 2008 for more examples.)

Significantly, historical linguistics, through its guiding uniformitarian principle, essentially states that protoworld was not very different from languages of today, e.g. that there was no language evolution, leaving unanswered the crucial question in evolutionary linguistics, i.e. how language with modern features has emerged from non-language.

Thus, historical linguistics, despite significant contributions in understanding the regularities in language change, is not likely to provide a theoretical platform for understanding the genesis of language, given that neither its initial assumptions nor methodology are congruent with these of evolutionary linguistics.

### 3.2.3. Languages as populations

Other linguists adopt E. Mayr's population view of organisms (E. Mayr, 2001). A population perspective defines languages in terms of population of idiolects, i.e. if people can successfully communicate, then they speak the same language. In analogy to species' reproductive isolation which is the cause of speciation, communicative isolation leads to loss of intelligibility which marks the difference between language varieties and different languages. Croft adopts a geno-centric perspective which analogizes the gene with a linguistic form, or lingueme and defines language as a pool of linguemes, i.e. a list of utterances. ( R. Croft 2000). The set of linguemes, constituting a language are linguistic conventions. In Croft's model glossogenesis/language change displays the distinctive features of evolution:

a. variation : diversity at various levels of language use is pervasive: 1. there is diversity of idiolects, 2. among sociolects, as sociolinguistic diversity, motivated by various social factors: age, gender, class, 3. variation within idiolects : in phonetics, lexicon and grammar as the same person is found to use different linguistic devices at different occasions in expressing the same idea.

b. competition : in language two or more vocabulary items are used as alternatives to encode the same concept (synonyms), or various syntactic structures are alternatively used to describe the same event .

c. inheritance : some linguistic forms are being persistently passed on over generations, which makes possible the understanding between generations, and texts written centuries ago.

S. Mufwene ( 2002, 2014) defines a language as a population of idiolects and analogizes these with parasites residing in the minds of speakers as their hosts ( S. Mufwene, 2002), suggesting that, similar to parasites languages have no existence independent of their speakers. A population of mutually intelligible idiolects is a language species. Similar to species, languages display diversity of individual idiolects forming a " language ecology" which form a linguistic eco-system and influence one another. He understands the evolution within a language system in terms of selection among the idiolects most suitable to the current communicative circumstances of the population .

### 3.2.4 Language change is not evolution.

Although many scholars, starting from Darwin, have detected similarities between the processes of change in biological and linguistic contexts, prompting the transplant of

---

conceptual machinery from biology into linguistics, there are also significant differences. For example :

\* The mechanisms of inheritance in linguistic and biological contexts differ significantly. In phylogenesis acquired characteristics are not transmitted to the next generation, while in glossogenesis such transmission is the norm, since linguistic innovations of predecessors are perpetuated by the new generation. Thus, biological evolution is Darwinian-Mendelian, glossogenesis is Lamarckian.

\* In phylogenesis The genomes of the parents are inherited in their entirety at the single point of conception , while linguistic items are learned piece-meal at different points of the learning process.

\* Linguistic entities are transmitted ( inherited) via language use , that is, mediated by communicative interaction as conscious behaviour , while genes are inherited directly, by instinctive urge to produce offsprings.

\* In genetic transmission the offspring has no active role in the production of the new genotype, while in the formation of the idiolect the learner is active participant by making choices in reflection of one's individuality.

\* In life forms an organism inherits characteristics of two parents, while in the formation of the idiolect multiple community members , e.g. parents, extended family, neighbours, teachers etc. make linguistic contributions. Moreover, in biological organisms the offspring inherits the totality of the parents' genomes, while in the idiolect the contribution of the parents' idiolects is partial.

\* In life forms genetic variation is produced by recombination of the pool of parental genes, while in the formation of the idiolect the learner can introduce his/her own innovations , although these are restricted by what would be considered acceptable by the community. The formation of the idiolect, then, is a creative process and a reflection of one's individuality as a creative entity.

\* In phylogenesis copying errors are rare and the genome is highly conservative, while languages display a much higher intra-lingual diversity of idiolects and sociolects which amplifies the potential choices for selection.

\* The selection factors in phylogenesis and glossogenesis are very different. Although biological factors play a role in both processes, in glossogenesis the social and cultural environment is of primary importance.

\* The number of species of flora and fauna is in the millions, while diversity of languages is highly constrained at about 7000.

The opposition to the “biologizing” of linguistics is most succinctly been formulated by Bonfante , 1946, referenced in B. Joseph, R. Janda 2003, p. 8)

“ Languages are historical creations, not vegetables”.

In sum, the analogy between evolution of life forms and languages is useful to a degree for illuminating some linguistic processes. That said, it has limited contribution to evolutionary linguistics. As a general principle, theories must reflect the properties of the field to be

---

effective. Language change is not evolution.

From a different but related point, attempts to adopt Darwinian principles of survival of the fittest by social sciences to foresee and/or guide social and economic policies have proven ineffective and even dangerous.

#### 4. COMPLEXITY THEORY AND EMERGENTISM IN LINGUISTICS

To remind, Complexity Theory was designed for understanding dynamic changes in inorganic matter, where atoms are formed from interacting particles, which form molecules which form compounds etc. , a multitude of simple elements, randomly dispersed and moving directionless through space, are subjected to the forces of wild nature and forced through a burst of energy to coordinate movement and direction. Thus, an individual unit of matter becomes a part of a complex structure of inorganic matter with properties different from those of individual units in isolation. It is a model which purports to explain how new levels of internal organization with new properties emerge spontaneously in inorganic matter from the interaction and coordination of simple localized events and processes, i.e. it aims to explain the formation of complexity from simplicity ( I. Prigogine, I. Sengers,1993).

Self-organization is a key concept, defined as a property of spontaneous formation of internal order, by which global organization emerges from interactions at a local level without external influence, where order is defined as a state of a system describable by fewer rules.

In this sense, initially chaotic behaviour of individual entities becomes coordinated by interactions with neighbouring entities by which patterns, i.e. order, emerge spontaneously and the individual becomes a member of a larger unity.

Complex systems are defined by the following properties : absence of central control, non-linearity, presence of attractors, dependence on initial conditions, that is, new cycles of self-organization are constrained by the outcome of previous cycles.

It was coopted for understanding the formation of complex organization in all ontological types, e.g. physical, biological, social.

In recent years the general theory of complexity has been coopted as a theoretical platform in evolutionary linguistics and is adapted to reflect the specifics of language although interpreted differently by different linguistic paradigms in reflection of the respective theoretical affiliations.

From a usage-based perspective the language system as patterns of linguistic behaviour in this context is understood as spontaneous emergence of linguistic innovations as a result of communicative interactions at a local level, which are further transformed into stable patterns of linguistic behaviour and form the communal language system.

In biolinguistic context the language system as a Language Faculty is explained with spontaneous self-organization of neurons in the brain, giving rise to a novel cognitive entity, a processor of syntactic computations.

---

#### 4.1. Languages as emergent systems

F. Heilighen ( 2013 ) has attempted to extrapolate the principles of the chaos theory from the behaviour of atoms in the emergence of complex systems in inorganic matter for understanding the formation of hierarchical organization in language. In this context language is understood in terms of emergent patterns of linguistic behaviour , converging and solidifying from repeated interactions of communicators .The emergence of language is viewed as formation of linguistic conventions, a special case of social norms, resulting from alignment of individual intentions through mutual coordination of individual speakers' idiolects around a common goal of successful communication .

Idiolects and sociolects are viewed as emergent systems. N. Ellis,( 2011) and also N.Ellis, D.Larsen-Freeman et all.( 2009 position paper ) base the emergentist argument on some common characteristics the formation of language systems share with other emergent phenomena.

a. Complex systems lack central control, thus, they are emergent systems, where global patterns emerge from local interactions without predetermined outcome. Such is the case of bird flocks and supermarket lines. Language in this context is viewed as emergent patterns of linguistic behaviour formed spontaneously from the communicative interactions among speakers .

b. Complex systems, are by nature diverse with unique properties. Similarly, there is no one prototypical speaker or a prototypical community. The individual speaker has a unique version of the language system, an idiolect. Each idiolect is a unique result of the individual's experience with the world and other idiolects.

c. Complex systems are dynamic, in constant flux in perpetual search for equilibrium. Similarly, both idiolects and sociolects are dynamic systems, constantly reorganizing , thus, change is a continuous series of events of emergence, a natural state of the language system at both levels.

d. Patterns in complex systems arise and become perpetuated through positive feedback, or die out due to negative feedback. Similarly, linguistic innovations are selectively perpetuated and become patterns if adopted by the population.

e. In complex systems small local changes can cause dramatic global effects, or phase transitions, known in the complexity theory as “ butterfly effect”. Similarly, during language learning children experience sudden dramatic increase in vocabulary, also known as “ lexical spurs” , leading to the emergence of grammar.

f. In a complex system the interactions are localized, i.e. each individual has access to a limited number of interacting agents. Similarly, each language speaker communicates with a social circle of friends and relatives who compose a network and influence each other's idiolects. The process of pattern formation usually begins at a local level before being extended to a larger population.

Various scholars have presented examples of self-organization in phonological systems via computer simulations (De Boer, B.,2000; Oudeyer, J.Y. 2005 and elsewhere ).

---

R. Keller (1994) proposes an explanation of how this happens with the 'invisible hand' hypothesis where language is defined as a rule system emerging spontaneously as unintended byproduct of the rational and intentional interactions of individual speakers to communicate with conspecifics in an attempt to solve interpersonal problems at a local level. Thus, linguistic conventions are unintended global results of intended local interactions. (For concrete examples see J. Aitchison 2001).

That said, emergentist accounts (B. MacWinney, 2005) assume that idiolects and sociolects are formed by processes similar to those driving the formation of crystals and sand dunes. That said, atoms are uniform in shape, while speakers are individualities, shaped by biological factors, i.e. sex, age, in addition to individual experiences during development. Sand dunes emerge instantaneously, idiolects take years to form, sociolects take centuries. Emergence in matter is a simple process, emergence of languages is a multifactorial, complex process where various factors interact at different time frames.

#### 4.2. The Language Faculty and the theory of complexity in biolinguistics

In life sciences some have adopted the chaos theory as explanation for the diversity in biological forms as alternative to the Darwinian theory of adaptation and natural selection (D'arcy Thompson 1917). Similarly S. Kauffman (1993) talks about "order for free" in unison with S.J. Gould and R. Lewontin (1979) who argue that complex biological entities are often explicable by laws of inorganic nature.

The biolinguistic perspective has suggested that that complexity theory offers a plausible explanation for some aspects of the Language Faculty which appear difficult to explain, and even inexplicable, with evolutionary principles (Chomsky 2005 and elsewhere). As an alternative Universal Grammar is explained with an event of restructuring i.e. self-organization, in the neuronal connectivity of the brain, deemed to have produced UG, a biological innovation of unparalleled complexity in biological matter. unmotivated by survival benefits. UG is said to have appeared at once as a full package (N. Chomsky, 2005 and elsewhere) thus, eliminating the possibility of intermediate stages of lesser computational complexity as precursors for a full UG. The argument is consistent with that advanced by S.J. Gould and R. Lewontin (1979) for the appearance of the Language Faculty as a side effect in the evolution of some other, unknown and possibly unknowable, traits.

That said, the analogy between the behaviour of atoms and molecules and neurons is, in my mind, unwarranted given that: a. atoms, biological organisms and human individuals belong to different ontological categories which determines their individual properties and interactions, e.g. atoms belong to physical matter or "nature morte", the brain is a bio-cognitive entity, i.e. a biological tissue, b. atoms are identical, brains are unique reflections of people as individualities, genetically, developmentally, in terms of experiences, c. atoms are eternal, brains change with experience and age, d. atoms' interactions are impulsive and self-organization is instantaneous, while the formation of neuronal associations and networks during early child development is gradual and protracted, e.g. language attainment and other learning processes take several years.

---

And although it is undeniable that life forms are influenced and constrained by the laws of physical matter as biological organisms are composed of atoms and molecules, living matter is organized under different principles. Biological entities, their life cycles and behaviours are guided by the laws of biology, i.e., Darwinian evolution, as adaptations to some part of the environment, be it organism-internal within the body, or external within an ecological niche, none of which are applicable to inorganic matter. Moreover, the likelihood that a cognitive entity with such specific characteristics could have appeared by violation of evolutionary principles by chance is negligible. In addition, speciation cannot be described as “event”, it is always a long process which usually takes thousands of years. The appearance of Universal grammar as a hallmark of human speciation cannot be attributed to an event.

The postulation of the FLN and FLB distinction (M. Hauser, N. Chomsky, T. Fitch, 2002) was brought by the attempt of rapprochement between linguistics and biology in order to find a credible explanation for the presence of such, otherwise highly unusual piece of biological matter, by introducing Darwinian principles as a contributor in the evolution of FLB. At the same time FLN is attributed properties of ultimate perfection and computational efficiency, highly unusual for biological matter (N. Chomsky, 2002, 1995; R. Berwick, N. Chomsky, 2011).

That said, the notion of perfection is usually attributed to idealizations as there is no perfection to be found in reality. Moreover, perfection is an absolute notion, i.e. something is either perfect or it is not. Attributing a characteristic in terms of absolutes, yes/no, is possible only in artificial systems, e.g. Algorithms are composed of 1s and 0s, and inorganic matter, i.e., physical matter and chemical products, e.g. something is either gold or it is not, while biological matter, by its nature as evolutionary product, is graded. In addition, atoms and molecules in inorganic matter are eternal, unchangeable, i.e. nothing like living organisms.

Thus, perfection as a property of a biological entity is untenable as products of evolution are by definition imperfect which prompts the need for evolutionary change as improvement. (S.J. Gould, 1980) Perfection is a dead end which leaves no room for improvement. Thus, evolution and perfection are incompatible notions. Gary Markus (2009) defines human mind as a “kluge”, or clumsy, inelegant, although very effective problem-solving evolutionary product.

In sum, the complexity theory as a theoretical platform is originally designed for studying inorganic matter and as such reflects its defining properties. It understands the formation of patterns and structures as spontaneous unpredictable events resulting in ground-breaking novelties with no continuity. This is not how life forms and language systems behave as innovations in both biological entities and in languages do not normally happen instantaneously. Changes in language systems as well as in life forms take centuries. Moreover, the complexity theory understands emergence of unique and complex organization from simple and trivial processes. That said, biological organisms are formed by multiple interacting processes at multiple levels of organization, genetic, epigenetic, developmental, with characteristics not reducible to inorganic matter which makes the presumption of equivalence between the two unwarranted.

In short, theoretical machinery designed for the study of inorganic matter is incompatible with

biological entities and is inadequate for the understanding of the bio-cognitive representation of language in the human organism.

#### 4.3. Language Faculty emergent by language use

As an alternative to the evolutionary model some scholars of usage-based persuasion, who also oppose the generative/biolinguistic and stipulationist views of innate UG, have adopted emergentist explanations for the design of language and the Language Faculty.

A defining feature of emergent systems is that they display novel characteristics not reducible to the sum total the individual interacting components. In this context a Language Faculty emerges by the coordination of a number of bio-cognitive aspects of the human organism involved in non-linguistic functions, e.g. capacities for socialization ( R.Dunbar, 1998) , joint attention ( M.Tomasello, 2008, 2003,) , symbolization ( T.Deacon 1997), capacity for complex imitation ( M.Donald, 1993, 1999) etc. Thus, a “ ... quite a heterogeneous cognitive subsystems, none of which is a language processor by design” (T. Deacon, 1997, p. 298) in coordination, produce a novel bio-cognitive entity with unique capacity for language processing.

Corning ( 1998) talks about language processing as synergistic effect. The concept of synergy encapsulates the effects of co-operative behaviours among various interacting entities. In this context the Language Faculty is understood as emergent from coordination and cooperation among various structurally and behaviourally unrelated aspects of the human organism, cognitive, physiological capacities and activities which interact . The synergistic effects are at multiple levels as follows:

\*synergy among the articulatory organs for the purpose of speech production

\*synergy among cognitive capacities :

# capacity for reference ( to represent a class of objects through signs ( as special case symbolic thought, symbolic representation)

# capacity to form categories ( things and actions are universal categories)

# capacity for mind-reading, or theory of mind

# capacity for self-monitoring, or metacognition, ( M. Studdert-Kennedy,Ch. Knight, J. Hurford, 1998 ).

# consciousness ( awareness that one's person and mind differ from others)

# intentionality ( stimulus-free initiation)

# capacity to learn , extended memory

# imagination, planning ( or displacement: capacity to refer to referents distant from here and now)

# capacity for socialization ( need for the company of conspecifics)

\* synergy between cognitive and physiological capacities for externalization of linguistic meaning and structure in speech

Synergistic interactions are purely behavioural and temporary, although when repeated for long enough give rise to more stable relationships which solidify by a process of self-organization

---



and ultimately result in the formation of stable integrated units, i.e. emergent systems with new properties.

In emergentist context the Language Faculty is envisioned as a property of the adult human organism formed by the coordination and collaboration of various aspects of the human body by continuous synergistic effects resulting in self-organization and emergence of a new bio-cognitive entity under the influence of experience with language during early language attainment by youngsters ( B.Macwinney,1998).

In short, an emergent Language Capacity is a unique product of cooperative, localized interactions of simple entities which become components of a unified entity with complex internal organization and behavioural specialization.

That said, although communities clearly differ in their choices of encoding human experiences in linguistic forms, communication by language is universal and demands some form of specific innate predispositions in the human organism to account for this obvious fact. Evolution must have prepared the human organism in some reliable way for the inevitability of language use as early in life as possible by evolving some form of specialization . As mentioned earlier, some innate predispositions at rudimentary levels are present in the human organism at birth , e.g. innate propensity for speech is demonstrated by the early onset of babbling, innate propensities for formation of lexical words are demonstrated by infants (P. Bloom 2000), innate propensities for some basic grammatical categories are demonstrated by early and effortless learning of animate/inanimate distinction, state/activity distinction, presence/absence distinction etc.. Thus, innate predispositions for learning the fundamentals of language are detectable early in life, suggesting specific aspects of language learning as evolutionary targets ( Dor,D. , Jablonka,E., 2001).

Thus, the human organism must have some specific predispositions for language attainment and processing, cognitive and physiological. On the other hand, a growing number of scholars agree that these innate predispositions cannot be in the form of abstract grammatical rules or UG.

#### 4.4 .Languages as Complex adaptive systems

Complex Adaptive Systems ( CAS) are dynamic systems of inorganic matter which interact and adapt to one another while adapting in tandem with a changing environment. Some scholars see similarities between dynamic processes in inorganic matter and biological entities as the latter exist and evolve in the context of eco-systems which blurs the boundary between an individual entity and environment ( Lewontin, R. 2002). Biological evolution, especially in complex organisms, has been proven to be a complex process involving coordinated processes of mutual adaptation in the genome, the phenotype, developmental patterns and behaviour (Jablonka, Lamb, 2006), suggesting that evolution can be viewed in terms of complex adaptive systems.

The evolution of language, one such complex process, is argued to be an interaction of various systems, each differently organized, which prompts the argument for its explanation in terms of complex adaptive systems.

---

Scholars differ in their understanding of which systems are included in the interactive complex. L. Steels (2011) identifies social relations, the language system and cognition as mutually influencing one another. T. Schoenemann (1999, 2005) advances the argument that syntax evolved as a result of a bottleneck formed by the cognitive capacity to conceptualize in exquisite detail the world and the limitations of human physiology to communicate this rich content with limited physiological resources under the time restrictions of a conversation.

T. Givón, (1979, 2002) argues that complex grammar emerges as a result of extending the spheres of language use from the limitations of linguistic communication within the immediate circle of individuals into a larger and more informationally diverse society. In this context change of function triggers a demand for transformation in the language system in terms of transformation from loosely connected utterances and meaning-based linguistic communication in a “society of intimates” into a tightly organized system of sentences with highly regularized syntactic structure. Thus, social changes trigger behavioural changes resulting in change in language functions and, consequently, in the language system.

For others grammar emerges from the discrepancy between the enormous size of language and the processing limitations of the human brain, (M. Christiansen, N. Chater 2008). Grammatical rules and categories emerge as a solution to this inadequacy. Yet others explain compositionality and grammar as emergent through iterated language attainment by youngsters as every new generation introduces new regularities given that regular patterns are preferred by learners. (Hurford, J. 2000; S. Kirby, 1998; K. Smith, S. Kirby, H. Brighton 2003).

That said, the iterated learning hypothesis is based on experiments with robots which represent an extremely simplified version of the human infant, thus posing limitations on its explanatory prominence.

Complex adaptive systems are positioned at the cusp of order and chaos. Adopting the complex adaptive systems theory in understanding the internal dynamics of languages focusses on the fact that languages are stable but flexible systems, composed of various components, each semi-independent, but connected by membership in an integrated whole.

And although the adoption of the Complex Adaptive Systems framework highlights some crucial aspects of language evolution as a multifaceted process of coordinated adaptations at multiple levels and time frames, it reflects the properties of inorganic matter and, in my mind, has significant explanatory limitations for understanding phenomena like the human organism, mind, and language, as well as language evolution, phenomena hardly explicable by simple processes in simple units of matter.

In sum, theoretical machinery, designed for understanding dynamic changes in inorganic matter, were adopted for answering questions which linguistics alone cannot. Nevertheless, the units of organization as well as the processes in inorganic matter bear little similarities to human speakers or linguistic forms to justify borrowing of theoretical machinery.

## 5. EVOLUTION AND SELF-ORGANIZATION, two interacting forces in phylogenesis of language

Some students of evolution have hypothesized interaction of self-organization and Darwinian evolution as a part of the overall evolutionary process. S.J. Gould and R. Lewontin's (1979)

---

offer an anti-adaptationist explanation for individual organs and systems as side effects of standard evolutionary processes of selection for some unknown and possibly unknowable, traits. These are termed spandrels in analogy to spandrels in buildings construction. A spandrel in buildings and, by analogy, in biological bodies, is initially functionless. S.J. Gould and E. Vrba, (1982) have enriched the anti-adaptationist argument for appearance by chance with the concept of exaptation, as a special case of adaptation. It is a label for an evolutionary process where under certain circumstances an organ or a system initially having appeared by accident as functionless, a metaphorical spandrel, undergoes a process of exaptation, i.e. slight adjustments of its initial biological form, i.e. an adaptation, as it acquires functionality. Exaptation also refers to evolutionary process where a biological entity, initially selected for a function, undergoes a behavioural change followed by biological transformation as adaptation to a new function. Naturally, the new function must be maximally similar to the previous one in order to satisfy the evolutionary principle of change by least effort. This is one way evolution looks for shortcuts by recycling what is already available in its attempt to respond to environmental changes.

Chomsky and some of his followers have adopted the Gould/Lewontin's argument as they attribute the existence of FLN and FLB to interaction of event and process, of self-organization and evolution, given the fundamental differences in their functionality. The FLB showing evolutionary continuity with other species, has a standard evolutionary explanation. In earlier versions of the argument the existence of the FLN has various is attributed to one-time event event of restructuring of the genome producing a “hopeful monster”, known in the literature as the leap hypothesis. In more recent versions FLN is attributed to extragenetic events of reorganization and restructuring within the brain driven by the brain expansion and the space limitations of the cranial cavity, resulting in alteration of the neuronal connectivity, an instance of self-organization producing the FLN, a bio-cognitive novelty. In the latest version the FLN, having appeared initially as a spandrel, produced by unspecified forces of physical matter, known as Chomsky's “third factor” (Chomsky, 2005), has later undergone exaptation for a function. Others speculate that the current function of FLN in the formation of modern language is a product of additional cycles of exaptation where speculations on from previous functions include :

- exaptation from conceptual structure ; Phrase structure in syntax is believed to be a cognitive exaptation of the thematic role structure in protolanguage e.g. agent, theme, goal, etc. ( Bickerton, Calvin 2000 ) Others argue that FLN is exaltation from Language of Thought ( LOT).
- exaptation from the so called social calculus (conceptualization of interpersonal relations), Dunbar ( 1998, 2009)
- exaptation from phonology ; Phrase structure, the distinction between Noun Phrase and Verb Phrase is believed to be an exaptation from syllable structure( Carstairs-McCarthy, 1999).
- exaptation from instinctive manual gestures for motor control, suggesting that spoken language had gestural origins, emerged initially in the manual domain. ( in Corballis 2009, Tomasello 2008 )

Others speculates that the original function of the language organ may have been spatial

---

orientation, later put to use in forming linguistic structure.

Thus, another aspect of the provenance of the Language Faculty is unclear, adding to the challenges for potential empirical confirmation, already made difficult by the fact of non-human homo species extinction, therefore precluding any possibility of comparative inquiries.

Criticism of this biolinguistic view is advanced by Ph. Liebermann (2002); M. Arbib (2004); Y. Grodzinsky, K. Amunts (2006) among many others as the theoretical ramifications of the Language Faculty as Universal Grammar have not been confirmed by empirical studies of the brain.

The argument for the dual nature of the Language Faculty is based in part on D. Bickerton's (1984) postulation of a pre-linguistic protolanguage stage as a demonstration of a pre-human form of FLB, said to be demonstrated by the formation of pidgins while the formation of creoles is interpreted as empirical demonstration of a grammar organ as a marker of human speciation.

It is contested by S. Mufwene (2007), M. De Graff (2001) and other creolists who argue that pidgins and creoles are unusual language systems produced by modern humans as solutions to highly unusual communicative circumstances of slavery and trade, created by modern civilization, and as such provide no information on language evolution and/or the evolution of the Language Faculty.

Both individually and in combination the arguments for phylogenesis and emergence of the Language faculty, as offered by the classical biolinguistic perspective, suffer from the same misgivings given the lack of experimental confirmation.

That said, humans display some specific predisposition for learning and processing of language early in development suggests a role of phylogenesis although it is highly unlikely that innate predispositions for language are in the form of UG, even in its latest version informed by minimalist views.

So in linguistics and evolutionary linguistics language and its genesis is formalized by adopting theoretical models from biology and hard sciences, two theoretical platforms which formalize different types of reality, foreign to language.

A much more detailed and profound understanding of language evolution involves a more sophisticated understanding of evolution as a biological process as an entangled interdependence of multiple processes each with different input at different time frames and contexts. In this sense acknowledgement of the three systems participating in the interactive complex, the genome, the learning mechanisms and communication, operating in three time-scales suggesting the participation of Baldwinian evolutionary processes offered by S. Kirby (2007) is a sign of progress. A further exploration of these co-evolutionary processes promises fruitful results.

## 6. ON LANGUAGE, ITS EVOLUTION AND LINGUISTIC THEORIZING

To remind, science is a systematically organized body of knowledge covering general truths, achieved by study of reality through observation and experiment, and the intellectual activities

---

which produce it. All types of scientific inquiries begin with a clearly defined object of study. Language is a heterogeneous phenomenon which makes it very difficult to define and study. In the words of N. Ellis “...language can be viewed as “ a genetic inheritance, a mathematical system, a social fact, the expression of individual identity, the expression of cultural identity, the outcome of dialogic interaction, a social semiotic, the intuitions of native speakers, the sum of attested data, a collection of memorized chunks, a rule-governed discrete combinatory system, or electrical activation in a distributed network...We do not have to choose. Language can be all of these things at once. “ ( N. Ellis, 1998, p. 642 ).

None of the theoretical perspectives dominant in the landscape of modern linguistics and discussed above provides an adequate description and explanation of language. The difficulties stem from the nature of the object of study as language is a multifaceted and multidimensional complex. This makes it unusually difficult to describe and elusive to define and formalize which has led to the perception that language is unsuitable or unworthy of scientific inquiry and of linguistics as less of a science as science is traditionally defined in terms of hard sciences. Moreover, the multifaceted nature of language creates the virtual impossibility to find a common conceptual framework to unify a multitude of fields of study vastly different in their spheres of focus, methodologies and goals. This explains why linguistics has struggled to define its identity as well as its place among the rest of sciences : it has been defined as a social science, as a natural science, and lately, in terms of classical sciences physics and chemistry. The generative paradigm has strived to carve a respectable place for linguistics among standard sciences by attempting to become either a branch of physics and chemistry, or biology by reducing language to a genetically preprogrammed biological entity, i.e., language organ/ language faculty, or , physical matter , chemical compounds . On the other hand, the usage-based /functionalist perspective, in its attention to diversity and change of languages, has focussed on similarities of languages with living organisms, arguing that linguistic forms, similar to biological organisms, exist and function in life cycles and undergo constant change as they adapt to their environment in order to assure successful replication.

Language is neither a computer program, nor species of life forms or chemical compounds. Linguistic forms are neither plants or animals or atoms and molecules, nor can they be described in digits and historical changes in languages can be viewed in terms of biological evolution only metaphorically.

In short, linguistic paradigms dominating the theoretical landscape of modern linguistics have so far not been a useful tool for understanding language, which does not fit neither into the moldings of classical science or life sciences, nor does it lend itself to mathematical formulas and calculations . It is a unique phenomenon. Each of the above-mentioned models is a transplant from another field and its adoption for the study of language is necessarily based on focusing exclusively on some of the fundamental properties of language, while neglecting or excluding others. As a result, none of these provide a complete description of it, fundamental for the design of a successful model. Importantly, meaning is a fundamental property of language, while a good theory of linguistic meaning is missing as most theories focus on linguistic form. This theoretical plurality, although understandable, is , in my mind, unproductive as it invites endless debates over whom to resemble by framing language in

mutually exclusive alternatives with little common ground. The attempt to find identity by trying to imitate someone else is not a promising strategy.

On the other hand, the attempts to reduce language to either physical matter or a living organism can be interpreted as search for common conceptual ground to coordinate, provide theoretical bridges and integrate the results from the vast diversity of disciplines and theoretical perspectives. In this context, as an alternative such common ground is more likely to be found by adopting the theory of communication which would reflect the most distinct feature of language as a system designed, used and perpetuated in service of communication.

Communication is usually understood as an intentional effort to influence another mind by emitting signals. All types of utterances, i.e. statements, questions, requests make this abundantly clear by implying a communicative interaction between at least two participants.

Moreover, the most distinctive and universal feature of language is its use in face-to-face dialogues. One can envision communication in a broader sense, defined as an interaction by exchange of signals, between two entities, a sender and a receiver. In this sense any interaction between at least two parties, from computation in artificial systems to epigenesis and development, digestion, cognition, vocalization and speech, is inherently an act of communication. In fact, life can broadly be defined as interaction or exchange of signals, between an organism and environment, i.e. life can be defined in terms of communication.

This can serve as unifying platform for both the biolinguistic and the usage-based approaches. In this context the biolinguistic perspective could interpret linguistic computations as communication within the human brain, while the usage-based perspective, as communication among multiple brains. In my mind, defining communication in broader and more general terms and focussing on the most fundamental property of language as a system of communication is a better reflection of its hybrid nature and has the potential to achieve conceptual congruity among otherwise unrelated theoretical perspectives. It would eliminate the dichotomies of biology vs. culture, individual vs. community, meaning vs. structure, stability vs. flexibility.

### 6.1. Linguistics and the study of language evolution

Linguistic theories are the theoretical foundation for a number of related inquiries into human cognition, ontogeny, language evolution etc. The theoretical plurality creates confusion and contributes to the internal challenges of linguistics which spill over onto these and other related fields, as articulated by R. Jackendoff (2010). The absence of one agreed-upon theory of language leads to confusion especially in the study of language evolution, a multidisciplinary field, itself struggling to define its own character by bridging theoretical perspectives and empirical goals from a wide variety of unrelated fields. Various students of human biology and cognition, E. Szathmari, A. Fedor, (2009, p. 16) to name a few, have explicitly stated that the diversity of competing linguistic paradigms contributes to the challenges in their work.

In short, convergence of preliminary assumptions and conceptual machinery is badly needed in linguistics. For that to happen linguists must agree on the same facts as preconditions for theory building. Although there is some evidence for timid efforts in this respect between the

two major alternatives, biolinguistics and usage-based approaches, resulting in the articulation of Biolinguistics 2.0. as pointed out by M. Pleyer, S.Hartmann ( 2019 ) these are for now exceptions rather than a tendency. This state of affairs is likely to continue as without common ground of conceptual framework and goals little progress is to be expected , suggesting that given the lack of proper theoretical tools as a firm foundation, language evolution will continue to be the “ hardest problem in science”. In sum, given the current state of linguistic theorizing the study of language evolution has not even begun.

## REFERENCES

Aitchison, J., 2001, The birth of rules, in Trabant, Ward, New Essays in the Origin of Language, Walter de Gruyter, p. 133-149

Arbib, M. 2004, From Monkey-like Action Recognition to Human Language, An Evolutionary Framework for Neurolinguistics, Behaviour and Brain Sciences( BBS) p.105-167

Bates, E., Goodman, J., 1997, On the inseparability of grammar and lexicon, evidence from acquisition, aphasia and real time processing, Language and Cognitive Processes , 12(5/6) , p. 507-584

Berwick, R., Chomsky, N., 2011, The biolinguistic program, the current state of its evolution and development, in Di Sciullo A. Boeckx C. eds. The Biolinguistic Enterprise : New Perspectives in the Evolution and Nature of the Human Language Faculty , Oxford University Press, p. 19-41

Bickerton, D. 1984, The Language Bioprogram Hypothesis, behaviour and Brain Sciences (BBS)n. 7 p. 173-221

Bickerton, D. 2014 Some problems with biolinguistics, Biolinguistics, 8, p. 073-096

Bickerton, D., Calvin, 2000, *Lingua ex machina*, MIT

Benitez-Burraco, A., Boeckx C. 2014, Universal grammar and biological variation , an Evo-devo agenda for comparative linguistics, Biological Theory, vol.9, 2014, p. 122- 134

Bloom, P. 2000, *How Children Learn the Meanings of Words*, MIT Press

Boeckx, C. Groghmann, K. eds. 2013, *Cambridge Handbook of Biolinguistics*, Cambridge University Press

Boeckx, C. 2013, Biolinguistics: foray into human cognitive biology, Journal of Anthropological Sciences, vol 91,(2013)p. 63-89

Bouchard, D. 2013, *The nature and origin of language*, Oxford University Press

Bybee, J., Beckner, C. , 2009, Usage-based theory, in Heine, B. Narrog, H. Eds. Oxford

---

Handbook of Linguistic Analysis, p. 827-855

Campbell, L. 2008, What can we learn about the earliest human language by comparing the languages of today, in Demoule et all. eds. Origin and Evolution of Languages, Approaches, Methods, Paradigms, Equinox Publishing Indonesia

Carstairs-McCarthy, A. , 1999, The Origins of Complex Language: An Inquiry into Evolutionary Beginnings of Sentences, Syllables and Truth, Oxford Univ. Press

Chomsky, N. 1956, Three models for the description of language, IRE, Transactions in Information Theory, (2),113-124; doi: 10.1109/TIT.1956.1056813

Chomsky, N. ,1972 Language and Mind, Cambridge University Press

Chomsky, N. 1980, Rules and Representations, Columbia University Press

Chomsky, N. 1981, Lectures on Government and Binding, The Pisa lectures, Foris Publications

Chomsky, N. 1986 Knowledge of Language, Its Nature, Origin and Use, Greenwood Publishing

Chomsky, N. 1988, Language and the Problem of Knowledge, MITPress

Chomsky, N. 1995, The Minimalist Program, MITPress

Chomsky, N. 2002, On Nature and Language, Cambridge University Press

Chomsky, N. 2005 Three factors in language design, Linguistic Inquiry, 36(1), 1-22 , MITPress

Comrie. B. 2006, Languages and genes,  
[www.linguistics.ucsb.edu/projects/Language\\_and\\_Genes/position.pdf](http://www.linguistics.ucsb.edu/projects/Language_and_Genes/position.pdf)

Corballis, M., 2009, The evolution of Language, in The Year in Cognitive Neuroscience, Ann. N.Y. Acad. Sci. 1156, 19-43

Corning, P. 1998, The synergism hypothesis, On the Concept of Synergy and It's Role in the Evolution of Complex Systems, in Journal of Social and Evolutionary Systems, 21(2), p. 133-172

Christiansen ,M. , N. Chater , 2008, Language as shaped by the brain , in Behavioural and Brain Sciences , 31, p. 489-558

Croft, W. 2000 , Evolutionary model of language change and structure, in Explaining Language Change, an evolutionary approach, Longman Linguistics Library

Cullicover, P. Jackendoff, R. 2005, Simpler Syntax, Oxford University Press

Dabrowska E. , 1997, The LAD goes to School, a cautionary tale for nativists, Linguistics 35 p. 735-766

Dabrowska, Ewa (2012) Different speakers, different grammars: Individual differences in

---



native language attainment. In *Linguistic Approaches to Bilingualism*, 2 (3). pp. 219-253

Darwin, Ch. 1871, *The Descent of Man and Selection in Relation to Sex*, London, John Murray

Dawkins, R. 1976, *The Selfish Gene*, Oxford University Press

D'Arcy Thompson, 1917, *On Growth and Form*, Cambridge University Press

Deacon, T. ,1997, *The Symbolic Species, the co-evolution of language and the brain*, Norton

De Boer, B, 2000 Self-organization in vowel systems, *Journal of Phonetics*, (2000), 28,p. 441-465

Dediu D., Levinson V., 2018, Neanderthal language revisited, not only us, in *Current Opinion in Behaviour and Brain Sciences*, 21:p. 49-55

De Graff, M. , 2001, On the origins of Creoles, A cartesian critique of Neo-Darwinian linguistics, *Linguistic Typology*, vol.5, no. 2-3, p. 213-310

Dixon , R.M.W. 1997, *The Rise and Fall of Languages*, Cambridge University Press

Donald, M., 1993, *Origins of the Modern Mind*, Harvard University Press

Donald , M. 1999, Preconditions for the evolution of protolanguages , in M. Corballis, I. Lea, eds. *The Descent of Mind*, Oxford University Press, p. 355-365

Dor, D., E. Jablonka 2000, "From cultural selection to genetic selection" , in *Selection* , 1,1-3, p. 33-55

Dunbar, R. 1998, The Social Brain Hypothesis, in *Evolutionary Anthropology*, 6, p. 178- 190

Dunbar, R. , 2009, The social brain hypothesis and its implication for social evolution, in *Annals of Human Biology*, 36(5), p. 562-572

Ellis, N. , 1998, Emergentism, connectionism and language learning, *Language Learning*, , 1998, 48:4, p. 631-664

Ellis, N. , Larsen-Freeman, D. et all. 2009, Language as a Complex Adaptive System, Position Paper, in *Language learning* , Language learning research club University of Michigan 59 Suppl. 1 December p. 1-26,

Fitch , T. 2010, *The Evolution of Language*, Cambridge University Press

---

- Givon, T. 1979, *On Understanding Grammar*, Academic press
- Givon, T. 2002, *Bio-linguistics, the Santa Barbara lectures*, John Benjamins
- Givon, T. 2013, *The intellectual roots of functionalism in linguistics*  
<https://linguistics.oregon.edu/wp-content/uploads/2013/.../FuncLIng11Rus.pdf>  
 in print Givon, T. 2015 *The Diachrony of Grammar*, chap. 30, p. 771-787
- Goldberg, A., 2003, *Constructions, a new theoretical approach to language*, in *Trends in Cognitive Sciences*, vol. 7. No. 5. May, p. 219-224
- Goldberg, A. 2016, *Subtle implicit language facts emerge from the functions of constructions*, in Ansaldo, Enfield eds. *Is the Language Faculty Nonlinguistic*, *Frontiers of Psychology*, p.79-90, doi: 10.3389/978-2-88919-914-3
- Gopnik, M. et al. 1996, *Genetic Language Impairment, Unruly Grammars*, *Proceedings of the British Academy*, 88 p.223-249
- Gould, S.J. Lewontin, R. 1979, *The spandrels of San Marco, and the Panglossian paradigm*, *Proceedings of the Royal Society of London*, 1979, B 205 p. 581-598,
- Gould, S. J. 1980, *The Panda's Thumb, More Reflections on Natural History*, W.W. Norton and Co.
- Gould, S.J., E. Vrba, 1982, *Exaptation, a missing term in the science of form*, *Paleobiology*, Vol.8, no.1, p. 4-15
- Grodzinsky, J, Amunts, K. eds. 2006, *Broca's Region*, Oxford University Press
- Hauser, M., Chomsky, N. Fitch, T., 2002, *The Faculty of Language, What is it, Who Has it, How did it Evolve*, *Science* 298, p. 1569-1579
- Heilighen, F. 2013, *Self-organization in communicating groups, the emergence of coordination, shared references and collective intelligence*; DOI: 10.1007/978-3-642-32817-6\_10
- Heine, B., T. Kuteva 2007, *The Genesis of Grammar, A Reconstruction*, Oxford University Press
- Hornstein, N. 2018, *The Minimalist Program After 25 Years*, *Annual Review of Linguistics*, 4, p. 49-65
- Hull, D. 1988, *Science as Process, An evolutionary account of Social and conceptual development of science*, University of Chicago Press
-

Hurford, J. 2000, Social transmission favours linguistic generalization, in Knight, C.; Studdert-Kennedy, M; Hurford. J. eds. The evolutionary emergence of language: social function and the origin of linguistic form, Cambridge University Press p. 324-352

Hurford, J, D. Dediu, 2009, Diversity in languages, genes and the language faculty, in Botha and Knight, The Cradle of Language, Oxford University Press, chap.9, p.163-184

Jablonka, E. Lamb, M, 2006, Evolution in Four Dimensions: genetic, epigenetic, behavioural and symbolic variation in the history of life, MIT Press

Jackendoff, R. 1999, Possible stages in the evolution of the Language Faculty, Trends in Cognitive Sciences, vol.3 no.7 p. 272-279

Jackendoff, R. 2002, Foundations of Language, Oxford University Press

Jackendoff, R., 2010, Your theory of language evolution depends on your theory of language, in Richard Larson, Vivienne Deprez and Himko Yamakido eds. The Evolution of Language: Biolinguistic perspectives, Cambridge University Press, p. 63-72

Janda, R. Joseph, B., 2003, On language, change and language change, in Handbook of Historical Linguistics, Blackwell, p. 3-180

Kaan, E. 2009, Syntactic phenomena and their putative relation to the brain, in Bickerton Szathmari, eds. Biological Foundations and Origin of Syntax, MIT 117-135

Katz, J. and P. Postal, 1963, The Structure of a Semantic Theory, Language, vol. 39, No.2, p.170-210

Kauffman, S. 1993, Origins of order, self-organization and selection in evolution, Oxford University Press

Keller, R. 1994, On Language Change, the invisible hand in language, Routledge

Kirby, S. 1998, Language evolution without natural selection, Edinburgh Occasional Papers in Linguistics,  
<https://pdfs.semanticscholar.org/913b/d6f5ed007104b6552e72ec96aa07e336133b.pdf>

Kirby, S. 2007, The Evolution of Language, in Dunbar, Barret eds. Oxford Handbook of Evolutionary Psychology, Oxford University Press p. 669-681,

Krause et al, 2007, The derived FOXP2 variant of modern humans was shared with Neanderthals, Current Biology, p.1908-1912  
DOI: 10.1016/j.cub.2007.10.008

---

- Levinson, S. 2012, The Original Sin of Cognitive Science, in *Topics in Cognitive Science*, 4 , p. 396-403, DOI: 10.1111/j.1756-8765.2012.01195.x
- Lewontin, R. 2002, *The Triple Helix, Gene, Organism and Environment*, Harvard University Press
- Lieberman, P. 2002, On the Nature and Evolution of the Neural Bases of Human Language, in *Yearbook of Physical Anthropology*, 45, p. 36-62
- Lieberman, Ph. 2007, The Evolution of Human Speech, its Anatomical and Neural Bases, *Current Anthropology* , vol 48, No.1. Feb. , p. 39-66
- MacNeilage, P. 1998, The Frame-Content Theory of Evolution of Speech Production, *BBS*, 21, p. 499-546
- MacWinney, B. 1998, Models of the emergence of language, *Annu. Rev. Psychol.* 1998, 49:199-227
- MacWinney, B. 2005, Language emergence, five timeframes and three illustrations, in Burmeister, Piske, Rohde, eds. *An Integrated View of Language Development*, Papers in honour of Henning Rhode, p.17-42, Trier: Wissenschaftliche Verlag
- Marcus, G., 2008, *Kluge, The Haphazard Construction of the Human Mind*, Houghton, Mifflin, New York
- Mayr, E. , 2001, *What Evolution Is*, Basic Books
- Mueller R. A., 1996, Innateness, autonomy, universality? Neurobiological approaches to language, *BBS* , ,Vol. 19 ,issue 4, p. 611-675
- Mufwene, S. 2002, Competition and selection in language evolution, *Selection* 3(2002) 1, 45-56
- Mufwene, S. 2007, What do creoles and pidgins tell us about the evolution of language? In B. Laks et al. *The Origin and Evolution of Languages, Approaches, Models, Paradigms*, Equinox
- Mufwene, S., 2014, Language Ecology, Language Evolution and the actuation question, in Tor Afarly, Brit Maehlum, eds. *Language Contact and Change, Grammatical Structure Encounters the Fluidity of Language* , John Benjamins, p. 13-37
- Nettle, D. 1999, Is the rate of linguistic change constant? , *Lingua*, (8), 1999,p. 119-136

- Nickols, J. 1993, Diachronically stable structural features, *Historical linguistics*, Andersen. H. ed. Selected papers from the 11th International Conference on Historical Linguistics, John Benjamins, 337-356
- Newmeyer, F. 2003, Grammar is Grammar and Usage is Usage, in *Language*, vol. 79 n.4 p. 682-707,
- Oudeyer, P.Y. 2005, Self-organization of combinatoriality and phonotactics in vocalization systems, *Connection Science* , vol 17,no. 3-4, 2005,Taylor and Francis p.325-341
- Pinker, S. , P. Bloom,1990, Natural language and natural selection. *BBS* 13(4), p. 707-784
- Pinker, S. 1994, *The Language Instinct. How the mind creates language*, Harper Perennial,
- Pinker, S. 2003, Language as adaptation to a cognitive niche, in Kirby, Christiansen, eds. *Language Evolution, the States of the Art*, p. 16-37, Oxford University Press
- Pleyer, M. ,Hartmann, S., 2019, Constructing a consensus on language evolution? Convergences and differences between biolinguistic and usage-based approaches, *Front. Psychol.* , 2019, 10: 2537; doi: 10.3389/fpsyg.2019.02537
- Port, R. 2007, How are words stored in memory? Beyond phones and phonemes, in *New Ideas in Psychology*, 25 ,p. 143-170
- Prigogine, I., I. Stengers, 1993, *Order out of Chaos, Man's New Dialogue with Nature*, Bantam books
- Pylkkanen, L.,Brennan, J.,Bemis,D., 2013, Grounding the cognitive neuroscience in linguistic theory, in Boecks,C. , Grogmann,K. eds.*The Cambridge Handbook of Biolinguistics*, chap 16,p. 309-325
- Ruhlen, M. 1992, An overview of genetic classification in Hawkins, Gell-Mann, Addison eds. *The Evolution of Human Languages, Proceedings of the workshop on the evolution of human languages Aug.1989 in Santa Fe New Mexico, Proceedings vol XI*, Addison-Wesley Publishing, p. 159 -189
- Ruhlen M.1994. *The Origin of Language, Tracing the Evolution of the Mother Tongue*, Wiley
- Schoenemann, T.,1999, Syntax as an Emergent Characteristic of the evolution of semantic complexity, , *Minds and Machines*, 9, p. 309-346
- Schonemann, T. ,2005, *Conceptual Complexity and the Brain: Understanding Language*
-

Origins, in J.W. Minett, SY William , Language Acquisition, Change and Emergence, Essays in Evolutionary Linguistics, Univ. of Hong Kong Press , chap. 3 , p. 47-94

Scott-Phillips, T. 2015, Non-human primate communication , pragmatics and the origin of language, Current Anthropology, vol 56, no. 1, University of Chicago Press, p. 56-80

Smith, K. Kirby, S. Brighton, H. 2003, Iterated learning, a framework for the emergence of language, Artificial Life, 9: 371-386 ( 2003) , MIT

Smith , K. and S. Kirby ,2008, Cultural Evolution : Implications for understanding the Human language faculty and its evolution, Philosophical Transactions of the Royal Society, 19 Sept. 363, p. 3591-3603

Steels, L., 2011 Self-organization and selection in cultural evolution , in Steels ed. Experiments in Cultural Language Evolution, John Benjamins p. 1-37

Studdert -Kennedy, M., Ch. Knight, J.Hurford, 1998, Approaches to the Evolution of Language, Cambridge University Press,

Szathmary, Fedor, eds. 2009, Biological Foundations and Origin of Syntax, MIT

Tallerman et all, What kind of syntactic phenomena must biologists, neurobiologists...explain and replicate, in Bickerton, Szathmary, Biological Foundations and Origin of Syntax, MIT Press, p. 135-161

Tomasello, M. 2003, Constructing a Language, Harvard University Press

Tomasello, M. 2008, Origins of Human Communication, MIT Press

Thompson , D'arcy, 1917, On Growth and Form, Cambridge University Press

Trudgill , P. 2009, Sociolinguistic typology and complexification, in Sampson, Gil, Trudgill, eds., Language Complexity as an Evolving Variable, Oxford University Press, p. 98-109

Vargha-Khadem et all.2005, FOXP2 and the Neuroanatomy of Speech and Language, Nature Reviews, Neuroscience, vol.6, Feb. p. 131-137



Svetlana T. Davidova is a linguist, unaffiliated researcher, based in Toronto, Canada  
address for correspondence: [svetlana.t.davidova@gmail.com](mailto:svetlana.t.davidova@gmail.com)

---