Did Language Evolve for Communicative Purposes or the Structuring of Thought?

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Abstract

The evolution of human language remains one of the most intriguing and debated topics in cognitive science. This paper evaluates two dominant theories concerning the origin of language: the selectionist theory, which proposes that language evolved gradually through natural selection to facilitate communication, and the saltation theory, which suggests that language emerged suddenly as an internal computational system for structuring thought, with communication being a secondary development. Through a critical review of empirical evidence and theoretical perspectives, this paper highlights the strengths and limitations of both views. While the selectionist approach emphasizes language's communicative utility and evolutionary pre-adaptations, it struggles to explain its uniqueness to humans. Conversely, the saltation theory, heavily influenced by Chomskyan linguistics, argues that language emerged suddenly as an internal "instrument of thought," with externalization for communication being a secondary process. While acknowledging language's communicative efficiency, the paper points out that the selectionist theory struggles to explain the uniqueness of human language compared to other animal communication systems. The saltation theory, despite addressing the "spark" moment of language evolution, faces challenges in explaining the universality of recursion and the process of externalization into diverse languages. The discussion underscores that neither theory fully resolves the complexities of language evolution and suggests the need for more integrative models that account for both communicative and cognitive functions of language.

Key words: language evolution, selectionist theory, saltation theory, I-language, recursion, externalization, communication.

١. Introduction

(Fitch 2010: 1) considers the evolution of human language to be one of the crucial moments in the evolutionary history of life on Earth. He argues that '[l]anguage […] is what makes us human. It appears that no communication system of equivalent power exists elsewhere in the animal kingdom' (ibid: i). When compared with other world natural systems of communication, language uniqueness is verified by 'exhibiting rich combinatorial and compositional structure' (Kirby *et al* 2015: 87).

Despite agreement among researchers about the importance of language as a human phenomenon, there is controversy about the selective advantage that initially led to its evolution whether for communicative purposes or the structuring of thought (Fitch 2010: 2). In other words, the controversy revolves around the crucial question '[w]hat […] did language evolve for?'(Gontier 2012: 69). Currently, the debate is led by two major theories of language evolution: the selectionist and the saltation theory. This paper reviews these two main theories, and I will argue that the two theories still have critical gaps to bridge in their attempts to answer the question as to why language evolved.

2. The selectionist theory of language evolution

Advocates of this theory are called "selectionists" in the literature (Gontier 2012). They argue that natural selection was the main factor behind the evolution of language to facilitate communication with others (Pinker and Bloom 1990; Pinker 2003; Jackendoff and Pinker 2005; Burling 2005; Lieberman 2015). According to this theory, communication is the primary role of language, which took language millions of years to evolve through Darwinian processes. Lieberman refers to neural evidence for this role '[t]he communicative role of language is apparent in that the neural structures that code a word's meaning in the brain are activated by the sound pattern of its name' (Lieberman 2015: 1).

The interpretation given in this theory to the emergence of human language stems from Charles Darwin's theory of evolution, which states that organs with complex designs are adaptive to specific functions (Botha 2003: 93). Biologically speaking, the term "adaptation" is said to refer to any trait that in its essence is formed by natural selection genetically (Pinker 2003: 21). For example, the vertebrate eye is an organ with a complex design that evolved by natural selection for the adaptive goal of seeing. Similarly, just as in the example of the vertebrate eye, the selectionists view language as a biological organ with a complex design which evolved through natural selection for the adaptive goal of communication (Botha 2003: 93-95).

2.1 Language design

According to this theory, language is designed especially to perform the function it has evolved for, that is, communication. Pinker (2007:431) points out that language is designed essentially in a way 'aimed at coding propositional information for the purpose of sharing it with others'. The claim here is that propositional information such as 'who did what to whom, what is true of what, when, where and why' is transferred among people via this specialized design that maps between meaning and sound and which evolved specifically for the communication of such propositions (Pinker and Jackendoff 2005: 224). The astonishing communicative power of language is evidenced in the enormous number of ideas that people can continuously exchange through the use of signals represented by a structured stream of sound. It has been argued that our ancestors took full advantage of this design while performing multiple activities in their lives such as cooperation in hunting, problem solving, making plans, the coordination of activities, social ties and even in cheating as well as sharing tasks, knowledge and experience. This successful manipulation of language by our ancestors led Nowak and Komarova (2001: 288) to believe that '[n]atural selection […] can certainly see the consequences of communication'. Due

to the fact that our ancestors evolved as an information-dependent species, they must have developed an effective technique designed to exchange that information. The following extract from Pinker (2003: 28) explains the various benefits that our ancestors would have gained from communication:

> Language multiplies the benefit of knowledge, because a bit of know-how is useful not only for its practical benefits to oneself but as a trade good with others. Using language, I can exchange knowledge with somebody else at a low cost to myself and hope to get something in return. It can also lower the original acquisition cost […] I can learn about how to catch a rabbit from someone else's trial and error, without having to go through it myself.

The above extract suggests that the evolution of a communication system would enable our ancestors to gain knowledge and experience at low cost to maintain their survival. In doing that, the design of language has been extremely successful in performing the adaptive function of communication.

2.2 Pre-adaptations for language

As mentioned above the selectionist theory of language evolution assumes that the evolutionary process took a long time and that hominid lineage must have passed through various pre-adaptations which paved the way to the evolution of language. This is based on the belief that 'evolution is a cumulative process, leading incrementally and inexorably toward greater fitness' (Carballis 2011:175).

Though there has been controversy about what exactly such pre-adaptations were, researchers may agree on some of them such as the capacity to symbols among our ancestors. The hypothesis here is that, specifically for communication purposes, random connections were made between gestures or sounds to particular ideas and/or referents (Christiansen and Kirby, 2003:301). Besides that, it has been argued that some changes occurred in the mental as well as the social aptitudes of our ancestors, such as 'joint attention' which assumes 'the capacity to follow eye-gaze direction or direct the attention of another to a specific object' (ibid: 302). For effective communication, such change is significant and could be a social prerequisite for language. Christiansen and Kirby point out that the capacity for the development of the 'imitation of action sequences' by modern humans for communicative purposes is an additional possible social pre-adaptation for language (ibid). Furthermore, some physiological preadaptations occurred in Homo sapiens to improve vocal communication, such as the evolution of the supralaryngeal airway even at the expense of some vegetative functions such as chewing, swallowing, and breathing (Lieberman 1984:271). A variety of vowels could be produced as a result of the larynx descending to a lower position in the throat, which gives the tongue space for movement forward and backward as well as upward and downward. As for vocal tract reshaping, Lieberman adds that 'mutations that shaped the human vocal tract would not have been retained unless the neural circuits that allow humans to learn and execute the complex motor acts involved in talking were in place'(Lieberman 2015:2). Consequently, it has been hypothesized that the rapid communication of human society is due to this restructuring that led to human speech (Lieberman 1984:324).

2.3 Possible scenario for the evolution of language

Various scenarios for the evolution of language have been proposed according to selectionist theory, such as those of Falk (2012) and Dunbar (2012). But Számadó (2010: 366) suggests a two-stage ecological scenario in which pre-hunt communication was a potential trigger for the evolution of language. Firstly, the need for a novel signalling system was created by big game

hunting. Accordingly, conventional signals could evolve to coordinate recruitment for the hunting environment which was created by shared interest in hunting. Secondly, the increasing complexity of the communication was the result of a pressure created by the need to plan ahead and exchange hunting experiences. Számadó argues that 'climate change combined with the cultural inheritance of both hunting tools and hunting know-how made this transition unique'. Such a scenario is thought to be supported by evidence for the hunting of large mammals, meat consumption, and habitat change as well as the use of tools (ibid: 378).This scenario strengthens Pinker's (2003: 28) argument discussed in section 2.1 where the benefits of survival provided by better communication skills are thought to provide the pressure for language evolution (Gontier 2012: 69).

٣. The saltation theory of language evolution

This theory rejects the selectionists' view that the evolution of language is due to natural selection. Advocates of this theory are called "saltationists" in the literature due to the fact that they believe that the evolution of language has happened very recently and in one step (MacWhinney 2005: 1). The theory assumes that language evolved primarily as an internal 'instrument of thought' (Berwick *et al* 2013:91). This theory is highly abstract and mainly reflects the Chomskyan view of language.

3.1 Language from the Chomskyan prospective

Chomsky (2013: 37) points out that we should determine what an eye is before questioning how it evolved. Consequently, in order to understand how Chomsky and his colleagues view the evolution of language, it is necessary first to shed light upon terms such as "language", "externalization" and "communication" from the Chomskyan prospective. One of the significant distinctions that Hauser *et al* (2002: 1569) make is the faculty of language in its narrow sense (FLN) which is uniquely human if compared with the faculty of language in its broad sense (FLB) which includes human language and other animal communication systems. Chomsky (2010: 45) argues that what is meant by the term "language" in the FLN sense is internal language (I-language). Chomsky gives more clarification about what I-language is:

> The internal language, in the technical sense, is a state of the faculty of language. Each internal language has the means to construct the mental objects that we use to express our thoughts and to interpret the limitless array of overt expressions that we encounter. Each of these mental objects relates sound and meaning in a particular structured form.
> (Chomsky 2002: 48)

In other words, the ultimate goal of I-language is to express thoughts and to interpret expressions. For Chomsky, I-language represents a mind/brain's computational system that performs a recursive process of generating infinite numbers of hierarchically structured internal expressions, a process that Chomsky calls recursion (Chomsky 2010:45-46). Merge is thought to be the best recent account of how a 'language of thought' is generated recursively. During this operation, a new object is constructed form already constructed objects (Chomsky 2007: 1). Merge represents the recursion operation in its simplest form as in (1):

(1) {X, Y} =Z where X and Y are entities in their simplest form (Chomsky 2011: 273).

The product of an unbound merge is a discrete infinity of structured expressions. The interpretation of each of these 'structured expressions' is made at two interfaces. The first is for externalization, and it is a sensory-motor interface (sound, sign, or some other sensory modality), and the second is for 'thought and planning of action' which is a

conceptual-intentional interface (ibid: 263). Chomsky's interpretation of I-language stems from the Minimalist Program (his most recent theory of the nature of language).

3.1.1 I-language vs. Externalization

As discussed in the previous section, for Chomsky the term language refers to I-language specifically (a computational system based on recursion). The logical question may now arise where as long as there is I-language, do we expect to have its counterpart, i.e, external language (E-language), in this theory? Corballis (2011: 7) argues that, in Chomsky's theory, the Merge applies 'strictly to I-language, which is the thought process preceding E-language, the external language that is actually spoken or signed'. By using the term "E-language", it seems that Corballis perhaps assumes a counterpart to I-language. Actually, Chomsky (1986:21) has used the term E-language but not as a counterpart to I-language. He argues that the externalization process is carried out by a sensory motor system [SM] and that such a system is separate from language '[so] there's a sensorimotor system [SM] which is there, independently of the language; maybe it is somewhat modified because of the presence of language, but in essence it is there independently of language' (Chomsky 2002: 108). In perception and from sensory data, the SM system constructs expressions and externalizes them in production (Chomsky 2007: 1). Depending on some previous studies on sign language, he considers externalization (as a product of the SM system) to be a subsidiary feature of language and 'also in part independent of modality' (Chomsky 2011: 275).

Still, he points out that I-language needs to interact with this system to be usable. Accordingly, the SM system is no more than an output device that is linked externally to a central device (I-language). In other words, I-language is just as a laptop that is linked to a printer via a cable; they can work together but, after all, they are totally different devices.
Being totally separate systems, Chomsky argues that this situation is problematic '[e]xternalization is a hard problem. It requires relating two systems that arose quite independently' (Chomsky 2011:275). He does not clearly illustrate in what sense he finds such situation problematic and for whom it is so, although as discussed he admits that for language to be usable, it should interact with the other systems (Chomsky 2002: 108). One possible analysis is that it is problematic for the computing system in the sense that its interaction, especially with the SM system, is not an easy matter. Perhaps this is due to the belief that 'externalization is also easily subject to change, sometimes radical change' (Chomsky 2011:275).

3.1.2 Language vs. Communication

Taking the distinction made in section 3.1 into consideration, Chomsky and his associates distinguish between human language and the term "communication", claiming that there are many crucial differences between animal systems of communication and human language and that Merge is only one of these (Chomsky 2002: 48). In this respect, Fitch (2010:26) comments that [t]he distinction between communication and language is […] central to the study of language evolution. But this is a distinction and not a dichotomy'.

When invested with a certain kind of significance, the term "communication" is seen as 'a special case of externalization'. Consequently, and contrary to the general view, Chomsky argues that communication is an ancillary feature of language and that it certainly has many forms of which one is language use. Contrary to Aristotle's traditional view that language is sound with meaning, Chomsky reverses the equation by claiming that language is meaning with sound, privileging the computational system over the communicative one (Chomsky 2011: 275).

3.1.3 Evolution of language according to saltation theory

Why language evolved according to this theory is based on the distinction between FLB and FLN and giving priority to I-language over the SM system. Chomsky claims that other explanations of the evolution of language might be deviating away from the right direction '[t]he core of language appears to be a system of thought, with externalization a secondary process [...]. If so, much of the speculation about the nature and origins of language is on the wrong track (ibid: 263).

Chomsky answers the question about the evolution of language by adopting an assumption that he calls the 'strong minimalist thesis' (Chomsky 2007: 16). Chomsky tries to put things on the right track by shifting the question regarding the evolution of language from how language evolved to what specifically has evolved. He claims that any interpretation should account for the unbounded Merge feature. The hypothesis that Chomsky presents assumes that the unbounded Merge feature emerged suddenly, resulting in a particular language of thought which is to be seen as an 'internal system that makes use of conceptual 'atoms' […] to construct expressions of arbitrary richness and complexity' (ibid). This system is able to perform the process mentioned in example (1) given in section 3.1 where X and Y are atoms and Z is the constructed expression. But what is the possible interpretation of such a sudden emergence of the unbounded Merge? Chomsky gives a biological interpretation in which the term "evolution" is dealt with in a biological sense. He argues that what has evolved is a species rather than language. Languages do change but this is not evolution (Chomsky 2011: 268). The possible scenario for such an evolution of the species is that it has been resulted by sudden neural change that caused a "rewiring" in the brain of a particular individual. Having gained this endowment, the individual could express complex thoughts, and this capacity is later has been transmitted to offspring. It would be shared by a community as a result of the transmission to offspring. At this point the need for externalization would appear, to be linked to the SM as a secondary process aimed at groups communicating and interacting with one another (Chomsky 2007: 16).

The crucial question is now why does evolution take such an order, expressing thoughts as a first phenomenon and externalization as a second one? Chomsky answers this question by saying that:

> In this case, conditions of efficient computation conflict with facilitation of communication, and universally, languages prefer efficient computation. That appears to be true quite generally. If so, it appears that language evolved, and is designed, primarily as an instrument of thought, with externalization a secondary process (Chomsky 2007: 17).

In other words, the selective pressure for producing a system (language in the Chomskyen sense) that can cope with the growth of creative or abstract thinking would be greater than it would be for communicative demands. These conclusions have been supported by some evidence from children living in bimodal environments where one parent speaks and the other parent signs, where these children appear to show no preference when dealing with these two different languages exactly as they would treat any two natural languages such as English and Spanish. This result supports the view that language is designed as a system of thoughts and that externalization is ancillary (ibid).

Genetically, this theory could be supported by a suggestion claimed by Corballis (2011: 142) that 'evolution of the human brain was driven by the progressive influence of maternal genes, leading to expansion of the neocortex and the emergence of recursive cognition, including language and theory of mind'. According to this theory, present-day languages are thought to be based on I-language (ibid: 3).

4. Discussion

As discussed in sections 2. and 3., each theory proposes different selective advantage to the evolution of language but both theories still have problems to solve. Although everybody would agree on the efficiency of language as a communicative system, there are still some doubts about whether it first evolved mainly for this purpose. In this respect, Fitch (2010: 21) states that, while many syntactic and semantic features of language appear to be cognitively or historically constrained, very few are thought to be communicatively adapted. Selectionist theory could not give a convincing answer to questions such as "why is this system unique to humans?". By saying that it has evolved merely to enhance communication does not explain the inability of other primates to develop language despite the fact that they live complex social lives as well as having highly complex communication skills. But these skills are still quite different from human language (Gontier 2012: 75). In other words, there is no sufficient explanation of the qualitative difference between human language and other animal communication systems (ibid: 71). Accordingly, Gontier concludes that '[a] hierarchical societal structure, taken on its own, cannot […] provide the sole defining selection pressure to account for why language evolved' (ibid: 75). Reboul (2015: 2) raises the same question and argues that the theory should clarify 'why humans—and only humans—need to be able to communicate a potential infinity of different contents'. Such a theory is required to demonstrate that language is definitely a device for communication rather than taking it for granted (Gontier 2012: 87). Therefore, it seems that the selectionist theory is still unable to solve the dilemma of what language evolved for.

The saltation theory of language evolution also has some drawbacks. The first problem is about universality of recursion. There is much doubt about this issue and the absence of recursion has been reported, especially in some indigenous languages such as Pirahã which shows a capability for recursive thoughts that are expressed by phrase repetition and combinations of words. The required meanings are generated sufficiently by these repetitions and combinations without resorting to recursive devices or embodying phrases. Pirahã is said to be an example of a language that is functioning without recursion, although it is assumed to be governed by Chomskyen I-language (Corballis 2011:34-35).

Furthermore, Corballis points out that not all recursive mental processes are basically linguistic. Some such processes such as human imagination and theory of mind are recursive in principle as in I-language proposed by Chomsky, but in these processes 'it was language that adapted to thought, and not thought that was shaped by language'. In other words, recursion is a property of mind, but it is not Language-specific (ibid: 226). Finally, Corballis believes that the one-step evolution of the recursive mind is not evident (ibid). Speaking from the neuroanatomical point of view, Tallerman and Gibson (2012: 22) also argue that the "rewiring" that Chomsky claims to have happened in a particular individual is also not proven. In addition to the problems stated above, there is another problem in this theory. Chomsky always argues that the problem is in the externalization process; in this case the theory is required to give interpretation about the way I-language is externalized to this huge number of languages around the world despite the problem of externalization.

If we are to investigate the selective advantages that initially led to language evolution, it is better to investigate this evolution at its first moment and to call this moment "the spark". When looking at language evolution from this prospective, the selectionist theory again is unable to provide a satisfactory explanation. This is due to problem in its methodological principles, which claim that in order to study what language evolved for, implies studying language in its current state: a kind of flashback technique. But what is the current state of language? There is much debate among scholars about what language actually is. The other implication is that the function that language evolved for, i.e. communication, is constant and exclusive (Gontier 2012: 72-73).

In other words, the theory is governed by rigid constraints and more importantly it cannot investigate the selective advantage of language evolution at the moment of spark.

On the other hand, and despite the problems mentioned above, it seems that the saltation theory considers the spark moment regardless of the reservations about the "rewiring" scenario. It is also flexible about the functionality of language, implying that evolution was for thought structuring primarily but is also admitted that communication cannot be denied as a secondary property of language. This theory also admits the role that communication has played in 'the maintenance of language once it has appeared' (Bolhuis et al: 2014).

5. Conclusion

No one can deny that language can be used for communication or for expressing private thoughts. But using language for each of these purposes does not solve the mysteries of its evolution. Both theories are still far from standing on solid ground. As discussed above, each theory still has some serious gaps to bridge. The selectionist theory has to solve the problem of the uniqueness of language to humans. On the other hand, the saltation theory cannot explain the lack of recursion in some languages, or the way I-language is externalized to a huge number of various languages. It seems that the evolution of language may not be explained only from the two points of view described in this paper. Perhaps there are other theories that could be more satisfactory than the selectionists' or the saltationists'.

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