

RESEARCH

Did language evolve through language change? On language change, language evolution and grammaticalization theory

José-Luis Mendívil-Giró

University of Zaragoza, Zaragoza, ES

jlmedi@unizar.es

The relation between language change and the process of language evolution is controversial in current linguistic theory. Some authors believe that the two processes are completely unrelated, while for others the evolution of language is (at least in part) a consequence of linguistic changes. Both models imply a very different assessment of what is changing when languages themselves change. I present an explicit model of what changes when languages change, and I show that the claim that language change is a crucial factor in explaining the evolution of human language, although suggestive and very popular, faces problems of a theoretical and empirical nature.

Keywords: Language change; language history; language evolution; grammaticalization; reanalysis

1 Introduction: The evolution (or diachrony) of “language evolution”

Since Charles Darwin pointed out that “the formation of different languages and of distinct species [...] are curiously parallel” (Darwin 1871; *apud* Alter 1999: 100), the comparison between languages and species (and between historical linguistics and evolutionary theory) has enjoyed a remarkable development (see Lass 1997; Croft 2000; Mendívil-Giró 2006). One possible consequence of the application of the concepts of evolutionary theory to the understanding of linguistic change is the temptation to ask whether there is a relationship between the fact that languages change over time and the very phenomenon of the evolution of language as a characteristic faculty of the Human species. In fact, a strong tradition has developed in linguistics and in current cognitive and computational science according to which both processes are closely connected, so that for many authors (e.g. Batali 1998; Kirby 1998; 2000; 2002; Steels 1998; Heine & Kuteva 2007; Givón 2009; Dor & Jablonka 2010) the phenomenon of language change would be an essential mechanism of the evolutionary development of the modern human faculty of language (henceforth FL), and the former is even considered as a causal factor of the latter. However, for other authors (e.g. Bickerton 1990; Pinker & Bloom 1990; Chomsky 2010; McMahan & McMahan 2013; Berwick & Chomsky 2016) there is no connection between the fact that languages change over time and the fact that the human FL is the result of biological evolution, beyond the formal similarity between evolutionary processes in general, as noted by Darwin.

To avoid any misunderstanding, and to stick with the traditional use of the terms, I will use *language evolution* to refer to the (plausibly) biological processes that formed (or refined) the modern human faculty of language (as compared to other species), and *language change* to refer to processes that alter the structure of languages over historical time (for example, the shift from Latin to Spanish morphology).

Some readers may have noticed that the title of this section reproduces the title of a blog post by Martin Haspelmath (dlc.hypotheses.org/894, accessed September 2016). Following the appearance of the *Journal of Language Evolution* (Oxford University Press), Haspelmath notes that neither the editor's statement nor the contents of the first issue of the journal make clear if the expression *language evolution* refers to the evolution of language as a human faculty, i.e., to the evolution of the supposed biological prerequisites for language (which Haspelmath admits, is the default use), or whether it also refers to the processes of linguistic change, or to a mixture of these two options. Further work by the journal editors and other prominent authors confirm that, indeed, the vision has resurfaced in recent decades of a relationship between the evolution of language and language change according to which there is not a clear separation between the two kinds of processes.

It could be thought that the “unfortunate ambiguity” (in terms of Hurford 1992: 273) of the expression *language evolution* is a consequence of the fact that in English, contrary to what happens, for example, in Spanish or in French, the same word *language* is used for the general phenomenon, as a mass noun (cfr.: Spanish *lenguaje* or French *langage*) and for what people speak, as a count noun (cfr.: Spanish *lengua*, French *langue*). But this ambiguity is not enough to explain the apparent imprecision. Consider, for example, the following excerpt from Comrie:

As a result of the recent development of grammaticalisation as a tool in historical linguistics it has been possible to develop a more general variant of internal reconstruction [...] that does enable us to come up with plausible hypotheses concerning earlier states of language development (Comrie 2003: 249).

What does the author refer to with the expression *language development*, language change or language evolution? The reference to the method of internal reconstruction in historical linguistics and to the concept of grammaticalization might suggest that Comrie refers to linguistic change in historical time. But, as we can see in the following passage from the same work, the term also refers to those process by which humans acquired the modern faculty of language:

We can take grammaticalisation and base on it a kind of generalised internal reconstruction that gives us access to hypotheses concerning earlier stages of the language in question and by generalising our conclusions to *earlier stages of language in general* (Comrie 2003: 249, my emphasis).

The allusion to “earlier stages of language in general” clearly points to the belief that linguistic changes had an important (if not exclusive) role in the development of the modern human FL. This belief is also found in the interesting clarification between the two uses of *language evolution* made by Thom Scott-Phillips in a response to Haspelmath's post (elaborating on Scott-Phillips & Kirby 2010). He proposes three relevant areas of reference:

1. The biological evolution of the capacity to acquire and use languages.
 2. The change from very simple systems, with few if any of the characteristic features of languages (e.g. no or very little syntax), into a system that is characteristically linguistic.
 3. The change from one characteristically linguistic system to another.
- Historical and diachronic linguistics is classically concerned with (3). This is not to deny that it has something to say about (2) as well – clearly it does – but (2) is

not a/the central concern of these fields. Language evolution, on the other hand, is concerned with (1) and (2), but not (3) (dlc.hypotheses.org/894, accessed December 2018).

It is clear that the relevant stage, where language evolution and language history are somehow combined (or confused), is (2). Contrary to Scott-Phillips' expectation ("I would expect that most people in the field would accept at least some version of this characterisation"), I will show that (2) is a highly problematic scenario on both empirical and theoretical grounds, and that it is essential to keep the "phylogenetic" and the "glosogenetic" processes separate if we want to gain a good understanding of both of these.

As Hurford has argued, "the evolution of the human *syntactic* capacity can be seen as constituting the central challenge for any theory of the evolution of language" (Hurford 1998: 299). If the syntactic structure of modern language (its most characteristic design feature) is attributed to the process of historical change, then the process of the evolution of language is effectively excluded from the process of natural evolution. This controversy focuses not on whether human language includes both biological and cultural aspects, but whether or not language (mainly syntax) is part of the biological evolution of our species.

Note that the claim that language change is part of language evolution (just like when talking about the coevolution of language and the brain, as in Deacon 1997) requires using the term *evolution* in two distinct ways: the usual one from evolutionary biology, and an informal one referring to cultural evolution. For precisely this reason Berwick & Chomsky (2016: 92) state that "languages change, but they do not evolve".¹ In the following sections I will seek to provide reasons for the usefulness of maintaining such a distinction. As I pointed out, the difference between "evolution" and "change" is purely terminological. Of course, we can say that there is a *cultural evolution* of languages. In fact, following Darwin, I will argue later (Section 5) that biological evolution and linguistic change are processes which are *formally* identical, although *substantially* different (see Mendívil-Giró 2014 for discussion). By using the word *change* for what in other traditions is cultural *evolution* I simply intend to avoid confusion and maintain biological and cultural processes separate in understanding the evolution of language as a human capacity (independently of the plausible possibility that processes of cultural development can affect processes of biological evolution). My main concern here is to show that the biological evolution of the human faculty of language is a process totally independent of the cultural evolution of languages (language change), and hence the need for clearly different terms.²

2 Two models of the relation between language evolution and linguistic change

The different ways of conceiving the relationship between language evolution and language change can be grouped into two basic classes, which I will call the *biological model* and the *cultural model*, as schematically shown in Figure 1.

¹ In the same terminological vein, McMahon & McMahon assert: "differences between languages must have developed in historical time. They have not evolved" (McMahon & McMahon 2013: 11).

² According to Hurford, "A basic dichotomy in language evolution is between the biological evolution of the language capacity and the historical evolution of individual languages, mediated by cultural transmission (learning)" (Hurford 2003: 40). But note that this formulation still includes language change within language evolution. Chomsky's formulation is more suitable for my purpose: "Confusion about these matters could be mitigated by replacing the metaphorical notions 'evolution of language' and 'language change' by their more exact counterparts: evolution of the organisms that use language, and change in the ways they do so. In these terms, emergence of the language faculty involved evolution, while historical change (which goes on constantly) does not" (Chomsky 2010: 61).

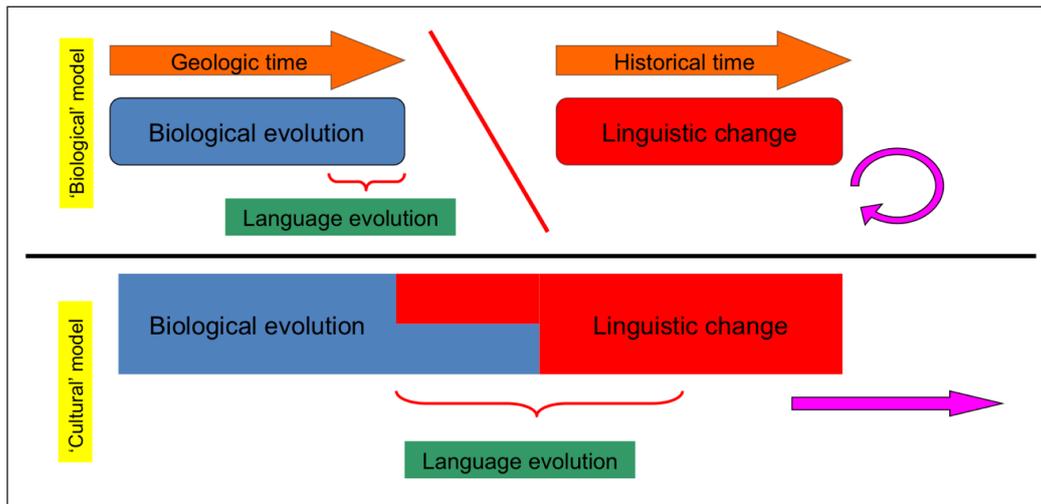


Figure 1: Two models of the relation between language evolution and language change.

According to the biological model, language evolution is a matter of the biological evolution of organisms, that is, part of natural evolution. As such, it is a process that happens on a geologic time scale (in the order of hundreds of thousands of years) and it bears no relation to language change (which might not even exist, and happens in the order of tens or hundreds of years). This model predicts that language change is a completely separate phenomenon of language evolution. Natural evolution would have produced a biological capacity for language (i.e., an ability for the brain to build and use languages) and linguistic changes would be limited to operating on languages defined and restricted by such a capacity. The term *biological* should not be understood simplistically: it is not assumed that the evolution of language is a purely biological fact, as the evolution of the pancreas may be, but rather it is assumed that the human brain's capacity for language has a biological basis that is species-specific, in the sense that an organism not endowed with this faculty would be unable to develop and use a natural language, as seems to be the case. But a biological model does not exclude cultural and social aspects in the context of the evolution of the human brain and, hence, of FL.

For its part, the model I have called *cultural* implies that the evolution of the language faculty (if its existence is accepted, which is not always the case, see for example Christiansen & Chater 2015) is determined by linguistic changes, that is, by changes in the structure of languages in their transmission from generation to generation. In other words, in this model the evolution of language is conceived of as the result of the processes of evolution (historical change) of languages, although it is conceded that some biological endowment allowing the learning and use of languages is also necessary (points 2 and 1, respectively, from Scott-Phillips' list). But note that in this model the leading role in the evolution of language is for language change and not for biological evolution. If the structure of languages becomes more complex as a consequence of linguistic change (as assumed by separating stages 1 and 2), and their learnability is still not compromised, it becomes clear that the biological adaptation for language is virtually irrelevant (and hence, the label *cultural*). The hallmark of the cultural model is then the assumption that if languages were historically immutable, the modern human FL would not have evolved.

A clear (and influential) example of the cultural model is Deacon's (1997) theory of brain and language coevolution. Here there is no vagueness in the interpretation of the expression *language evolution*, but instead a deliberate mixture of both senses (that is, precisely what the term *coevolution* involves). According to this model, the historical (cultural) evolution of languages themselves would have been a factor in the biological

evolution of the human brain, a point of view that situates the evolution of languages as something independent from the evolution of the brain:

Human children appear preadapted to guess the rules of syntax correctly, precisely because languages evolve so as to embody in their syntax the most frequently guessed patterns. The brain has co-evolved with respect to language, but languages have done the most of the adapting (Deacon 1997: 122).

The same view can be found in the reply of De Boer & Dediu (editors of the *Journal of Language Evolution*) to Haspelmath.³ Actually, the journal's website (jole.oxfordjournals.org, accessed November 2016) already defines the subject *language evolution* explicitly:

Language evolution is concerned with the question of how language came to be and how it came to be the way it is today. We are therefore interested in both biological evolution and cultural evolution as well as their interaction, and in all the functional constraints that determine how these processes take place.

But note the subtle difference between “how language came to be” and “how it came to be the way it is today”. These two different moments equate broadly to Scott-Phillips' points 1 and 2, again introducing cultural evolution (language change) within the evolution of language.

It is clear, therefore, that the two models are based on different conceptions of the FL and of linguistic change. For the biological model, the FL is a biological property of the species and determines the essential architecture of languages (which predicts a uniformitarian view of them). In this context, languages (in the sense of Chomsky's internal-individual languages, I-languages) are conceived of as different (historically modified) states of the *same* knowledge system, language. As for the cultural model, the FL does not exist as such, in the sense that it is assumed that biology exerts quite a shallow restriction on the structure of languages: “It is time to return to viewing language as a cultural, and not a biological, phenomenon” (Christiansen & Chater 2015: 14). This view predicts a more relativist scenario (e.g. Evans and Levinson 2009) and favors the conception of languages as cultural objects at the service of communication: “the way languages are used and structured [...] can be accounted for appropriately only with reference to communicative intentions of the people who create and use these systems” (Heine & Kuteva 2007: 319).

With regard to language change, the biological model sees it as superficial and non-directional, while the cultural model conceives language change as deep and directional, in both cases consistently with the prediction on the degree of language diversity. This contrast is shown in Figure 1 with the shape of the arrows representing linguistic change: circular in the first case, directional in the second. Note that the directional and somewhat creative character of linguistic change is a prerequisite for the consistency of the cultural model of language evolution. In the absence of an evolutionarily moldable FL, the weight of linguistic changes in the creation of the syntactic computational complexity that characterizes our species (as compared to other species and, plausibly, to predecessor species) becomes capital.

The relevant question then is: Could linguistic changes have created language as it is today? Or, in other words, did language evolve through the evolution (historical change) of languages? The question is pointless for the biological model, since it is assumed that

³ “Biological evolution plays a very important role, but we have learned over the last two decades or so that to really understand this question we must take cultural evolution (and its interaction with biological evolution) into account” (dlc.hypotheses.org/894, accessed December 2018).

linguistic changes operate surface modifications on biologically restricted classes of languages (see Section 6). By contrast, the cultural model implies an affirmative answer to this question. Note that in this context, language is an inductive concept derived from the study of languages and, therefore, it is expected that the evolution of language is conceived of as the result of the evolution (change) of languages. In fact, the version of *Grammaticalization Theory* defended in Heine & Kuteva (2007) (which I will refer to as *Evolutionary Grammaticalization Theory*) says specifically that linguistic changes created grammar, giving rise to language as we know from “non-grammatical” ancestral states.⁴

Of course, it can be said that linguistic changes created the grammar of languages, to the extent that the grammar of, say, French is different from the grammar of Japanese. What I intend to show is that linguistic changes did not create the grammatical structure of human language (the underlying syntactic structure), but only the formatives or grammatical morphemes that express it in languages (see Section 5 for a clarification of this difference).

It might be argued that the two proposed models present a very simplistic interpretation of the different points of view here. For example, van Gelderen (2009) seems to maintain an intermediate position between the two models. On the one hand, according to the biological model, she argues that part of syntax is the result of natural evolution, this being the part that she identifies with the Chomskyan notion of *external merge*, to which she attributes the formation of the “lexical” part of the syntactic derivation (VP and vP in minimalist models). On the other hand, van Gelderen also argues that another part of syntax (that related to the “grammatical” layer of the syntactic derivation, which she relates to the Chomskyan notion of *internal merge* -*Move*- and to the higher projections, TP and CP) is the result of grammaticalization as a historical phenomenon, thus pertaining to the cultural model:

Organizing the thematic layer through Merge is one aspect relevant to the evolution of language. I will argue that grammaticalization was the other step responsible for markings in the grammatical layer (van Gelderen 2009: 226).

If this were the case, then van Gelderen’s approach might be considered a mixed model. To the extent that she assumes that only linguistic change can create languages such as those that exist today, we would have to place van Gelderen’s proposal within the cultural model. However, her position is not entirely clear, because she does not specify whether the grammaticalization process really creates the grammatical structure above the vP, or if, on the contrary, the grammaticalization process provides formatives (“markings”) for the categories of the higher levels, in which case the model is consistent with the model advocated here, that is, the biological one.⁵

⁴ The rationale for this characterization is that the classical expositions of grammaticalization theory (primarily Lehmann 1995 and Hopper & Traugott 1993) do not explicitly assume that grammaticalization processes have a role outside the natural scope of historical or diachronic linguistics. As Hurford points out: “In keeping with a general reluctance to speculate with the remote past, most grammaticalization theorists have not theorized about the very earliest languages and the paths from them to modern languages” (Hurford 2003: 52).

⁵ Note that van Gelderen assumes that “if thematic structure was already present in protolanguage (Bickerton 1990), the evolutionary change of Merge made them linguistic. What was added through grammaticalization is the morphology, the second layer of semantic information” (van Gelderen 2009: 243). As we will see, the biological model implies that language change can create morphology, but not syntax. Yet identifying “morphology” with “the second layer of semantic interpretation” (CP, TP) is not an adequate solution here. We might add that the “second layer of semantic information” is present in languages with little or no morphology (as van Gelderen herself admits when discussing Chinese). This seems to suggest that her model is closer to the biological than the cultural one.

3 Historical and Evolutionary Theories of Grammaticalization

In the traditional definition, grammaticalization is presented as a process of linguistic change that produces “l’attribution du caractère grammatical à un mot jadis autonome” (Meillet 1912). Such characterization can be considered neutral with respect to the two models described in the previous section. If we adopt the biological model, then grammaticalization is a specific instance of the general process of historical reanalysis (to be considered in Section 5), with the peculiarity that in this case a unit of a lexical character (e.g. a verb or a noun) is reanalyzed as a unit of functional or grammatical nature (e.g. a conjunction or a case marker).⁶ But note that this interpretation does not necessarily imply the creation of the grammatical category itself (say the category of *conjunction* or the category of *case*), but the innovation of a new (or a more specific) formative or exponent for that category, which is assumed to be pre-existing. This interpretation might be called a “trivial” or “historical” conception of grammaticalization, which I think is the interpretation that connects with the traditional use, and the one I will employ here.

Yet if we adopt the cultural point of view of the evolution of language, the possibility of a “transcendent” or “evolutionary” conception of grammaticalization emerges. According to this view, the process of grammaticalization provides not only a new formative (or an alternative one) for a given syntactic category, but creates the category itself. And it is at this point that the process of linguistic change is mixed with the evolution of language and, from then on, the term grammaticalization no longer designates the historical innovation of grammatical forms, but rather the process by which a presumably non-grammatical language is made grammatical or more grammatical, that is, becomes “grammaticalized”. This is the position of what I call *Evolutionary Grammaticalization Theory* (henceforth EGT), the best-known exponents of which are Heine & Kuteva (2007) and Givón (2009). This point of view is shared by the *Iterated Learning Model* tradition represented by Simon Kirby and many others, as reflected in Scott-Phillips’ second point: “The change from very simple systems, with few if any of the characteristic features of languages (e.g. no or very little syntax), into a system that is characteristically linguistic”.

In generative grammar (the main biological model), traditional grammatical categories (which are called *functional categories*) are formal abstract entities which are manipulated by syntax and determine semantic interpretation. The syntax or computational system uses these functional categories, along with other human concepts, to build denominations, events, situations, and propositions. These functional categories (whose nature, number and identity is, of course, the subject of research and controversy) are supposedly universal and common to all human beings, since they would form part of a FL that is invariant in historical time. Thus, notions such as ‘singular’, ‘countable’, ‘path’, ‘present’, ‘past’, etc. are assumed to be inherently linked to human cognition and uniform within the species. The differences between the grammatical categories (exponents) found in languages, which are certainly evident, do not depend on the existence (or non-existence) of such functional categories, but on how they are externalized in formatives, if they do. So, when I suggest that grammaticalization does not create grammar, what I mean is that this process creates or modifies lexical exponents for underlying grammatical categories (functional categories). In this sense, the process of grammaticalization does not imply that a language is “less grammatical” before experiencing it than later, but simply that its grammar has changed.

⁶ For a more precise definition of the concept and scope of grammaticalization, see von Mengden & Simon (2014) and other contributions in volume 48/2 of *Folia Linguistica* (Special Issue: *Refining Grammaticalization*).

By contrast, EGT posits that languages are “less grammatical” before than after the process. In other words, EGT postulates that grammar (including syntax) is created by the process of grammaticalization of purely lexical units. According to the model developed by Heine & Kuteva (2007), the transition from an ancestral state of language to modern human language (that is, the evolution of language) is the result of the historical processes of grammaticalization. For Heine & Kuteva, all that is needed for grammaticalization to occur is “a linguistic system that (a) is used regularly and frequently within a community of speakers and (b) is passed from one group of speakers to others” (Heine & Kuteva 2007: 344). No mention is made of any biological transformation of the human brain to achieve this new type of language faculty, but, on the contrary, they state that their “account of the genesis of grammar [does] not require any assumptions on innateness” (Heine and Kuteva 2007: 355). In fact, they argue that “grammaticalization is a prerequisite for recursive structures to arise” (Heine & Kuteva 2007: 344–345), assuming then that linguistic change is the source of what, according to the usual view in Generative Grammar, is the *basic property* of the human FL (Hauser, Chomsky & Fitch 2002; Chomsky 2007).

Kirby suggests something very similar, although using a different approach (considering languages as complex adaptive systems in the Iterated Learning Model):

Basic structural properties of language such as recursion and compositionality will inevitably emerge over time through the complex dynamical process of cultural transmission -in other words, without being built in to a highly constraining innate language acquisition device (Kirby 2002: 174).⁷

In this model (Kirby 2002), the simulation of the cultural evolution of syntax begins with a grammar that only produces holistic sequences paired with semantic representations (for example *tigereatsjohn* paired with the meaning ‘eats (tiger, John)’); it is then shown that the compositional and recursive syntax emerges from iterated learning processes, as a kind of adaptation of grammar to semantics. But note that the assumption here is that speakers already have a compositional and recursive semantics, which is precisely what we want to explain. In fact, the agents of the simulation are assumed to have already internalized all the semantic representations that they might wish to communicate, as if that endowment did not in itself require a compositional and recursive *syntax*. Therefore, this model does not really explain how a recursive compositional syntax can arise simply by iterated learning. It does not explain how the compositional and recursive semantic structures that the agent *knows* arose, hence leaving the problem unresolved.

Although the models represented by Kirby (1998; 2000; 2002) and Heine & Kuteva (2007) belong to different fields and use different methodologies, they come together (see Hurford 2003) to propose an alternative to the biological model of language evolution and share the hallmark of the cultural model: that the “evolution” (= change) of languages is necessary and sufficient to explain the origin of modern Human language from ancestral states. Another feature common to both traditions is the assumption that language is a communication system, and not a knowledge system used for communication. For reasons of space, in what follows I will focus mainly on evolutionary grammaticalization theory, although the arguments against it are also applicable to models based on the adaptation of languages through iterated learning. This is so because iterated learning models are not models of the evolution of the recursive computational system

⁷ Since a specific biological endowment is not necessary for the emergence of modern human syntax (and the transmission from generation to generation of a proto-language made up of simple words is enough for this innovation), we might ask why this process has only happened in our species, and only between 50,000 and 100,000 years ago. Neither Kirby nor Heine & Kuteva address these issues.

that characterizes human language, but are models of linguistic changes (more specifically, of grammaticalization processes understood as processes of reanalysis of lexical categories as functional categories).

4 Why is Evolutionary Grammaticalization Theory so appealing?

The logic underlying EGT is sound and consistent. Historical Linguistics has clearly established that grammatical forms are usually etymologically derived from lexical categories (see Heine & Kuteva 2002 for a collection of about 400 grammaticalization processes in more than 500 languages).⁸ This seems to fit with the intuitive idea (common in both the functionalist and generativist stances⁹) that in the evolution of human language, substantive lexical units (nouns, verbs, adjectives) should precede in evolutionary terms the operators (prepositions, conjunctions, determiners, quantifiers, etc.) we use to join together and to interpret the conceptual entities designated by the major lexical units. On this view, grammatical categories would result from a process of abstraction (of “sublimation”, so to speak) of the more concrete and “tangible” meanings of lexical words. This idea invites us to stipulate that the mechanism by which modern language emerged is the very same mechanism that we observe when a noun or a verb is re-analyzed as a preposition or a suffix in documented human languages. To all this, we can add that grammaticalization processes seem to go beyond the traditional reanalysis, in the sense that some of them create new grammatical categories that *did not exist* in the previous linguistic state.

However, the EGT model faces two serious difficulties. The first of these has to do with the fact there is no evidence that the oldest languages to which we have access were “less grammatical” than more recent languages, or that there exist today grammatical categories that did not exist in the past. The second concerns the fact that the explanation of how a formative for a particular grammatical category arises does not necessarily explain how this category emerges in the minds of people. I consider the first problem in the remainder of this Section, and the second one in Section 5.

4.1 Cosmologic reasoning

The reasoning behind EGT is similar to that of twentieth century cosmologists: since we find that celestial bodies are moving away from each other (that is, that the Universe is expanding), we can deduce that the Universe was less expanded in the past, and given sufficient retrospective time, we can postulate that all matter was condensed at a point from which it initially began its expansion. This, of course, is the *Big Bang* theory, the generally accepted explanation of the origin of the Universe as we know it. Many other reasons, including the detection of so-called background radiation (which would have been emitted at the time of the initial explosion and that we can still identify with the same intensity in every corner of the Universe), suggest that the hypothesis is reasonably accurate.

If we transpose the reasoning to languages, we might conclude that since we observe that languages historically are grammaticalizing, we can postulate that the oldest languages would be less grammatical and, given enough retrospective time, that we would find languages without grammar (the supposed primitive languages, evolutionary ancestors of current ones).¹⁰ However, nothing like the detection of background radiation in

⁸ Note, however, that “in well-studied language families such as Indo-European, Uralic, Dravidian, Semitic, the vast majority of bound morphemes cannot be traced back to some lexical source” (Norde 2009: 105).

⁹ See, respectively, Heine & Kuteva (2007) and Bickerton (1990).

¹⁰ An extreme vision in this regard is the view expressed by David Gil in another response to Haspelmath’s post: “I would thus say that actual languages aren’t just changing but also, in some cases, evolving, ie. [sic] still on a trajectory whose starting point was no language”.

the Universe exists for the historical evolution of languages. Although this difficulty could be overcome (because we cannot require the same degree and type of empirical confirmation to all theories), the greatest problem for this view is that there is no empirical evidence that present languages are really more grammatical than the most ancient languages (i.e., we have no reason to believe that “the Universe is expanding”). This fact was noted by Nichols in a comparative examination of the diversity of languages in the past and the present:

This survey has uncovered no evidence that human language in general has changed since the earliest stage recoverable by the method used here. There is simply diversity, distributed geographically. The only thing that has demonstrably changed since the first stage of humanity is the geographical distribution of diversity (Nichols 1992: 277).

To sidestep such a serious obstacle, advocates of EGT (for example, Heine & Kuteva 2007) posit the existence of an *early language* (a supposed ancestral state of human languages predating the oldest limits of historical documentation and of the scientific methodology of language reconstruction), which would lack grammar and syntax (that is, the stage described in Scott-Philips’ point 2).¹¹ But since *early language* is merely postulated, the reasoning here is necessarily circular and the hypothesis is devoid of any empirical basis. If we could prove that the Universe does not really expand (i.e., that galaxies are not moving away from each other), and if we lacked the background radiation, then there would be no reason to support the *Big Bang* theory. Of course, this theory makes amazing predictions about the behavior and properties of the Universe, and therefore remains the strongest among available explanations.

However, EGT makes predictions which, from what we know, are not met. Thus, this theory predicts (i) that the most recent languages should have grammatical categories non-existent in the oldest languages (in which there would not have been enough time for their evolution), and (ii) that ancient languages should have fewer and less varied types of grammatical categories. Predictions (i) and (ii) are wrong, unless we resort to alleged early language as evidence. In fact, predictions (i) and (ii) allow one more: (iii) that creole languages should not develop grammatical categories, since they have a very recent history. It is true that, generally speaking, creoles have fewer traditional grammatical categories, essentially because they are typically languages with a less complex morphology (see McWhorter 2011). But unlike the pidgins from which creole languages (supposedly) derive, creoles (many of them less than two hundred years old) do have grammatical categories (conjunctions, pronouns, tense and aspect markers, etc.), which are usually derived from the reanalysis of lexical categories of superstrate languages, and which would supposedly take many more years to evolve if the procedure was the same as that observed in languages with a documented history of thousands of years, with subtle and much more gradual changes in the evolution of its grammatical forms.¹² Thus, creole languages are themselves direct arguments against the view that the creation of grammatical categories can be explained as a historical process of gradual change.

But it is even more important to consider what creoles *do not* usually have: verbal inflection, agreement systems, passive constructions or ergative marking alternations. All these gaps, which many non-creole languages share, clearly point to the type of phenomenon

¹¹ Bickerton’s (1990) notion of *protolanguage* is a similar concept.

¹² “It takes, as a rule, centuries before a new functional category evolves [...], and the time until such a category runs its full course, turning into an inflectional affix may be in the range of one millennium or more” (Heine & Kuteva: 2007: 339).

that is in fact the result of grammaticalization (understood as reanalysis): not grammatical categories themselves, but the creation of the grammatical exponents that generate the kind of morphological complexity (bound morphemes and fusion) that only history can provide. Dahl (2004) shows that the usual dynamics of language change produce an increase in morphosyntactic complexity (*maturity*). The “maturity” of languages is measured in terms of elements involving a previous derivational history, that is, elements that can only be explained by previous historical evolutionary chains, such as inflectional morphology, phonological tone or case marking. Thus, we might accept that the historical process of grammaticalization makes languages “more grammatical”, but only in the sense that certain languages have a specific type of morphological complexity (that is, that they are *mature* in Dahl’s sense). This allows us to conclude that history is necessary for the development of certain types of grammatical formatives, but not for the existence of grammar *per se*.

4.2 Directionality and the illusion of bounded time

Along with the inadequate implementation of what I have called the “cosmological reasoning”, in some grammaticalization-related literature, we can also find what we might call the “illusion of bounded time”. Thus, Traugott (2003: 126), following fruitful and familiar lines, notes that the history of English *in fact* is a sample of the unidirectional nature of semantic change in the trajectory *non subjective meaning > subjective meaning*. *In fact* would have evolved from a manner adverb to be an adversative adverb (expressing the contrast with the previous proposal) and from there to a discourse marker (indicating that what comes next is an argument stronger than the above one, according to the speaker’s viewpoint). This is certainly interesting information, and the fact that these processes occur in different and unrelated languages requires an explanation, which the historical version of grammaticalization theory provides. The problem lies in the use of the concept of directionality. Note that in postulating that there is a *non subjective > subjective* drift, we are implying (*ceteris paribus*) that language change increases subjectivity, which is the same as saying that the greater age of a language, the more subjectivity it can express. But there is no evidence that the languages of two or three thousand years ago (any further back the extant documentation is barely sufficient to form an opinion on objective criteria) were less apt than current ones to express the internal states and views of speakers with respect to the communicative situation or to their interlocutors. If we return to the evolution of *in fact*, we might admit that in Old English this expression did not have the subjective sense it has today, but it would be very risky to claim that Old English was a less suitable language for the expression of subjectivity than is current English (something that, to my understanding, Traugott does not claim).

Note that with this kind of reasoning we are implicitly setting an arbitrary fragmentation of historical reality that can distort our conclusions, as if when assigning a cover name to a succession of states of a language (e.g., *English*), we are putting the counter to zero, so to speak. By starting the description in Old English and finishing in today’s English we are (incorrectly) implying that prior to Old English there had not been an equal or indeed longer time than that since the Middle Ages until now, which is obviously false. If the effects of subjectification in languages can be shown empirically by analyzing the semantic changes since the eleventh century, then we must admit that in the thousands of years before reaching the state in which we find Old English, those same subjectivizing forces must also have been acting in exactly the same way. Speaking of directionality, then, is inadequate, unless we specify it properly, for example, in the sense that we are talking about how certain linguistic units may acquire subjective senses that they did not have before, or about the fact that the historical analysis of languages

shows that the *non subjective* > *subjective* change is more frequent than the reverse, which undoubtedly requires explanation, but which does not mean that languages tend towards a certain goal. The unidirectionality of linguistic changes (including grammaticalization) is empirically well established (see Hopper & Traugott 1993: Chapter 5), but this does not allow us to claim that changes are directional, but only that the mechanisms of change are (or tend to be) unidirectional. Grammaticalization is something that happens to words and morphemes, but not to languages.

5 But what changes when languages change?

Let us now return to the second objection to EGT, that is, that the explanation of how a formative for a grammatical category arises does not imply the explanation of how that category itself appears. In the alternative model I am assuming, linguistic changes are limited to modifying the relationship between abstract structures and the morpho-phonological exponents used to externalize them. So, by definition, linguistic changes cannot create functional categories, let alone the syntax of human languages. We therefore need an explicit model of what changes when we say that languages change.

5.1 The locus of language change

To determine the locus of language change we need a global perspective of what a human language is, that is, a model of what components form any language and which of them are subject to variation and historical change. According to Hauser, Chomsky & Fitch's (2002) influential model, the human faculty of language (FL) can be conceived of as a system minimally integrated by three independent components: a conceptual-intentional system (CI) related to meaning and interpretation, a sensorimotor system (SM) related to the perception and production of linguistic signals, and a computational system (CS), responsible for the creation of the recursive and hierarchical syntactic structure underlying linguistic expressions.

Following later proposals by Chomsky (2007) and Berwick & Chomsky (2011; 2016), I will assume that the computational system has an asymmetrical relationship with the two other components (CI and SM), such that the computational system would be optimized for its interaction with the conceptual-intentional system, while the relationship with the sensorimotor system would be ancillary or secondary. It is then implied that the computational system is coupled with the CI system to form a kind of "internal language of thought" (ILOT) that would be essentially homogeneous within the species. Chomsky has suggested that from an evolutionary point of view, the computational system in its connection with the conceptual-intentional system was initially (and of course remains) a "language of thought" independent of communication and of the systems of externalization: "the earliest stage of language would have been just that: a language of thought, used internally" (Chomsky 2007: 13). This ILOT would be insensitive to linguistic change, given that it is naturally conditioned, it is internal (not externalized) and, therefore, it is not transmitted culturally from generation to generation.¹³

The subsequent connection of the computational system with the sensorimotor system is what would allow the "externalization" of language for interaction and communication with others.¹⁴ Since the connection of the ILOT with the externalization systems is

¹³ See Hinzen (2011) for a defense of the hypothesis that the internal syntax is the same as the "language of thought", and for arguments against proposals that seek to distinguish between them. Of course, even assuming that the conceptual-intentional system is biologically conditioned, it would be unfounded to claim that it is identical in all humans. The assumption here is that most differences in people's conceptual systems do not correlate with the languages they speak.

¹⁴ Huybregts (2017) provides evidence suggesting that the separation of human groups followed the possession of internal language, but preceded externalized language. See also Berwick & Chomsky (2019).

posterior or secondary, it would be precisely within this process that the principal (if not exclusive) source of the diversity among human languages (I-languages) would emerge:

Parameterization and diversity, then, would be mostly –possibly entirely– restricted to externalization. That is pretty much what we seem to find: a computational system efficiently generating expressions interpretable at the semantic/pragmatic interface, with diversity resulting from complex and highly varied modes of externalization, which, furthermore, are readily susceptible to historical change (Berwick & Chomsky 2011: 37–38).

The externalization of the computational system (which is supposedly unchanging and universal in its structure and in its connection to the CI system) gives rise, however, to different I-languages (Spanish, Russian, Chinese, etc.). This would be because the externalization process essentially involves learning the “language” of the environment. Note that what is implied is that what humans have to learn from the environment are actually *the patterns of externalization* of the ILOT. To put it more simply: when we learn the “language” of the environment, what we essentially learn is how to externalize the ILOT in the same way that other people in our linguistic community do (of course, not an easy task).

I admit there is an apparent contradiction in the statement that the *internal* language of thought is *externalized* in a given *internal* language (I-language). The adjective *internal* is somehow being used here in reference to different “continents”. An I-language is internal (as well as individual) insofar as it is a mental organ, a system of knowledge internal to the mind and brain of a person, not just a public or shared social object (Chomsky 1986). The expression *internal language of thought*, meanwhile, refers to the language of thought formed by the conceptual-intentional system in its interaction with the computational system. Therefore, any I-language includes (i) a naturally conditioned component (which in turn includes both the CI system and the computational system or syntax), and (ii) a component “internalized” from the environment through the acquisition process, which is precisely what distinguishes languages from each other, and where linguistic changes can occur.

I will call this component the *Lexical Interface*. The establishment of the connection between the ILOT and the sensorimotor system produces different I-languages, so in principle we can suppose that it is during the development of this connection that language change occurs (and hence where the diversity of languages arises). The interface between the computational system and the sensorimotor system must include at least a repertoire of linguistic forms for linking syntactic computations with a phonological system that produces chains of articulated sounds (or, where appropriate, visual signs). Language development in an individual speaker (i.e., the process of language acquisition from the environment) therefore consists of the development of a lexical interface in the individual’s brain. The simpler hypothesis is that linguistic change is the result of a change in some aspects of the lexical interface during its transmission from generation to generation. These mismatches are processes of *reanalysis*. When a process of reanalysis spreads throughout a population, it is called a *linguistic change*.

The diagram in Figure 2 represents the three essential components of every language (following the model of Hauser, Chomsky & Fitch 2002) along with the lexical interface that historically singularizes each language (see Figure 2). Note that this model assumes that syntax is common to all languages. This is not to deny that there are differences in the syntax of languages, but to state that a single computational system with the same formal properties (according to the model developed by Chomsky 1995 and many other authors within the Minimalist Program) underlies all languages. The obvious differences in the syntax of languages would then be the effects caused by differences in how to externalize

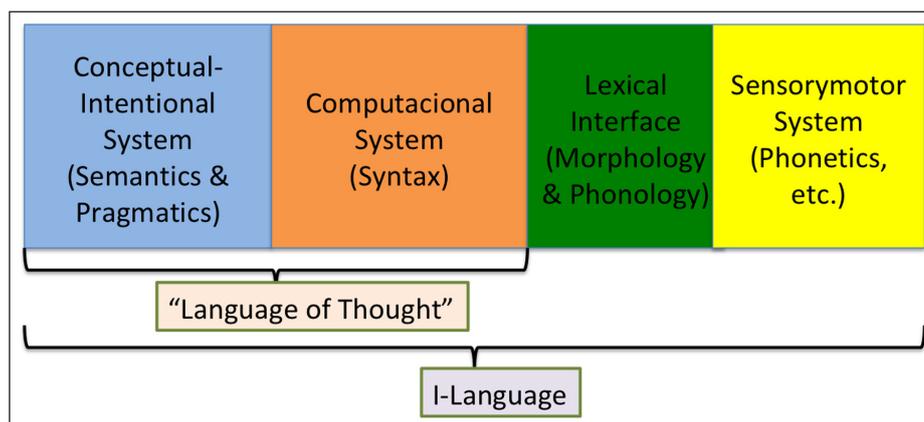


Figure 2: The main components of I-languages, with indication of the traditional disciplines addressing them.

abstract hierarchical structures in linear chains of sounds (or, where appropriate, visual signs) in each language. In other words, the hypothesis is established that all differences between languages are of a morphological and phonological character.¹⁵

In fact, theoretical disagreements in contemporary linguistics are derived in part from different appreciations of what a human language is. Thus, in the biological model characterized above, a language includes all four components shown in Figure 2 (three of them essentially uniform and one, the lexical interface, subject to variation). However, in the cultural model there is a tendency to identify languages with the part I have called the lexical interface (green in Figure 2), attributing the remaining components to general aspects of human cognition or anatomy. Much of the discussions on the linguistic specificity of the biological endowment for language, on its innate character, and even on the very nature of syntactic structure, are rooted in this confusion (see Mendivil-Giró 2018 for a review). The divergence of views on the nature of language change and its capacity to create grammar, syntax, and the human language faculty in general also follow naturally from that misleading identification of human languages with their externalizing component (the lexical interface).

It is in the context of a theoretical model such as the one presented here that there is appreciable sense in the statement that linguistic changes, which are solely responsible for the diversity of languages, only superficially affect languages, and that they can be conceived of as processes of reanalysis.

5.2 Language change is reanalysis

So, if linguistic change (including grammaticalization) is limited to the lexical interface between the internal language of thought and the sensorimotor system, it follows naturally that the essential mechanism of change is reanalysis, understood as *an alteration of the relationship between an underlying structure and a linguistic expression*.¹⁶ In the case of grammaticalization, the alteration implies that the exponent that was used to externalize a lexical category goes on to be used to externalize a structure that includes a functional category (or that consists only in it). What matters now is that this view of language

¹⁵ Of course, an examination of this hypothesis is beyond the scope of the present paper. It can be said that the development of so-called parametric theory since its inception from the 1980s until today is an explicit effort to articulate a theory about it. See Richards (2016) for a specific and comprehensive recent approach, and Karimi & Piattelli-Palmarini (2018) for a recent state of the art on parametric theory. Henceforth I confine myself to the implications of this model for the theory of language change.

¹⁶ The theory of linguistic change assumed here (and presented in this Section) is developed in Mendivil-Giró (2015).

change implies that changes in languages cannot affect the FL or create the syntactic structure of languages, and thus cannot be factors in the evolution of language as a human faculty.

If we follow Darwin's intuition that there is a curious parallelism between language change and natural evolution, the clearest equivalent of a genetic mutation in natural evolution would be reanalysis in the case of linguistic change. Genetic mutation is one of the essential mechanisms by which inheritable phenotypic variation in natural organisms is created. An accidental alteration in the process of DNA replication can lead to some differences in the particular phenotype of an individual with respect to others, producing variation in the form of an individual with respect to the rest in a given population. These distinctive features (for example in the external coloration of an animal) can be harmful, can be irrelevant, or can confer on an individual a higher probability of survival in a particular environment (for example providing better camouflage against usual predators), which could imply that this accidentally mutated, innovated gene is spread in the population at the expense of non-mutated or "old" genes. If the individual bearer of the mutated gene has a higher survival rate compared to unmutated organisms, it will have a better chance of reproducing and thus passing on the gene to its offspring who, in turn, will have a greater than average chance of reproduction, rendering the unmutated population progressively scarce and even extinct, resulting in a change in the overall physiognomy of the resulting population, that is, producing an evolutionary change. The logic of linguistic change is exactly the same (see Pinker 1994: Chapter 8). The analogy between genetic mutation and reanalysis implies that reanalysis consists of an altered relationship between a linguistic expression and its underlying structure (including its meaning). Somewhat simplified, we could say that for speaker S_1 expression E has the structure X, whereas for speaker S_2 the *same* expression E has the structure Y, that is, speaker S_2 *re-analyzes* expression E, conferring on it a different underlying structure (Y) than that of speaker S_1 (X). In a sense, therefore, the I-language (the lexical interface) of speaker S_2 has a mutation, because the relationship between the elements of expression E and its underlying structure is different than in the I-language of speaker S_1 .

In the case of a semantic change (for example the change of meaning of a nominal root) the expression E corresponds to the signifier, and the structure X to the original meaning; the structure Y would be the innovated meaning. In the case of a phonetic change, the expression E corresponds to a phonic segment, for example [p], and the structure X to a phonological representation, for example /p/, while the structure Y corresponds to a new phonological structure, for example /b/ in the case where [p] is re-analyzed as a contextual allophone of /b/ instead of as the original /p/ (see Ohala 2012). In the case of a morphological change, the expression E corresponds to the signifier, the structure X to (for example) a clitic pronoun, and the structure Y to an agreement suffix. In the case of a syntactic change, the expression E corresponds to an utterance, and the structures X and Y correspond to different underlying syntactic structures of such an utterance (for example passive with nominative marking versus active with ergative marking).

Let us consider a very simple example of lexical reanalysis, taken from a handbook on Historical Linguistics, in order to explore the internal mechanisms of this process. According to Campbell (2004: 117) the English noun *adder* is from Old English *næddre*, and the change in the initial sound came about through a reanalysis of the article-noun sequence *a + næddre* as *an + adder*, an accident that did not happen in German (whose cognate is *Natter* 'adder, viper'). To understand how this (or any other) process of reanalysis has occurred we must take into account the model of the FL presented in Figure 2, according to which language variation is the result of the differences that each I-language

has in the connection between the internal systems and the system dedicated to language externalization, that is, the lexical interface. The lexical interface is, simplistically put, a set of morphological exponents stably linking two elements in long-term memory: (i) a fragment of structure associated with a semantic representation (the specific meaning of that structured expression), and (ii) a phonological representation directly connected to the sensorimotor system (which will be vocal-auditory in the case of spoken languages and manual/facial-visual in the case of signed languages). Consider Figure 3.

Regular use of language involves the internal operation of the computational system, which generates a syntactic structure combining conceptual and functional elements (A, B, C, D) with a particular semantic interpretation. Then the externalization of the internal syntactic structure is produced through the appropriate exponents (W, X, Y) of the lexical interface, *materializing* the syntactic-semantic structure as a continuous and linear sound wave. This sound representation is a material object that reflects very poorly the syntactic structure and the semantics of that expression. Note that, crucially, there is no one to one matching between A, B, C, D elements and X, Y, Z elements, specific of each language.¹⁷ On the contrary, according to the model I am assuming, such a gap is the main (if not the only) source of the structural differences between human languages.

The listener (or the child acquiring a language) does not have immediate access to the syntactic structure or to the semantic representation underlying a given expression E, but only to the sound wave that materializes it in a particular communicative context. The listeners' (or learners') task is to use their I-language (including their own lexical interface) to discover this structure (and interpretation) by analyzing the sound wave received (plus, of course, to infer the speaker's communicative intentions). In the ideal case, the syntactic-semantic structure that the listener (or learner) gets (let us say X) is identical to what the speaker had in mind. When this is not the case (let us say Y), we can say that there has been a reanalysis. So a reanalysis is basically a decoding (or acquisition) error, and when this error (this "mutation") is stabilized in the listener's I-language and is extended to other speakers, we say that there has been a linguistic change. Not surprisingly, Anthony Kroch stated that "language change is by definition a failure in the transmission across time of linguistic features" (*apud* Roberts 2007: 125).

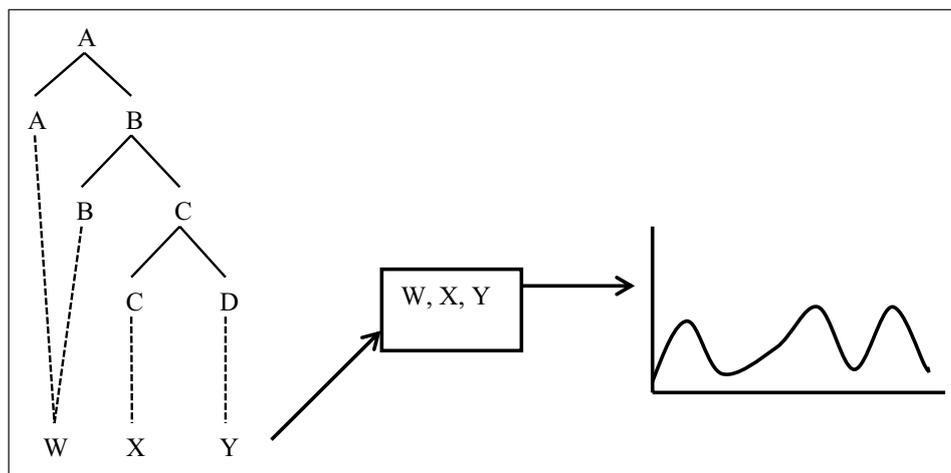


Figure 3: Derivation of a syntactic structure, its externalization as a sequence of elements of the lexical interface (W, X, Y), and materialization of these elements in a sound wave.

¹⁷ Here, the elements X, Y, Z can be conceived of as phonological words representing terminal nodes or (typically) larger fragments of syntactic structure.

If the listener has firmly grounded in her I-language the same exponents that the speaker has, and if no other factor operates, it is expected that in our simplified example the segmentation of the sound wave *anadder* is produced as shown in (1):

(1) $anadder \rightarrow a \mid nadder = [[a] [nadder]]$

However, note that this sequence can be segmented in other ways without excessive conflict with the general system of the language and with the communicative situations or contexts in which that phrase may appear. We can now suppose that the innovation of the previously inexistent lexical form *adder* is the result of a different segmentation of the sound wave, which in turn implies a different mapping of lexical exponents in the materialization of the structure, that is, a reanalysis of this material, as reflected in (2):

(2) $anadder \rightarrow an \mid adder = [[an] [adder]]$

In this case the recovered structure is virtually identical, just as the meaning associated with it. The only change is the phonological exponent of the word *adder*. If the innovated form extends through most speakers, displacing the original form, we would be faced with a linguistic change, albeit a modest one. The fundamental idea is that this mechanism is the only mechanism of language change, be it lexical, phonological, syntactic or morphological.¹⁸

But before proceeding we should return to a condition that I mentioned above to justify the occurrence of a reanalysis process. I have suggested that, somehow, the listener making the reanalysis (opposed to the listener who does not produce it) should not have very firmly established in her mind the lexical entry of the word *nadder*.

It seems reasonable to assume that the probability for a reanalysis to occur increases with the listener's degree of uncertainty regarding the properties of the items stored in the lexical interface. For this reason, processes of reanalysis are especially prevalent in mature speakers who try to master a linguistic register or a dialect they do not know well, in children who are in the process of acquiring their native language (L1), or even in children or adults in the process of learning a second language (L2). The individuals most exposed to insecurity or uncertainty as to the specific properties of lexical items in their I-language are, by definition, children, i.e. the speakers in the process of acquisition and development of their own I-language. Of course, many linguistic changes can be caused by processes of reanalysis produced by mature adults. However, since we ultimately speak of a linguistic change when innovations over previous states are widespread in a population and transmitted to successive generations (the only thing that allows us to have a proper historical perspective), in practice we will assume that linguistic changes are produced by the differential transmission of an I-language over successive generations of speakers, even though this does not mean we can overlook the fact that changes must also be extended "horizontally" in populations to be operational as such in the historical dimension.

¹⁸ Of course, there are linguistic changes that are not like reanalysis, such as when speakers enrich their language with new signs (neologisms, borrowing) and new uses of existing signs (metaphor, metonymy). In fact, some authors (e.g. Mufwene 2002) assume that linguistic change, in contrast to natural evolution, is Lamarckian. But this is not an objection to the similarity between the two processes, since the difference depends on the substance on which processes are produced (a biological, genetic substance in one case, a "cognitive substance" in the other), and not on the formal structure of the processes, which is the same (see Mendívil-Giró 2014). In any case, note that metaphorical or metonymic changes in meaning perfectly fit the reanalysis model, as the addition of new units (whether lexical or grammatical loans) also implies a (quite radical) reanalysis of the relations between form and structure, that is, a "mutation" in the innovative I-languages of speakers that extends to the rest and is passed on to subsequent generations.

The cause of natural evolution is that the process of biological replication is insecure, as it depends on a complex process of replication of the long DNA chain that contains the instructions to generate the proteins, tissues and structures that make up an organism. This possible change in coding is what can lead to genetic mutations, which depending on external factors and contingent variables, can lead to evolutionary changes in populations of individuals. Similarly, the process of language acquisition is typically insecure and, like the process of genetic replication, is clearly exposed to mutations, in this case processes of reanalysis. The reason for the insecurity of the process of language acquisition (i.e. the replication of I-languages through the generations) has direct relation with the architecture of the FL we have described. Recall that the only link between the I-language of a speaker S (assuming that S is the “progenitor”) and the I-language of a listener L (assuming L is the “descendant”) are the linguistic expressions produced by S (and, of course, by the rest of the linguistic community) when S materializes her I-language.

In simple terms, L’s task is to reconstruct in her brain S’s lexical interface. Once L has a sufficient fragment of the lexical interface in her brain, such lexicon functions as an interface between her own (computational/syntactic and conceptual/semantic) internal systems and her sensorimotor system, allowing L the externalization of the same I-language (actually a very similar one) as S’s. In other words, L must learn to externalize her internal language of thought as the other members of her community do. In this prodigious task, L is assisted by her very nature (in the sense that it is likely that the computational system and the conceptual-intentional system are largely biologically determined, as the sensorimotor system is), but she must still employ environmental stimuli (inside and outside the organism) to mature and elaborate these innate attributes; above all she has to internalize the lexical interface from samples of acoustic materializations of such lexical exponents (samples which, as we have seen, typically have an impoverished and fragmented structure). Following standard usage, I use the term *corpus* to designate the set of linguistic expressions to which L is exposed in order to internalize the necessary lexical interface.

Although the literature on language acquisition is vast, with many theories and models to explain the mechanisms and stages of language acquisition, our interest in understanding the mechanism of linguistic reanalysis leads us naturally to the concept of abductive learning (see Roberts 2007: 123 et seq.). Charles S. Peirce introduced the concept of abduction as a complement to the classical concepts of deduction and induction, while Andersen (1973) first applied this concept to the explanation of linguistic change. Deduction proceeds from a law and a case to a result. For example, if the law is “All human beings are mortal” and the case is “Socrates is human”, the result follows: “Socrates is mortal”. Induction proceeds from a case and a result to a law. Thus, if a god of the Mount Olympus notes that humans (cases) always die (results), he formulates the law “Humans are mortal”. Meanwhile, abduction proceeds from a law and a result to a case, which makes abduction considerably weaker logically than induction and deduction, in the sense that the case does not necessarily follow, since the connection established between the case and the result expected under the law might be accidental. Thus, from the result “X is mortal” and from the law “Humans are mortal” it does not necessarily follow that “X is a human being” (the case); that is, X could here be mortal but not human, like a horse. As Roberts (2007: 124) points out, it is the more fallible character of abduction which makes it an interesting cognitive process for understanding reanalysis during language acquisition. Following Roberts (2007: 124), we can represent linguistic reanalysis as part of an abductive process in the following way.

In the diagram of Figure 4, the expression *corpus* (C) denotes the set of linguistic expressions produced by a given grammar (G). Thus, generation 1 (“the procreators”) has the

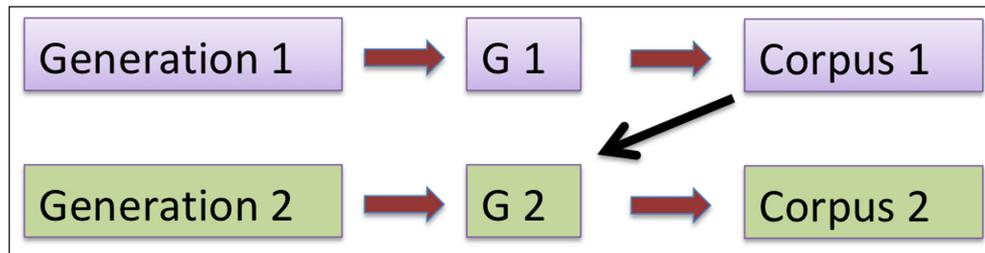


Figure 4: Abductive process. Generation 2 abduces Grammar 2 (G2) from Corpus 1 generated by Grammar 1 (G1).

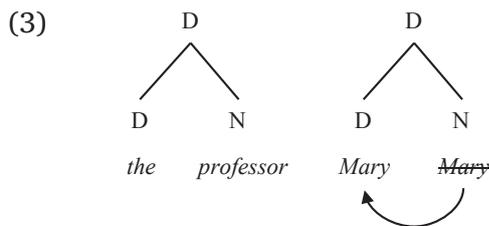
grammar G1 and produces the corpus C1. Meanwhile, generation 2 (“the descendants”) produces the grammar G2 from corpus C1, to which it is exposed. At this point abduction occurs, indicated by the oblique arrow in the diagram. Note that, in principle, generation 2 may produce the grammar G1 from corpus C1 (in fact, it would be expected), but there is an abductive mistake, so to speak, and it produces grammar G2 instead, which in turn generates a different corpus, C2. It is in comparing the differences between C1 and C2 that we find a linguistic change has taken place. This is an abductive process because generation 2 is using the corpus C1 as the result, and its own biological endowment (the invariant part of FL, usually called Universal Grammar) as the law, abducting the case (grammar G). There is an abductive mistake because generation 2 is taking a wrong case (G2) to be the correct one (G1). Both G1 and G2 follow the law (Universal Grammar) and are consistent with Corpus 1 (the result), just as both the statement “X is a human being” and the statement “X is a horse” are consistent with the result (“X is mortal”) and the law (“humans are mortal”), although only one can be appropriate to the nature of X. If we return to our example, both the analysis *a nadder* and the analysis *an adder* (cases) are consistent with the chain /anadder/ (the result) and both follow the law (the grammar of English in this case), but only one was intended by the speaker.

The key to this model of linguistic change through reanalysis is the abductive nature of language acquisition (and therefore of the transmission of languages). In turn, the abductive nature is a consequence of the fact that the only link between G1 and G2 (i.e. between two different historical states of a given language) is the corpus produced by G1. Since the listener (or learner) cannot have direct access to the mental grammar of the speaker (or the linguistic model), the listener has to abduct G from C1, and C1 is inherently ambiguous in the sense that more than one G can produce C1 following the general conditions imposed on the process (biological or otherwise). It is therefore no coincidence that in our illustrative example of reanalysis, the source of abduction is precisely a sound sequence which is ambiguous between two possible syntactic and morphological analyses (*a nadder/an adder*).

Note that this model of language change based on a single mechanism, reanalysis, provides a prediction that fits perfectly with the vision of linguistic change we have made, according to which linguistic changes are severely restricted by the historically invariant part of the language faculty (the internal systems) and thus cannot create anything new beyond modifying the exponents inventoried in the lexical interface characteristic of each I-language. In other words, linguistic changes cannot alter the internal syntax (the computational system), the conceptual-intentional system, or the sensorimotor system, but only the specific interface system that externalizes these internal systems to the sensorimotor system (the lexical interface). Therefore, this model based on reanalysis supports a non-directional and non-teleological (non-functional) interpretation of linguistic changes.

6 Grammar ex nihilo: Does grammaticalization explain the origin of grammar?

According to EGT, grammaticalization, unlike reanalysis, is a creative process, that is, able to create units or categories previously non-existent in the language under analysis. Let us consider a very simplified example of what has been called *pure grammaticalization* (the creation of a category that previously did not exist in the language), such as the evolution of definite articles in Spanish. In general terms, the function of the article is to indicate that the referent of a nominal expression is accessible to the listener through context data, allowing the restriction of the set of possible referents of that expression. Latin lacked articles, but that does not mean that defined expressions could not be built in that language. In fact, as Elvira (2015) points out, other grammatical units (such as demonstratives and possessives) may eventually play the role of determiners. What is specific to the article is that it has the determination function as an exclusive task. But in that case, if in classical Latin, and in many other (ancient and modern) languages in which there are not definite articles defined expressions can be obtained, we may suspect that the category of ‘definiteness’ (call it D) also exists in the mind of the speakers of those languages, even without a specific exponent. Note that, for example, proper nouns are definite expressions, and in English, Spanish, and many other languages (as, of course, in Latin) they do not require articles. Compare the following representations of the definite expressions *the professor* and *Mary*:



The left side represents a Determiner Phrase (DP) according to the standard use of generative grammar. We see here that the determiner takes as a complement an NP whose head is materialized by *professor*. For its part, D is materialized by *the*. On the right side we see that the proper noun *Mary* materializes both N and D.¹⁹ Note that *the professor* and *Mary* have the same syntactic distribution, suggesting that they have the same category (DP). Bare nouns like *teacher* or *lady* cannot occupy the same syntactic positions, precisely because they are not DPs (cfr. **Professor speaks* or **Lady is very clever*). Therefore, we are in a position to claim that D existed in classical Latin, although it lacked definite articles. This would explain why Latin expressions such as *Arma virumque cano* were interpreted as ‘I sing of the arms and the man’, and are usually translated thus, using articles and not bare nouns. Elvira (2015), in his review of the process of grammaticalization of the Spanish article (which derives from the Latin demonstrative *ille* ‘this’), mentions that their appearance in Romance languages is sensitive to the loss of morphological cases. In fact, he also mentions the typological correlation between the absence of articles and the presence of rich case morphology, and he assumes that the absence of morphological case would be one of the conditions favoring the development of the article in Romance languages.

¹⁹ Note that I am ignoring here the complex semantic structure of proper nouns for the benefit of the general argument. In some theoretical models of generative grammar it is assumed that N moves to D, and other models assume that the proper noun materializes the entire sequence. For the purposes of our discussion the difference between both models is irrelevant, so I assume the most widespread one, according to which N, if a proper noun, is attracted to D, as shown by the arrow; I also use the convention of representing the displaced element (which is not pronounced) as blacked out.

All this makes sense if we assume that in classical Latin case morphology materialized the category D (along with others). Actually, in some languages case is only shown in determiners (and not in nouns). In other languages, only definite nominals are marked with case (and not indefinite ones), and in other languages the case marking of complements varies depending on the degree of specificity of the complement. If suffixed case marks in Latin nouns materialized traits of D, it is expected that the loss of morphological cases (as a consequence of phonetic changes) opened a way for the reanalysis of other adnominal elements (e.g. demonstratives) as instances of D. Note that, regardless of the complex details of the process, a path is opened up to show that the creation of a new grammatical exponent (the definite article from a demonstrative) does not necessarily imply the creation of a new grammatical category (D), unless we define grammatical category as ‘the morphological exponent of a functional category’. In the same way, we should not assume that the process has made one language (Spanish) more grammatical than another (Latin), but just that their grammars are different.

Advocates of EGT might argue that their choice is still superior, since this model explains how this type of determiners arise, while the other option has to assume the pre-existence of D. This may seem reasonable, but then it is necessary to show that the processes of language change created grammatical categories, something considerably harder than showing how the morphological exponents are created.

Let us return to the intuitive idea that “primitive” language must consist of lexical units without grammar, and that “modern” language derived from it through grammaticalization. Even if we could propose any scenario in which the evolutionary ancestor of our language (say, for example, the language of our ancestors 500,000 years ago, before the emergence of *Homo sapiens*) was constituted only by some sort of denotative lexical units, the idea that the historical process of grammaticalization could be the explanation of the evolution of language in our species would not be acceptable. First, because there would be no way to explain why language as we have it today did not evolve, say, 300,000 years ago (when we know from creoles that grammaticalization can sometimes be very rapid). Second, and more importantly, because in fact the major lexical units (nouns and verbs) typically said to be “sources” of grammatical categories are themselves grammatical categories and not pure concepts linked to sounds. Of course, we do not know what kind of languages hominids spoke 500,000 or 300,000 years ago, or indeed if they spoke at all, but it makes no sense to say that they would have a language like ours (with nouns and verbs, for example) but without grammatical categories, since the very notions of noun and verb involve grammar (and syntax). Consider the Latin words *dolor* ‘pain’ and *doleo* ‘hurt’ (to take an example already discussed by speculative grammarians of the Middle Ages). It is possible that the two words share a conceptual core, equivalent to that expressed by the root (say *dol-*), but in no way can we say that they only consist of the conceptual meaning, since otherwise the two would be identical. To imagine a “primitive” language without grammar we ought to start not with nouns and verbs (entities that already have grammar) but with the kind of roots that lack internal structure. Syntax does not just combine words, it creates words by combining conceptual and functional elements.²⁰ Imagining words without syntax is like comparing words with elementary symbols, such as those used by other species; human words, though, are not like that (see e.g. Berwick & Chomsky 2016: 84–85). To move from roots without grammatical category to words, we should imagine that other roots without category (e.g. those corresponding to ‘object’ or ‘event’, or ‘state’, etc.) were attached to the first ones and eventually became category assigners themselves (N, V, etc.); we should then further

²⁰ On the relevance of syntax for word structure see Marantz (1997) and Embick (2015).

imagine that, from a given moment, all concepts were associated with a category of that type and, combining with each other and being grammaticalized, they gave rise to other grammatical categories, such as pronouns, determiners, etc. But this model (among other deficiencies) assumes without further justification that, for example, the concept of ‘stone’ (the concept, not the visual image of a stone) is prior to the concept of ‘object’, or that the concept of ‘pain’ is prior to the concept of ‘feel’, etc. Yet the question of what ‘stone’ or ‘pain’ might mean to an organism unable to handle the concept of ‘object’ or ‘feel’ remains unexplained. If the concept of ‘stone’ cannot precede the concept of ‘object’, then it makes no sense to assume that denotative lexical categories necessarily precede functional categories. The existence of human thought does not imply only the existence of concepts like ‘stone’, ‘hand’, ‘hunger’ or ‘dark’, but also the existence of more abstract concepts, which correspond to functional categories and which allow denotation, reference, predication, etc., that is, the compositional connections between them. As Piattelli-Palmarini points out, “communication as mere speech minus syntax is not an option, lest we fall into the fallacy of subtraction” (Piattelli-Palmarini 2010: 160). If human thought preceded the externalization of languages, then it makes no sense to believe that the origin of syntax (which is what enables thought) is to be found in the historical grammaticalization of denotative lexical units.²¹

7 Evolution, change and why we should stick to uniformitarianism

The theory of linguistic change presented in the previous sections allows for the conclusion that the only consequence of linguistic change is the diversity of languages. The evolution, refinement, or improvement of language (and of languages) are excluded. Of course, the diversity of languages is a fact of transcendental importance for human beings, but it is not in itself the goal or purpose of any process. It is a collateral effect of the mechanism of linguistic transmission across generations, a mechanism that is incapable of preventing the processes of reanalysis that, as we have argued, underlie all linguistic changes.

In this conclusion the analogy with evolutionary theory is closely adhered to, since the diversity of species is but a consequence of natural evolution. It is true that, thanks to natural evolution, our proud species now occupies a small point on one branch of the complex tree of life, but we should not be inclined to think that evolution has singled out our species (or any other) to survive and prosper through radioactive rains, glaciations, volcanic eruptions and meteorite impacts. Certainly, when we compare a bacterium with an almond tree, when we compare an almond tree with a lizard, a lizard with a chimpanzee, or a chimpanzee with a human being, we feel compelled to conclude that evolution implies an increase in complexity, in sophistication, even in freedom. But that is a biased and subjective feeling. After all, we are living beings, and we are human. If we could adopt the point of view of subatomic particles, this would be meaningless. Such a point of view, though, is forbidden to us by our very nature.

Fortunately, the world of languages does not require such an exercise in alienation. Languages are part of our world, of our nature, and we can examine them, investigate them, and empirically contrast our theories about their nature, their complexity, and their degree of evolution. Nevertheless, there is no consensus among language scientists about the meaning of the claim that the essential consequence of linguistic change is the diversity of languages, because the assessment of the degree of depth in the diversity of languages depends on the set of cognitive entities that one chooses to call *a language*. Thus, if we identify languages with the lexical interfaces we use to externalize language, Martin

²¹ See Chomsky (2007) and Sigurðsson (2011) for some speculations on the origin and nature of functional categories, and Golston (2018) for an attempt to relate some of these to the cognition of other species.

Joos' famous observation that "languages can differ from each other without limit and in unpredictable ways" (Joos 1957: 96) would be appropriate, since, in effect, linguistic changes can profoundly affect the variable (though superficial) externalization component of languages. But if we conceive of language as an internal language of thought to which a historically conditioned lexical interface is added in each person, then Chomsky's equally famous statement that, abstracted from that external component, all humans speak the same language (Pinker 1994), would be correct.

I have argued here that linguistic change is not part of the process of language evolution, but I have also assumed that the processes of historical change in languages have the same logic and structure as biological evolutionary processes. And the use of the analogy with natural evolution can also be confusing. It is noticeable that there is a great difference between the structure and way of life of, on the one hand, a single-celled organism and, on the other, a human being with a brain composed of 86 billion neurons (Herculano-Houzel 2016), a difference that might tempt us to equate the simplest organisms with, for example, an Amazonian language without writing and spoken by three hundred people, and the higher mammals with, for example, French. But it is important to note that although life forms are extraordinarily varied from the phenotypic point of view, it is equally true that all life forms employ exactly the same chemical processes and the same biological mechanisms to develop, metabolize, reproduce and die. As compared to inorganic objects, life forms are remarkably similar. And, compared to non-human communication systems, human languages are remarkably similar. Just as the tradition of generative grammar has insisted on the underlying similarity between languages by considering them to be different variants of the same Universal Grammar, the biochemist Michael Sherman (2007) has suggested that all organisms are variants of a single Universal Genome.

Needless to say, biological evolution produces more complex organisms. And, as mentioned above, linguistic changes produce an increase in morphological and phonological complexity (see Dahl 2004). However, we might note that according to the model presented in Figure 2 this natural increase in complexity actually amounts to an increase in the complexity of the lexical interface, not the whole language itself. We should not assume that some languages are more complex than others, but that there are languages with more complex lexical interfaces than others. Thus, the remarkable morphological differences between, for example, Georgian and Tok Pisin do not imply differences in the deep layers of structure (basically the conceptual-intentional system and the computational system), but rather differences in the historical evolution of their lexical interfaces. The proof of this is that the two languages allow their users to carry out the same cognitive and communicative functions. In the same way, biological evolution produces more complex organisms, but it does not alter or make more complex the molecular biology that underlies their development. Once we have assumed this view, there is no contradiction in arguing that linguistic change has the same formal structure as evolutionary change, and at the same time to claim that this in no way implies that linguistic change produces a qualitative and directional transformation of languages.

In defining a language as a historically modified mental organ I am assuming that the essential cause of linguistic diversity lies in language change, a conclusion identical to that of Darwin when he stated that the existence of different species was simply explained by the fact that they were not immutable. Therefore, the question of the breadth and depth of the diversity of languages is actually reduced to the power of the process of change and its transforming capacity. Note that we can pose the following question: *Can the process of linguistic change produce anything other than a language?* As far as we know, linguistic changes never destroy languages or render them unusable in terms of their usual functions, and

thus the answer must be a clear *no*. In Section 3 I posed the inverse question: *Can linguistic change produce a language from anything other than a language?* I have suggested that the answer is also *no*, but, as we have seen, this answer is not universally accepted.

At this point, confusion may once again arise in connection to evolutionary theory. The analogous question would be: Can natural evolution create life from what is not alive? This complex question really depends on what we mean by *life* and by *natural evolution*. In order to give an answer, the question can be reformulated in more specific terms: was the origin of life, however it happened, part of the process of natural evolution? If we define natural evolution as the process of modification of living forms,²² then the answer, in purely logical terms, can only be negative: if the origin of life (see Kauffman 1993) is in some way the thermodynamic result of the coupling of different atoms in a medium that promoted the appearance of more complex molecules, then certain chemical (pre-biological) processes produced the first form of life and only from then on does the notion of natural evolution appear.

I will defend the same scenario for language: certain evolutionary processes (not studied by historical linguistics, but by evolutionary biology) produced human brains capable of developing modern human language (see Bickerton 1988 and Berwick & Chomsky 2016 for some speculations on this process). From that moment, human languages were exposed to historical changes, but within the biological limits imposed by this FL. Similarly, the emergence of the first form of life determined the limits of variation of any subsequent forms of life on Earth. Of course, one might oppose a gradual conception between the living and the non-living, which would obviously make it impossible to give a clear answer to the question of whether the origin of life is part of biological evolution. As we have seen, this is the attitude that seems to be behind the historical or cultural conception of the evolution of language. Thus, for example, David Gil (in another response to Haspelmath's post) suggests that "the uniformitarianist hypothesis needs to be qualified, ie. [sic] that languages even as recently as 10,000 years ago were not quite like today's languages", which leads him to the claim that languages are still evolving in a qualitative sense: "I would say that today's languages are just changing but also, in some cases, evolving, ie. [sic] still on a trajectory whose starting point was no language".

However, we have seen that there are compelling reasons to reject this point of view. Consider the case of the physical laws that govern the Universe as we know it. Physicists operate on the assumption that these are always the same and would reject explanations in which we have to postulate that the basic laws were different in the past (for example, that Einstein's equation $E = mc^2$ is only applicable at certain moments). It is possible to conceive that the physical laws themselves had an origin, or even that they come from different ones, but in this case one still has to assume a discontinuity (a singularity), such as the moment before the Big Bang. The same applies in biology, so that evolutionary changes occur between forms of life, and the same must be applied in historical linguistics. The origin of biology (and of biological evolution) would be at the moment life arose, and the origin of linguistics (and of language history) would be at the time when human language arose.

The principle applied in the three domains is the so-called *uniformitarian principle*, a general methodological principle of any historical science (whether linguistic, biological or physical). Its formulation is often attributed to geologist Charles Lyell, and the subtitle of his celebrated *Principles of Geology* (1830–3) is a clear expression of it: "An attempt to explain the former changes of the earth's surface by reference to causes now in operation" (*apud* Lass 1997: 28). The merit of Lyell's work lies in the fact that he attempted to

²² "Evolution is change in the heritable characteristics of biological populations over successive generations" (Wikipedia s.v. *evolution*, accessed October 2016).

explain the structure of the Earth's surface by resorting to existing mechanisms of change (earthquakes, eruptions, etc.) and not by postulating mechanisms that do not exist today. According to Lass, the general idea is that the principles that govern the *world* (that is, the research domain of a discipline) were the same in the past as they are today. Lass proposes the following formulation in the field of historical linguistics: "No linguistic state of affairs (structure, inventory, process, etc.) can have been the case only in the past" (Lass 1997: 28). We must, therefore, operate with the maxim that nothing that is impossible today was, in principle, possible in the past, so we should discard proposals for reconstructions which involve states or processes which are now impossible.²³ This is the argument that I have previously contrasted with Evolutionary Grammaticalization Theory, since that model resorts to *early language* states (language states that do not exist at present) to argue that the evolution of language is produced through directional linguistic changes.

8 Conclusion

The question I have tried to answer can be formulated in the following way: if we could look into the remote past of languages, what would we find, a historical continuity or different biological classes of languages?

I have shown that the conflation of the process of linguistic change and the process of the evolution of FL is natural in those approaches that conceive of languages as social and cultural objects. From this perspective, the evolution of human language (in contrast to the language of our evolutionary ancestors) would in fact be an effect or consequence of historical changes in languages. Language history would be part of language evolution. In contrast to this view, the conception of languages as externalizations of a system of knowledge uniform in the species implies that linguistic changes are restricted to the variation of those externalization patterns and, therefore, they can have no effect on the biologically determined aspects of FL. As a consequence, the evolution of language, however it happened, is independent of language change.

FL is a restrictive framework for the variation of languages, in the same way that biochemistry is a restrictive framework for the diversity of species. There are more complex organisms (with more cells and organs) than others, and there are also languages with a more complex morphology than others, but there are no organisms that are biochemically more complex than others, and there are no languages that are more syntactically and semantically complex than others. The scheme of Figure 5 (inspired by Hurford 1992: 278) seeks to synthesize the difference between these two main ways of approaching the relationship between language evolution and language change.

The biological evolution between two language faculties, FL_x and FL_y, is represented in the upper part. Assume, for example, that FL_x represents the capacity of language analogous to that of the species *Homo erectus* (as Bickerton 1990 assumes about his notion of protolanguage) and that FL_y represents the language capacity of *Homo sapiens* (assuming simplistically that the former is an ancestor of the second). I also represent the specific "languages" that would emerge from each of the FLs and the historical evolution between them (marked with horizontal arrows). Thus, the scheme is intended to illustrate that FL_x would give rise to language L_{x1} (among many other possible ones) which, due to historical changes, could itself produce other descendant languages, L_{x2}, L_{x3} and so on, for tens of thousands of years. All languages of the L_x type, regardless of their age in time, would be coherent with FL_x and, at the same time, they would be confined to that "biological type" of languages. Once certain evolutionary changes, presumably in the organization or architecture of the brain, give rise to a new FL_y (for example, ours), all the languages

²³ Lass provides a simple example: since all known languages have consonants, by this principle a reconstruction that projected a protolanguage without consonants would be rejected.

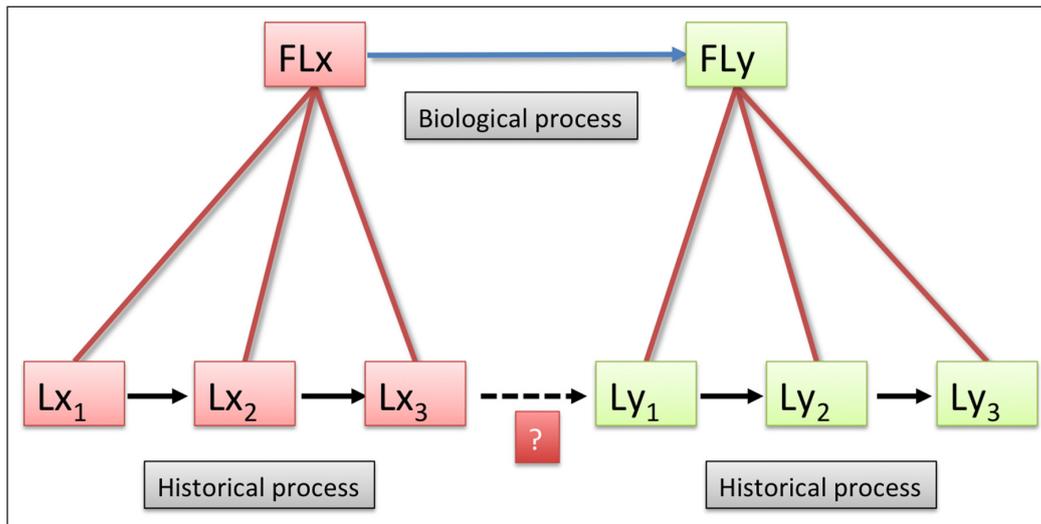


Figure 5: The evolutionary relation between two Faculties of Language (FLx and FLy).

resulting from this new capacity will have common properties different from the previous ones and, again, we assume that historical changes giving rise to successive lineages of languages ($Ly_1 > Ly_2 > Ly_3$, etc.) cannot alter FLy itself.

From this point of view, the question of the extent to which there is a historical continuity between Lx languages and Ly languages (indicated by the discontinuous arrow and the question mark in the scheme), while fascinating, is to some extent irrelevant, since the idiosyncrasy of this new “biological type” of languages would not be explained by such a possible deep historical connection, but by the underlying evolutionary innovation.

Moreover, tracing the historical connection becomes virtually impossible, because languages do not fossilize and also because we are talking about events of linguistic change occurring about 100,000 years ago (the approximate date of appearance of anatomically modern Homo sapiens). Some authors (e.g. Bickerton 1990) have suggested that this possible transition would have been in part similar to what happens when pidgins are creolized, that is, when they are “naturalized” when acquired by children as first languages. If this speculative scenario were to have any plausibility, we would observe that over the course of a generation the new Ly-type languages, historically based on those from the previous FL (FLx), would acquire new properties, these obtained, so to speak, from “within the organism” (from FLy) and not from directional historical changes.²⁴

However, from the externalist point of view that minimizes biological conditioning for language, the emergence of modern languages (in contrast to the supposed primitive languages of our ancestors) would have occurred through the historical connection indicated by the discontinuous arrow in the second line of the diagram. Even for some authors (proponents of Deacon’s 1997 theory of the co-evolution between languages and the brain) historical changes would have been responsible for the possible biological changes produced in the human brain as an “adaptation” to the new type of languages, which would have originated by means of historical changes (crucially, including grammaticalization).²⁵

²⁴ As noted in Section 4.1, it might have been possible at this point to observe states of language with “low degree of grammaticalization” (or with low degree of “maturity”) assuming that grammatical categories are historically configured exponents that materialize functional categories.

²⁵ Another variant of this model is the hypothesis that historical linguistic changes produced more complex languages that later provoked a process of genetic assimilation giving rise to a new innate Language Acquisition Device (Briscoe 2003).

According to the arguments I have presented, language families L_x (L_{x_1} , L_{x_2} , L_{x_3} , L_{x_n}) and L_y (L_{y_1} , L_{y_2} , L_{y_3} , L_{y_n}) of our scheme would be affected by the uniformitarian principle, in the sense that they would be sequences of events separated by a discontinuity. The evolutionary novelty that separates FL x from FL y (even if it is continuous in strictly biological terms) represents for languages a discontinuity, which justifies the application of the uniformitarian principle. If, on the contrary, we consider that the evolution of language is the result of language history, then this principle is not justified, and a directional, creative conception of linguistic change emerges.

Hence, despite the striking resemblance between the processes of biological evolution and language history, it seems advisable to consider the phenomena of language evolution and language change as fully independent processes.

Funding Information

This research was supported by the Spanish State Research Agency (AEI) & FEDER (EU) grant FFI2017-82460-P, and a Government of Aragon grant to the Psylex research group.

Competing Interests

The author has no competing interests to declare.

References

- Alter, Stephen G. 1999. *Darwinism and the linguistic image*. Baltimore & London: The John Hopkins University Press.
- Andersen, H. 1973. Abductive and deductive change. *Language* 49. 567–595. DOI: <https://doi.org/10.2307/412063>
- Batali, John. 1998. Computational simulations of the emergence of grammar. In James R. Hurford, Michael Studdert-Kennedy & Chris Knight (eds.), *Approaches to the evolution of language: Social and cognitive bases*, 405–426. Cambridge: Cambridge University Press.
- Berwick, Robert C. & Noam Chomsky. 2011. The Biolinguistic program: the current state of its development. In Anna-Maria Di Sciullo & Cedric Boeckx (eds.), *The biolinguistic enterprise*, 19–41. Oxford: Oxford University Press.
- Berwick, Robert C. & Noam Chomsky. 2016. *Why only us*. Boston: The MIT Press. DOI: <https://doi.org/10.7551/mitpress/9780262034241.001.0001>
- Berwick, Robert C. & Noam Chomsky. 2019. The siege of Paris. *Inference* 4(3). <http://inference-review.com/article/the-siege-of-paris>.
- Bickerton, Derek. 1990. *Language and species*. Chicago, IL: Chicago University Press.
- Briscoe, Ted. 2003. Grammatical assimilation. In Morten H. Christiansen & Simon Kirby (eds.), *Language evolution*, 295–316. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199244843.003.0016>
- Campbell, Lyle. 2004. *Historical linguistics: An introduction*. Edinburgh: Edinburgh University Press.
- Chomsky, Noam. 1986. *Knowledge of language: Its nature, origins and use*. New York: Praeger.
- Chomsky, Noam. 1995. *The minimalist program*. Cambridge, MA: The MIT Press.
- Chomsky, Noam. 2007. Approaching UG from below. In Uri Sauerland & Hans-Martin Gärtner (eds.), *Interfaces + recursion = language? Chomsky's minimalism and the view from semantics*, 1–30. Berlin: Mouton de Gruyter. DOI: <https://doi.org/10.1515/9783110207552-001>
- Chomsky, Noam. 2010. Some simple evo devo theses: How true might they be for language?, In Richard K. Larson, Viviane Déprez & Hiroko Yamakido (eds.), *The evolution*

- of human language: *Biolinguistic perspectives*, 45–62. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511817755.003>
- Christiansen, Morten H. & Nick Chater. 2015. The language faculty that wasn't: A usage-based account of natural language recursion. *Frontiers in Psychology* 6. 1182. DOI: <https://doi.org/10.3389/fpsyg.2015.01182>
- Comrie, Bernard. 2003. Reconstruction, typology and reality. In Raymond Hickey (ed.), *Motives for language change*, 243–257. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511486937.015>
- Croft, William. 2000. *Explaining language change: An evolutionary approach*. London: Longman.
- Dahl, Östen. 2004. *The growth and maintenance of linguistic complexity*. Amsterdam & Philadelphia: John Benjamins. DOI: <https://doi.org/10.1075/slcs.71>
- Deacon, Terrence W. 1997. *The symbolic species: The co-evolution of language and the brain*. New York: W.W. Norton.
- Dor, Daniel & Eva Jablonka. 2010. Plasticity and canalization in the evolution of linguistic communication: An evolutionary developmental approach. In Richard K. Larson, Viviane Déprez & Hiroko Yamakido (eds.), *The evolution of human language: Biolinguistic perspectives*, 135–147. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511817755.010>
- Elvira, Javier. 2015. *Lingüística histórica y cambio gramatical*. Madrid: Síntesis.
- Embick, David. 2015. *The morpheme: A theoretical introduction*. Boston and Berlin: De Gruyter Mouton. DOI: <https://doi.org/10.1515/9781501502569>
- Evans, Nicholas & Stephen C. Levinson. 2009. The myth of language universals: Language diversity and its importance for cognitive science. *Behavioral and Brain Sciences* 32. 429–448. DOI: <https://doi.org/10.1017/S0140525X0999094X>
- Givón, T. 2009. *The genesis of syntactic complexity*. Amsterdam & Philadelphia: John Benjamins. DOI: <https://doi.org/10.1075/z.146>
- Golston, Chris. 2018. Phi-features in animal cognition. *Biolinguistics* 12. 55–98.
- Hauser, Marc D., Noam Chomsky & W. Tecumseh Fitch. 2002. The faculty of language: what is it, who has it, and how it evolved? *Science* 298. 1569–1579. DOI: <https://doi.org/10.1126/science.298.5598.1569>
- Heine, Bernd & Tania Kuteva. 2002. *World lexicon of grammaticalization*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511613463>
- Heine, Bernd & Tania Kuteva. 2007. *The genesis of grammar*. Oxford: Oxford University Press.
- Herculano-Houzel, Suzana. 2016. *The human advantage: A new understanding of how our brain became remarkable*. Cambridge, MA: The MIT Press. DOI: <https://doi.org/10.7551/mitpress/9780262034258.001.0001>
- Hinzen, Wolfgang. 2011. Language and thought. In Cedric Boeckx (ed.), *The Oxford handbook of linguistic minimalism*, 499–522. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/oxfordhb/9780199549368.013.0022>
- Hopper, Paul J. & Elizabeth Closs Trougott. 1993. *Grammaticalization*. Cambridge: Cambridge University Press.
- Hurford, James R. 1992. An Approach to the phylogeny of the language faculty. In John A. Hawkins & Murray Gell-Mann (eds.), *The evolution of human languages*, 273–303. Reading, MA: Addison-Wesley.
- Hurford, James R. 1998. Introduction: the emergence of syntax. In James R. Hurford, Michael Studdert-Kennedy & Chris Knight (eds.), *Approaches to the evolution of language: Social and cognitive bases*, 299–304. Cambridge: Cambridge University Press.

- Hurford, James R. 2003. The language mosaic and its evolution. Morten H. Christiansen & Simon Kirby (eds.), *Language evolution*, 38–57. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199244843.003.0003>
- Huybregts, M. A. C. (Riny). 2017. Phonemic clicks and the mapping asymmetry: How language emerged and speech developed. *Neuroscience and Biobehavioral Reviews* 81. 279–294. DOI: <https://doi.org/10.1016/j.neubiorev.2017.01.041>
- Joos, Martin. (ed.) 1957. *Readings in linguistics*. Washington, DC: American Council of Learned Societies.
- Karimi, Simin & Massimo Piattelli-Palmarini. (eds.) 2018. *Special issue on parameters*. *Linguistic Analysis* 41(3–4).
- Kauffman, Stuart A. 1993. *The origins of order: Self-organization and selection in evolution*. New York & Oxford: Oxford University Press.
- Kirby, Simon. 1998. Fitness and the selective adaptation of language. James R. Hurford, Michael Studdert-Kennedy & Chris Knight (eds.), *Approaches to the evolution of language: Social and cognitive bases*, 359–383. Cambridge: Cambridge University Press.
- Kirby, Simon. 2000. Syntax without natural selection: How compositionality emerges from vocabulary in a population of learners. In Chris Knight, Michael Studdert-Kennedy & James R. Hurford (eds.), *The evolutionary emergence of language: Social function and the origins of linguistic form*, 303–323. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511606441.019>
- Kirby, Simon. 2002. Learning, bottlenecks and the evolution of recursive syntax. In Ted Briscoe (ed.), *Linguistic evolution through language acquisition: Formal and computational models*, 173–203. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511486524.006>
- Lass, Roger. 1997. *Historical linguistics and language change*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511620928>
- Lehmann, Christian. 1995. *Thoughts on grammaticalization*. München: Lincom Europa.
- Marantz, Alec. 1997. No escape from syntax. *University of Pennsylvania Working Papers in Linguistics* 4(2). 201–225.
- McMahon, April & Robert McMahon. 2013. *Evolutionary linguistics*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511989391>
- McWhorter, John H. 2011. *Linguistic simplicity and complexity: Why do languages undress?* Boston & Berlin: The Gruyter Mouton. DOI: <https://doi.org/10.1515/9781934078402>
- Meillet, Antoine. 1912. L'évolution des formes grammaticales. In Antoine Meillet (ed.), *Linguistique historique et linguistique générale*, 130–148. Paris: Champion.
- Mendívil-Giró, José-Luis. 2006. Languages and species: Limits and scope of a venerable comparison. In Joana Rosselló & Jesús Martín (eds.), *The Bilingualistic turn: Issues on language and Biology*, 82–118. Barcelona: PPU.
- Mendívil-Giró, José-Luis. 2014. What are languages?: A Bilingualistic perspective. *Open Linguistics* 1. 71–95. DOI: <https://doi.org/10.2478/opli-2014-0005>
- Mendívil-Giró, José-Luis. 2015. *El cambio lingüístico: Sus causas, mecanismos y consecuencias*. Madrid: Síntesis.
- Mendívil-Giró, José-Luis. 2018. Is universal grammar ready for retirement?: A short review of a longstanding misinterpretation. *Journal of Linguistics* 54. 859–888. DOI: <https://doi.org/10.1017/S0022226718000166>
- Mufwene, Salikoko S. 2002. Competition and selection in language evolution. *Selection* 3. 45–56. DOI: <https://doi.org/10.1556/Select.3.2002.1.5>
- Nichols, Johana. 1992. *Linguistic diversity in space and time*. Chicago, IL: University of Chicago Press. DOI: <https://doi.org/10.7208/chicago/9780226580593.001.0001>

- Norde, Muriel. 2009. *Degrammaticalization*. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199207923.001.0001>
- Ohala, Peter. 2012. The listener as a source of sound change. In María J. Solé & Daniel Recasens (eds.), *The initiation of sound change*, 21–35. Amsterdam: John Benjamins. DOI: <https://doi.org/10.1075/cilt.323.05oha>
- Piattelli-Palmarini, Massimo. 2010. What is language, that it may have evolved, and what is evolution, that it may apply to language. In Richard K. Larson, Viviane Déprez & Hiroko Yamakido (eds.), *The evolution of human language: Biolinguistic perspectives*, 148–162. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511817755.011>
- Pinker, Steven. 1994. *The language instinct. how the mind creates language*. Cambridge, MA: The MIT Press. DOI: <https://doi.org/10.1037/e412952005-009>
- Pinker, Steven & Paul Bloom. 1990. Natural language and natural selection. *The Behavioral and Brain Sciences* 13. 707–784. DOI: <https://doi.org/10.1017/S0140525X00081061>
- Richards, Norvin. 2016. *Contiguity theory*. Cambridge, MA: The MIT Press. DOI: <https://doi.org/10.7551/mitpress/10542.001.0001>
- Roberts, Ian. 2007. *Dyachronic syntax*. Oxford: Oxford University Press.
- Scott-Philips, Thom C. & Simon Kirby. 2010. Language evolution in the laboratory. *Trends in Cognitive Sciences* 14. 411–417. DOI: <https://doi.org/10.1016/j.tics.2010.06.006>
- Sherman, Michael. 2007. Hypothesis: Universal genome in the origin of metazoa: Thoughts about evolution. *Cell Cycle* 6. 1873–1877. DOI: <https://doi.org/10.4161/cc.6.15.4557>
- Sigurðsson, Halldor Á. 2011. On UG and materialization. *Linguistic Analysis* 37. 367–388.
- Steels, Luc. 1998. Synthetizing the origins of language and meaning using coevolution, self-organization and level formation. In James R. Hurford, Michael Studdert-Kennedy & Chris Knight (eds.), *Approaches to the evolution of language: Social and cognitive bases*, 384–404. Cambridge: Cambridge University Press.
- Traugott, Elisabeth Closs. 2003. From subjectification to intersubjectification. In Raymond Hickey (ed.), *Motives for language change*, 124–139. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511486937.009>
- van Gelderen, Elly. 2009. Grammaticalization from a Biolinguistic perspective. In Rudie Botha & Chris Knight (eds.), *The prehistory of language* 1. 225–243. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199545872.003.0012>
- von Mengden, Ferdinand & Horst J. Simon. 2014. What is it then, this grammaticalization? *Folia Linguistica* 48. 347–360. DOI: <https://doi.org/10.1515/flin.2014.012>

How to cite this article: Mendivil-Giró, José-Luis. 2019. Did language evolve through language change? On language change, language evolution and grammaticalization theory. *Glossa: a journal of general linguistics* 4(1): 124. 1–30. DOI: <https://doi.org/10.5334/gjgl.895>

Submitted: 12 January 2019 **Accepted:** 11 September 2019 **Published:** 12 November 2019

Copyright: © 2019 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.



Glossa: a journal of general linguistics is a peer-reviewed open access journal published by Ubiquity Press.

OPEN ACCESS