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C H A P T E R 1

THE ORIGINS AND THE EVOLUTION OF LANGUAGE

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1.1 INTRODUCTION¹

ALTHOUGH ‘language evolution’ is perhaps more commonly used in linguistics than ‘evolution of language’, I stick in this chapter to the latter term, which focuses more specifically on the phylogenetic emergence of language. The former, which has prompted some linguists such as Croft (2008) to speak of ‘evolutionary linguistics’, applies also to changes undergone by individual languages over the past 6,000 years of documentary history, including structural changes, language speciation, and language birth and death. There are certainly advantages in using the broader term, especially to uniformitarians who argue that some of the same evolutionary mechanisms are involved in both the phylogenetic and the historical periods of evolution. For instance, natural selection driven by particular ecological pressures putatively applies in both periods, and social norms emerge by the same principle of the ‘invisible hand’ or ‘self-organization’ (e.g. Hurford 2006, Mufwene 2008). However, I focus here only phylogenetic evolution.

In this chapter I provide a selective history, since antiquity, of this complex but still largely speculative topic which, over the past two decades alone, has prompted numerous publications and has aroused much controversy among linguists and informative exchanges between them, primatologists, psycholinguists, anthropologists, neuro-linguists, evolutionary biologists, paleontologists, and computational linguists. This

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intellectual engagement has been in sharp contrast with most of the twentieth century, during which linguists appear to have abided by the the Société de Linguistique de Paris' 1866 ban on discussing the subject at its meetings. It appears also to have resurrected several positions by—and controversies among—especially eighteenth- and nineteenth-century European philosophers and philologists. I show below that the differences between the two periods lie especially in the stronger empirical foundations of some recent hypotheses, and in the realization by their authors of the need for interdisciplinary scholarship.

My discussion is organized around the following questions (which do not necessarily determine the section structure of the chapter):

1. Was language given to humans by God or did it emerge by Darwinian evolution?
2. From a phylogenetic perspective, did language emerge abruptly or gradually? If the emergence of language was protracted, what plausible intermediate stages can be posited and what would count as evidence for positing them? Assuming that the structure of modern languages is modular, would gradual evolution apply to any of the modules, only to some of them, or only to the overall architecture? What is the probable time of the emergence of the first real ancestor of modern language?
3. Does possessing Language, the non-individuated construct associated exclusively with humans, presuppose monogenesis or does it allow for polygenesis? How consistent is either position with paleontological evidence about the evolution of the *Homo* genus? How did linguistic diversity start? Assuming Darwinian (variational rather than transformational) evolution, can monogenesis account for typological variation as plausibly as polygenesis?
4. What is the chronological relationship between communication and language? What light does this distinction shed on the relation between sign(ed) and spoken language? Did some of our hominin ancestors communicate by means of ape-like vocalizations and gestures? If so, how can we account for the transition from them to phonetic and signed languages? And how can we account for the fact that modern humans have favoured speaking over signing? Assuming that language is a communication technology, to what extent are some of the structural properties of languages consequences of the linearity imposed by the phonic and signing devices used in their architecture?
5. Is the evolution of language more biological than cultural? Or is it the other way around, or equally both? Are languages as cultural artifacts deliberate inventions or emergent phenomena? Who are the agents in the emergence of language: individuals or populations, or both?
6. What is the relationship between language and thought? Did these entities co-evolve or did one cause the other?
7. Is there such a thing as 'language organ' or 'biological endowment for language'? How can it be characterized relative to modern humans' anatomical and/or

mental makeups? What are the anatomical, mental, and social factors that facilitated the emergence of language?

8. Can we learn something about the evolution of language from historical language change, especially from the emergence of creoles and pidgins? Can we learn something from child language and/or from home sign language? And what can be learned from 'linguistic apes'? Does it make sense to characterize these particular communicative 'systems' as fossils of the human protolanguage (cf. e.g. Bickerton 1990)? In the same vein, what can modelling contribute to understanding the evolution of language. This is definitely the kind of thing that scholars could not do before the twentieth century; it is important to assess its heuristic significance.

As noted by Kirby (2007), the subject matter of the origins and evolution of language is very complex. It lies at the intersection of several academic disciplines and requires an interdisciplinary approach. I have listed all the above questions, which are still but a subset of the larger range of questions one can address in a book, so that the reader may empathize with the daunting task I have accepted in writing this synopsis, and appreciate the synthetic approach I adopt in focusing on noteworthy positions and issues, aiming at the big picture. Unfortunately, this strategy entails omitting many equally relevant references, aside from forcing me to be topically selective. The positions of the scholars I discuss may not even be presented in their entirety, due largely to space limitations. More interested readers are encouraged to read recent publications such as Fitch (2010) and Hombert and Lenclud (in press) for complementary and/or alternative accounts. I must also apologize for focusing exclusively on Western scholarship, which reflects my embarrassing ignorance of the other traditions. I will seek no excuse for the fact that European colonial expansion, which has shaped me intellectually, has generally downplayed what we could be learning from the other scholarly traditions.

1.2 A HISTORICAL SYNOPSIS

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Speculations about the origins of language and linguistic diversity date from far back in the history of mankind. Among the most cited cases is the book of Genesis, in the Judeo-Christian Bible. After God created Adam, He reportedly gave him authority to name every being that was in the Garden of Eden. Putatively, God and Adam spoke some language, the original language, which some scholars have claimed to be Hebrew, the original language of Bible. Adam named every entity God wanted him to know; and his wife and descendants accordingly learned the names he had invented.

Although the story suggests the origin of naming conventions, it says nothing about whether Adam named only entities or also actions and states. In any case, it suggests

that it was necessary for Adam's wife and descendants to learn the same vocabulary to facilitate successful communication.

Up to the eighteenth century, reflecting the impact of Christianity, pre-modern Western philosophers and philologists typically maintained that language was given to mankind, or that humans were endowed with language upon their creation. Assuming that Eve, who was reportedly created from Adam's rib, was equally endowed with (a capacity for) language, the rest was a simple history of learning the original vocabulary or language. Changes needed historical accounts, grounded in natural disasters, in population dispersals, and in learning with modification, to which I return below.

The book of Genesis also deals with the origin of linguistic diversity, in the myth of the Tower of Babel (11: 5–8), in which the multitude of languages is treated as a form of punishment from God. According to the myth, the human population had already increased substantially, generations after the Great Deluge in the Noah's Ark story. To avoid being scattered around the world, they built a city with a tower tall enough to reach the heavens, the dwelling of God. The tower apparently violated the population structure set up at the creation of Adam and Eve. God brought them down (according to some versions, He also destroyed the tower), dispersed them around the world, and confounded them by making them speak in mutually unintelligible ways. Putatively, this is how linguistic diversity began.² The story suggests that sharing the same language fosters collaboration, contrary to some of the modern Darwinian thinking that joint attention and cooperation, rather than competition, facilitated the emergence of language (see e.g. Tomasello 2008).

Another story often reported in linguistics is the following:

According to Herodotus (*Histories* 2.2) Pharaoh Psammetichus I [also known as Psamtik, of the 26th dynasty, seventh century BC] wanted to determine the oldest nation and establish the world's original language. For this purpose, he ordered two children to be reared by a shepherd, forbidding him to let them hear a single word, and charging him to report the children's first utterance. After two years, the shepherd reported that on entering their chamber, the children came up to him, extending their hands, calling *bekos*. Upon enquiry, the pharaoh discovered that this was the Phrygian word for 'wheat bread', after which the Egyptians conceded that the Phrygian nation was older than theirs. (*Wikipedia*, Jan. 2011)

The story may be interpreted to suggest monogenesis, according to which a single language was the ultimate ancestor of all modern languages. This would correspond to a protolanguage, such as proto-Bantu or proto-Indo-European, in genetic linguistics. However, this is not the theme we find in Plato's *Cratylus*, which focuses on how the

² Hombert and Lenclud (in press) identify another, less well-recalled account also from the book of Genesis. God reportedly told Noah and his children to be fecund and populate the world. Subsequently, the descendants of Sem, Cham, and Japhet spread all over the world and built nations where they spoke different languages. Here one also finds an early, if not the earliest, version of the assumption that every nation must be identified through the language spoken by its population.

first words emerged (in Greek). According to the dialogue with two disciples, Cratylus and Hermogenes, Socrates (the teacher and Plato's mouthpiece) claims that names originally captured the essence of the entities they denote; transmission from generation to generation has affected their transparency, making them (rather) opaque, reducing them to conventional, arbitrary signs. Opaqueness is accordingly more obvious in words borrowed from other languages, then considered 'barbarous,' especially since their roots are harder to trace. Socrates' comparison of the putative initial baptismal practice with the work of a painter makes his account a precursor of modern synesthetic approach, as he associates particular sounds with specific meanings. He thus anticipated some eighteenth- and nineteenth-century philologists who saw the origins of language in 'natural sounds' produced by animals and other entities in nature.

Anticipating Johann Gottfried Herder, Socrates rejects the hypothesis that names had divine origins because, according to him, they are so imperfect that they could not have been made by the gods. The *Cratylus* is also one of the earliest works that associate language change with imperfect learning and language contact. The latter phenomenon complicates the evolutionary trajectories of particular languages, which, in contemporary metalanguage, need not be considered as unilinear.

Recently, the significance of population movements and language contacts in the evolution and diversification of languages has been underscored especially by Cavalli-Sforza (2000). Assuming that the exodus of *Homo sapiens sapiens* out of East Africa was protracted, he argues that some of the later migrant populations came in contact with earlier ones. Though he says nothing about monogenesis vs polygenesis, the idea appears to be that the original language changed as human populations migrated away from the homeland. Later contacts between the dispersing populations produced even more changes. No more reason other than population dispersal is given for the change, which is also problematic in typical accounts of speciation in language families such as Bantu and Indo-European.

The dominant trend in genetic linguistics, which inspired Cavalli-Sforza (2000) but had been disputed by Trubetzkoy (1939), has indeed been for monogenesis, positing a protolanguage from which all the members of a language family can be derived. This account of the evolution of language has also been adopted in particular by Ruhlen (1994), who attempted to reconstruct the ultimate phylogenetic protolanguage since *Homo sapiens*, on the model of proto-Indo-European or proto-Bantu. This 'protolanguage,' identified by some as 'proto-world,' should not be confused with the 'protolanguage' (without a hyphen) posited by Bickerton (e.g. 1990) and discussed below.

Writing in the first century BC, the Roman poet and philosopher Titus Lucretius Carus questioned one particular brand of monogenesis that is not necessarily Adamic:

[...] to think that one individual then distributed names to things and that humans learned the first words from him is absurd. For why would he be able to mark everything with utterances and emit different sounds of the tongue, and at the same time others not being capable of having done it? Besides, if others too had not

used their voices with one another, from where was the notion of utility implanted, and from where was this power first granted to him, to know what he wanted to do and conceive of it in his mind? Similarly, one person could not have prevailed and forced so many to want to learn the names of things so thoroughly [. . .] (Lucretius Carus 2003 [?54 BC]: ll. 1041–51).

Lucretius thereby suggests that language emerged and evolved from the collective communicative acts of individuals interacting with each other. We may, in modern terms, think of different interactants innovating on different occasions and the successful innovations being copied by others. This is the position articulated by Michel Bréal in the late nineteenth century (see below), in contrast with the vast majority of scholars who have simply ignored the question.

There doesn't seem to have been much speculation on the origins of language since Lucretius until the eighteenth century, 'the (Age of) Enlightenment.' The contribution of the Renaissance period appears to be negligible, as the focus was on (the logic of) the structure of language, epitomized by the Port-Royal Grammar, published in 1660 by Claude Lancelot and Antoine Arnauld. It's not evident what the reason for this return to the subject matter of the origins of language was, except perhaps that the post-Renaissance social philosophers, so interested in defending the natural rights of people and freeing fellow citizens from superstition and the creationist dogma of Christianity, may have wanted also to have a better understanding of the origins of mankind. Convinced that rationality distinguishes mankind from other animals, they were interested in the apparent chicken-and-egg connection between humans' mental capacity and language.

A name that was particularly influential in the eighteenth century was Étienne Bonnot de Condillac, who, according to Aarsleff (1982), then launched debates on the origins of language with his *Essai sur l'origine des connoissances humaines* (1746). He argued that language is a consequence of humans' being rational and needing this tool to express their thoughts. Although he saw language as constrained by its phonetic architecture to linearize thought, he also claimed that language gives more structure to thought processes and is the foundation of (the growth of) human knowledge. This sounds similar to Bickerton's (e.g. 1990) claim that the emergence of language, especially syntax, enhanced human capacity for thought (see below).³

Contrary to the received doctrine of the Catholic Church, the dominant one at his time, Condillac, an abbot, concluded that language was man-made, the product of humans' capacity for creative thought, and not God-given, a position adopted by other eighteenth century philosophers. He is also reported to have contributed to, if not started, the hypothesis that language emerged from natural cries. Although it would be derided by Friedrich Max Müller in the nineteenth century (see below), this position addresses the question of how humans evolved from the mere production of 'natural

³ Yet one can argue that syntax, also phonology and morphology, are just a consequence of linearity, constrained though it is by other, cognitive or pragmatic factors.

cries,' identified today as holistic vocalizations, to phonetic ones, which Condillac characterized as 'vocal signs,' at least according to Aarsleff (1982). This is a question that still awaits a conclusive answer (see esp. Wray 2002, Tallerman 2007, and Bickerton 2010) and on which MacNeilage (2008) contributes some significant insights (see below).

The hypothesis that the original ancestor of language lies in the natural cries and gestures was also developed by Jean-Jacques Rousseau in his 1755 essay on the origin of language, in *Discours sur l'origine et les fondements de l'inégalité parmi les hommes*. For him, cries and gestures are the language most expressive of humans' passions, which dominated in the earliest phylogenetic stages of mankind. The evidence can allegedly still be found in 'savage' or less advanced populations, particularly in southerly, warmer climates, where humans are, according to him, closer to nature. It is not that those populations are still in the primordial or less evolved stages of human evolution,

the order of their progress is different. In southern climates, where nature is bountiful, needs are born of passion. In cold countries, where she is miserly, passions are born of need, and the languages, sad daughters of necessities, reflect their austere origin. (1755; Moran and Gode's translation, 1966: 46)

According to Rousseau, the passions are still best expressed through tones (and intonation) and gestures, and thus in tonal languages. However, 'while visible signs can render a more exact imitation, sounds more effectively arouse interest' (Moran and Gode 1966: 9), which is why, as communication became less and less passionate and more and more referential/rational, speech prevailed as a means of communication. Like most philosophers and philologists of the eighteenth century, Rousseau did not realize that tones play a contrastive lexical and/or grammatical function in many languages, although this is not the case in most European languages. On the other hand, like some modern students of the origins of language (e.g. Tomasello 2008, MacNeilage 2008, Corballis 2010, Dor and Jablonka 2010, Mufwene 2010b), Rousseau also assumed that modern language emerged under social ecological pressures, especially out of the need to help each other understand what they had to do in order to survive danger (pp. 47–8). On the other hand, unlike today's scholars, Rousseau interpreted evolution as progress towards a more explicit architecture meant to express reason more than emotion. According to him,

Anyone who studies the history and progress of tongues will see that the more words become monotonous, the more consonants multiply; that, as accents fall into disuse and quantities are neutralized, they are replaced by grammatical combinations and new articulations. [...] To the degree that needs multiply [...] language changes its character. It becomes more regular and less passionate. It substitutes ideas for feelings. It no longer speaks to the heart but to reason. (Moran and Gode 1966: 16)

Thus, Rousseau interpreted the evolution of language as gradual, reflecting changes in the *Homo* genus's mental, social, and environmental structures. He also suggests that

consonants emerged after vowels (at least some of them), out of necessity to keep 'words' less 'monotonous.' Consonants would putatively have made it easier to identify transitions from one syllable to another. He speaks of 'break[ing] down the speaking voice into a given number of elementary parts, either vocal or articulate [i.e. consonantal?], with which one can form all the words and syllables imaginable' (p. 17). This account appears to anticipate Peter MacNeilage's notion of 'syllabic variegation' (see below).

Like his contemporaries and predecessors, Rousseau did not (always) distinguish sounds from the letters, but he also had curious positions about the latter. He associated pictographic writing with 'a savage people, signs of words and propositions [with] a barbaric people, and the alphabet [with] civilized peoples' (p. 17).

This stratification of populations was a common belief until the early twentieth century (see below). However, it is not out of place to discuss, in the context of the evolution of language, the evolution of writing systems as technology designed to overcome some of the shortcomings of speech and signing. Writing does not just extend our capacity to remember and carry to longer distances what was or could have been spoken or signed. For instance, Chinese ideograms are additionally efficient in enabling speakers of mutually unintelligible Sinitic language varieties to understand each other. In this particular respect, they also illustrate why evolution should not be thought of in rectilinear and unilinear terms, as there is room for variation. While alphabetic writing systems, designed to capture speech, may be preferred (by the principles of economy and productivity) for their simplicity, they cannot accomplish the role Chinese ideograms play in bridging dialectal differences with regard to meaning. Scholars who think of language as technology (Smith and Szathmáry 1999, Lee et al. 2009, Mufwene 2010a) will hail Rousseau for bringing writing as derivative technology into the picture. It's undoubtedly also relevant to ask to what extent writing has influenced language evolution during the historical period (Wang 2011).

Rousseau questioned the Adamic hypothesis on the origins of modern language, arguing that the language that God had taught Adam and was learned by the children of Noah perished after the latter abandoned agriculture and scattered. Modern language is therefore a new invention (Moran and Gode 1966: 36). Rousseau may have been concerned more about the diversification of the language that Noah's children had spoken before they dispersed than about the origins of language itself. He assumed the speciation to have happened before the Tower of Babel explanation in the Judeo-Christian tradition.

Language diversification is a topic that has not been sufficiently discussed in today's literature on the evolution of language(s). The focus has typically been language as a common endowment of all humans, thus obviating the question of whether the origins of modern languages were monogenetic or polygenetic. If they evolved ultimately from one language, was this original language internally variable or not? Accounts of how linguistic diversity emerged should vary, depending on whether one assumes monogenesis without internal variation or polygenesis with the possibility of variation from one hominin colony to another.

It is thus noteworthy that, unlike most of his contemporaries and somewhat anticipating variational evolutionary theory, Rousseau also addressed the question of the consequences of inter-idiolectal variation in the emergence of language as a communal phenomenon:

[E]ach individual is unique, possessed of, even in some ways identical with, his own nature or ‘essence’ while participating in the whole of nature, the whole of reality, so speak. In so far as there is plurality of individuals, and one individual (or group) practices any of the arts on others, there is a basis for contrasting nature (the nature of one) and art (the art of another). (Moran and Gode 1966: 76)

In modern terms, every idiolect differs from others. This situation raises the interesting question of how they converge toward the same communal norm (Mufwene 2008, 2010b). Does normalization as emergence of a communal norm entail elimination, or just reduction, of variation? What does it really mean when two or more individuals are said to speak the same language? One should also ask: what role has inter-idiolectal variation played in the evolution of language?

A contemporary of Jean-Jacques Rousseau, the German philologist Johann Gottfried Herder contributed to the debates on some of the above issues, with his *Über den Ursprung der Sprache* (1772), translated and published in Moran and Gode (1966) as *Essay on the origin of language* (which is cited here). Herder especially argued that human language was not God-given, and that it started in animal communication (p. 94). Like Lucretius, he thought that even Hebrew, assumed then to be the oldest language, was too imperfect to be God’s creation (pp. 94, 96), though he could have made allowance for change, which normally disturbs the original design, over time. Likewise, he observed:

Now trace, if you can, divine order in the fact that a god, who saw the plan of language as a whole, invented seventy words for the stone and none for all the indispensable ideas, innermost feelings, and abstractions, that in one case he drowned us in unnecessary abundance while leaving us in the other in the direst need which obliged us to steal and usurp metaphors and talk half nonsense, etc. (p. 153)

The distribution of the vocabulary within and across languages appeared to Herder to be too inconsistent for the latter to be God’s creation(s). Like Rousseau, he concluded that such varying reality could only reflect the work of mankind.

Herder was ambivalent about the origins of language. On the one hand, he argued against Rousseau’s and Condillac’s position that it evolved from emotional cries (p. 102). On the other, he admitted that it may have started as animal-like cries, with the difference that human utterances in the form of speech are volitional and driven by reason (p. 99). He concludes several pages later that early human language ‘was an expression of the language of all creatures within the natural scale of the human voice’ (p. 137).

Herder also argued that knowledge of particular languages is not instinctive; the child learns the language of its social environment. Anticipating modern linguists, he clarified that what is being discussed is the capacity for language, what Ferdinand de Saussure referred to as the *faculté de langage* and generativists as Universal Grammar or biological endowment for language. He observed that this capacity, which is also shared by the deaf (p. 118), enables humans to learn naturalistically, through interactions or by immersion, whatever language they have been exposed to. This of course leaves unanswered the question of how in the first place this particular capacity for language evolved in mankind and in what form. It also leaves open the question of how particular languages displaying both structural diversity and common/universal features evolved (see below).

Herder also speculated that language started with the practice of naming. He claimed that predicates, which denote activities and conditions, were the first names; nouns were derived from them (pp. 132, 160). He thus partly anticipated Heine and Kuteva (2007), who argue that grammar emerged gradually, through the grammaticization of nouns and verbs into grammatical markers, including complementizers, which make it possible to form complex sentences. An issue arising from Herder's position is whether nouns and verbs could not have emerged concurrently. Not quite in the same way, Allan (2010a: 230) comments that Herder was more concerned with proving that 'God could not have invented human language because, as the Western Classical Tradition affirms, the logical order is to name entities first and then predicate acts and attributes of them.'

On the other hand, as hypothesized by William Dwight Whitney (discussed below), the original naming practice need not have entailed the distinction between nouns and verbs and the capacity to predicate. At that time, naming may have amounted to pointing with (pre-)linguistic signs; predication may have started only after hominins were capable of describing states of affairs compositionally, combining word-size units in this case, rather than holophrastically. This issue cannot be addressed independently of what Bickerton's (1990) 'protolanguage' is and when it may have emerged. The question of the order in which other grammatical categories emerged remains open, there being no conclusive evidence in support of the particular order proposed by Heine and Kuteva (2007). In any case, Herder also argued that language was 'the child of reason and society' (p. 91). He thought that 'vowels are the first, the most vital things, the hinges of language' (p. 95), which appears to suggest evolution from primate-like vocalizations.

Another important philosopher of the eighteenth century was Pierre Louis Moreau de Maupertuis, author of *Réflexions sur l'origine des langues et la vie des mots* (1748). Among other things, he sought to answer the question of whether modern languages can ultimately be traced back to one single common ancestor or whether current diversity reflects polygenesis, with different populations developing their own languages. Associating monogenesis with the Tower of Babel myth, which needs a *deus ex machina*, God, to account for the diversification of languages, he rejected it in favour of polygenesis. Note, however, that his position needs Cartesianism, which assumes

that all humans are endowed with the same mental capacity and suggests that our hominin ancestors could have invented similar communicative technologies at the same or similar stages of our phylogenetic evolution. This position makes it natural to project the existence of language as the common essence of languages beyond their differences. Saussure (1962 [1916]) may be credited with similar thinking when he observed that *le langage* 'language' is heteroclitic, anterior to languages and more natural than them, and yet deriving its unity from the latter (pp. 25–26). These considerations provide the background for speaking of universals in the architecture of language and of (constraints on) parametric typological variation.

In the nineteenth century, scholarship on the origins of language was enriched with an alternative perspective. Charles Darwin commented in *The Descent of Man* (1871) that the evolution of language was in several ways reminiscent of that of mankind itself. He hypothesized that it had emerged gradually, had not been given by God or invented by design by humans, and could also be explained by natural selection. He was among the first to correlate the evolution of language with that of the human mind (see also Müller 1880 [1861]), thus accounting for why parrots cannot produce original spoken messages intentionally, although they can imitate human speech fairly accurately. Showing what an important driver role the human mind has played in the evolution of language, he argued that it was for the same reason that other primates do not use their buccopharyngeal structure to speak.

We now know that Charles Darwin was only partly right. The other primates' buccopharyngeal structure is not shaped in exactly the same way as that of humans, although, based on the parrot's phonetic accomplishments, we must wonder how critical this particular structure was for the emergence of language (not speech!) in the first place. After all, humans who cannot speak produce signed language, which is just as adequate for communication. This argument may be claimed to support the position that the emergence of the capacity for language must be distinguished from the emergence of languages. However, one must also wonder whether the two questions can be considered independently of each other (see below).

On the other hand, like eighteenth-century philosophers, Charles Darwin also claimed that complex thought could not 'be carried on without the aid of words.' Many modern linguists doubt that the language of thought is structured just like spoken or signed language. It does not appear to be constrained by linearity (see below). In fact, in its most fundamental form it does not appear to depend on these communication media and is ontologically anterior to them. Just because the language of fundamental thought is probably structured differently, it does not follow that it is less complex than spoken or signed language. The evidence appears to be lacking regarding the role that speech and signing allegedly play in structuring human thinking. It seems so natural to claim that complex language evolved in response to the communicative needs of social minds that were becoming more and more complex.

Charles Darwin should be credited for subsuming the topic of language vitality, as it should be under the umbrella of language evolution (Mufwene 2001, 2008). He paid attention to the spread of some languages at the expense of others, a topic that

linguistics has dealt with recently under the heading of ‘language endangerment.’ However, he also thought of some populations and their languages as less evolved than others, although he did not establish any obvious correlation between the alleged less evolved populations and less evolved languages. This is a recurrent claim throughout the eighteenth and nineteenth centuries, whereby non-Europeans are often described as ‘savages’ and the position of their languages on a putative evolutionary trajectory as ‘primitive,’ simply because their morphologies are too complex (the case of agglutinating and polysynthetic languages), or they have no morphophonology (the case of isolating languages), and/or they are tonal. Though Charles Darwin also concluded that races are probably the counterparts of subspecies in biology, he was still a prisoner of the social prejudices of his time (Mufwene 2008: ch. 6). His hypotheses on the evolution of language were thus tainted by them.

It is worth mentioning in this context the contribution that George Howard Darwin, Charles Darwin’s son and an accomplished astronomer and mathematician, made to the subject of the evolution of language. He defended his father and Dwight Whitney against Friedrich Max Müller, both of whose views are discussed below. In his essay titled ‘Professor Whitney on the Origin of Language’ (1874), George Darwin especially supported the idea that human language may have started from ‘the imitational and interjectional sources of [Aryan] roots,’ that the number of initial roots must have been very small at the early stages of true language and everything else developed later. He elaborates:

It is surely probable that ~~that~~ many generations of quasi-men passed away, who used a small vocabulary of conventionalised cries, that these cries became more and more conventionalised, by departing more and more from the sounds of exclamations, from which they took their origin. Many roots would probably propagate themselves by fission, and give rise to new roots, gradually to become entirely separate from their onomatopoeic originals. (Harris and Pyle 1996: 288)

Max Müller had ridiculed as ‘bow-wow theory’ the hypothesis that human language had started from imitations of animal sounds, interjections, etc. In his essay titled ‘The theoretical stage, and the origin of language’ (1861), Müller argues that what distinguishes humans from other animals is not so much speech but the ‘inward faculty which is called the faculty of abstraction, [...] which is better known to us by the homely name of Reason.’ Against Charles Darwin’s unjustified assertion that there are languages without abstract terms (of course spoken by ‘savages’), he observes that every (denoting?) word ‘contains a predicative root’ which ‘expresses a general concept’ (Harris and Pyle 1996: 197). Against the ‘bow-wow theory,’ Müller argues that although there are interjections and onomatopoeic terms in every language, ‘as yet no language has been discovered that was so formed.’ According to him, ‘interjections are only the outskirts of real language,’ which begins where they end (Harris and Pyle 1996: 23). Although it is conceivable that ‘some kind of language might have been formed’ based on onomatopoeias and interjection, it could not have been ‘a language like that which we find in numerous varieties among all races of men’ (p. 24).

In his 1873 ‘Lectures on Mr. Darwin’s Philosophy of Language,’ Müller is undecided about whether the roots emerged in a protracted fashion or all at the same time. His overall position raises the question of when grammar emerged in the phylogeny of human language and whether, in the first place, our hominin ancestors were capable of producing phonetic sounds at the time they developed the initial vocabulary. Nonetheless, the original roots evolved gradually into the vocabulary of modern spoken languages, some of them becoming grammatical terms, as argued today by Heine and Kuteva (2007).⁴

On the other hand, Müller also thought that some languages are primitive and simpler, especially those with an isolating morphosyntax. Within the context of complexity/simplicity in language, this is fundamentally the thesis defended recently by McWhorter (1998, 2001), according to whom creoles are not only young languages but also the world’s simplest. According to the latter, creole ‘prototypes’ lack derivations, inflections, and tones, all being features that older languages have putatively acquired through much longer histories of evolution and accretion. Independent of the forceful and extensive rebuttal provided by DeGraff (2001), how ironical it is that, for reasons that are no sounder, much of the eighteenth- and nineteenth-century literature on the evolution of language considered inflections and tones to be primitive features! As we will see soon in the discussion of Otto Jespersen’s views, creoles could thus be considered more evolved than their European lexifiers and other languages.

Objecting to Charles Darwin’s hypothesis that human languages, like different races of man, have evolved from a common ancestor, Müller (1873) states:

[B]ecause the merest tyro in anatomy knew that the different races of man constituted so many species, that species were the result of independent creative acts, and that the black, brown, red, yellow, and white races could not possibly be conceived as descended from one source. (Harris and Pyle 1996: 175)

This remark is reminiscent of objections made by some scholars such as Maine (1875) and Freeman (1881, 1886) to Sir William Jones’s 1786 hypothesis that Sanskrit, Greek, Latin, and other Indo-European languages had all evolved ultimately from the same protolanguage. They thought that the Indians were too ‘barbaric’ to share genetic ancestry, racially and linguistically, with Europeans. Otherwise, Müller’s objection conjures up the question of whether monogenesis and transformational evolution, as typically suggested in linguistics, can account adequately for the emergence of linguistic diversity, especially if no allowance is made for internal variation in the protolanguage à la Bickerton (1990). In this respect, modern linguists would be remiss to overlook the fact that Charles Darwin invoked natural selection as applying to variation which he assumed to obtain in any population (see below).

⁴ Note that, although the book is titled *The Genesis of Grammar*, Heine and Kuteva offer no plausible hypothesis of how the overall grammar evolved, beyond the emergence of free grammatical morphemes and a few inflections.

Müller thought that ‘collateral development’ (polygenesis) was more likely to account for some of the differences between dialects and languages. According to him, there is no reason why different individuals at different places and/or different times would have solved the same communicative challenges in identical ways, even when they are endowed with the same ‘instinct, gift, talent, faculty, *proprium*’ for language (1873: 228–9). He was clearly not Cartesian! Nonetheless, he maintained that language was a means ‘for the formation of thought’ (pp. 231–2), oddly in agreement with Darwin in this case.

Müller was also strongly opposed to the hypothesis that humans are phylogenetically related to the great apes and monkeys. He concluded that Darwin must have been confused, ignoring the fact that human language is unattainable by other animals (p. 183). The question is whether this state of affairs is a consequence of Müller’s suggestion that the great apes are not phylogenetically related to humans. One wonders what he would think of today’s attempts to get some great apes to communicate with humans in approximations of sign language or with lexigrams, or even of claims that they understand speech.

Like Jean-Jacques Rousseau, Müller stipulated a distinction between ‘emotional language’ and ‘rational language.’ Accordingly, the former is something that humans share with animals and in which imitations of ‘natural cries’ fit, whereas the latter is the outer side of the mind and is unique to mankind. Müller was curious how one may account for the evolution from ‘emotional’ to the ‘rational language’ (1873: 225). This question has remained hard to answer, though one may suggest that our hominin ancestors may have started with modulating their vocalizations into sequences of contrasting syllabic peaks, thus producing different vowels. However, as discussed below, more was involved in the process; we need to learn from paleontology and other relevant disciplines about how we evolved mentally, anatomically, and socially from *Homo habilis* to *Homo sapiens sapiens* to be able to account adequately for the transition.

William Dwight Whitney responded to Müller in his article titled ‘Nature and Origin of Language’ (1875), by first articulating a distinction between the ‘capacity for language,’ with which every normal human is endowed, and ‘speech.’ The critical point is that the ‘capacity’ has made it possible for humans to develop language or learn whatever is spoken and/or signed in their social environment. This ‘capacity’ distinguishes mankind from animals, although, as recent findings about bird songs have made clear (e.g. Margoliash 2010), the observation should be mitigated (see below). Whitney argues that ‘the only conscious motive’ for developing language was communication, which is certainly at odds with Bickerton’s (1990) claim that it was made to enhance human capacity for thought. Then he reformulates the ‘bow-wow theory’ as follows:

Spoken language began [...] when a cry of pain, formerly wrung out by real suffering, and seen to be understood and sympathized with, was repeated in

imitation, no longer as a mere instinctive utterance, for the purpose of intimating to another, 'I am (was, shall be) suffering.' (Harris and Pyle 1996: 298)

Whitney thus saw the foundations of language in the intentional use of the cries and other sounds. Then he proceeded to address the question of how spoken language has emerged as the dominant mode of explicit communication in mankind:

[I]t is simply by a kind of process of natural selection and survival of the fittest that the voice has gained the upper hand, and come to be so much the most prominent that we give the name of *language* ('tonguiness') to all expression. There is no mysterious connection between the thinking apparatus and the articulating apparatus, whereby the action that forms a thought sets the tongue swinging to utter it. (Harris and Pyle 1996: 300)

As we shall see below, 'natural selection' is not much of an explanation if one does not mention the factors that influenced the resolution of the competition in this particular direction. On the other hand, like Charles Darwin, Whitney seems also influenced by the social prejudice of his time, as in the following passage that should not resonate well to speakers of tone languages:

[T]one, and still more gesture, has assumed the subordinate office of aiding the effectiveness of what is uttered. And the lower the intellectual condition of the speaker and the spoken-to, the more indispensable is the addition of tone and gesture. (Harris and Pyle 1996: 302)

The bias against non-Indo-Europeans is equally strong in the following passage:

An infinity of things can be said in English which cannot be said in Fijian or Hottentot; a vast deal, doubtless, can be said in Fijian or Hottentot which could not be said in the first human language. (Harris and Pyle 1996: 307)

A great deal can be said in Fijian, Hottentot, and other non-European languages that cannot be said in European languages either, just as there are things that can be said in English but cannot be readily expressed in French, for instance, and vice versa. Whitney also claimed that the earliest form of linguistic communication must have been holographic, consisting of one-word utterances, without a formal distinction between entities and actions; parts of speech and predication emerged later, and even later the combinations of words belonging in different lexical categories into complex utterances (Harris and Pyle 1966: 306, 308). As noted above, this comes as an apt rejoinder to Herder's speculations, although, as with everything else, this must be verified by future research. Like his contemporaries, Whitney thought that inflectional or fusional languages represent a high level of 'cultivation.' However, he also thought of the evolution of language as the 'accidental [. . .] product of forces and circumstances so numerous and so indeterminable that we cannot estimate them and could not have predicted their result' (pp. 312–13). In this respect, he is like today's emergentists, for whom evolution is largely driven by self-organization.

Several other scholars, many of them anonymous, published on the origins of language in the nineteenth century. One of the non-anonymous was the social anthropologist Edward Burnett Tylor. In a 1866 paper titled ‘On the Origin of Language’, he attempted to support the ‘bow-wow theory’ by invoking the ways in which ‘savages’ in the colonies named the goods the Europeans brought, using words based on sounds associated with the goods. For instance, the Sea Islanders in the Pacific allegedly used *pu* for musket, *puhi* for ‘to blow’ (as they thought the European blew in the gun), *puff* for the smoke coming out of the musket, and *pupuhi* for the barrel of a gun. He concluded:

If several languages have independently chosen like words to express like sounds, then we may reasonably suppose we are not deluding ourselves in thinking that such words are highly appropriate to their purpose. Thus we have such forms as *pu*, *puf*, *bu*, *buf* recurring in the most remote and different languages with the meaning of blowing or puffing. (Harris and Pyle 1996: 91)

In a note, he illustrates his claim with the following list: ‘Tongan *buhi*, Mahjori *pupui*, Zulu *pu*, Hebrew *puach* &c.’ He likewise finds evidence for the common origin of language in the cross-linguistic similarities among words used for ‘father’ and ‘mother’, words which, according to him, vary more in their consonants than in their vowels (p. 95). It did not matter at all to him that some terms that are phonetically similar sometimes denote opposite entities. It is striking how nineteenth-century scholars really thought that the colonial populations were apparently less evolved anatomically and/or mentally and therefore may provide evidence for how language evolved. Nowadays, we have to deal with Bickerton’s (1990) controversial claim that pidgins (typically those based on European languages) represent fossils of his ‘protolanguage.’

Nobody articulates the above thesis as explicitly as the Revd Frederic William Farrar, who, in his 1865 book *Language and Languages*, asserts:

Savage languages are [. . .] the best to show us what *must* have been the primitive procedure; but we can trace the same necessary elements of words in languages far more advanced. (Harris and Pyle 1996: 59)

Arguing that language is too imperfect to be God’s creation, he also interpreted the multiplicity of languages as evidence that language is an invention of mankind, ‘developed by intelligence and thought. [. . .] It may be *unable to keep pace with* the advancing power of abstraction, but it can never by any possibility anticipate or outstrip it’ (p. 45). He adduced evidence for humans’ ability to invent languages from what is now known as ‘home sign language’ and from the ability of abandoned children living in groups to develop a language of their own (pp. 54–5). This evidence should actually be used to highlight the fact that, from an evolutionary perspective, the language phenomenon under discussion is a communal one, which does not emerge unless there is population of individuals, at least two, who interact with each other. (See also Lieberman 2006: 354ff.) Unless a situation such as the Nicaraguan boarding

school for the deaf arises, no particular communal sign language emerges from the practices of isolated home signers interacting only with their speaking relatives.

Not unlike Bickerton (1990) with pidgins and creoles, Farrar thought that the modifications of European languages in the colonies might shed light on how language evolved, just like the invention of ‘Argots’ by ‘the dangerous classes throughout Europe’ (Harris and Pyle 1966: 66). According to him, because they are not intelligible to speakers of the languages from which they have evolved or been developed, they ‘must, from their very nature, remain uncultivated’ (p. 66). Although he assumed that language emerged gradually, he discussed the complexity of ‘savage languages’ in a way that reveals again strong prejudice against non-Europeans. This was indeed the century of ‘la mission civilisatrice’ or ‘the white man’s burden,’ ideologies developed by the French and the British respectively to justify exploitation colonization. Being non-European, isolating languages ~~were deemed primitive~~ and, according to Farrar, also agglutinating and polysynthetic languages. Putatively, the ‘apparent wealth of synonyms and grammatical forms is chiefly due to the hopeless poverty of the power of abstraction’ (Farrar’s italics, p. 78). This would allegedly be obvious in languages that lack the copula. All such remarks that are undoubtedly offensive today, at least to some of us, underscore how cautious we must be in how we use our findings about some modern linguistic systems to make inferences about the evolution of language.

We should, of course, not ignore Friedrich Wilhelm Christian Karl Ferdinand Freiherr von Humboldt, who conceived of language dynamically in terms of the ‘energeia’ that translates the ‘inner linguistic sense’ into the outer expression, in which the universe of experience is categorized differently from one community to another. He may be considered ~~the~~ forerunner of the Sapir-Whorf hypothesis. What is especially relevant to the study of the evolution of language (a topic on which Humboldt did not say much) is the individuality of the inner sense, which makes every idiolect different but also every dialect and every language different, as the dynamics leading to social norms vary from one community to another. Humboldt also claimed that different populations have not evolved identically in developing their linguistic individuality. He characterized the evolution of language as what Harris and Taylor (1989: 177) paraphrase as ‘the continuous outcome of [the] dialectic between the inner linguistic sense and sound-form; that is, between *energeia* and *ergon*.’ Every individual speaker contributes to this process, as they reshape ~~but do not reproduce~~ perfectly the language of their social environment.

Then we must now ask how the different individuals, innovators and copiers, ultimately converge toward shared communal norms (Mufwene 2008). Note that invoking either the ‘invisible hand’ or ‘self-organization’ is simply admitting that we cannot yet articulate explicitly how the mutual accommodations that speakers/signers make to each other, in their ever-changing dyadic and triadic interactions, evolve to these ‘conventions.’ It is like saying that languages take on lives of their own when in reality the agents and hosts are the speakers or signers (Mufwene 2001). The conclusion does not take us farther than Saussure’s 1916 correct observation that ‘la parole fait évoluer la langue’ (‘speech makes language evolve’), without explaining how it does it.

The foregoing gives us a representative canvas of the state of the art in the eighteenth and nineteenth centuries concerning the evolution of language. It also gives us a sense of the kinds of controversial speculation that led the Société de Linguistique de Paris in 1866 to ban any linguistic discussions on the subject matter at its meetings. Only one more scholar is worth noting from the period, the semanticist Michel Bréal, who argued against the French ban on the ground that it impoverished the subject matter of linguistics. Bréal saw languages as being reshaped constantly by their speakers, and rejected his contemporaries' organic approach to them. He thought the approach was inaccurate in casting some languages not only as less evolved than others but also as decaying or dying. He would undoubtedly have opposed the present discourse about language birth, vitality, and endangerment, as well as about moribund languages, though it can be argued that languages conceived of as species (Paul 1880, Mufwene 2001) are born and may die in the same protracted ways biological species do, unlike individual organisms (Mufwene 2008: 208–9).

As noted above, the French ban appears to have been respected even outside France. It became almost taboo to discuss the evolution of language throughout most of twentieth century, until the 1990s, which I discuss in the next section.⁵ Among the exceptions to the rule are the Dane Otto Jespersen, in his book *Language: Its Nature, Development and Origin* (1922a) and the American Morris Swadesh, whose book *Origin and Diversification of Language*, written in 1967 but published posthumously in 1971, also changed the nature of the discourse.

Otto Jespersen's contributions to the study of the origins of language include his argument that the 'bow-wow' theory (claiming the origins of language in the imitation of sounds in nature), the 'pooh-pooh' theory (based on human interjections), and the 'yo-he-yo' theory (based on human sounds during collective physical work) need not be dismissed offhand. 'Each of the three chief theories enables one to explain *parts of language* but still only parts, and not even the most important parts—the main body of language seems hardly to be touched by any of them' (1922a: 416).

A more important and relatively uncontroversial contribution of Jespersen's is his position that we can learn indirectly about the origins of language by focusing on infant language during the first year of what is still nonlinguistic interaction with the caretakers, focusing on its cooing, babbling, and gestures. Later scholars such as Tomasello (2008) have suggested the development of joint attention, observable in human infants but not in great apes, as an important determinative factor in the evolution of language. Babies' ability to take turns in vocalization games also appears to be evidence of joint attention.

⁵ According to Hombert and Lenclud (in press), much of this practice has to do with what the linguists thought was the subject matter of their discipline. Ferdinand de Saussure was allegedly more interested in languages (*les langues*), which consist of systems, are unified, but are not organic. He was less interested in language (*le langage*), which he putatively considered 'multiform and heteroclitic' (as noted above), straddling domains that are 'physical, physiological, and psychic' [i.e. mental?].

Jespersen also advocated paying attention to trends in how human languages have evolved in documented history, though the conclusions he suggests are controversial. He points out that European languages such as English and French have evolved from more complex morphosyntax to simpler, analytic ones and from structures putatively harder to learn and full of irregularities to more regular and systematic ones. ‘The direction of the movement is toward flexionless languages (such as Chinese, or to a certain extent Modern English) with freely combinable elements’ (1922a: 425). If, like Jespersen, one adopted from the misguided nineteenth century the view that some languages and related populations are less evolved than others, this would not rank German (which Jespersen does not discuss in this context) very high on the scale, nor Basque, which he finds excuses for not lumping into the category of ‘primitive languages.’ His conclusion is that the initial language must have had forms that were more complex and non-analytic; modern languages reflect evolution toward perfection which must presumably be found in languages without inflections and tones. It is not clear what Jespersen’s position on derivational morphology is. In any case, his views are at odds with Bickerton’s (1990) hypothesis that the proto-language, which ~~must have~~ emerged by the late *Homo erectus*, was much simpler and had minimal syntax, if any. While Bickerton sees in pidgins fossils of that proto-language and in creoles the earliest forms of complex grammar that could putatively evolve from them, Jespersen would perhaps see in them the ultimate stage of the evolution of language to date. Many of us today find it difficult to side with one or the other position.

Rather outrageous is Jespersen’s claim that languages of ‘savages’ in Africa and the Americas could inform us about the origins of language, not only because they have longer words (with complex morphology, 1922a: 421), but also because they use difficult sounds such as clicks and rely on tones (p. 419), which, according to him, suggests that their speakers are ‘passionate’ (p. 420). ‘Primitive languages’ were accordingly sung, poetic, and figurative (p. 432). Being tonal and using numeral classifiers (pp. 429–30), ~~Chinese~~ would be low on Jespersen’s scale of evolved languages, though it might be better off than languages that are both tonal and have complex morphological structures. It is of course worse for languages that have no terms such as ‘colour’ for abstract concepts or general categories. Jespersen concludes, among other things: ‘Primitive units must have been more complicated in point of meaning, as well as much longer in point of sound, than those with which we are more familiar’ (p. 425). As pointed out in Mufwene (2008: ch. 6), it is noteworthy how late race lingered as a factor in accounts of language evolution in linguistics.

In contrast, Morris Swadesh’s arguments are grounded in the then state of the art concerning phonetic and morphological properties of several languages around the world, as well as in paleontological and archaeological evidence. The examination of these led him to draw (among others) the following conclusion, which anticipated Mufwene’s 2010b comparison of the pace of the evolution of language with that of computers, in shorter and shorter intervals of time as we near the present: ‘It seems probable that language developed in the same general lines as other aspects of human culture: very slowly at first and gradually faster and faster’ (Swadesh 2006: 45).

However, like many others before him, Swadesh hypothesized that language started with naming. The words may originally have been imitative of sounds heard in nature; then they were allegedly replaced by ‘exclamative’ ones, and later by ‘a purely expressive paradigm and an attention-calling or demonstrative one’ (p. 182). He believed that numerals ‘were among the last to take on their present character’ (p. 183). His worldwide comparison of demonstrative forms led him to the conclusion that ‘before the neoglottic period, perhaps in the paleoglottic, fewer phonemes were differentiated than in contemporary languages’ (p. 199), suggesting that even the phonetic inventories of modern languages must have evolved gradually, not becoming fully modern until as late as the emergence of agriculture.

Philip Lieberman (2002) believed phonetic language to have emerged earlier with the late *Homo erectus* or archaic *Homo sapiens*. Although this position has been revised (see below), the most relevant point here is that different parts of language appear to have evolved incrementally and no particular module seems to have emerged abruptly. It does not appear likely that *Homo erectus* or archaic *Homo sapiens* waited until a complete phonetic inventory was in place before producing their first words, or waited until there was a complete vocabulary with identifiable morphemes before producing phrases and sentences. Although ontogeny does not recapitulate phylogeny, child language acquisition discourages us from speculating about the phylogenetic emergence of language in strictly linear terms. Then, as now, early lexical and phonetic developments must have proceeded concurrently. One may also speculate that the expansion of the lexicon drove the elaboration of a wider phonetic inventory, as this enables more lexical distinctions.

In the style of evolutionary biology, Swadesh proposes a monogenesis account which assumes inter-individual variation in the ‘vocal behaviour’ of the relevant hominins: ‘in addition to individual differences, there could have been variations by sub-species and by locality, but all within essentially ‘one language’ (1971 [2006 edn: 213]). Putatively, hominin populations equipped with similar anatomical and mental structures, living in different localities, and having developed comparable communities in which they experienced similar pressures to interact explicitly, would have developed comparable but non-identical means of communication. This sounds quite plausible, as East Africa, where most of the hominin fossils have been found, is a vast geographical area; to date no paleontological evidence suggests that an early *Homo habilis* or *Homo erectus* population dispersed out of one single locality to the rest of the world.

As argued in Mufwene (2008, 2010b), different individuals endowed with the same capacity for language need not have innovated exactly the same strategies for the same communicative needs.⁶ Locally and regionally, there must have been plenty of

⁶ According to Dor and Jablonka (2010: 139), this variation ‘is inevitable given genetic differences, anatomical differences between brains, differences among ontogenies, and differences of processes of socialization,’ which amount to ‘different developmental trajectories.’ Mufwene (2008) underestimated the consequences of biological variation across individuals when he invoked ‘different interactional histories’ (pp. 120, 126) in his account of inter-idiolectal variation.

variation, as argued by Johann Gottfried Herder, which set the innovators' productions up for competition among their imitators. This would have set things up for variational evolution, through competition and selection among available alternatives even within the same language, as members of the relevant populations converged toward their respective norms. Dor and Jablonka (2010: 138) call this normalization process 'canalization.'

Swadesh assumed that in the earliest, longest stages of the emergence of language, communication among hominins remained instinctive and did not vary significantly from one locality to another; therefore it is normal to assume that our hominin ancestors spoke the same language. According to him, significant diversity started to emerge about 'half a million or so years ago,' when the earliest forms of phonetic and symbolic communication, which he calls 'formal language,' started to emerge (2006: 214–15). The estimated period is consistent with that proposed by Corballis (2002) and Lieberman (2002), though they now think otherwise (see below). This is a stage when Swadesh believes it was possible for different individuals to innovate different linguistic forms for the same denotata and presumably different structures for the same propositions. (Which is reminiscent of Herder's account of the origin of synonyms in various languages.)

Swadesh's hypothesis raises the question of whether his monogenesis position is not really polygenesis; it leaves open the possibility that two late *Homo erectus* or archaic *Homo sapiens* populations developed languages that were not structurally identical and/or mutually intelligible. As is obvious from Bickerton's (1990) hypothesis of the protolanguage from which 'true language' putatively evolved, all may depend on what particular stage in the evolution of the *Homo* genus and what particular phase of its vocal communication one decides to identify as the beginnings of modern language. This entails particular assumptions about the size of the phonetic inventory and the nature of grammar, which are captured eloquently by Ray Jackendoff's 2010 title 'Your Theory of Language Evolution Depends on Your Theory of Language.'

Swadesh is also one of the very few scholars who have considered the implications of population movements for language evolution. As the migrants' languages come into contact, often coexisting in competition with each other for the same communicative functions within the same larger population, some may drive others to extinction. Typically, the prevailing language undergoes structural changes and can even speciate into separate languages. Seldom have linguists who are concerned with language endangerment and loss today cast the subject matter from this perspective, which Mufwene (2001, 2008) articulates in his ecological approach. The contact-based approach to language birth, endangerment, and death makes language evolution more similar to biological evolution, especially regarding the consequences of language practice under differing ecological pressures. The relevant ecology includes not only the mental and anatomical structures of hominins and humans but also the socio-economic conditions that determine their population structures and their particular interactional dynamics. Indeed, the latter also trigger migrations, which history has shown to affect both the vitality and structures of languages.

1.3 RECENT DEVELOPMENTS

As a research topic, the evolution of language has expanded into a productive and stimulating, though diverse, area of scholarship since the 1990s. The scholarship has also expanded beyond the origins of language to include language birth and death, as well as language speciation. While philosophers and philologists no longer appear to deal with it, linguists can hardly claim it as a private domain. No insightful or informative linguistics publication on the subject matter is based exclusively on linguistic data. Interestingly, this is also an area where generative syntax, which has claimed centre stage since the late 1950s, has probably been unable to prevail over other areas, especially since the notion of Universal Grammar (UG), or ‘biological endowment for language,’ or ‘language organ’ (Chomsky 1986, Anderson and Lightfoot 2002), or ‘bioprogram’ (Bickerton 1981) is still a black box whose contents have not been articulated in sufficient detail and whose capacity to account for how language works and/or is learned has increasingly been disputed (see below).

Noam Chomsky’s occasional contributions to the discourse (e.g. Hauser et al. 2002, Chomsky 2010) have aroused controversy, primarily for not considering much of the non-linguistic evidence and for ignoring objections to his claim that recursion is the most important characteristic of the capacity for language that is not shared by other animals. Others have objected that recursion distinguishes human languages from other animals’ means of communication only to a degree. For instance, Margoliash and Nusbaum (2009) argue that some form of it occurs in some bird songs. Moreover, it may be a general cognitive, problem-solving strategy, as it is attested outside language, such as in mathematics and musical scores, unless the latter domains are claimed to be consequences of language. According to Lieberman (2006: 4–5; 2010: 164), it can be identified in dancing too. In addition, some scholars argue that there is little, perhaps nothing, in the structure of the human brain that exists only for language and is not part of the general learning adaptation. Language has also increasingly been interpreted as the gradual cumulation of exaptations of particular mental capacities and anatomical organs for communication (Hurford 2006, Oudeyer 2006).

Chomsky’s (2010: 51) stipulation ‘The study of the evolution of language is specifically concerned about UG and its origins’ is questionable. An important reason why several scholars have raised issues with it has to do with whether language boils down to UG only, to the exclusion of the physical architecture of language(s). Chomsky’s usual equivocations with the disjunctive phrase ‘mind/brain’ has not been informative about the nature of UG. Neurolinguistics has revealed that there is no particular part of the brain that can be identified as the ‘language organ.’ The fact that the parts of the brain implicated in language are not only situated in different regions but also associated with domains other than human communication precludes the possibility of a discontinuous modular language organ. The fact that UG appears to be mental, a property of the mind rather than of the brain as physical matter, clearly leaves open the

possibility that it is a (by)product of something else in the many brain activities, including its capacity to produce language. Anderson and Lightfoot (2002) do not address these issues, although the book is specifically on this topic. Taking the notion for granted, they decide to define it ‘in functional rather than in anatomical terms,’ as it is ‘not localized in the manner of the kidney’ (p. xiii). As a matter of fact, they sometimes identify language itself, like the ‘knowledge of language,’ as the language organ (e.g. p. 8).⁷

One must also note an important difference between, on the one hand, how ‘modularity’ is invoked here in reference to concurrent engagements of different parts of the brain during the production of utterances and, on the other, the way the concept is used in technology to characterize the way different parts of a complex machine just complement each other. While complementarity is also true in the case of language, it is not evident that the brain parts are specialized for language only. For instance, Broca’s area plays a central part in coordinating sensorimotor activities that have nothing to do with language. Mirror neurons, which have been invoked recently as playing a role in the reproduction of sounds, also play an important part in the reproduction of other physical activities and have been identified in other primates. The lateralization of the brain is not exclusively associated with language either. According to Lieberman (2010: 171), the FOXP2 gene, which was initially too hurriedly associated with language alone, also appears to facilitate ‘learning and precise motor control in human and other species.’

If UG contains no properties that are unique to language, then we are perhaps back to the interest of Condillac and other eighteenth-century philosophers in the evolution of language as a way of learning about the evolution of mankind and their mind. Thus some linguists such as Jackendoff (2010) justifiably object to focusing on a questionable notion of FACULTY OF LANGUAGE, especially ‘in the narrow sense’ (Hauser et al. 2002). It impedes investigating the evolution of language in relation to that of, say, human cognition in general and animal communication.

Several scholars appear to align themselves with Pinker and Bloom’s (1990) position that an all-purpose mental capacity, or various phases of its development, at a particular stage (or stages) of the *Homo* phylogeny, would have sufficed to produce language.⁸ Assuming that what emerged are individual languages but not Language *per se* (a position consistent with Saussure’s ‘la parole [. . .] est nécessaire pour qu’une langue s’établisse’, 1962 [1916]: 37), an alternative interpretation of UG is that it is the common denominator of the properties and architectures of the different languages. Thus, UG may not be a particular mental infrastructure that emerged at some particular

⁷ MacNeilage (2008) doubts that the notion of UG is worth positing at all. He suggests that it is a consequence of language emergence rather than its cause. According to him, ‘*there is currently no validity to the claim that UG has a specific genetic basis*’ (p. 298, MacNeilage’s italics).

⁸ Hombert and Lenclud (in press) state more specifically: ‘The capacity for language is considered as a derivative capacity and its emergence as the secondary or induced effect of the emergence of a general cognitive competence. It may have followed from the aptitude that only humans would have been endowed with to read and share the other’s intentions’ (my translation).

phylogenetic stage of the *Homo* genus and enabled or facilitated the emergence of language, but simply a consequence of this evolution (MacNeilage 2008: 298).

Subscribing to the distinction between I-language and E-language, Chomsky correctly dismisses the hypothesis that language emerged in the form of ‘language of thought’ (LOT), citing lack of linguistic evidence and the fact that ‘we have almost no idea what LOT would be’ (2010: 226, n. 24). However, he associates language diversification with the externalization of language. According to him, the reason why there are so many languages ‘might be that the problem of externalization can be solved in many different and independent ways, either before or after the dispersal of the original population [out of Africa]’ (p. 61).

Consistent with some remarks in §1.2, one may want to justify this position by invoking the Cartesian view that the mind is the same in all members of *Homo sapiens sapiens* and would work the same way (allowing a limited number of alternatives) in speaking or signing. However, this position does not entail that they must of necessity be endowed with a language-specific UG in order to accomplish this. We just do not know yet. A general-purpose problem-solving cognitive capacity can lead to the same results, if interactants develop similar technologies for communication. UG could amount to common properties of these technologies, i.e. languages of particular communities, properties that are tantamount to universals of language and typological variation on particular parameters. Alternatively conceived of as a body of constraints on the architecture of language, UG can boil down to specifications of what the general-purpose problem-solving cognitive capacity permits and does not permit, bearing in mind that some of the constraints may simply be consequences of the materials used in the technology.

Chomsky too speculates that the externalization ‘might have been a process of problem-solving using existing cognitive capacities’ (2010: 61). This appealing position need not be wedded to his assumption of UG. Those who believe that modern language emerged to facilitate communication among humans can ask why I-language, associated with UG, need be considered anterior to E-language; it may also be conceived of as patterns emerging from successful utterances, as suggested in Construction Grammar or by Complexity Theory. In other words, ‘knowledge of language’ may be considered as internalization of what the communicator can(not) do vocally and/or with manual signs in his/her attempts to express meaning, i.e. a mental representation of the technology developed by a particular population for communication. As hypothesized by Saussure (cited above), the internalization may be considered as a consequence of practice.

Chomsky also argues that only I-language should be in the domain of investigations on the evolution of language. In his own words, ‘any approach to the evolution of language that focuses on communication, the SM [sensory–motor interface] system, or statistical properties of spoken language, and the like may well be seriously misguided’ (2010: 61). This position raises the issue of whether in some cases students of the evolution of language should not start by agreeing on the particular conception of LANGUAGE they are assuming. This is especially important because Chomsky’s reaction

to the question of ‘why languages appear to vary so widely’ is that this phenomenon ‘is an illusion, much like the apparent limitless variety of organisms’ (p. 62). He is of course driven to this remark by his strong minimalist theory, which appears to treat typological variation as a linguistic epiphenomenon less important than the core of language putatively determined by UG.

Could language really have originated as an abstract and uniform UG, thanks to the brain-rewiring event Chomsky hypothesizes? Or, as surmised above, is UG only the consequence of similarities among the ways members of the *Homo* genus have gradually solved their communicative problems? As remarked above, this evolution would have been enabled by the same general-purpose mental capacity that evolved gradually in them, and would have led them to coopt their anatomical structures to produce the relevant technology for communication, but not necessarily in identical ways.

It is certainly necessary to agree on a particular definition of language, so that we may determine whether or not we seek to explain the same subject matter. As pointed out in Mufwene (2001, 2008), the Saussurean conception of language as ‘system,’ which still prevails in linguistics, is at odds with the folk notion of language as the particular way a population speaks. In fact, lay people speak of languages, not Language (which is a philosophical concept); for them a language is just a way of speaking. It is not evident that the earliest speculations about the origins of human communication were not about languages but about Language, hence the long-held belief among some that Hebrew was the original language.

A problem in linguistics about what is language also arises from the status of phonetics. It is not obvious that linguists agree on whether it is part of language proper or is just a modality, as suggested, for instance, by Hombert and Lenclud (in press). This is a legitimate question, as some like to focus on rules and constraints seemingly ignoring the fact that these apply to physical items called words, which couple meanings (abstract entities) with forms. The architecture of language is built on them. It is hard to imagine that any grammar at the UG level or at the specific-language level, say I-language, could exist without physical entities that it applies to.

The above considerations make it natural to investigate how typological diversity emerged between languages and sometimes within individual languages. The diversity regards, among other things, the specific phonetic inventories that different populations of speakers have chosen and whether or not they made tones phonemic. It also has to do with whether they chose agglutination, polysynthesis, inflections, or isolating morphosyntax to code information around the main verb, whether the verb comes second or in another position in the sentence, whether they use Nominative/Accusative or Ergative/Absolutive syntax to code agency, what strategies they use to specify reference (for instance, do they use noun classifiers or genders?), how they articulate tense distinctions, etc. (See Hurford 2008 for a complementary discussion.)

Although syntax has long been privileged in formal linguistics, it has by no means claimed centre stage in the scholarship on the evolution of language, despite all of Bickerton’s (1990) claims about the nature of his phylogenetic protolanguage. Very little has been written, for instance, about the evolution of combinations of words,

constraints on the positions of particular constituents within larger units, and movements of constituents to particular positions in sentences. If Chomsky is correct in claiming that typological variation is an illusion, then something should be said about how the common aspects of these syntactic phenomena evolved.

The above question may be more difficult to answer than that of why delimiters such as TENSE, ASPECT, and MOOD for the verb as well as NUMBER and CLASS for the noun evolved in language. One can surmise that for communication to be more precise, or less vague, events and conditions must be situated in time and reported differently according to whether they are facts or not, and whether the referents of nouns must be specified according to cognitive requirements that interest particular populations. It must be equally informative to find out why, for instance, the verbal complements of volitional verbs in inflectional languages are more likely to be used in the subjunctive or infinitive. Are the constraints purely linguistic or cognitive?

An answer to the question of why predication emerged, one that Herder considered to be central to the study of the evolution of language, can also be attempted here. We can resort to the way the distinction between TOPIC/SUBJECT and PREDICATE has been traditionally explained in grammars, viz. what the utterance is about (the TOPIC) and what state of affairs (ACTIVITY OR STATE) is associated with the topic. However, much more is involved in predication than just having a head of the predicate phrase. The evolution of the organization of an utterance into TOPIC/SUBJECT + PREDICATE PHRASE for most languages needs some explanation, as much as the ways in which materials are structured into the predicate phrase. Would a UG-based account be satisfactory? Or would it be more informative to invoke general-purpose problem-solving cognitive capacity to explain how different populations developed their communicative technologies which nonetheless share similar principles? We probably need considerations not exclusively grounded in linguistic theory to answer this question.

As pointed out by Jackendoff (2010: 69), an important problem with ‘syntactocentrism’ is that it does not account for ‘the evolutionary source of the lexicon.’ Questioning the centrality of syntax in generative grammar, Bolinger (1973) had argued, along with generative semanticists, that syntax was a consequence of the lexicon, being a body of generalizations from the ways that individual lexical items behave in utterances. It captures morphosyntactic similarities that lexical items display among themselves. Jackendoff (2010: 70) is also right on the mark in pointing out that Chomsky’s approach makes it hard to explain how lexical categories (and presumably the ensuing syntactic categories) emerged. Were they arbitrarily predetermined? Why do they not all occur in all languages or in identical ways? Is it also an illusion that some languages have articles while others do not, or that inflectionless languages may not have a FINITE/NONFINITE distinction for the verb, or that the INFINITIVE may not have an identical syntactic status from one language to another?

Ideologically germane to Chomsky’s reliance on UG but drawing very different conclusions is Derek Bickerton’s work since his book *Language and Species* (1990). Bickerton started with the claim that modern human language evolved almost abruptly from a ‘protolanguage’ used by our hominin ancestors up to *Homo erectus*. The

protolanguage putatively consisted of a (limited) vocabulary without much grammar, and may have combined both words and gestures.⁹ The protolanguage ‘is not a true language, but it’s made up of languagelike elements’ (2010: 40). Its users produced ‘short and shapeless and disconnected utterances,’ as one may encounter in especially child language and incipient pidgins, which he considers to be its modern fossils (p. 40). They lack the kinds of syntactic rules and constraints one finds in a ‘true language.’

Like Slobin (2002), Mufwene (2008, 2010b) argues against this characterization of particularly pidgins and child language, products of humans endowed with *Homo sapiens sapiens*’s mind. Moreover, one must be cautious; the human child is not creating a language but learning the language of its social environment. The producers of a pidgin did not start from the absence of a language. Nor did their minds regress to the state of *Homo erectus*’s mind when faced with the challenge of communicating with another population in a language other than their own and without sufficient exposure to the target language. If anything, pidgins tell the extent to which a modern language can be reduced without losing the status of a language, therefore what are the most central/essential architectural materials a language cannot do without. Assuming that language has evolved gradually, they also tell us what in the architecture of language is so deeply entrenched that it cannot be dispensed with (Wimsatt 2000). Gradual emergence assumes a lot of scaffolding (Wimsatt and Griesemer 2007), a position quite implicit in grammaticization hypotheses, in which later developments are built on earlier ones. That order of evolution would more or less determine what can be dispensed with, in a less costly manner, if the system must be reduced to an earlier functional modern stage. We also learn that the architectural complexity of a language can be correlated with the communicative needs of its creators/users, not necessarily with the complexity or sophistication of their mental structure. Pidgins are by-products of contact settings where communication was minimal and sporadic (Mufwene 2008).

Bickerton also hypothesizes that language must have started with labels that were iconic. Symbolic communication would evolve later, making human language more different from animal means of communication. It’s not clear whether symbolic items were already present in the putative protolanguage or whether they emerged in ‘true language.’ I am not sure that his quoting Terrence Deacon’s assumption that ‘symbolism’ emerged ‘probably not until *Homo erectus*’ (Bickerton 2010: 50) answers the question, though he concedes to Deacon (1997) that symbolism, rather than syntax, is what distinguishes humans from animals (Bickerton 2010: 49). Symbolism enabled what Hockett (1959) identified as ‘displacement,’ the ability to talk about entities and states of affairs that are not in the *hic et nunc* of interactions, and thus the ability to talk also about the past and the future, as much as about fictional scenarios. All human

⁹ Note that some scholars, including Corballis (2010) and Lieberman (2010), now think that modern language may not have originated before 50,000 years ago or so, thus much later than *Homo erectus*, apparently during *Homo sapiens sapiens*, and this event may have coincided with the last exodus out of East Africa. (I return to this below.)

populations have developed the capacity to narrate stories and even construct myths of all kinds thanks to the world-creating power of language. This is not possible in animal communication, even after they have been taught to communicate with humans. The reason appears to lie not so much in our invention of symbolic language as in our being endowed with the mental capacity that enabled us not only to produce it but also to do more with it.

On the other hand, Bickerton appears to contradict himself in some ways, when he elaborates on the architecture of his ‘protolanguage’:

[T]he words of protolanguage, even if vocal, could not have been divided into component parts [i.e. sounds], and would likely sound to us like meaningless grunts or squawks. But, like today’s words, each would have a fairly well-defined range of meaning, and that meaning, rather than relating directly to the current situation, would refer to some relatively stable class of objects or events, regardless of whether or not these were present at the scene. (2010: 66)

This sounds very much like symbolic communication minus phonetics and syntax. Except for symbolism, protolanguage would be a more elaborate version of primates’ calls and gestures, raising the question of why Bickerton compared it to child language and incipient pidgins, which have human linguistic properties. These varieties have basic syntax, variable as it may be in the case of pidgins. In addition, it is not clear how consistent he is with the concession he makes to Deacon. If the latter version is right, reference would have started before ‘true language’ emerged, though ‘true language’ would refine reference by the addition of specifiers such as demonstratives and articles, as well as possessive constructions. The question of when such strategies developed is as worth investigating as that of when parts of speech emerged, and what the emergence entailed regarding the complexification of the architecture of grammar.

One of Bickerton’s most problematic positions is his claim, like Condillac’s, that language emerged to enhance human capacity for thought. In addition to Chomsky’s (2010) observation that ‘we have almost no idea what LOT would be’ (p. 226, n. 24), we must ask why anybody would need a language of thought that would slow down their thinking process with the constraints of linearity? What is so more efficient about conceptual categories that are labelled linguistically when they can be identified non-linguistically, as is often obvious when speakers do not have words for ideas they want to express? Granted, human languages have a world-creating capacity; but isn’t language more for sharing conceptualizations across speakers rather than for conceiving the scenarios that are shared?

In a different vein, some linguists such as Croft (2000), Wang and Minett (2005), Mufwene (2008, 2010b), Beckner et al. (2009), and Lee et al. (2009) also now conceive of languages as complex adaptive systems, which presuppose no permanent sets of rules that guide linguistic behaviour. Instead, linguistic rules are interpreted as emergent patterns produced by self-organization, in a way similar to other natural phenomena involving complexity. This position does not remove from mankind its agency in the emergence of language; it simply means that, throughout the *Homo* genus phylogeny,

the individual acts of solving communicative problems did not include anticipation or a plan to develop what Antoine Meillet identified as a ‘système où tout se tient’. The interactants never had/have any foresight of what their communicative ‘system’ will be like in the future or once it is presumably completed. The focus is always on the *hic et nunc* ecological pressures for adequate or successful communication.

Patterns, which linguists have identified as ‘rules,’ are therefore consequences of habits that the interactants have developed, based largely on analogies that obtained among items (Mufwene 2008), as when, in English, verbs of intention combine with verbal complements in the subjunctive or the infinitive but verbs of prohibition (such as *prevent* and *discourage*) combine with verbal complements in the gerund, sometimes preceded by the preposition *from*. Because there are cross-linguistic similarities across languages, though the patterns are not identical, it is interesting in terms of evolution to understand why such variation is the case.¹⁰ Thus, are there any particular cognitive pressures that impose on speakers only the typological options that have been attested in human languages but not others? Why would such a mood as the SUBJUNCTIVE, as opposed to the INDICATIVE, have emerged, even if it is not universal? Why didn’t some other kinds of strategies develop for complements of verbs of intention and prohibition?

Would such constraints provide evidence for Charles Darwin’s hypothesis that mental evolution drove the evolution of language rather than the other way around? This kind of question has generally not been addressed, though it arises as an issue from Bickerton (1995). He could not address it, because he assumes that language emerged to enhance human capacity for thought; therefore the conceptual infrastructure could not possibly influence how language would evolve. Is there any hope that cognitive grammar, functional grammar, construction grammar, or any other approach to syntax that does not rely overly on what Lieberman (2006: 61) calls ‘theories of data’ may help us address the question adequately? Or are the approaches that assume that language is primarily a means of communication misguided? In any case, emergence is antithetic to design. If the claim that language emerged out of hominins’ attempts to communicate at various stages of their evolution is correct, then it may be misguided to continue using Hockett’s (1959) ‘design features.’

Much of the current scholarship on the evolution of language has been more global, focusing on the correlation between, on the one hand, the different stages of the evolution of the mental and anatomical structures of the *Homo* genus and, on the other, the apparently gradual emergence of language, especially since *Homo habilis*. These include but are not limited to Bickerton (1990, 1995, 2007, 2010), Lieberman (1984, 2002, 2006, 2010), Corballis (2002, 2010), MacWhinney (2002), Fitch (2002,

¹⁰ Dor and Jablonka (2010: 140) comment on this as follows: ‘as more and more elements came to be canalized, and the language came to assume a certain architectural logic, the logic gradually imposed system constraints on what the next viable innovation would be.’ This underscores Wimsatt and Griesemer’s (2007) idea that current forms and/or structures provide the scaffold for innovations. From the point of view of the evolving system, they refer to this extension of the notion as ‘self-scaffolding.’

2010), Tomasello (2008), Tomasello et al. (2005), McNeill (2005), McNeill et al. (2008), MacNeilage (2008), Mufwene (2008, 2010b), and Hombert and Lenclud (in press). All but Bickerton argue for gradual, protracted evolution. Tomasello stresses the significance of ecological pressures exerted on hominins by their increasingly more complex social lives, which required management by means of efficient and explicit communication. Modern language would provide this, driven by the same mind that was ready to handle the corresponding complex social interactions. He argues that cooperation and joint attention played as important a role in the emergence of language as in social organization. He shares with Sperber and Wilson (2002) (see also Sperber and Origi 2010) the ‘theory of mind,’ which enables interactants to second-guess each other and thus to infer the intended meaning. All these factors enabled the emergence of symbolic language, the characteristic that indeed led Deacon (1997) to identify mankind as the ‘symbolic species.’ As noted above, symbolic communication is, according to the latter, the characteristic that clearly distinguishes human communication from animal communication. Sperber and Origi (2010: 131) conclude:

From a pragmatic perspective, it is quite clear that the language faculty and human languages, with their richness and flaws, are only adaptive in a species that is already capable of naïve psychology [i.e. mind-reading ability] and inferential communication.

Corballis, MacWhinney, and McNeill also argue that the earliest ancestors of human language could not have been vocal. Whereas Corballis and MacWhinney originally estimated that the embryonic forms of speech may have started as early as 500,000 years ago, Corballis (2010: 115–16, 119, 123) argues that only language, using gestures, may have started that early, with some complex grammar for that matter, and that the contribution of *Homo sapiens* since about 100,000 years ago was the introduction of speech. This may not have evolved to its modern forms until about 30,000 years ago. To be sure, Corballis does not claim that the switch was abrupt or that no phonetic vocalizations occurred before *Homo sapiens*. What he means is that gestural communication was dominant and verbal communication did not prevail as the dominant means of communication until *Homo sapiens*. It still took tens of thousands of years to evolve to modern phonetic norms.

Corballis’ new position is echoed by Lieberman (2010: 175):

McCarthy, Strait, Yates and Lieberman (forthcoming) found that the necks of the Middle Paleolithic fossils who lived about 100,000 years ago were too short to have a pharyngeal SVTv [vertical supralaryngeal vocal tract] that was equal in length to SVTh [horizontal SVT]. A similar constraint rules out Neanderthals having a human SVT. Surprisingly, neck lengths that would support a fully human SVT are not apparent in the fossil record until the Upper Paleolithic, some 50,000 years ago, when a blossoming of complex tools and art appears in the archeological record [...] the sudden appearance of an array of advanced artifacts has been taken to be a sign of cognitive advance. [...] The presence of a human SVT in a fossil hominid can be regarded as an index for the reiterative neural substrate that

makes voluntary speech possible. And that neural substrate also plays a critical role in making syntax, cognitive flexibility, and, yes, dancing possible. Speech, language, and some degree of cognitive flexibility surely were present earlier, but the presence of a SVT specialized for speech at the cost of choking places a date stamp on when brains like ours definitely existed [and presumably on when, or after which, modern languages did too].¹¹

McNeill's work certainly indicates that speech has not become the exclusive means of communication to date, as it is usually complemented or supplemented by gestures. Kegl et al. (1999, on Nicaraguan Sign Language), Goldin-Meadow (2003b, on home sign language), and the rest of the literature on sign language (see Woll, Ch. 4 below) suggest also that mankind could have evolved to become predominantly signers rather than speakers.¹² It appears to me that biology-style natural selection *did* drive the evolution of language conceived of as the cumulative manufacture of particular communicative technology under specific ecological pressures that favoured speech as its medium. Givón (1998, 2002) cites advantages such as the ability to work and communicate at the same time and the ability to communicate in the dark or in spite of barriers to vision. MacNeillage (2008) and Allan (2010a: 233) also invoke the broadcast capacity of speech, a factor that, according to Dunbar (1996), fostered the emergence of speech, as it enables the speaker to 'groom' (interpreted here charitably in the sense of 'socialize with') several rather than one other person at a time.¹³ Broadcasting certainly widens the radius of message transmission. Corballis (2010: 122) and Mufwene (2010b: 305) invoke, in addition, the fact that speaking uses less energy, as it depends on compact articulators that move in a much smaller space and proceeds faster. To be sure, signing compensates for this in not being absolutely linear, though the signer's hands probably cannot keep up with the speed of a normal speaker's speech organs.

These considerations are nonetheless not the full story. Signing has its advantages too. As John W. Wenzel (p.c., 24 Jan. 2009) pointed out to me, signing is useful when silence is required, such as during group hunting, or in situations where speaking would place the speaker in danger (such as before a carnivorous predator), or when one is diving. It looks as though our hominin ancestors would have weighed the pros and cons of speech vs signing as the primary technology for communication. All these

¹¹ [McCarthy, Strait, Yates, and Lieberman (forthcoming) is still being revised as we go to press, and its title is not yet determined.–*Editor*] The shift from Corballis' (2002) and Lieberman's (2002) early conclusion about when phonetic language emerged underscores the stronger empirical foundations of today's speculations on the evolution of language. New paleontological discoveries and a better understanding to modern humans' neural circuitry will shed more light on the subject matter.

¹² MacNeillage argues against this perspective, citing not only the assumption that the ability to vocalize started before *Homo habilis* but also 'the greater organizational similarity between speech and birdsong than between speech and sign language' (2008: 309).

¹³ Bickerton (2010: 28) disputes this account, on the grounds that 'it fails the ten-word test, what you might call the test of immediate utility.' To be sure, grooming falls in the category of ecological explanation; it provides actuation for the emergence of language but says nothing about how the emergence occurred. It is undoubtedly one of the many social reasons and is not mutually exclusive with any particular account of how things proceeded, including Bickerton's own account.

dangerous situations are not part of humans' default mode of existence, in safe environments and interacting in dyads or triads rather than in large groups. If Tomasello (2008) is right about the significance of social life as an ecological pressure on the emergence of language (see also Corballis 2010: 116), then interactions in situations of no danger must have favoured the advantages that speech offers over signing, though we now know that one can express in signed language anything that can be expressed in spoken language. Interactions in situations of danger might explain why gestures have not been completely eliminated, especially if one factors in their tendency to be iconic.

However, Fitch (2010: 442–5) articulates more explicitly some of the counterarguments developed since Hewes 1996 about this evolution, highlighting more advantages of signing over speech. Auditory attention is freed while signing, and gestures can be more efficient while teaching a partner to make tools (aside from the fact that actions are more often learned by observation and imitation than from somebody else's verbal teaching). Speech may be more energy-efficient, as it depends on articulators that are smaller than those involved in signing. However, as MacNeilage (2008) points out, the latter is not structured in exactly the same way. So, according to Fitch, there is still no convincing explanation for why speech has prevailed as the demographically dominant medium of human language.

It appears that the study of the evolution of language will be enriched by a better understanding of changing ecologies of the *Homo* genus, within and outside the species, during its protracted evolution. It will be informative to learn more about the role played by obvious major ecological factors such as its neural, mental, and anatomical structures, the evolving social structure, and all the pressures they exerted on the emergence and evolution of language. It is crucial to identify individuals as the most direct ecology that filters the external ecological pressures, because the structures and vitality of languages are determined not by concerted behaviours of populations but rather by accumulations of individual behaviours, which occur without foresight of consequences but just happen to converge toward certain outcomes. (See also Dor and Jablonka 2010 for a related discussion.) Each communicative act is determined by particular ecological pressures to which the communicator responds in the *hic et nunc* of the interaction.

Much of the recent scholarship has focused just on the emergence of speech, especially regarding the transition from ape-like holistic vocalizations to phonetic communication, and the relation of this aspect of the evolution of language to that of the relevant neural circuitry and anatomical structure. This is probably also an area that is less abstract than syntax and semantics and easier to speculate on with more paleontological evidence. Space and time constraints force me to focus here on Philip Lieberman, Peter MacNeilage, and Alison Wray, though many others deserve attention.

MacNeilage (2008) presents perhaps the most extensive discussion to date, which, as noted above, also questions, like Lieberman (2006), the empirical justification for the notion of UG and its relevance to accounting for the emergence of language. According to him, speech evolved in several steps, starting with the cooption for phonation of

organs that had evolved for ingestion. The rhythmic pattern of the relevant organs was subsequently exapted for vocalization in CV syllables, which could be reduplicated as in child language; but reduplication was abandoned for ‘syllabic variegation and (the related) restrictions on VC co-occurrences’ in the production of words, as ‘pressures on speech systems to expand the size of their message sets’ increased (MacNeilage 2008: 320). Eventually, longer utterances corresponding to sentences would evolve, but MacNeilage does not discuss this particular aspect of the evolution of language. However, he leaves ‘some latitude for different dialects and for individual differences’ to have been part of the emergence process. (He does not specifically tackle the monogenesis/polygenesis issue.) Against the role that UG, he writes:

For language in particular, mirror neurons provide the foundation for a more encompassing embodiment-based neuro-cognitive alternative to UG, one that goes beyond the mechanisms that lie between meaning and sound, considered separately, by including meaning and sound in the same picture, and giving us a better basis for the relationship.

The embodiment perspective was primary in my attempt to say how the first words were made. I suggested that the phonetic structure of the first words resulted from the cognitive pairing of an observed *action* [...] with a concept. (p. 326)

To be sure, MacNeilage brings us closer to articulating Wray’s (2002) hypothesis that the *Homo* genus evolved from holistic vocalizations to phonetic communication. However, it is difficult to link both scholars here, largely because they do not start from the same working assumptions. MacNeilage does not subscribe to Bickerton’s protolanguage any more than to UG. A natural bridge between them is Carstairs-McCarthy (1999), who, not unlike Jean-Jacques Rousseau, argues that Wray-style vocalizations would have been articulated into syllables first and later into the segments that these consist of. This evolution would have resulted in phonetic communication, though, as noted in §1.2, it raises the question of whether vowels and consonants arose at the same time, and whether ‘syllabic variegation’ started in the way hypothesized by Rousseau and by MacNeilage (with CV syllables) or initially just with variation in the quality of vowels—which would raise the question of how long the initial polysyllabic words consisting only of vowels could be. In the relevant passage quoted in §1.2, Rousseau suggests that the initial vocalizations consisted of vowels only, and consonants were innovated to mark syllabic boundaries. The fact that in all languages around the world the vast majority of syllabic peaks consist of vowels makes these considerations an interesting question for students of the evolution of language.

An informative complement of the above discussion on speech comes from Fitch’s (2010: §8.3) summary of the state of the art about the evolution and functions of what linguists call ‘speech organs,’ which, based on the foregoing, are but exaptations of anatomical structure that evolved primarily for breathing and ingestion of food and liquids. Their use for speech is a perfect illustration of exaptation as defined by Gould and Vrba (1982):

A character, previously shaped by natural selection for a particular function (an adaptation), is coopted for a new use—cooptation. (2) A character whose origin cannot be ascribed to the direct action of natural selection (a nonadaptation), is coopted for a current use—cooptation. (Gould and Vrba, copied from *Wikipedia*, 1 Mar. 2011)

Fitch starts by noting, ‘Many animals open and close their jaw in the course of a call [...] and changes in lip position are almost as common’ (2010: 311). The role of the descent of the larynx in the emergence of speech has been exaggerated, especially also in the interpretation of the feature as uniquely human. It is attested in other animals too, though in many of them the descent is not permanent. Its role in non-humans is to exaggerate size, and humans too exploit this feature: ‘it is really the descent of the tongue root [...] that is the critical factor in speech production, rather than the descent of the larynx *per se*’ (p. 312). Fitch agrees with Lieberman et al. (1972) that ‘hominids *must* have had some form of speech [intended as ‘language’] before the descent of the larynx’ (p. 313)—which does not mean that they had modern language.

Based on Lieberman (2006, 2010), discussed above, one must ask when (i.e. at what stage of hominin evolution) the larynx descended. According to Lieberman (1984, 2006), this otherwise maladaptive phenomenon (which puts humans at the risk of choking while ingesting) was probably a consequence of the reconfiguration of the basicranial structure after the hominins became bipedal. This says nothing about the phylogenetic time of the emergence of the feature. However, it is informative to know more specifically that the descent of the larynx was a consequence of the descent of the tongue root down the pharynx, pushing the larynx down, as happens now in human infants (Lieberman 2007: 46). This anatomical feature must have been selected because of the advantages it conferred to the further evolution of speech into its modern form. Fitch concludes:

Not only does the descent of the larynx enlarge our phonetic repertoire, but it does so in a way that enhances speech encoding and decoding [...] and it give[s] us the point vowels [i/, /a/, /u/] that are found in all human languages, particularly the ‘supervowel’ /i/, which plays a central role in the vocal tract normalization. (2010: 315)

[T]here must be functions of a descended larynx other than increased phonetic versatility [...] leaving size exaggeration as the most plausible explanation. (p. 321; Fitch’s italics)

[T]he primary evolutionary changes required for [modern] spoken language were neural, not changes in vocal anatomy. (p. 362)

This conclusion confirms Darwin’s (1871) position that the mind drove the emergence and evolution of human language, as it enabled hominins at successive stages of their phylogeny (mental and physical) to coopt parts of their anatomy to develop various stages of the language technology. In other words, **by** the increasing power of their minds, hominins and humans gradually domesticated their anatomies to produce the communicative technologies called languages. I submit again that the mind is really the

most important feature that distinguishes mankind from other primates, and certainly other animals, although it does not function identically in all individuals, not any more than their physiologies are identical. Language is after all a collective gradual invention (by emergence).

The implications of this position are worth exploring further, since no two speakers have identical competences in any language they speak and/or sign. This interpretation is consistent with the notion of IDIOLECT, whose features, as noted above, are determined as much by the variation in the interaction histories of speakers/signers (Mufwene 2008: 120, 126) as by their individual learning capacities as determined by their mental and anatomical singularities (Dor and Jablonka 2010: 139).

It should be obvious by now that students of the evolution of language do not share identical working assumptions. Nor have they focused on the same research questions. Some have been more interested in the particular interactive dynamics that made it possible for language as a communal phenomenon to emerge. This is especially the case for Croft (2000, 2003b, 2008), Tomasello (2008), Tomasello et al. (2005), and Mufwene (2001, 2005). Croft and Mufwene have patterned their approaches on biological evolution. Assuming an emergentist construction grammar, Croft has assumed that utterances are replicators, which vary across individuals and are in COMPETITION, which is explained by Mufwene 2008 as a situation in which the variants are not equally rated by users. The competition is resolved by SELECTION, which can be interpreted as in biology, when a variant prevails over another or others, for any number of reasons in the relevant ecology.

Mufwene has gone as far as to argue that individual languages are the counterparts of viral species, with their organisms being the idiolects of particular speakers/signers. He posits a FEATURE POOL in which the variants produced by different speakers/signers are in competition and the machine that runs selection lies in the ecologies in which languages are used. The challenge is to define ECOLOGY, which has usually been understood as the social environment, with all the pressures emanating from population structure. I now think that, regarding the evolution of language, the ecology that matters the most lies in the different evolutionary stages of the mental and anatomical structures of the *Homo* genus. They determine what forms the relevant means of communication could assume.

Where both Croft and Mufwene hope to inspire those focusing on strictly phylogenetic topics and issues is especially the way they invoke INNOVATORS and SPREADERS/COPIERS (concepts also used by Tomasello 2008 and Tomasello et al. 2005) to account for the emergence of new linguistic features, which can, for convenience, be explained roughly here as applying to forms and constructions. As different innovators need not introduce the same features, competition arises, and various ecological factors determine which variants will prevail for which specific functions, there being room for free variation too. Selection is not made consciously, but is the cumulative outcome of choices made at different times by speakers/signers in their utterances. Since most interactions are dyadic or triadic, and since speakers do not normally hold meetings to state which particular variants they prefer, the question arises of how norms emerge.

Both linguists have at times invoked the ‘invisible hand’ but have been invoking ‘self-organization’ in their recent works, after familiarizing themselves with complexity theory.

EXAPTATION has been a recurrent concept in the literature, underscoring the (self-) scaffolding aspect of language evolution. This has been implicit in many of the discussions above, but the term has increased in currency especially regarding the emergence of speech (see Oudeyer 2006 for an extensive discussion.) It is also applicable to the emergence of grammar, especially in the process called ‘grammaticization’ or ‘grammaticalization,’ whereby some verbs or nouns are exapted to be used as function words, such as complementizers or prepositions. Regarding the emergence of grammar itself, the boldest attempt is to be found in Heine and Kuteva (2007), who, in the footsteps of Herder and Max Müller, claim that the initial language consisted just of nouns and verbs; all the other categories are derivatives from these. They do not explain how, among other aspects of grammar, predication and different strategies for specifying reference and time evolved, or under what particular ecological pressures, though they explain, on the basis of synchronic linguistic evidence, how particular markers may have acquired grammatical meanings.

I will conclude this selective survey of topics addressed in the past two decades on the evolution of language with a brief discussion of the emergence of linguistic diversity. It is particularly significant because universals and typological variation have been central in linguistics since Greenberg’s (1966) landmark publication on the subject. Even ~~the~~ generative linguists’ preoccupation with principles and parameters as they are constrained by UG is a consequence of the pioneering work of Greenberg, though UG is not synonymous with language universals. The question is critical especially because most of the literature has assumed or suggested monogenesis; it has typically not mentioned variation in the protolanguage or the earliest ancestor of modern language. As a matter of fact, as noted above, Swadesh (2006 [1971]) assumed that because the original ancestor of modern language was instinctive, there could not be significant variation in it. Let’s thus focus on when speech started to emerge. Here is what Jim Hurford, one of the veteran students of the evolution of language, has to tell us:

Summarizing the factors contributing to linguistic diversity, (1) the fact that languages are learned, rather than coded into the genes, (2) the arbitrariness of the sign, and (3) the prevalence of horizontal transmission allow for great diversity, but this is significantly constrained by (4) biological factors such as memory and processing limitations, which may or may not be specific to the Language domain. (Hurford 2008: 251).

These factors account more for idiolectal variation, as there is no faithful replication in language learning (Lass 1997), than for the emergence of typological variation across languages. If populations can choose to build their languages on different words and only on overlapping phonetic inventories, what should keep them from developing different combination patterns of these units into larger utterances and therefore different grammars? If we interpret phonology as the grammar of sounds and assume

that grammars are consequences of the ways units are combined together and structured into larger and larger (hierarchical) units, why should we expect the relevant hominin/human populations at the different stages of the evolution of language to have done exactly the same thing?¹⁴ After all, the paleontological evidence does not suggest that *Homo sapiens sapiens* dispersed to the world out of one village in Africa; hominin fossils have been found in a vast area of East (and South) Africa. Shouldn't it be normal to assume that, having reached the same stage of mental and anatomical evolution, hominin populations developed languages that were comparable but not identical in their architectures? They did not have to package information in identical ways, no more than they developed identical cultures.

Another dimension of the scholarship on the evolution of language today lies in computer modelling, which I will not discuss here, due to lack of space. The rewards depend largely on the assumptions that underlie the models. When they are empirically grounded, they become important research tools, such as when used by Philip Lieberman and his associates to determine whether the Neanderthal was capable of speaking. When accurately informed and well designed, modelling can help empirical research reformulate some of its questions about a distant past that cannot be recreated. (See e.g. Oudeyer 2006 on self-organization in the emergence of language and Steels 2011 on the emergence of communal norms.)

Last but not least, there is all the research on animal communication, especially intraspecifically among non-human primates and between humans and some great apes. It is expected to inform research on the evolution of language insofar as scholars can identify both behaviours that may have been inherited from our common ancestors millions of years ago and later homologous evolutions from features shared earlier in our common phylogenetic ancestry. Unfortunately, I can do even less justice to this topic here than to those discussed above. Comparisons by Tomasello (2008) regarding joint attention and cooperation highlight the significant role which these social factors that we do not share with the other primates played in the phylogenetic emergence of human language. Fitch's and Lieberman's comparisons regarding primates' supralaryngeal vocal structures also reveal important differences that rule out the possibility that they would have developed human-like speech even if they were endowed with the same kind of mind as we have. On the other hand, discoveries that non-human primates share with us mirror neurons, the FOXP2 gene, and some of the specialized functions associated with Broca's area suggest that the human mind had a greater role to play in the emergence of language than may have been assumed before, which is precisely why our phylogenetic cousins have not even developed some symbolic-iconic system similar to sign language. Language may be a more cultural phenomenon than some of us have assumed. I submit that language is indeed one of the facets of human culture,

¹⁴ A convenient nonlinguistic illustration of this may be found in how engineers using similar algorithms constrained by the same principles produce technologies (such as computers and derivative products) that are not identical in their architectures and functionalities.

and that both linguists and anthropologists may have been misguided in speaking of language and/in culture as if they were opposed to each other on the same plane.

On the other hand, there is a growing literature suggesting that differences between animals and humans are more a matter of degree than dichotomy. Some of the capacities having to do with mirror neurons and mind-reading are very similar, which raises the question of whether human intelligence is not a consequence of the particular ways various parts of the brains and modules of the mind interact.

It has long been assumed that animal means of communication are innate but that of humans are not. However, it has also become evident that a certain amount of learning is involved in, for instance, bird songs (Margoliash 2010). Past the critical period, the bird does not develop the right song for its con-specifics! Besides, some birds exposed to alter-specifics' songs acquire it rather than that of their con-specifics. This and other factors raise the question of whether there is such a thing as language or cultural 'transmission,' analogous to gene transmission in biology, especially among humans. Unlike transmission, which, in the absence of mutations, guarantees faithful maintenance of inherited traits, learning by inference almost ensures modification of the target features, which is more consistent with language 'acquisition,' interpreted as system reconstruction (Mufwene 2001, 2008). Students of cultural evolution, such as Richerson and Boyd (2005), Mithen (2005), and Mesoudi et al. (2004), have kept up impressively with the scholarship on language evolution. We have everything to learn in reading them too.

Some of the more popular studies of animal communication have focused on what can be learned from teaching human language or an artificial system made by humans to primates (e.g. Segerdahl et al. 2005). It appears that lexigrams constitute a seriously impoverished system that does not go beyond the telegraphic stage in child language. Although great apes such as Kanzi have been credited with the ability to understand human speech, it is not obvious that they can follow a narrative the way a human child can. This highlights mental differences between non-human primates and us, though differences in mental capacities are also a matter of degree. Nonetheless, it appears that the less than 2 per cent genetic differences between chimpanzees and humans have entailed exponential cultural, and more specifically language-related, differences.

The overall approach has assumed that humans are more evolved than non-human primates, rather than just being different from them. We have not yet accounted for why we cannot learn to communicate the way they do! Answers to this question may equally well inform us about how different our minds really are from theirs or, more accurately, about how communication in all species is jointly constrained by their respective mental and anatomical ecologies. We have discussed culture as if it were peculiar to humans, whereas it can be interpreted as customary ways in which members of a particular population behave and do things. Cultural differences can also inform us about how different social structures have influenced what needs to be communicated and what kinds of systems are needed to convey the relevant pieces of information.

1.4 CONCLUSIONS: OLDER VS CURRENT APPROACHES TO THE EVOLUTION OF LANGUAGE

As aptly expressed by Fitch (2010: 389),

regarding language evolution, there are very few new hypotheses under the sun, and current debates can and should pick up where our scholarly predecessors left off. [...] here are real insights in the older literature which remain unappreciated.

Hombert and Lenclud (in press) note likewise that a number of the positions assumed today were already defended by philosophers of the eighteenth century. For instance, the claim that language is what distinguishes mankind the most clearly from the animal kingdom is already evident in Condillac. It is also hard to sharply distinguish eighteenth-century arguments for the emergence of human language out of instinctive cries and gestures from Bickerton's position that the predecessor of his 'protolanguage' consisted of holistic vocalizations and gestures. The idea of gradualism in the evolution of language is not new either; and Rousseau had already articulated the significance of social interactions as a prerequisite to the emergence of language. And one can keep on identifying a number of current hypotheses which are hardly different from earlier speculations on the subject.

An important difference between us and those philosophers and philologists before the nineteenth century, and in some cases up to then, is that we no longer assume that our hominin ancestors up to 200,000–100,000 years ago were just like us, except that they were either created by God or just happened to inhabit our planet long before we did, or just were mentally inferior to us. We now approach the subject taking into account what communicative architecture would have been possible at various stages of hominin evolution. We ask: since *Homo habilis* was anatomically different from *Homo erectus*, what kind of language would those remote ancestors of ours have been capable of developing even if they were equipped with the same kind of mental capacity as us? The same applies to *Homo erectus* and archaic *Homo sapiens*. A similar question arises regarding the complexity of utterances relative to the complexity of the hominin mind and/or social organization. What kinds of ecological pressures did they exercise on the evolution of language? Lieberman (1984), Bickerton (1990), Tomasello (2008), Corballis (2002, 2010), MacNeilage (2008), and Fitch (2010) are good illustrations of this ecological approach, although they do not draw identical conclusions.¹⁵

Another important difference between us and philosophers and philologists before the nineteenth century is that, better than Socrates in Plato's *Cratylus*, we are more

¹⁵ As a matter of fact, Bickerton (2010) now discusses the evolution of language from the point of view of 'niche construction,' which Laland (2007: 35) characterizes as 'the process whereby organisms, through their metabolism, their activities, and their choices, modify [their] niches.' (See also Odling-Smee et al. 2003 for a more elaborate discussion.) The subtitle of Bickerton (2010) captures the idea adequately: *How Humans Made Language, How Language Made Humans*.

aware of the speculative nature of our hypotheses in this research area. With few exceptions, scholars have generally been more critical and more cautious, revealing more awareness of the limitations of the state of the art.

Whether or not we acknowledge it, Charles Darwin has also exercised a long-lasting impact on us: most scholars today do not assume that language was God-given (presuming creationists to be in the minority). Even Chomsky's account that UG emerged by some rewiring of the brain is a Darwinian explanation, because Darwin made allowance for mutations, and UG could have emerged only at a particular stage of hominin evolution, quite late. Besides, mutations are probably also the best explanations from all the changes in hominin evolution, with the mutants prevailing and the rest evolving as consequences of those mutations.

We also now think of the architecture of languages as modular. This is an idea that does not appear in the earlier literature. It also frees scholars from having to assume that every component of modern language must have evolved at the same time as the others. Nor do we have to assume that the anatomical and mental structures that were coopted in the apparently gradual emergence of language all evolved at the same time. Even in assuming that the mind domesticated hominin and human anatomy for the production of language, it need not have coopted the different organs concurrently. This is the kind of evolution suggested by the paleontological evidence that experts have adduced, leading both Michael Corballis and Philip Lieberman to now conclude that speech-dominated communication must have emerged more recently, 50,000–30,000 years ago, not 500,000 years ago. This thinking is consistent with Hombert and Lenclud's (in press) conclusion that the capacity for language is a derivative and consequence of hominins'/humans' evolving cognitive capacity.

It is more and more evident that the subject matter of the evolution of language is multifaceted, having to do with the mechanical/architectural aspects of language, with the particular anatomical organs coopted for its production and perception, with the mental aspects of the technology (including the formation of concepts and their combinations into larger chunks), and with the apparently social motivation for producing the technology. It would be difficult, if not impossible, to explain how modern humans' linguistic communication got where it is now without answering various questions that pertain to these different facets of the subject matter. It is part of understanding how the *Homo* genus has evolved over the past two or three million years biologically, anatomically, mentally, and socially.