

Book Review

More than Nature Needs.
Language, Mind, and Evolution

Derek Bickerton
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*There are no grotesques in nature;
not anything framed to fill up empty cantons,
and unnecessary spaces.*

Sir Thomas Browne, *Religio Medici*, Part XV (1642)

1870. United Kingdom. *Scenes from a divorce*. Alfred Russel Wallace, the co-inventor with Darwin of the theory of evolution through natural selection, completely captivated by the melodious song of the sirens hailing spiritualism landed definitively on the controversial shores of the treason. In effect, with his essay *The Limits of Natural Selection as Applied to Man*, Wallace turned his back on the explicative power of natural selection regarding the properties that best depict humans, denying «that all nature can be explained on the principles of which I am so ardent an advocate» (Wallace, 1870, p. 133) and wondering how sophisticated skills always in use among members of learned societies may have been inlaid in the brain of savage, de facto foreign to these capacities.

We see, then, that whether we compare the savage with the higher developments of man, or with the brutes around him, we are alike driven to the conclusion that in his large and well-developed brain he possesses an organ quite disproportionate to his actual requirements - an organ that seems prepared in advance, only to be fully utilized as he progresses in civilization (Wallace, 1870, p. 342).

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The clashing note in the symphony orchestra of natural selection is briefly the fact that the brain of the savage is shown to be larger than he needs it to be.

So, if on one hand the course undertaken by Wallace to account for human evolution has been the use of supernatural explanations – «the existence of some power, distinct from that which has guided the development of the lower animals through their ever-varying forms of being» (ibid.), on the other hand the question appears to still be in search of a scientific solution.

It's precisely into the empty place of this missing tile – not by chance so called “Wallace's problem” – that Derek Bickerton lays the foundations of his last book *More than Nature Needs. Language, Mind, and Evolution*.

As indeed outlined by the same author on the first pages of his work, the specific topic of his argumentation is to explain how the human species acquired cognitive capacities that seem far more powerful than anything humans could have needed to survive, and specifically, with all due respect to Wallace, to illustrate how this could have come about without the intervention of any mysterious extra-evolutionary forces.

On the other side of the fence, Darwinian gradualism and its proud army composed of *steady slow and continuous changes* in evolution do not seem to convince Bickerton: if the march of evolution proceeds as a gradual process, and the act of natural selection was just a response to the requests placed on animals by their environment, then humans should have had a brain *little superior to that of an ape*. Thus, if Darwin surely was aware of the extent of the problem, having «no doubt that the difference between the mind of the lowest man and that of the highest animal is immense» (Darwin, 1871, p. 100), the argument he used as a counterattack, namely the continuous gradation of intellect between the “lower fishes and the higher apes”, turns out to be a statement not against the gap but for it. In fact, if the vast panorama of nature has countless animals with capacities and skills partway between those of a lamprey and a chimp, how is it that nothing resembling humans exists anywhere else in nature?

How is it that there are no animals with small or moderate amounts of self-consciousness, gradually increasing degrees of innovation and creativity, varying levels of artistic achievement (perhaps in only one or two of the arts), or at least a rudimentary language? The flat assertion of “no fundamental difference” is not (and could not have been, even in Darwin's time) a scientific statement. It was and is a pure declaration of faith (Bickerton, 2014b, p. 3).

So, the immense gap between human mental abilities and those of any other species is presented as an evolutionist's *Achille's heel* and the human mind seems to be a deeply unlikely evolutionary development. Nothing of unexpected. This particular conception is an outlet perfectly coherent with the author's whole body of work. In his *Language and species* (1990), in fact, his starting point is represented by the idea that the differences between language and the most sophisticated systems of animal communication of which we are so far aware of are *qualitative* rather than *quantitative*. Thus, he sketches the contours of his guiding light, "the Continuity Paradox", for which language must have evolved out of some prior system, and yet there does not seem to be any such system out of which it could have evolved. This particular point is restated in his consecutive work, *Adam's Tongue* (2009), in which the linguist acknowledges that «discontinuity exists, and that discontinuity is not limited to language – it extends to all aspects of the human mind. We have, first, to admit that it exists. Then we have to figure out how evolution could have produced it» (Bickerton, 2009, p. 9).

Thinking about language evolution represents an unavoidable exposure to the long-standing debates surrounding empiricist *versus* nativist theories and externalist *versus* internalist explanations. Joining state of the art research with forty years of studying language evolution, Bickerton overtakes this hackneyed "nature or nurture" refrain, underlying how the only constructive way to confront the issue is through a path of synthesis. More specifically, it should be a path that, unresponsive to philosophical or linguistic prejudices, takes into account a genetic component that furnished the basic mechanisms necessary for language and allowed subsequent variation to environmental factors. The first step oriented in the direction of such a synthetic view is to recognize that the attempt to uncover how language evolved is not just "the hardest problem in science", so as defined by Christiansen and Kirby (2003), because it is not simply a problem: it is a disguise that masks three separate problems. Furthermore, this particular kind of *three-question-marked-head* Cerberus, that guards the secrets of language evolution, represents the three problematic situations into which the general process has to be broken down and each of which, forming the backbone of the treatment, requires separate questions and separate answers in the central part of the book.

The first process under analysis is the human jailbreak from the confinement of animal communication. It emerged as a direct response of a specific ecological demand that an ancestral human relative had to face around

two million years ago, a process driven mainly by external evolutionary factors. Before defining where to put the starting grid of a like-language communication system, it would be useful to reflect about how rich or poor the cognitive state of our last alingual ancestors was. This is because the course of language development has been surely conditioned by the degree of complexity of prelinguistic cognition: intuitively, in the presence of an initially rich cognition it's possible to imagine a short trajectory for that course, whereas a longer road would have been traveled if prehumans were relatively poor in cognition. Embracing a specific tendency in the field (e.g., de Waal, 2006; Pollick & de Waal, 2007), the assumption is that communication in the last alingual relative of modern human beings has been profoundly similar to the communication existing among living apes. We then arrive at another stagnant situation according to which nonhumans must have advanced cognition and human-like concepts because there are so many things they can do, but at the same time (coup de théâtre!) they cannot have advanced cognition and human-like concepts because there are so many things they *can't* do (Bickerton, 2014b, p. 79). Thus, a way for avoiding the quagmire deriving from this so defined "Paradox of Cognition" is to delineate the difference between *online thinking*—when there is perception (it involves something that is present in the surrounding situation) - and *offline thinking*—for mental activity not triggered by an immediate external stimulus or by the thinker's current behavior (see also the distinction between *cued representations* and *detached representations* in Gärdenfors, 2003; Gärdenfors & Osvath, 2010). In this regard the pillar idea in the book is that there is no good reason for assuming nonhuman animals to be capable of an offline mental activity. The core of this belief is perched on the idea that the huge creativity and variability in human behavior rests exactly on the capacity to think offline: in reverse, the absence of this ability in all other animals would suffice to justify their slight creativity and minimal variability in behavior. The main role in carrying out offline mental activity is played by voluntary retrieval and by the existence of a hard neural linkage: any concept, in fact, has to be continuously accessible, immediately retrievable, and potentially connectable with every other one. As Bickerton affirms «it can hardly be an accident that these prerequisites, as well as being basic essentials for any complex thinking, are identical with those required for conducting fluent linguistic communication» (Bickerton, 2000, p. 270). Thus, the most meaningful breakpoint with other communication forms is represented by the capacity to transfer information about entities and events

that lay outside the immediate sensory range of the animals concerned: namely *referential displacement*.

The next step in the reasoning is to pursue a likely early hominid need to which a crucial property of language, precisely displaced reference, might have been the answer. That is because any enhancement in intelligence that is not caused by the specific requests of a particular species' niche is extremely improbable - if not impossible - (Odlin-Smee et al., 2003), and every evolutionary change answers a specific need. The need found by the author is the recruitment of fellow hominids to cooperate in butchery and in fending off rival scavengers of megafauna carcasses, beginning in east Africa some 2 million years ago (Bickerton & Szathmary, 2011). Confrontational scavenging requires recruitment. And recruitment requires cooperation. The choice between cooperation and defection is crucially based on the nature of information. The only manner in which the transfer of information, rich and precise enough to guarantee operative collaboration, is possible is by increasing existing models of communication through the addition of displacement. What resulted from this change, at this level, was no more than an enhanced form of animal communication. Over time, in social animals with large brains, the processes evolved into the enrichment of a signal inventory with the capacity of displacement sufficient enough to transform this set into a crude and structureless protolanguage. More specifically, this protolanguage was a system containing only the semantic components of language: "all that nature needed" (e.g. Bickerton, 1990, 2000, 2009, 2014a; Calvin & Bickerton, 2000).

Recruitment for confrontational scavenging forced the prehuman mind to accept the notion that the world might consist of nameable objects.

The ability to name the species would prove not only central to language when language finally emerged but would also establish the linkage between voluntary signals and their related concepts crucial for the development of both language and advanced cognition (Bickerton, 2014b, p. 88).

Through continued use for the more purposes, these displaced reference units (proto-words) would more closely resemble fully symbolic units, and the neural representation of each unit would be linked with a (presumably pre-existing) concept. The presence in the brain of representations of symbolic

units set the second process in motion: the acquisition of very basic structures for the output of the first process.

This second stage was driven by an internal development. When a new source of information becomes available, brains punctually regroup their resources, self-reorganizing in response to their own requirements, such as reducing neural connections to economize both time and energy. In the case of our brave primordial relatives, this new source was represented by a growing store of words and their associated meanings, and the wealth of information that these phenomena created. More specifically the brain, just as a capable interior designer, had to re-distribute spaces for permitting the storage of proto-words, redrawing at the same time its wiring pattern so as to link words with their opportune concepts and with one another, and also with the motor controls for speech.

Whereas in generative theory, both vocal language and Universal Grammar made their appearance simultaneously and independently from any external event (or UG preceded spoken language in the features of a language of thought) substantially because language emerged ready-made, “pretty much as we know it today”, in Bickerton’s proposal the scenery is overturned. In particular, he takes a position against the generative idea that language didn’t evolve to solve any special problem but emerged as a result of organism-internal developments, and that there need not be anything you could call proto-language (e.g. Chomsky, 2010; Piattelli-Palmarini, 2010). Thus, the assumption of Bickerton’s book is conversely that UG and the enhanced communication that would grow into protolanguage emerged separately, in the reverse order. As the linguist states, «from an evolutionary perspective, it seems obvious that words came first but had only a small subset of the properties of modern words, that their arrival precipitated syntax, and that their subsequent interactions with syntax built the set of modern properties» (Bickerton, 2014b, p. 105). The most crucial contribution of brain developments to language does not lay in the sphere of lexical parcellation but in the improvement and automation of the construction of meaningful propositions. This automation of the process of utterance consists of fixing on a stereotyped routine and then increasing the rapidity with which that routine can be executed. More precisely, *Attach, Close, and the phrase and clause algorithms* constitute, in the Bickertonian account, the totality of UG in the sense of specific computational mechanisms for generating syntax. And

syntactic infrastructure so resulted from self-reorganizing activity within the brain itself.

But originally this syntactic engine was not sufficient enough to permit those mental units to be externalized outside the brain, and there was no further round of grammatical processing. How this became possible is the story of the third process, managed by culture: the creation of the kind of language we know today. As we have seen, the human brain, once fertilized with words, developed a means that enabled our ancestral species to achieve and use language. Thus, members of our species began to use linguistic materials, constrained by fundamental elements of UG. On the basis of this bond, every further development corresponds to cultural innovations that would have to be acquired by inductive learning. For this reason, in Bickerton's argumentation, the issue about the third process is presented as strictly connected to the problem of linguistic variation. More specifically, after the brain imposed structure on the output of the first process, how was the final result not a single language but several thousand languages?

The idea of the linguist is that «once humans had the materials for a starter language, change was inevitably going to take place at a rate too fast to form a target for natural selection» (Bickerton, 2014b, p. 152). Besides the inherent instability of the phonetic elements (perhaps the first source of variables that can then be pulled in different directions by a variety of extralinguistic factors: social, cultural, or merely statistical), the other principal factor that contributed to variation and change is that UG was radically underspecified on a second level. On the one hand, there were things unspecified in UG that had to be specified in speech (this is because the brain, far from designing an optimal language, is merely satisfying its own needs for wiring economy and automated routine), on the other hand there were those cases where additional specification, though not strictly necessary for communicative purposes, was seen as enhancing the efficiency of communication.

As we have seen, the model proposed by Bickerton is structured into three steps. So, if protolanguage evolved to facilitate recruitment for confrontational scavenging, on the contrary, language (or rather that part of language instantiated in UG) did not evolve as a consequence of any particular human need, but rather it evolved to refine the brain's speed and accuracy in processing words and concepts. It was successful not to the extent that it improved human fitness but rather to the extent that it satisfied the brain's need for economy and automaticity. In the last step, culture provides the

developments and variation that characterize modern language. As noted by the linguist, «Neither brains nor individuals could have foreseen [...] that the syntax that grew out of protolanguage would create the most powerful cognitive mechanism that had ever existed» (Bickerton, 2014b, p. 162).

This precise model has its direct benchmark in the process of language acquisition by children under normal and abnormal conditions (creolization); both cases being regarded as living forms of protolanguage. The idea is that the child doesn't *learn* or *acquire* language, but rather produces it, «as an automatic reaction to the sound of a running stream of speech, with which they are almost constantly bombarded from birth onward (and even before)» (Bickerton, 2014b, p. 194). The core of language is a small set of algorithms that automatically create basic structures and that are invariant across language. Such UG is fully present throughout development, thus there's no need to postulate any form of grammatical maturation or any cognitive operation actively performed by child on it or with it: it simply sets itself in motion when stimulated by the words around it. After the first "one-word stage", in which words are few in number, produced in isolation, and very gradually acquired over a period of several months, the next "two-word stage" serves to establish some of the major word-order relationships in the target language and to develop a critical mass of words. The increasing rapidity of vocabulary growth that this mass makes possible determines the transition to the next stage: "telegraphic speech", consisting of strings of words in phrases or sentences and thus concerning grammatical inflections and simple prepositions. So, this *Language Bioprogram* (Bickerton, 1984) is a single monolithic grammar also used by children in creolizing situations in exactly the same way as it is by children in "normal", established-language settings. All that differs is the quantity or quality of primary linguistic data in the two cases.

The approach, resulting from the reasoning, satisfies the need for a synthetic view, capable of integrating the evolution of language into an overall account of human evolution. The basic Bickertonian idea is that only by taking such an approach - that regards *syntacticized* language as neither fully innate nor fully learned, but rather compounded of a learned component and an innate component - we can show how nature could have provided our species with powers far in excess of their needs. In response to the opening-stated-purpose of the book, adopting a trio of different solutions takes the author beyond the sterile and seemingly unending arguments of empiricists and nativists alike. Natural selection, internal development, and culture have all

played roles in the evolution of language. It's just that they haven't played them at the same time or in the same process.

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