

# From Wallace's Problem to Owen's Solution

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**Derek Bickerton.** 2014. *More than Nature Needs. Language, Mind, and Evolution.* Cambridge, MA: Harvard University Press.

*Out of the ground*  
*Into the sky*  
*Out of the sky*  
*Into the ground*  
'Very Ape', Nirvana (1993)

## 1. Introduction

Nineteenth century biological treatises are almost unexceptionally beautifully crafted works of art, whose closing *perorations*—respecting the essentials of the classical rhetorical cannon—are a never-ending source of literary joy. Darwin's (1859) words at the end of *On the Origin of Species* are well remembered for this reason, but nowadays readers would also certainly be greatly surprised by other contemporary masters of the genre, were their works as accessible as Darwin's still are. We are particularly thinking of Richard Owen: For example, the final pages of the third and last volume of *The Anatomy of Vertebrates* (1868), where he confesses himself a tough-minded materialist concerning such delicate matters as the essence of life or the nature of mind; and, above all, the final section of *On the Nature of Limbs* (1849), a beautiful literary exercise that includes something alike to a twin-earth thought experiment. Owen speculates there that given the astronomers' certainty that basic conditions of other planets and their associated satellites might be as beneficial to the proliferation of life forms as those actually benefitting it in the Earth, such forms should be not very different from the ones we presently know here, as these are constrained by laws of variation affecting a restricted array of basic forms that define the realm of the organic. Let us quote Owen's beautiful prose at large:

The naturalist and anatomist, in digesting the knowledge which the astronomer has been able to furnish regarding the planets and the mechanisms of the satellites for illuminating the night-season of the distant orbs that revolve round our common sun, can hardly avoid speculating on the organic mechanism that may exist to profit by such sources of light, and which

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must exist, if the only conceivable purpose of those beneficent arrangements is to be fulfilled. But the laws of light, as of gravitation, being the same in Jupiter as here, the eyes of such creatures as may disport in the soft reflected beams of its moons will probably be organized on the same dioptric principles as those of the animals of a like grade of organization on this earth. And the inference as to the possibility of the vertebrate type being the basis of the organization of some of the inhabitants of other planets will not appear so hazardous, when it is remembered that the orbits or protective cavities of the eyes of the Vertebrata of this planet are constructed of modified vertebræ. Our thoughts are free to soar as far as any legitimate analogy may seem to guide them rightly in the boundless ocean of unknown truth. And if censure be merited for here indulging, even for a moment, in pure speculation, it may, perhaps, be disarmed by the reflection that the discovery of the vertebrate archetype could not fail to suggest to the Anatomist many possible modifications of it beyond those that we know to have been realized in this little orb of ours.

The inspired Writer, the Poet and the Artist alone have been privileged to depict such. (Owen 1849 [2007]: 83–84)

It is a happy coincidence—as Richard Owen has never been a point of reference of Derek Bickerton’s lifelong project of figuring out the origins and evolution of language—that Bickerton’s own *peroration* in his last book also contains a reflection along the same speculative, almost dreamlike mood. Let us also quote (from here on, we will refer to Bickerton’s book as *MTNN*, with page or chapter numbers added when appropriate):

[T]here is still a strong possibility that, on any planet that hosts life forms, some species that has reached the chimpanzee-dolphin-crow level of cognitive capacity will eventually adopt a niche similar to that occupied by ants, bees, and human ancestors on this planet. [...] [T]hen other planets with “intelligent life” become perhaps unavoidable.

In the week these lines were written, Harvard astronomers, analyzing new data from the Kepler telescope, estimated that there might be as many as 17 billion Earth-size planets in the Milky Way alone, a sizable percentage of which would have orbits within a zone congenial to life [...]. Earth, far from being the galactic anomaly many previously believed, is as ordinary a planet as the last common ancestor of apes and humans was an ordinary primate. To speculate further is premature, but these findings strongly suggest that the array of life forms on these planets may differ little in their cognitive spread from those found here, and that consequently “intelligent life,” far from being a rare or even unique aberration, may have multiple loci throughout the universe. (*MTNN*: 273)

This review of *MTNN* is mostly devoted to show that what strikes us as a happy coincidence is more than a simple matter of literary style.

## 2. The return of another hopeful monster (or the raise of neo-Owenian biolinguistics)

Surely enough, readers may have guessed that Owen and Bickerton are defending exactly the same stance in their respective texts above: Namely, that given patterns of organization unavoidably linked to particular environmental con-

ditions, the array of conceivable paths of diversification from such patterns must be constrained (and radically so) in a law-like manner. Granted that Owen is referring to the constrained plasticity of vertebrae to compound structures like cavities or limbs, while Bickerton is writing about brains and their associated cognitive capacities. But it is an additional happy coincidence that Owen also devoted similar reflections to the case of brains. It can be witnessed in passages like the following one, which in the original is preceded by an exposition of the major morphological distinguishing features of the varying complex versions of the mammalian brain:

In Man the brain presents as ascensive step in development, higher and more strongly marked than that by which the preceding subclass was distinguished from the one below it. Nor only do the cerebral hemispheres overlap the olfactory lobes and cerebellum, but they extend in advanced of the one and further back to the other. Their posterior development is so marked that anthropotomists have assigned to that part the character and name of a 'third lobe:' it is peculiar and common to the genus *Homo*: equally peculiar is the 'posterior horn of the lateral ventricle' and the 'hippocampus minor,' which characterize the hind lobe of each hemisphere. The superficial grey matter of the cerebrum, through the number and depth of the convolutions, attains its maximum of extent in Man.

Peculiar mental powers are associated with this highest form of brain, and their consequences wonderfully illustrate the value of the cerebral character; according to my estimate of which, I am led to regard the genus *Homo* as not merely a representation of a distinctive order, but of a distinct subclass, of the Mammalia, for which I propose the name *ARCHENCEPHALA*.  
(Owen 1859: 25–26)

We have only to lament that Owen's ideas in passages like this one have been historically distorted to the point of making them a gross caricature of their real import. For Owen's theses were very clear: (1) that the human brain is but a particular variant of the same organ in different species (or "homologues"), the diversity of which may be described by means of a few distinctive criteria; (2) that, as a matter of observation, this particular variant diverges from its closest homologues more than the latter diverge from their corresponding ones down in a scale of morphological complexity; and (3) that such a morphological contrast correlates with the gulf between the "mental powers" of humans relatively to that of the chimpanzee and other quadrumana, as "intelligence" (using now Bickerton's word) is nothing but the organic activity of brains (Balari & Lorenzo 2013a). More than a century and a half ago, Owen was as convinced as Bickerton is today that the "specialness" of humans ("peculiar mental powers are associated with this highest form of brain," Owen 1859: 26; "humans have large brains with unusual computational capacities," *MTNN*: 45) was a matter of fact, not of faith. No wonder their solutions to such a defying biological question are constructed along very similar lines. As defenders of a self-assumedly Owenian project aimed at disentangling some of the most recalcitrant difficulties in order to frame the evolutionary understanding of cognition and language within normal explanatory parameters (Balari & Lorenzo 2013b), we cannot but welcome Bickerton's new and highly promising attempt in a congenial direction.

We want to stress from the start that *MTNN* is a quantum leap relatively to Bickerton's previous *Adam's Tongue*—a failed effort to explain “how humans made language, and language made humans,” as the book promised in its subtitle (Bickerton 2009). As Bickerton self-acknowledged after a review that we targeted to the book (Balari & Lorenzo 2010a), *Adam's Tongue* was “about the transition from the alingual state that characterizes all other species to something that might qualify as a genuine precursor of language” (Bickerton 2010: 128), but it had almost nothing to offer beyond that, in clear contradiction with its declared purpose. In *MTNN* Bickerton offers an honest diagnosis of why *Adam's Tongue* was a flawed project and also a very interesting plot to overcome its many shortcomings.

As for the diagnosis, Bickerton coins in the book the suggestive name of “Wallace's Problem” as a shortcut for referring to the problem that threatened to leave his original project into a dead end. This apt name reminds us Alfred Russel Wallace's conclusion that such typically human skills as language or music, but also some physical characters like the loss of hair or the shape of the hand, were far beyond the explanatory scope of Natural Selection (see, for example, Wallace 1870, and the valuable comments in Shermer 2002: Ch. 8), the idea that Wallace conceived independently of Darwin (Darwin & Wallace 1858). Some decades after originally formulating his point, Wallace expounded it with the following words:

In [“The limits of natural selection as applied to man”] I apply Darwin's principle of natural selection, acting solely by means of “utilities,” to show that certain physical modifications and mental faculties of man could not have been acquired through the preservation of useful variations, because there is some direct evidence to show that they *were not* and *are not* useful in the ordinary sense, or, as Professor Lloyd Morgan well puts it, not of “life-preserving value,” while there is absolutely no evidence to show that they were so. In reply, Darwin appealed to the effects of female choice in developing these characteristics, of which, however, not a particle of evidence is to be found among existing savages races. (Wallace 1908: 212–213)

“Wallace's problem” was certainly Bickerton's problem in *Adam's Tongue*, for he was incapable to invent a just-so story there able to make sense of the releasing of early humans from the state of proto-linguistic communication that, according to Bickerton's tale, living in a confrontational scavenging niche had left them into. We will not assess here the plausibility of this latter thesis. It has already been the target of enough criticism (Balari & Lorenzo 2010a, Arbib 2011, Clark 2011), which Bickerton has decided to plainly ignore in the new book.

As for the plot, the main novelty of *MTNN* is that Bickerton strongly adheres to the idea now that no adaptive narrative is capable of dealing with the complexities and subtleties not just of full-fledged language, but even of interlanguage phenomena like early child language or pidgins in the way of becoming creoles. Obviously enough, this does not entail (contra Wallace) that for Bickerton, no biological explanation can be offered to such natural developments. As a further happy coincidence, Bickerton's line of argumentation again converges with that of Owen here, who after wielding some very thoughtful criticisms against the power and the scope of Natural Selection (Owen 1860, 1866:

Preface, 1868: Ch. XL), largely ignored by today's historians and philosophers of science, articulated an alternative based on the inherently self-organizing capacity of organic matter (Balari & Lorenzo, in progress).

Bickerton's recipe for solving Wallace's problem involves disassembling particular languages in order to take apart, on the one hand, a universal component made of very basic computational operations and, on the other hand, grammar particular rules that complete and repair the former in areas of under-specification when applied in the communicative uses of language. According to Bickerton, the fact that evolutionary linguistics had hitherto been incapable of understanding the difference between the former (biological) stratum of languages and the latter (cultural) one is the main responsible of the state of stagnation of the field, mostly devoted to Byzantine debates between nativist and empiricist oriented opinions. In his own words:

In retrospect it seems bizarre that nobody, throughout this debate, proposed a principled and systematic distinction between those parts of syntax that were biologically given and those that had to be acquired through acculturation into one of the many thousands of speech communities.

But what you have just read includes, and to a considerable extent depends on, the first coherent theory of syntax that makes such a distinction.  
(*MTNN*: 274)

Fair enough; but we cannot escape pointing out that the statement in the first paragraph is, to say the least, inaccurate: Prior to Bickerton's book, the distinction was at least very clearly established, and along very similar lines, in Balari & Lorenzo (2013b), also as a necessary point of departure for an evolutionary understanding of language. Let us quote:

This problem, which we will refer to as the "dual nature of language," concerns a pervading confusion, both in linguistics in general and in evolutionary linguistics in particular, between the biological/computational system with which all members of the human species are endowed and the psychological/cultural systems every member of the species is capable of developing—namely, for the lack of a better term, "grammars." [...] The issue can be summarized very briefly by stating that it is one thing to investigate the origin of FL (with the specific technical meaning we reserve for this term here) and another, different thing to speculate on the process, contexts, and contingencies that favored the emergence of grammatical systems. We regard the former as a strictly organic question, whereas the latter concerns the interaction between biology and culture. Our contention here is that the former, the organic aspect of language, is basic—actually, prior—if we want any just-so story about the invention of grammars to make any sense at all, but also if we want to achieve a better understanding of language as a whole.  
(Balari & Lorenzo 2013b: 7–8)

Let us also clear up that we are not raising this point here as a question of property rights—incidentally, a very common issue in Victorian biology (Richards 1987). We simply want to underlie it as a further reason to align Bickerton's new ideas with the neo-Owenian current of thought defended in our own book. Obviously enough, differences also exist between the respective approaches: For instance, Bickerton's biological level is very close to the barebones of current

minimalist analyses (Chomsky 1995, and subsequent works), while our main source of inspiration are the barest essentials of the computational/representational theory of mind of approaches like that of Pylyshyn (1980). As for the cultural level, the two approaches are congenial in underscoring its value both in individual acquisition and use, but while Bickerton seems to emphasize the latter, in Balari & Lorenzo (2013b), we adhere to a primacy thesis theoretically favoring the former (Minelli 2003, Balari & Lorenzo, submitted). In this sense, Bickerton's ideas run parallel to other minimalist framed approaches to language evolution, like Longa *et al.* (2011), where it is also stressed the pressure of vocabulary explosion in the emergence of a first stratum of computational complexity (Longa *et al.* 2011: 601–604), as well as the needs of exteriorization as the main driving force leading to a further complexity stratum underlying phenomena like long-distance dependences, crossed paths, parallelisms, and so on (Longa *et al.* 2011: 610–615). But leaving aside details like these, the two approaches are coherent enough as to deem them both as neo-Owenian, for they equally give support to the idea that brain evolution as to be the site of “unusual computational capacities” (Bickerton) could not possibly be driven by Natural Selection, the alternative being certain spontaneous capacities for reorganization. In Bickerton's words:

Indeed whether the brain shows diversity within uniformity or uniformity within diversity seems to depend not on any kind of external pressure but solely on the brain's ability to optimize its own resources. (MTNN: 119)

In one of the passages where Owen confronted the means by which the complementary mechanisms of Natural Selection and of Derivation (Owen's name for his suggested principle) worked, he wrote the following:

‘Derivation’ holds that every species changes, in time, by virtue of inherent tendencies thereto. ‘Natural Selection’ holds that no such change takes place without the influence of altered external circumstances educating or selecting such change. (Owen 1868: 808)

Clearly enough, Bickerton's is a derivative rather than a selective theory—also in concurrence with Balari & Lorenzo (2013b) here. Again, there exist some differences between one approach and the other as in, for example, the role the latter concede to standard evo-devo mechanisms in driving the process, where the former shows much more confidence in ‘third factor’ (Chomsky 2005) principles of sorts alone to the same effect. But, as an aside, let us say that we understand (even if we do not share) Bickerton's (MTNN: 51–53) distrust in the application of Evo-Devo to the case of language, for it is actually the case that it has hitherto been vacuously appealed to more than truly applied in the evolutionary explanation of the language faculty (as an example see Chomsky 2010, and for a critical appraisal Benítez-Burraco & Longa 2010). We however think that Balari & Lorenzo (2013b: Ch. 6) proves that this is not necessarily so.

### 3. A brief note on the primacy of the developmental role

In the preceding paragraphs, we have highlighted a number of points of contact between Bickerton's proposals and the ones set forth by ourselves in Balari &

Lorenzo (2013b). Our main motivation, so far, was to emphasize that the solution to Wallace's problem is more Owenian than Darwinian, both in form and in spirit and, hence, closer to Evo-Devo contentions than Bickerton actually suspects. In doing so, we have mostly enumerated those elements where Bickerton's work and ours either agree or diverge, without paying much attention to the details. In the following, however, we would like to concentrate on one particular aspect of *MTNN* which, in our opinion, is perhaps the most interesting and welcome of the whole book: Bickerton's approach to variation, acquisition, and creolization.

In the first chapter of our *Computational Phenotypes*, right after expressing the need to recognize the dual nature of language in the terms illustrated by the quotation above, we delineated a very sketchy proposal as to how grammatical systems might have emerged, with some hints also as to how the problem of variation could be dealt with. Our proposal boiled down to two main assumptions: (1) that no selective theory based on the idea of the optimization of communication could ever be able to explain the presence of such grammatical features as case or agreement markers in some languages but not in others; and (2) that such features could nevertheless be understood as accidental products of the process of acquiring language, for which they acted as scaffolds and which were later preserved in the adult system for no specific purpose apart perhaps from this developmental role (Balari & Lorenzo 2013b: 15–20).

To be sure, our proposal did not go beyond this promissory note and the (implicit) indication that this was a topic for future research. *Computational Phenotypes* was, after all, a book intended to provide a detailed account of the origins of language as a computational system. In *MTNN*, however, Bickerton, in his clear bet for breadth rather than depth, devotes the second part of his book to outline a much more articulated proposal to explain the emergence of grammars and variation (*MTNN*: Chs. 6–8). Now, if we took the two or three pieces of the puzzle that we set out on the table and then added those contributed by Bickerton, the whole would conform a rather coherent and consistent image, with just a little distortion perhaps at the edges.

To summarize Bickerton's position, he doesn't believe either in the adaptive value of a single grammatical feature, although he nonetheless does believe that a collection of such features inserted in an otherwise greatly underspecified grammar would make of it a better tool for communication that would, in turn, "confer enhanced fitness" (*MTNN*: 153) to those possessing it. Thus, grammatical features would have emerged in order to repair the radical underspecification left by the biological component of language through what Bickerton describes as a speaker–hearer arms-race of sorts, where speakers struggle to minimize costs during the production of utterances and hearers wanting a maximal precision in order to prevent misunderstanding.

At first glance, this looks like a model where grammatical features are an *adult* invention introduced by horizontal diffusion (Labov 2010: Ch. 15) through several rounds of more or less fruitful acts of communication. But this cannot be so if we take into account the chapter Bickerton devotes to creoles. In chapter 8 of *MTNN*, Bickerton presents a revival of his Language Bioprogram Hypothesis (Bickerton 1981), now refurbished to fit into the more streamlined conception of UG he presents in the first part of the book. Refurbishments are minimal and

Bickerton makes a strong case for his original idea that creoles are the product of children acquiring a pidgin as their first language in a process that is completed in a single generation. We are no creolists and we can therefore not fully evaluate the details, but it is certainly the case that the picture Bickerton portrays in *MTNN* fits much better than the alternative offered by his adversaries into the well-grounded assumption that variation and change are to a large extent the product of vertical transmission from parents to children (Ringe *et al.* 2002, Labov 2010). Note that this position is accepted even by those, like Peter Trudgill, for example, who see in culture a strong factor influencing grammatical structure (Trudgill 2004, 2011).

Accordingly, Bickerton's story would run like this: Grammatical systems would have emerged through transmission of a pidgin-like protolanguage from parents to children as repair strategies to fill in the gaps left by a highly underspecified UG component. It remains an open question whether, as in the case of creoles, this would have occurred in a single generation or in subsequent transmission rounds as suggested by Kirby's Iterated Learning models (e.g., Kirby 2013); but this is just a secondary question that would certainly not undermine Bickerton's model as it is quite likely that the sociolinguistic and biological context of our ancestors was not comparable to the one giving rise to creoles.

We would like however to point out what we believe to be a flaw in this scenario. Bickerton throughout the second part of *MTNN* seems to hesitate between settling on a "facilitation-of-processing" role versus a "facilitation-of-efficient-communication" role for grammatical features. Granted, these are perhaps two sides of the same coin, but we suspect that both introduce an ecological factor in the explanation that runs the risk of seriously undermine Bickerton's explanation of the nature of linguistic variation. The point is simple and can be summarized with the following question: If what motivated grammatical features was just the need for much more efficient communication and understanding, why don't we observe what in general is observed when similar ecological conditions occur, namely convergence; or, in other words, why don't all languages have case, agreement, etc.? Indeed, why is there variation at all?

Obviously enough, the question would deserve a full-length monograph, but we would like to suggest here what we see as the key to solve it one day: Grammatical features emerged (where they emerged) accidentally in the course of language development during vertical transmission. Where they were present, they acted as "ontogenetic adaptations" (Oppenheim 1981, 1984) capable of "scaffolding" (Caporael *et al.* 2014) later stages of the process to the point that some became "generatively entrenched" and to the extent that some downstream features depended upon them (Wimsatt 1986). For example, an interpretation along these lines may be appropriate to explain some observations concerning children learning German, who do not master the intricacies of V2 phenomena until full completion of the agreement paradigm (Clahsen 1986). Moreover, well-known developmental delays selectively affecting the agreement system seem to have a similar cascading effect in children at older ages, with signs of recovering showing up after intensive therapy exclusively focused on agreement (Clahsen & Hansen 1997; see Balari & Lorenzo, submitted, for an interpretation). This "primacy of developmental role" view does not suffer from the same shortcomings

as the “ecological” approach of Bickerton. Well-understood development does not entail “development toward,” but “development from” certain previous conditions; its conceptualization must emphasize “processes” instead of “outcomes” (Moore 2003). So it is not aimed at certain pre-established goals (Thelen & Smith 1994), but it is constructed upon mere stages contingently paving the way for further stages (Oyama *et al.* 2001). Within a viewpoint like this, the expectation is not that of convergence toward predictably optimal solutions, but rather patterns of ramifications of unexpected scaffolding effects.

It goes without saying that this is an extremely sketchy idea, but we think that it ought to serve to open a salutary debate within a framework in which the basics have already more or less been agreed upon. When properly worked out, it hopefully could serve to rescue Bickerton from his present state of distrust and dissatisfaction with the idea of disentangling how language and languages could possibly have emerged through the intertwined action of biological and cultural development.

#### 4. Conclusion

Bickerton’s book describes a really fascinating journey out of the ground of proto-linguistic communication into the sky of mental computations, and out of the sky of mental computations into the ground of the vagaries of linguistic communication as dealt with by grammars. While we strongly disagree with the starting point (i.e. a scavenging related protolanguage) and only partially agree with Bickerton’s favored explanations for the underlying motivation of the endpoint (i.e. full-fledged grammatical systems), we sincerely believe that the journey is worth pursuing and, in any event, discussing. We like *MTNN*. This may come as a surprise to those who followed our debate around *Adam’s Tongue* (Balari 2010a, 2010b, Bickerton 2010); maybe to Bickerton himself, who confesses in the book to be ready for strong criticisms (*MTNN*: 271). But we actually like *MTNN* for the same reasons that we disliked *Adam’s Tongue*: i.e. for scientific, and not personal or clannish reasons. With its blind spots, *MTNN* is a well-argued and well-written book, in which Bickerton displays great doses of expertise in the fields of grammatical analysis, language acquisition theorizing and creole studies. So we feel proud of underscoring the continuity between our own efforts in Balari & Lorenzo (2013b) and related works and Bickerton’s new project. From a practical perspective, Bickerton’s is certainly a good and accessible introduction to this way of looking at the origin and the evolution of language—and of languages—and a most welcome contribution to what above we termed the neo-Owenian current in biological thought.

We hope that Richard Owen would also be proud of all us.

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