speech communities can undergo very rapid language change, especially if there is no braking effect from widespread literacy in the language or the use of the language in school and official contexts. Ideally, authors would describe the target language spoken around the children and not, for example, data gathered thirty years earlier. Some authors source target-language examples from standard reference grammars, but not all authors do, leading to examples with spellings or glosses that differ considerably from the recorded grammatical descriptions (e.g. Warlpiri exx. 2, 3a–c, 4b, 13); are they errors or hitherto unattested forms/glosses? It is crucial that each type of data be properly sourced, including the time of gathering.

Studying the acquisition of language in small speech communities is not easy—it requires mastery of the target language, good understanding of the context, and excellent relations with caregivers. These authors provide rich material for research into acquisition of language in small communities and for understanding ergativity.

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Why only us? Language and evolution. By Robert C. Berwick and Noam Chomsky. Cambridge, MA: MIT Press, 2016. Pp. 224. ISBN 9780262034241. $22.95 (Hb).

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1. Chomsky's knot. It is a good thing that we linguists are discussing language evolution, for without linguists' input, this important question cannot be properly addressed. Likewise, 'like other biological phenomena, language cannot be fully understood without reference to its evolution, whether proven or hypothesized' (Givón 2002:39, emphasis added). In that sense, Berwick and Chomsky's book is important; being written by scholars of such great stature, it sends a clear message that this topic is both timely and relevant for linguists. While there has been a slight (tacit) shift from some of their previous claims, my conclusion is that B&C's proposal still keeps them and many other linguists tied in a knot, a knot that prevents them from developing new hypotheses and angles to be explored. This leaves ample room for the alternative approaches to language evolution, the ones that B&C dismiss.

It is encouraging to see that B&C have softened, as least to some extent, their original stance on the emergence of language, as well as the vehemence of their criticism of opposing views. For example, while they do not acknowledge this, B&C have significantly shifted their estimated date of the emergence of language to up to 200,000 years ago (157), from the previous 'just a bit over 50,000 years ago' (Chomsky 2005). In this respect, they meet almost half way Dediu and Levinson's (2013) estimate that language dates back to the common ancestor of humans and Neanderthals, to some 400,000–500,000 years ago (for sharp criticism of Dediu and Levinson's claims, see e.g. Berwick et al. 2013). Not only that, but B&C no longer claim that Neanderthals did not have language. Instead, B&C now say that it is the '$64,000 question whether Neander-

tals had language' (50). This shift comes in the midst of a host of very recent findings in both archeology and genetics that point to a deeper timeline for the emergence of language. Such findings will continue to accrue and surprise us.

In this short review, I can only address a few claims among many made by B&C. I see two main threads streaming into what I call CHOMSKY'S KNOT (on analogy with B&C's references to 'Darwin's problem' or 'Darwin's troubles'). The first thread is their claim that the only serious way to approach the question of language and its evolution is to adopt the most recent theoretical postulates of Chomsky's framework MINIMALISM (in particular, the strong minimalist thesis), which reduces syntax to a single optimal operation Merge: 'UG [universal grammar] must meet the condition of evolvability, and the more complex its character, the greater the burden on some future account' of its evolution (93). The second thread is the claim that 'we simply do not have as much to explain' (11): given how simple syntax must be,[1] the evolution of syntax/language amounted to just one single, unremarkable event. In other words, according to B&C, (i) in order for syntax to be evolvable, syntax itself has to be extremely simple, and (ii) given that syntax must be super simple (as per (i)), syntax must have arisen through one single, minor mutation. This proposal is circular and entangled. It has kept many researchers tied in a knot, since this reasoning makes unclear what remains to be learned either about syntax or about the evolution of syntax.

2. DOES MERGE COMBINE *CONCEPTS*? MERGE, MOVE, PERFECTION, AND MORE. B&C simply assume that there is in fact 'the optimal situation', contra appearances (of great complexity), and that 'UG reduces to the simplest computational principles … This conjecture is sometimes called the Strong Minimalist Thesis (SMT)' (94). The claim is that the 'generative process is optimal', based on 'efficient computation' (71), and that 'this newly emerged computational system for thought … is perfect, in so far as SMT is correct' (80). However, B&C give no definition of 'optimal' or 'efficient' or 'perfect'. And they do not know if the SMT is correct (see below).

Evoking the SMT, B&C define Merge as 'the simplest possible mode of recursive generation: an operation that takes two objects … and forms from them a new object … the set' (70). But what are these 'objects' that get combined by Merge? B&C claim that Merge 'takes human CONCEPTS as computational atoms and yields structured expressions that … provide a rich language of THOUGHT', suggesting that 'these processes might be computationally PERFECT' (87, emphasis mine). But what exactly are 'human concepts', and what exactly is 'perfect' in this context? Crucially, syntactic Merge, or any other combinatorial operation that goes by different names in different linguistic frameworks, is taken by linguists to combine WORDS, and not units of thought.[2] Linguists have at least converged on reasonably reliable definitions and characterizations of what a word is, or what a morpheme is, but there are no comparable characterizations of what a human concept would be, at least none that are introduced in B&C's book.

B&C in fact state that 'the atomic elements [of Merge] pose deep mysteries'. They are 'word-like, but not words … Their origin is entirely obscure' (90). However, claiming that the purpose of Merge is to combine something that we have no characterization of is not very helpful. For if we do not know what the units of Merge are, how can we possibly know or even hypothesize about what cognitive and reproductive advantages resulted from combining them? Did B&C conclude that the only way to continue to appeal to mathematical purity and perfection, which they seek, is to replace messy and imperfect words with something intangible, something that can at least in theory be 'perfect'? According to B&C, to understand evolution 'requires a more subtle mathematical analysis, and so far as we can make out, none of the recent books on the evolution of language seem to have grasped this in full' (16). In fact, B&C suggest that Darwin did not either, since he was not mathematically minded, and they quote from Darwin's autobiography:

[1] Contra appearances, as linguists from a variety of frameworks and language backgrounds have found otherwise. B&C maintain that this appearance of complexity and diversity simply reflects 'a lack of deeper understanding' (93).

[2] The general understanding in syntactic analysis is that words have various (idiosyncratic) grammatical features that drive Merge in the first place and determine what is possible to Merge and what is not. For an accessible introduction to this framework, the reader is referred to, for example, Adger 2003.

‘ “my power to follow a long and purely abstract train of thought is very limited; and therefore I could never have succeeded with metaphysics or mathematics” ’ (16).

More intriguingly yet, given B&C’s vague proposal, how do we prove or disprove that some (or all) other animals do not have this same kind of thoughtful (and unobservable) Merge, and with it, thus, the essence of language and thinking? As B&C themselves observe, ‘we know that non-human animals excel at many challenging cognitive tasks’, such as making tools and causal reasoning (139–40).

On p. 74, there is some discussion in relation to so-called Internal Merge (formerly called Move), meant to illustrate the workings of a computationally perfect system. As B&C show, Move applies to *John is eating what* to yield the question *What is John eating ~~what~~?*, from which the initial copy of *what* is deleted (not pronounced). According to B&C, ‘to pronounce more [copies of Move] would yield enormous computational complexity’ (101). First of all, it is not clear why pronouncing copies that have already been created by grammar would increase computational cost, let alone enormously. If anything, pronouncing or deleting a copy looks like one of those surfacey ‘externalization’ phenomena that B&C have deemed irrelevant for syntax proper. And why does the very application of Move, a significant distortion of the original sentence structure, not incur more computational cost than a mere pronunciation of a copy already created? This question becomes that much more relevant in the light of the fact that in some languages, such as Japanese and Chinese, there is no (visible) Move of WH-phrases, resulting in questions of the kind *John reads what?*.

B&C further claim (74) that it is the final copy of Move that has to be pronounced (rather than initial), for ‘otherwise, there will be no INDICATION that the operation has applied’ (emphasis mine).[3] But why does there have to be an overt (externalized) INDICATION that the operation has applied, unless this is for the purposes of communication? Why would the language of internal thought care about this? Astonishingly, however, B&C proclaim that this property of syntax, to pronounce only one (final) copy, demonstrates that ‘language evolved as an instrument of thought, with externalization [communication] a secondary process’ (74).

Finally, it is rather curious to find that B&C do not in fact believe that the SMT, the cornerstone of their proposal, has been established, or that it necessarily will be. They state that ‘some years ago, SMT would have seemed a very exotic idea. But in recent years evidence has been accumulating SUGGESTING that SOMETHING LIKE THIS MAY HOLD CONSIDERABLE PROMISE. That would be a surprising and significant discovery IF IT CAN BE ESTABLISHED’ (94, emphasis mine), but ‘the SMT is very far from established’ (71). In fact, this proposal reads more like a legal document than a scientific proposal: it hedges and avoids explicit claims, and is lacking in specific hypotheses that can be subjected to verification and falsification.

3. WHAT’S WRONG WITH NATURAL SELECTION, GRADUALISM, AND DARWIN? Ch. 1 covers a host of new claims and findings in the field of evolutionary biology, with one goal being to discredit all of the recent books on language evolution. These, according to B&C, put too much emphasis on natural selection, which they argue faces serious problems.[4] However, given their blanket criticism of all of the recent books on language evolution, but lacking any specific details, it is not really possible or advisable to respond.[5]

[3] If so, then Japanese and Chinese WH-questions would need to be analyzed as lacking Move, rather than as pronouncing the initial copy, as some syntacticians have proposed.

[4] There is imbalance in this book between covering evolutionary biology vs. syntactic theory. B&C proceed as if minimalism is a given, well known, and hardly controversial, while Darwin’s natural selection is in serious trouble.

[5] In fact, as far as B&C are concerned, these recent books on language evolution should not exist at all. B&C’s book is full of warnings and reprimands aimed at these books, seen as clear undesirables. Their authors were supposed to heed Lewontin’s (1998) warning that the question of the evolution of language and cognition is almost impossible to address, and when they did address it, it was to their own detriment (B&C, p. 97). But B&C have obviously written books and articles about language evolution. Are B&C trying to say that this incredibly hard topic is only for a select few: B&C and a few close followers?

First, B&C point out that natural selection for beneficial traits is extremely hard to achieve (21–22), since there are typically also opposing forces working against it, such as genetic drift or chance. On p. 59 B&C do acknowledge that Darwin himself never thought that natural selection for a beneficial trait was the only or the exclusive mechanism of evolution. Nonetheless, for all relevant intents and purposes, natural selection in the Darwinian fashion does happen, as the authors themselves acknowledge (26) and actually adopt in later chapters (e.g. p. 59). So, perhaps the message of Ch. 1 is not that one should never invoke natural selection when it comes to language evolution, but that one should not appeal to it too much. Elsewhere in the book, however, as well as in previous work, B&C suggest that appealing to natural selection via tinkering can be symptomatic of the lack of understanding: 'if you take a look at anything that you don't understand, it's going to look like tinkering', but when things are properly understood, one realizes that there is much more order in nature (Chomsky 2002:139).

B&C point out that it is especially difficult to spread a completely NOVEL mutation, before it reaches some critical 'tipping point' in the population (80). While B&C seem to claim that one single NOVEL mutation emerged in humans and gave them Merge (and with it syntax and the internal language of thought) and that this single mutation got naturally selected (because it was beneficial for thinking and planning), it need not be the case that the ability to use syntax or language in general had to wait for a completely novel mutation to emerge. It is entirely possible that the initial (simpler) stages of language recruited elements of existing genetic makeup, possibly clusters of mutations, through the selection of those individuals who were just a little better at combining words or storing words in the memory. In fact, the problem for natural selection that B&C discuss is much more of a problem for their own abrupt and discontinuous approach, and much less of a problem for a gradualist, step-by-step approach.[6]

In Progovac 2015, I have proposed such a gradualist approach to the evolution of syntax, arguing, contrary to B&C, that one can decompose the attested complexities of syntax into evolutionary stages/primitives, with each new stage leaning on, and overlapping with, the previous one(s) and bringing about some concrete, incremental communicative benefits.[7] Utilizing certain stable theoretical postulates of minimalism and its predecessors, this approach reconstructs the initial stage of syntax as a flat, intransitive, absolutive-like, two-word stage, which does not manifest a distinction between subjects and objects. This is arrived at by peeling off the layers of sentential hierarchical structure (tense phrase/TP and transitive verb phrase/vP), but also by taking language variation into account. This foundational stage is seen as the common denominator for the attested variability in, for example, the expression of transitivity across languages and constructions, including nominative-accusative, ergative-absolutive, and serial verb patterns. Identifying such a basic stage also goes a long way toward revealing some points of contact and continuity with the capabilities of other species. For continuity is not to be sought in the most complex of grammatical abilities, but rather in the simplest of syntax.

On this approach, one need not deny the 'appearance' that today's syntax is rich and complex or that syntactic variation across languages is significant, but can actually use both to formulate concrete hypotheses about language evolution, specific enough to engage genetics, neuroscience, and the hominin timeline. This gradualist approach views syntax less as a precise mathematical formula and more like a quilt, stitched together from a variety of patterns and structures, accrued at various junctures in language evolution. This is also how geneticists describe the human genome: as 'a patchwork quilt … with segments that were picked up at different stages of our ancestry' (Harris 2015:xvii). It may seem 'messy' to some, but there is pattern and richness in this quilt of syntax, as well as a plenitude of clues about its evolutionary trajectory.

4. THE IMPORTANCE OF THE SCIENTIFIC METHOD. B&C put forth some sensationalist claims, including that sophisticated Martian scientists would consider all of the organisms on Earth as one

[6] The novel mutation scenario is preferred by B&C because they insist on a total discontinuity with other species when it comes to the capacity for language. If the initial selection targeted mutations that were already available in some individuals of the other species, then the divide between 'us and them' cannot be as sharp as B&C envision. But B&C do acknowledge on p. 52 that, in principle, selection can make use of variation already present in a population.

[7] [Editor's note] Progovac 2015 is also reviewed in this issue of *Language*.

and the same (61) and all human languages as one and the same (78), and that an infant from a Stone Age tribe in the Amazon would, if brought to [today's] Boston, be indistinguishable in linguistic and other cognitive functions from the rest of the children (54). This latter claim comes from their view that all humans are identical in their genetic basis for language (with the exception of language disorders) and that humans have always had this same genetic basis, even in prehistory. The burden has to be on B&C to at least identify a method by which one can prove or disprove claims of this kind.

Suffice it to say here that recent research has found there to be individual linguistic differences that correlate with genetic differences, even among healthy adults, contra B&C's claim on p. 55. This is, of course, especially evident with disorders. In the very last footnote of their book, B&C do acknowledge that there may indeed exist 'some language variation in "normal" human populations that is being uncovered by genome sequencing' (177). They quote Kos and colleagues (2012), who found that CNTNAP2 gene SNP variants in human populations affected language processing in otherwise normal adults. At the population level, researchers have been looking into possible correlations between parameters of language variation and genetic makeup, starting with the pioneering work by Dediu and Ladd (2007).

In conclusion, contrary to B&C's claims, there is an enormous amount to discover when it comes to language evolution, and the only way to proceed is to consider a variety of hypotheses, to subject them to testing and falsification, and to emerge from this process with ever better and more refined hypotheses. Simply making claims about things and hoping to be right is not nearly as useful as generating specific and testable hypotheses, even if they turn out to be wrong.

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