Clarifications on the no half-MERGE fallacy

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Abstract

Berwick & Chomsky (2019) raise a number of issues with Martins & Boeckx (2019). In what follows, we will briefly outline and dispel these issues, as well as clarify some points which have been the object of misrepresentation.

1 Introduction

In comment to Martins & Boeckx (2019), Berwick & Chomsky (2019) make a number of claims that grossly misrepresent both our paper and our points of view on the the topic of language evolution more generally. In this brief comment we identify such claims and clarify why they are misleading.

2 The no half-Merge fallacy

Our paper points out what we call the "no half-MERGE fallacy." This fallacy consists of deriving from the formal complexity of MERGE the number of evolutionary steps it took for it to arise. Even though our motivation is to show that it is not biologically plausible or at the very least not warranted to claim that MERGE arose in a single step (by means of a single mutation), the fallacy is independent of the actual number of steps it took for MERGE to

arise. The fallacy is also independent of the actual existence of MERGE. We use "fallacy" in the conventional sense: an argument which does not work either because of its logical structure or its content.

The first misguided assumption by Berwick & Chomsky (2019) is what they understand by "no half-MERGE fallacy." They take it to be a claim about whether such a thing as "half-MERGE" exists, which it is not. Instead, what we mean by it, as we state multiple times in our article (Martins & Boeckx, 2019) is that "from the formal simplicity of MERGE one cannot infer the evolutionary steps that led to it." One could represent the fallacy as follows:

1. There is such a thing as MERGE.
2. There cannot be such a thing as half-MERGE (MERGE is formally so simple it cannot be reduced)

$\therefore$ MERGE had to evolve in a single step.

The premises that MERGE exists and that there can be no such thing as "half-MERGE" are in the domain of formal analysis, and the conclusion is about how it must have *evolved*, a completely different domain, biology.

One hopes there are connections between the two (or else the formal analysis of mental processes would be in vain), but there is no necessary or warranted connection between formal simplicity and steps leading to biological emergence (the latter being furthermore difficult to define). It is fallacious to draw that connection as conceptually necessary. It is fallacious to claim that a mental operation that cannot be reduced formally definitely arose suddenly as the result of a single mutation.

We used fairly conventional terminology in naming the fallacy the way we did. To take a similarly named fallacy (though different in its structure, but that is beside the point here), the "no True Scotsman fallacy" (Flew, 1975) says nothing about the existence of true Scotsmen, or Scotsmen for that matter. Or more generically, the Historian's fallacy (Fischer, 1970) says nothing about the existence of historians. Fallacy names are not claims, but rather shorthand allusions to notable arguments that do not hold for one reason or another. That's the approach we take here as well. A claim is made: "MERGE arose in a single step", others question it "why is that?", and the fallacy arises with the answer "well, there is no half-MERGE."

To sum up: the argument would work if there were a correspondence between the formal structure of a computational operation and the biological changes that would lead to it. Since there isn't such a connection (as we defend in Martins & Boeckx 2019), it is fallacious to claim that the state of affairs of there not being "half-MERGE" shows that MERGE arose suddenly. Any criticism from Berwick & Chomsky (2019) of the "no half-MERGE fallacy" on the basis of the premises and not the unwarranted conclusion is seriously misguided. Much can be said about the premises too, of course, but that is outside of the scope of the fallacy.

Berwick & Chomsky (2019) also seem to assume that we attempt to replace their fallacious argumentation by claiming that MERGE evolved in two steps instead of one. They do so already in their abstract: "Furthermore, their specific evolutionary scenario counterproposal for a "two-step" evolution of MERGE does not work." But as we say quite clearly in our paper, pre-empting this interpretation (Martins & Boeckx, 2019, 4): "To be clear, we are not suggesting that it actually took exactly two steps for MERGE to arise. We simply use Berwick and Chomsky's methodological approach to try to derive evolutionary steps by looking only at formal properties and conclude that these don't entail a single mutation." We simply show that there would be possibilities beyond a single-step scenario, highlighting the fallibility of their approach.

3 Agree to disagree

Berwick & Chomsky (2019) list five issues on which they supposedly agree with us, or us with them. But all of these are loaded statements attributing to us more than what we have said or let through with our paper (and in many cases indeed with our work in general).

3.1 Core properties of language and Merge

Berwick & Chomsky (2019) say that we:

> "do not question [Berwick & Chomsky's] assumption that the core properties of language are based on the combinatorial operation MERGE."

This cannot be concluded from reading our paper, or at the very least is ambiguous. The point in our paper is independent of such sweeping statements about the "core properties of language", and we could point to work of ours where we question precisely the insistence on the "core" or "uniquely human" aspects of language (e.g. Boeckx, 2013). However, doing so is unwarranted, since we see no reason to defend ourselves from objections to things we haven't said, beyond pointing out that we indeed haven't said them.

3.2 Implementation of Merge in the brain

Berwick & Chomsky (2019) say:

> "we both agree that it is important to determine how MERGE is implemented in the brain. [...] we advance a specific proposal about this neural "wiring," grounded on recent explicit neurological and comparative primate findings. [Martins & Boeckx] do not challenge this proposal. We therefore put the matter of neural implementation aside here."

While we think it's relevant to understand the brain implementation of anything that enters the realm of cognition, and particularly language, the goal of our paper is clearly not a proposal of such an implementation, and we definitely do not agree with Berwick & Chomsky that a single rewiring of the brain yields MERGE. Again, nothing in our paper is a claim in favor of Berwick & Chomsky's view on the implementation of MERGE, much less MERGE *qua* central property of language.

3.3 How a Merge-based system is used

Berwick & Chomsky (2019) say:

> "we both agree that it is important to determine how a MERGE-based system is used, that is, how it is externalized in the sensory-motor system (typically, though not necessarily, sound) and then actually used in performance."

They then list several ways in which they discussed the architecture of such a MERGE-based system, which they do in a chapter of their book

(Berwick & Chomsky, 2016), and how we fail to criticize or indeed mention any of this.

It is a reasonable expectation that we would not wish or be able to do an in-depth review of the contents of Berwick & Chomsky (2016) in our paper, which is about a problem of argumentation, and not an exhaustive evaluation of the body of work of Berwick and Chomsky or any others. Fulfilling this expectation cannot be used to argue that we agree with said contents.

Moreover, and again this is beside the point, we are of course aware that such matters are discussed in Berwick & Chomsky (2016) but it still stands that, whatever the algorithm, and whatever must be physically in place for that algorithm to be used, a multitude of structures and connections are required, which had to evolve, and cannot be attributed to a small change.

3.4 Fallacy or no fallacy?

The fourth claim of agreement is confusing. Berwick & Chomsky (2019) say:

> "We agree that there need not be, as [Martins & Boeckx] notes in its abstract, a "parallelism between the formal complexity of the operation at the computational level and the number of evolutionary steps it must imply." [...] We too regard it as "problematic" and, indeed, a "fallacy.""

This statement is confusing, given that what they defend in Berwick & Chomsky (2019) and in their other work they point us to incurs this very fallacy. They then go on to say:

> "What is under discussion is not operations in general but rather a specific one, the simplest combinatorial operation, binary set formation, called MERGE. Crucially, as we discuss next, MB's own proposal adopts our account of the evolution of MERGE unchanged, thus tacitly recognizing that binary set formation (MERGE) cannot be decomposed and emerges in a single step. MB then add new proposals about immediate precursors to our shared account of the evolution of MERGE. The justification for the added complexities that they propose about precursors to MERGE is the sole point at issue."

First, there is an assumption, left unexplained, that MERGE is somehow a special operation and somehow above the fallacy we describe. This, we do not understand. Simple operations such as MERGE are precisely the kind of entity that expose the "dangers" of simple and simplistic evolutionary scenarios. Secondly, they immediately incur the fallacy again, when they say we tacitly recognize that "binary set formation (MERGE) cannot be decomposed and emerges in a single step." The "and" in this statement is a huge leap, and it is what our paper is about. That's our real issue; that's the fallacy.

The latter part of the quote is again taking our exercise of deriving more than one step for the evolution of MERGE as an actual proposal for its evolution, which we already deny in the original paper, earlier in this very paper, and now again.

3.5 Long evolutionary history

Berwick & Chomsky (2019) say:

> "we both agree that it would be important to discover the long evolutionary history that preceded the appearance of MERGE. [...] In this case, although both we and [Martins & Boeckx] agree that there were multiple steps that preceded the appearance of MERGE, neither we nor [Martins & Boeckx] present any explicit proposals about these previous steps, so we can put this matter aside too."

Again, it would be far beyond the scope of our paper to present explicit proposals about what preceded MERGE, and the same applies to Berwick & Chomsky (2019). One would, however, be hard-pressed to identify this concern in the work they point us to (e.g. Berwick & Chomsky, 2016), which insists on MERGE as the core part of language: "Any residue of principles of language not reducible to MERGE and optimal computation will have to be accounted for by some other evolutionary process—one that we are unlikely to learn much about, at least by presently understood methods, as Lewontin (1998) notes." (Berwick & Chomsky, 2016, 72).

This is effectively the position that studying language evolution in a meaningful way can be reduced to studying MERGE. It is also not entirely persuasive to allude to work by Lewontin from 1998, more than two decades ago, as casting doubt on "presently understood methods" (which are in any case left unidentified).

3.6 A secondary issue

After going through our exercise in deriving an alternative analysis from the formal properties of MERGE, Berwick & Chomsky (2019) conclude:

> The errors in Martins & Boeckx (2019) concerning emergence of EM [EXTERNAL MERGE] and IM [INTERNAL MERGE] are, however, secondary. The crucial point is that the sole proposal in Martins & Boeckx (2019) about evolution of language is untenable. The "no half-MERGE fallacy" analysis in Martins & Boeckx (2019) collapses because there is no such fallacy.

Our point would stand without our having ventured into the task of deriving more than one step from the formal properties of MERGE, and this is what Berwick & Chomsky (2019) spend most of their paper on. We of course will have our bones to pick regarding how "correct" our analysis is as a formal exercise (that goes beyond the scope of this comment), but we do indeed wholeheartedly agree: all of this is secondary. There is no aspiration of tenability in our proposal, since we argue precisely that such proposals are untenable. One can get one step for the evolution of MERGE by looking at its formal properties, or one can get two like we did. Most likely, other analyses could get different numbers of steps.

Finally, after at some point recognizing that the fallacy we point to exists (see section 3.4), Berwick & Chomsky (2019) now say there is no fallacy. But given their practice of repeatedly committing the fallacy, which is the real problem (and not what is said about it), this too is secondary.

4 Final Remarks

To conclude, the reply by Berwick & Chomsky (2019) does not counter the points in our paper, and we maintain our conclusions that 1) from the simplicity of a formal operation one cannot derive the evolutionary steps that led to it, and 2) doing so is not a productive way of understanding the evolution of language.

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