The Strong Minimalist Thesis is too strong: syntax is more than just Merge

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This paper argues that the Strong Minimalist Thesis (SMT) is false. I do so by pointing out that the SMT entails two undesirable consequences: first, the SMT assumes that the Borer-Chomsky Conjecture is true; in other words, that all syntactic variation across languages is due to the lexicon. Second, it assumes that there can be no ordering restrictions on Merge, because it would imply the existence of a linguistically proprietary entity that is not simply Merge. I first present recent crosslinguistic evidence from the literature based on case and agreement that the Borer-Chomsky Conjecture alone is not sufficient to account for syntactic variation, based on Baker (2008)'s survey on case and agreement. I then present evidence for the existence of ordering restrictions on Merge, based on Rizzi (1997)'s cartographic distinction between high and low complementizers. I argue that this distinction is attested crosslinguistically, and is purely syntactic, and it cannot be accounted for via interface factors or via principles of efficient computa tion. I conclude that these independent problems raise puzzles for saltationist theories of language evolution like Berwick & Chomsky (2016).

Keywords: minimalism, strong minimalist thesis, language evolution, parameters, Merge, cartography

1 Introduction

Determining how language evolved is a notoriously vexing problem for multiple reasons. There is, of course, the dearth of empirical evidence: early human language has not left behind many archaeological traces. Regardless, the little evidence that is available has allowed archaeologists and paleoanthropologists to preliminarily establish the following facts about human language evolution, and this ends up making the problem of language evolution even more vexing.[1] First, humanity can trace its origins to a group of anatomically modern *Homo sapiens* living in eastern or southern Africa 150,000-200,000 years ago. These humans had language, or at the very least were linguistically capable: for instance, engravings on red-ochre in South Africa provide evidence for symbolic and abstract thought.[2]

By contrast, it appears that the Neanderthals did not have such capacity for symbolic thinking, who were present in Europe even as recently as 40,000 years ago. As Pagel (2013) points

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[1] My discussion here of the archaeological evidence is based on Pagel (2017).

[2] See Henshilwood et al. (2002) and Henshilwood & Dubreuil (2009) for further discussion.

out, art, sculptures, musical instruments and specialized tools made by *Homo sapiens* in Europe had become very common at that point. But there is no such evidence of similar creations by Neanderthals–in fact, it appears that they did not even sew their own clothes, instead merely draping themselves with skin. It appears, then, that language must have evolved 150,000-200,000 years ago, together with the first population of *Homo sapiens*.

It is hard to reconcile this with the complexity of language. To see why, let us start with Chomsky (1980)'s Principles and Parameters (P&P) framework. In P&P, differences between languages were captured via parametrizing a finite set of permissible perturbations. For example, it is well known that a language like Turkish is classified as head-final (at least for the most part), whereas a language like English is classified head-initial. One would have the parameter head-initial vs. head-final to account for this difference. Thus, all syntactic possibilities across languages might be accounted for in terms of different parametric values. Syntax, then, ends up looking quite similar to the Periodic Table, like atoms combining into many possible different molecules, as Baker (2002) has suggested.

Now, generative linguists commonly accept that linguistic capacity is due to the *faculty of language*, or *universal grammar* (UG), which is innate to all human beings. In other words, that there is an innate system of mechanisms and principles that are unique to humans which is used for language acquisition. Chomsky (2000b) calls this innate system a "language organ": for generative linguists, it is the object of study in the same way that biologists study literal organs like the heart or the lungs. But the conjunction of the fact that language is innate together with the P&P framework would entail a paradox: namely that it is impossible for so many parameters, potentially in the hundreds, or even thousands, to have evolved. There are two reasons for this: most pressingly, such parameters could not have evolved in a mere 150,000-200,000 years, which is a very short amount of time for evolutionary change. Significant change often takes millions of years. And it is also hard to imagine that such parameters could have exerted a strong enough evolutionary pressure to lead to "fruitful sex" in the words of Lightfoot (1991).

By the early 1990s, Chomsky and other linguists had decided to reduce the computational principles in UG. The most optimal solution would be to assume that UG reduces to the absolute simplest computational principles–perhaps nothing more than the recursive, structure-building operation Merge–which has been called the Strong Minimalist Thesis (SMT). The SMT has been defined in many different ways in the literature.[3]. But more generally, one could view the SMT as claiming that all of the properties of human language syntax can be derived from three things:

(1)   a.   the syntactic operation Merge
       b.   interface conditions (involving semantic and phonetic restrictions)
       c.   principles of "efficient computation"

Under this way of thinking about UG, Merge is the only linguistically proprietary entity. Chomsky (2020) points out that this radical conclusion seems paradoxical: properties like the linear order of words and copy deletion have nothing to do with language per se. These simply arise from interface conditions and/or principles of efficient computation, both of which are language-independent. But if the SMT is right, then this would immediately solve Darwin's problem: language could have evolved suddenly, as the result of a single mutation, which endowed the operation Merge onto a particularly lucky individual 150,000-200,000 years ago.

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[3]I will focus on a definition provided by Chomsky (2004) in section 2.

But I believe that Darwin's problem remains just as burdensome. The goal of this paper is to show that the SMT is too strong. In particular, I believe that there is more to syntax, and to language in general, than just Merge. In other words, my goal is to show that Merge is not the only linguistically proprietary entity. I will provide two such pieces of crosslinguistic evidence against the SMT in this paper. In particular, what both of these patterns have in common is that they involve purely syntactic crosslinguistic generalizations that cannot be explained by language-independent interface conditions, nor by principles of efficiency.

I will first argue for the existence of macroparameters in the sense of Baker (2008a). The SMT, as we will discuss in more detail, entails that all parameters that lead to crosslinguistic variation are attributed to the differences in the features of lexical items. Such parameters are called microparameters. According to Baker, there are parameters within the general principles that shape natural language syntax; in other words, microparameters alone are not sufficient to account for crosslinguistic variation. I will provide Baker (2008a)'s crosslinguistic evidence, based on a survey of 108 languages, in favor of the existence of such macroparameters. If Baker is right, I will claim that such macroparameters are also proprietary, in addition to Merge–even if macroparameters can be reduced to microparameters, as Boeckx (2011) has claimed.

I will then provide a second, independent argument in favor of other linguistically proprietary entities. This is based on the cartographic enterprise first developed by Rizzi (1997) and Cinque (1999). Rizzi and Cinque have developed a very finely ordered cartographic blueprint for syntactic structure: Rizzi for the C domain of a clause, and Cinque for the positioning of adverbs within a clause. Although I will grant that much of the blueprint could be reduced to semantic interface conditions following Ernst (2002), I will argue that not all of the blueprint can be reduced to interface conditions. To be more specific, I will argue that the positioning of high and low complementizers is linguistically proprietary, because it is a purely syntactic property.

This paper is structured as follows. Section 2 presents Chomsky (2004)'s definition of the SMT, together with a discussion of what it would entail and what would falsify it. Section 3 introduces the reader to Baker's work on macroparameters in syntax, concluding that Merge alone is not linguistically proprietary. Section 4 introduces the reader to Rizzi and Cinque's framework, concluding that not all of the cartographic hierarchy can be reduced to interface conditions. Section 5 argues that Darwin's problem remains, given the falsity of the SMT. I provide a tentative discussion of how one might attempt to solve this problem via Progovac (2009)'s gradualist approach to language evolution. Section 6 concludes.

2 The Strong Minimalist Thesis

Before defining the SMT more formally, I would like to present a background in order to make it more accessible. As Berwick & Chomsky (2016) (B&C) point out, any theory of UG, at a bare minimum, has to meet the condition of evolvability. It becomes more and more difficult to meet that condition as we stipulate the presence of additional computational mechanisms that are innate to all humans. According to Berwick and Chomsky, the only way to meet this burden is via stipulating that syntax itself is simple, and that it evolved as the result of a single mutation. For them, the only serious way to approach the problem of language evolution is to assume that syntax is nothing more than the single and optimal syntactic operation Merge, allowing for recursive sentence structure. This is one way of conceiving of the SMT.

Chomsky (2000a) provides a similar definition of the SMT as follows: *language is an optimal solution to legibility conditions*. This follows B&C's assumption that the generative process is optimal from the perspective of efficient computation. Language keeps to Merge, which is the simplest possible recursive operation that is capable of satisfying interface conditions while being efficient. B&C compare language to snowflakes, which is shaped by the laws of nature. By contrast, language is shaped by the interfaces and principles of efficient computation.[4]

Each derivation, at its conclusion, is accessed by the phonological and semantic interfaces for further evaluation. The phonological interface is instantiated by a sensorimotor system for externalization, such as production or parsing. It might be responsible for, for instance, the deletion of copies. The semantic interface, on the other hand, is instantiated by a conceptual-intentional system for "thought," namely inference, planning and interpretation, among other things. Conditions on representations such as Case theory, binding theory, control theory, θ-Criterion might all be accounted for via this system. These systems are, however, language external, because they are not a part of UG.

We are now ready to present the more formal definition of the SMT by Chomsky (2004). Suppose that the faculty of language has a genetically determined initial state S_0. S_0, which is UG, determines all of the possible states that a particular language L can be. The goal of the minimalist is to reduce the number of elements present in S_0. From the perspective of language acquisition, we are initially concerned with the following categories (2a)-(2c):

(2) a. unexplained elements of S_0

b. interface conditions (the principled part of S_0)

c. principles of efficient computation

Chomsky (2004) defines the SMT as the claim that there are no unexplained elements of S_0: (2a) is empty. Although Merge is the linguistically proprietary operation, it is an explained element rather than an unexplained one, according to Chomsky: it "comes for free" simply because it is the simplest possible operation that accounts for the recursion in human language. Case, agreement, binding theory, the deletion of copies, and all other operations and theories taken to be a part of syntax all should be reduced to either (2b) or (2c), according to Chomsky.

For instance, Chomsky's own theory of the operation Agree holds that a probe P deletes its uninterpretable features by valuing them with the interpretable features of goal G. This seems to be an operation in syntax proper. One's natural inclination is to suppose that, like Merge, it is a part of UG. Why should uninterpretable features, and Agree, exist at all? Chomsky proposes that these are in fact part of the optimal mechanism in order to account for displacement phenomena in syntax, and so can be reduced to (2b)-(2c). The reduction of other phenomena such as control and binding, among other things, is also supposed to proceed along these lines.

Thus far, it seems there has been little discussion in the literature regarding what the hypothetical truth of the SMT would entail. The first entailment is that the SMT commits its believers to Borer (1984)'s conjecture, which is defined as follows:

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[4]Progovac (2019) argues that there are numerous problems with this line of reasoning. For instance, according to B&C, it is both the case that syntax has to be simple in order to be evolvable and given that syntax must have evolved, it must have been simple. This is plainly circular. Furthermore, B&C, nor Chomsky in any of his works, have attempted to define terms such as "efficient" or "optimal." It appears that Chomsky has not provided an explanation of what principles of efficient computation are in any of his formulations of the SMT. Progovac points out that this makes the SMT unfalsifiable and impossible to analyze from a scientific perspective.

(3)   The Borer Conjecture
        All parameters of variation are attributable to differences in the features of particular
        items in the lexicon.

Here is why. There is no doubt that there is crosslinguistic syntactic variation. If it truly is the case that there is nothing more to syntax proper than Merge, then it alone cannot account for the vast amount of variation that is attested. Nor is it sensible to say that different languages have different principles of efficient computation. Therefore, all variation can only be as a result of the different features present in items of the lexicon. As such, Chomsky (1995) incorporates a more specific version of this conjecture into his Minimalist Program, which has been referred to as the Borer-Chomsky Conjecture: given that there are no syntactically proprietary elements apart from Merge, all variation can only be due to the presence of features visible in the two interfaces, namely the conceptual-intentional and sensorimotor systems.

Omer Preminger points out a curious consequence of this entailment that is worth mentioning: it commits the Minimalist to (a non-trivial version of) the Sapir-Whorf hypothesis.[5] Preminger uses an example of syntactic variation between English and Kaqchikel to illustrate his point: in Kaqchikel, the subject of a transitive clause cannot be targeted for focalization, relativization or wh-interrogation, whereas it can in English, as in (4). (4) is ungrammatical in Kaqchikel.

(4)   It was the cat who licked the child.

Recall that all variation ultimately must arise from the two interfaces. Given that speakers of Kaqchikel are able to *pronounce* sentences like (4) before immediately commenting that they are wrong, it appears that the variation does not arise from the sensorimotor interface.[6] This leaves the conceptual-intentional interface, which involves the system of thought in the human brain, and is not LF, as Chomsky has stressed.

We are left with two options: either (i) the conceptual-intentional systems of English and Kaqchikel speakers differ, or (ii) sentences like (4) express different interface properties in English compared to Kaqchikel. Though (i) is plainly the Sapir-Whorf hypothesis, (ii) entails it as well, because it implies that English speakers are able to construct sentences with different conceptual-intentional content. Thus, we arrive at the inevitable conclusion that the English and Kaqchikel speakers have different thought processes. Like Preminger, I leave the reader to determine whether this consequence is problematic.

The second entailment is one noted by Preminger. The SMT also commits one to the following conclusion: if there is any cause for Merge apply or not apply, and this cause is not explainable by reference to the interface conditions (2b) or principles of efficient computation (2c), then it must also be a linguistically proprietary entity, which would violate (2a), given that it would be an unexplained element of S_0.

This lays the foundation for the two independent problems for the SMT I will present. Both of these arguments involve crosslinguistic patterns which are not amenable to explanation via (2b) or (2c). First, not all syntactic variation can be accounted for by the Borer Conjecture, at least not without positing the existence of unexplained elements. Second, I argue that Merge can

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[5]The reader is referred to Preminger (2020) for this blogpost, and Preminger (2021) for further discussion regarding the SMT.

[6]Preminger notes that the Minimalist cannot assume that there is a system between syntax and the phonological interface, given that the existence of this system would itself violate the SMT.

apply in a very specific, cartographic order, further indicating the existence of more unexplained elements. I will conclude that it is exceedingly unlikely (2a) to be empty, contra Chomsky.[7] Thus, the Strong Minimalist Thesis is false.

3   The Borer-Chomsky Conjecture is not sufficient

I believe that the presence of macroparameters for syntactic variation–whether or not they exist as a general rule of grammar, as Mark Baker holds, or as aggregates of microparameters, as many Minimalists today like Cedric Boeckx hold–is problematic for the SMT. For my purposes, it is in fact irrelevant whether macroparameters exist independent of microparameters. But first, I will first provide some background into the literature on parameters before presenting Baker (2008a,b)'s evidence that the Borer-Chomsky Conjecture alone is not sufficient to account for syntactic variation. This will lead me to conclude that the SMT is false.

The first parameter that was proposed was the Null Subject Parameter by Chomsky (1981) and Rizzi (1982). This parameter was more general in its scope, in that it was meant to account for a cluster of seemingly interrelated properties, such as the overtness of subjects, subject inversion and complementizer-trace effects. It was proposed to explain differences between the major Romance languages French, Spanish and Italian. It did not arise as a result of comparing different language families with each other, which would be broader in scope, nor did it arise from comparing different dialects of the same language with each other, which would have been narrower in scope.[8] Indeed, Gilligan (1987) has shown the Null Subject Parameter falls apart if we examine it in either a broader or narrower scope, not matching Chomsky or Rizzi's predictions.

As a result, parameters, at least in the classical sense, have gone out of fashion in recent years: authors such as Culicover (1999), Gallego (2011), Newmeyer (2004, 2005), Boeckx (2011), Richards (2008) among others have rejected the existence of macroparameters like the Null Subject Principle entirely. *Micro*parameters, however have flourished since Kayne (2005). Instead of looking at a cluster of properties, microparameters involve very localized and small differences in the grammars of closely related languages. Works such as Boeckx (2011) claim that macroparameters for syntactic variation can in fact be reduced to aggregates of such microparameters, and one need not posit macroparameters as general rules of grammar after all. This has allowed for the Borer-Chomsky Conjecture to take root in Minimalist syntax.

We are now ready to look at Baker (2008b)'s survey of 108 languages on a macroparameter regarding the relationship between case and agreement.[9] It provides evidence in favor of the classical parameter theory of syntactic variation. Baker's survey indicates that languages can be grouped up into parametric clusters–four to be precise, just as Baker's macroparametric theory would predict. On the other hand, the microparametric theory would predict the distribution of languages with regard to these properties to be in a relatively smooth continuum. This predic-

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[7]Preminger also comes to the same conclusion in Preminger (2011, 2014) regarding the nature of agreement. Preminger argues that agreement is a syntactic phenomenon, and not merely postsyntactic, and it cannot be reduced to interface conditions. I refer the reader to these works for further detail.

[8]This is one of the reasons why Baker (2008a) calls this the Null Subject Parameter a medioparameter rather than a macroparameter.

[9]100 of these languages are from the core 100-language sample of the *World Atlas of Language Structures (WALS)* by Haspelmath et al. (2005).

tion is not borne out, and Baker's theory seems to be on the right track here. Hence, the Borer-Chomsky Conjecture seems to miss what is really going on in syntactic variation.

Baker's macroparameters are stated as follows in (5)-(6):[10]

(5) *The Direction of Agreement Parameter*
F agrees with DP/NP only if DP/NP asymmetrically c-commands F.

(6) *The Case-Dependency of Agreement Parameter*
F agrees with DP/NP only if F values the case feature of DP/NP or vice versa.

These parameters emerged as a result of a detailed comparison between the Niger-Congo (NC) and Indo-European (IE) languages. (5) would be valued Yes in the NC languages, but not IE, while the opposite would be the case for (6). The crucial idea behind these parameters is that NC agreement obeys certain structural configurations that IE does not. Namely, while the IE languages only care about Case matching in regards to agreement, in NC the agreeing head must be in a position lower in the structure than the NP that it agrees with.

Let us see an example of this in action with subject agreement, or in other words, agreement on the finite T head of a sentence.[11] Although in simple clauses both IE and NC languages show agreement between the preverbal subject and the finite verb, we can tease apart the differences in contexts in which something apart from the thematic subject occupies the canonical Spec,TP subject position. This is because in IE, the verb must agree with the nominative NP, regardless of its position, whereas in the NC languages its structure does matter. For instance, in the Bantu language Kinande the finite verb must agree with the fronted object (7a), whereas in Yiddish it must agree with the postverbal subject (7b).

(7) a. **Olukwi** si-**lu**-li-seny-a   bakali   (omo-mbasa)
wood.11 neg-11S-PRES-chop-FV women.2 LOC.18-axe.9
'WOMEN do not chop wood (with an axe).'   Kinande

b. ...az vayn **ken men** makhn fun   troybn oykh
that wine can one   make   from grapes also
'(You should know)... that one can make wine from grapes also.'   Yiddish

Here is another example involving locative inversion. In the Kinande example (8) we see agreement on the finite verb with the fronted locative, whereas in English it agrees with the thematic object instead, due to its nominative case:

(8) **Oko**-mesa   **kw**-a-hir-aw-a   ehilanga.
LOC.17-table 17S-T-put-PASS-FV peanuts.19
'On the table were put peanuts.'   Kinande

Let us now consider examples in which nothing is moved into Spec,TP. In other words, it is either left empty, or filled with a null expletive. English requires agreement with the postverbal subject in this context, as in (9a). In the Kinande example (9b), the subject agreement slot is filled with a locative prefix, which can either be analyzed as a null expletive *there* or default agreement. The finite verb does not agree with the post-verbal subject.

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[10](5) is simplified. The reader is referred to Baker (2008b) (p. 215) for the complete version.

[11]The reader is referred to Baker (2008b) for a much fuller discussion of the differences between the two kinds of languages.

	Agree must be up ((5)) = Yes	Agree can be up or down ((5)) = No
Agreement dependent on case ((6) = Yes)	Turkish, Lango, Greenlandic, Apurina, Chamorro, Mapudungun (n = 6)	IE languages (7), Hausa, Finnish, Abkhaz-Abaza, Kannada, Asmat, Amele, Alamblak, Maung, Mangarrayi, Tiwi, Lavukaleve, Daga, Yimas, Lakhota, Tzotzil, Warao, Barasano, Yagua, Wichi, Choctaw, Hixkaryana, Hebrew, Wari, Chukchi, Makah (n = 32)
Agreement independent on case ((6) = No)	Zulu, Swahili, Kinande, Berber, Arapesh, Tariana, Fijian, Tukang Besi, Slave, Canela-Kraho, Jarawara (n = 11)	Georgian, Arabic, Persian, Warlpiri, Dani, Kewa, Burushaski, Mayali, Halkomelem, Tauya, Ojibwa, Nez Perce, Karok, Otomi, Zoque, Ika, Basque, I. Quechua, Guarani (n = 19)

(9)   a.   There arrive three new delegates each day.

       b.   Mo-**ha**-teta-sat-a   mukali   (omo-soko).
           AFF-there-NEG/PAST-dance-FV woman.1 LOC.18-market
           'No woman danced in the market.'   Kinande

We are now ready to see Baker's survey. Table 1 provides Baker (2008b)'s survey (p. 221). 68 out of the 108 languages can be categorized into one of the four clusters are predicted to exist by the parameters in (5)-(6). 40 of these languages were unclassified; 29 of these simply have no agreement, whereas the other languages are indeterminate, for which I refer the reader to Baker (2008b) for more details. What is crucial here is that languages are grouped into clusters, rather than a smooth continuum, contrary to what the microparameter approach would predict.

     The Borer-Chomsky Conjecture is not sufficient. At this point, there are two paths we can take. We can either accept that macroparameters do exist as a general rule of syntax, as Baker does. This would immediately falsify the Borer-Chomsky Conjecture, and hence the Strong Minimalist Thesis. This is because macroparameters would end up being an unexplained element in the faculty of language, that cannot be reduced to interface conditions or principles of efficiency computation. But I am also interested in a second way of thinking about macroparameters, that is more in line with Minimalist thinking, because this path also contradicts the SMT.

     Boeckx (2011), for instance, has claimed that macroparameters do exist, but not as a general rule of grammar: they are in fact aggregates of microparameters, so they are in fact the one and the same thing. But this simply does not address Baker's argument–it doesn't change the fact that languages cluster around certain sets of microparameter values. In other words, even if the Borer-Chomsky Conjecture is correct, it tells us nothing about *why* certain microparameters cluster like macroparameters would. And why should they? The only way this clustering of properties could be explained is by supposing that there are unexplained elements in universal grammar–even if the Borer-Chomsky Conjecture is true. To conclude, I believe that Baker's survey contradicts the SMT.

4 A syntactic ordering restriction on Merge

We have just seen evidence, in my view, that not all crosslinguistic variation can be accounted for by assuming that there are no unexplained elements in S_0. I would like to present more evidence in favor of there being unexplained elements, that is independent of the problem just raised in the previous section. The argument comes from the cartographic enterprise in modern syntax; in particular, I will argue that there are at least some purely syntactic, ordering-based restrictions on Merge that cannot be reduced to interface conditions or principles of efficient computation. I will argue that at least some of Rizzi (1997)'s cartographic blueprint of the C domain is purely syntactic, and is therefore an unexplained element as in (2a).

The goal of cartography in modern generative syntax is to draw highly detailed maps of syntactic structure. For Cinque & Rizzi (2009), under this conception, cartography ought to be seen as more of a research topic rather than a theory or hypothesis that attempts to determine the right map for syntactic structure.[12] There is disagreement as to what the right order of projections is in either Cinque or Rizzi's cartographic frameworks, but Cinque & Rizzi still think that this doesn't alter the fact that cartography is a relevant question for modern syntactic theory. Let's start by looking at Cinque (1999), although I will ultimately conclude that Rizzi's cartographic split C-domain raises the main problem for the SMT.

Cinque seeks to account for a crosslinguistic pattern regarding the ordering of adverbs that can appear in a sentence. If there are multiple adverbs in a sentence, for the most part, they have to obey the ordering in (10).

(10)   frankly > fortunately > allegedly > probably > once/then > perhaps > wisely > usually > already > no longer > always > completely > well

An example of this can be seen in English. Below, we have a sentence with two adverbs: *any longer* and *always*, and both appear before the verb. What we find is that the adverb *any longer* must precede the adverb *always*:[13]

(11)   a.   John doesn't any longer always win his games.
       b.   * John doesn't always any longer win his games.

Cinque tests Norwegian, Bosnian/Serbo-Croatian, Hebrew, Chinese, Albanian and Malagasy in addition to Italian and English. He finds that the ordering in (10) is maintained in each language. Of course, for such fine ordering to be attested in all of these languages would be a remarkable coincidence–it appears that there are some general cognitive constraints from which these patterns derive. Cinque argues in favor of the existence of many and finely ordered functional projections within each clause, into which adverbs can be inserted.[14]

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[12]Cinque & Rizzi (2009) note that there prima facie may be tension between Minimalism and cartography, if cartographic blueprints truly are innate. This appears to contradict the SMT. But they that there is no inherent conflict between the two viewpoints: because Minimalism studies the mechanism by which syntactic structure is created–via Merge–whereas cartographers study the ordering in the maps that are created. I will argue that cartography still raises a problem for the SMT, however, in this section.

[13]There is one little catch with this data. Notice that the sentence *John doesn't always win his games any longer* is acceptable, in which *always* appears to precede *any longer*. This is also possible in Italian, according to Cinque, but only if *any longer* is emphasized. Without emphasis, it is not possible. As Cinque notes, appearances are deceiving: one could suppose that it involves movement of the adverb from its initial position.

[14]I believe the first to argue in favor of this was Alexiadou (1997).

Now, if these functional projections truly are innate, then they would be an unexplained element in UG, contradicting the SMT. But this is exceedingly unlikely: Chomsky et al. (2019) notes that taking this theory at face value would be unable to minimally meet the conditions of evolability and acquirability.[15] How could such fine ordering between adverbs like *any longer* and *always* have evolved? People even rarely use them in the same sentence. Further, linguists such as Ernst (2002) have provided purely semantic explanations of Cinque's hierarchy. This can be used by believers of the SMT to account for (10) in terms of interface conditions. In other words, the ordering in (10) could be explained via semantic or pragmatic reasons that are independent of syntax. To conclude, I do not believe this makes a strong argument against the SMT.

Let us move onto the cartography of the C domain. Rizzi (1997) provides empirical evidence for two different kinds of complementizers. In Italian, for example, we see in (12) below that it is impossible to place topics in a position to the left of the high complementizer *che* (which Rizzi calls a finite complementizer), but it is possible to place topics to its right.

(12) a. Credo che,   il tuo libro, loro lo apprezzerebbero molto.
          I.think that[+fin] the your book them it will.appreciate   much
          'I think that they will appreciate your book very much.'

      b. * Credo, il tuo libro, che loro lo apprezzerebbero molto.   Italian

This contrasts with the behavior of the low complementizer *di* (which Rizzi calls a nonfinite complementizer), which only allows one to place topics to its left in (13).

(13) a. Credo, il tuo libro, di   apprezzar-lo molto.
          I.think the your book that[-fin] appreciate-it much
          'I think that they will appreciate your book very much.'

      b. * Credo di, il tuo libro, apprezzar-lo molto.   Italian

This contrast is visible in English as well, to an extent. *That* is a high complementizer, given it doesn't allow topics to precede it:

(14) a. I think that Aspects, Chomsky wrote t.

      b. * I think Aspects, that Chomsky wrote t.

How do we account for this contrast? If we had just one C projection–CP, as is commonly assumed–it would be impossible for a single projection to be responsible for the contrast between high and low complementizers. Along with other pieces of evidence, Rizzi splits up the C domain as follows.[16] Relevant for the present is that *che* is located in ForceP, because it necessarily precedes all focalized elements and topics. This makes it a high complementizer. *Di* is located in FinP, because it necessarily follows them, making it a low complementizer:

(15)   ForceP > TopicP* > FocusP > TopicP* > FinP

I would like to point out that there is considerable crosslinguistic evidence that the distinction between high vs. low complenentizers is not unique to Italian. It is widely attested crosslinguistically, in other Romance languages (such as Spanish, according to Villa-Garcia (2012), in the

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[15]See also Bobaljik (1999) for problems for Cinque's hierarchy.

[16]The * indicates that TopicP is recursive, in that it can appear before or after any other functional projection between ForceP and FinP, but not before ForceP, or after FinP.

Scandinavian languages (Larsson (2017)), in the Niger-Congo language Lubukusu (Carstens & Diercks (2009)) and even in English (Haegeman (2012)). Regardless of whether one buys the generative enterprise, there really does appear to be two kinds of complementizers–one which necessarily precedes topics, and one which necessarily follows them.

The problem for the SMT is, in fact, exceedingly simple. We noted previously that any kind of syntactic functional structure that is innate would contradict the SMT, because it would be an unexplained element in UG. I granted, for the sake of argument, that all of Cinque's hierarchy could be reduced to semantic/pragmatic explanations, following Ernst (2002). I will even grant that much of Rizzi's hierarchy could be reduced to semantic/pragmatic explanations. Rizzi (2013) provides a possible explanation of the crosslinguistic asymmetry between the ordering of topic–which can be reiterated in many languages–and left-peripheral focus, which cannot. But not all of Rizzi's hierarchy can be reduced in such a manner.

This is where high and low complementizers come in. Recall Preminger's point that any restriction on Merge would itself be an unexplained element in UG, and hence contradict the SMT. Why must *that* or *che* in Italian be Merged after all topics and focalized elements? Why must *di* in Italian be Merged beforehand? A complementizer by definition simply marks a clause as the subject or object of a sentence. It has no semantic purpose.[17]. Nor does it appear to have any phonological function: to borrow Preminger's reasoning from section 2, speakers are perfectly capable of pronouncing sentences like (14b), before immediately commenting that they are wrong. No interface factors are at play. And there does not seem to be reason to think that such complementizers play a role in principles of efficient computation. The fact that there are restrictions on *where* different complementizers must appear seems to contradict the SMT.

Satık (2022) proposes a further problem regarding the SMT. Note first the seemingly trivial observation that the English infinitive doesn't allow a complementizer like *that*, though *for* is a possibility, which is often treated as a nonfinite complementizer in English.

(16) a. I seem (*that) to be happy.

b. Mary is eager (for/*that) John to please.

Satık (2022) provides a survey of 27 languages belonging to several different language families. He notes that although it is common for infinitives to allow complementizers crosslinguistically, just like English, what all of these complementizers have in common is that they are lower in structure–in other words, located in Rizzi's FinP. It is impossible for a high complementizer to be located within an infinitive, in any kind of infinitive in any language of the survey. This leads him to define finiteness in terms of clause size–in other words, the truncation of ForceP.

This is a theory-independent and a purely empirical observation. *Why* should this be the case, though? As Preminger notes, anything that prevents Merge from applying is linguistically proprietary. And this once again contradicts the SMT, given that infinitives, by their very nature, do not allow Merge of a high complementizer. To conclude, there appear to be at least a small set of cartographic generalizations which are not amenable to a Chomsky-style reduction.

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[17]It is often treated as semantically vacuous, see Heim & Kratzer (1998).

5 Resurrecting Darwin's problem

In the two preceding sections, I have argued that there are in fact unexplained elements within the language faculty–purely syntactic properties that cannot be reduced to interface conditions or explained in terms of principles of efficiency. If I am right, then I must confess that we are facing a fiendishly difficult problem. How could such linguistically proprietary elements have evolved, in addition to Merge? It is unlikely that all of these syntactic constraints evolved saltationally– that is, a large and sudden mutational change from one generation to the next.

In order to maintain our hypothesis that language is innate, I believe it is therefore necessary to consider an alternative to BC's saltationist approach to language evolution. Many researchers have proposed gradualist accounts of language evolution, even in syntax.[18] To see how syntactic constraints on deriving movement constraints in the generative grammar framework, let us consider how Progovac (2009) derives islandhood under a gradualist account of language evolution.

The seminal dissertation Ross (1967) notes the existence of *islands*: these are defined as syntactic environments which do not allow movement out of them. Note that there is a clear difference in acceptability between (17a)-(17b) below. A classical example of an island is the coordination structure in (17b):

(17)   a.   What did Mary eat ham with <what>?

         b.   * What did Mary eat ham and <what>?

The existence of islands is puzzling from an evolutionary perspective. How could constraints on movement have led to "fruitful sex," in the words of Lightfoot (1991)? Why would a grammar with island constraints be selected over a grammar without islands? Of course, concerns such as these were the original kind of justification for B&C's saltationist approach.

Progovac (2009) suggests that islandhood constraints could have evolved gradually. Taking movement itself as an exceptional operation, she argues that islandhood is in fact the default state of syntax. Progovac makes the observation that movement itself is only available out of a subset of complements, forming a natural class. But the set of islands do not form one, because islands are things like conjuncts and adjuncts, among other things. According to Progovac, movement evolved from a proto-syntax that only had small clauses and one-word utterances. Subordination and movement evolved due to the need to embed multiple viewpoints within each other. Adjunction and coordination were not sufficient enough for this purpose, as the example in (18c) illustrates. Only (18c) allows a person's knowledge about someone else to be reported:

(18)   a.   [As you know], [as Mary knows], he is a linguist.

         b.   He is a linguist, [and you know it,] [and Mary knows it].

         c.   You know [that Mary knows [that he is a linguist]].

We now have a gradualist account of islandhood–the need to be able to embed multiple viewpoints does seem important, after all. But can such a gradualist account of islandhood be extended to macroparameters, and certain parts of the cartographic framework? This seems to be

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[18] Apart from Progovac, some examples are Givón (1979, 2002, 2009), Pinker & Bloom (1990), Newmeyer (2005), Jackendoff (1999, 2002), Culicover & Jackendoff (2005), Tallerman (2014), Heine & Kuteva (2007), Hurford (2007, 2012), Gil (2017) and Progovac (2009, 2016, 2019) among others. For a helpful survey of the field of language evolution, the reader is referred to Progovac (2019).

difficult, to say the least. It is difficult to see how the evolution of a macroparameter for agreement and case, for instance, could have ever led to fruitful sex. For the purposes of my paper, I have only sought to merely argue that there are unexplained elements of the language faculty–I am leaving open how these unexplained elements evolved for future research.

But here is my tentative attempt in explaining how at least Baker's macroparameters on case and agreement could have evolved. One possibility is that they evolved accidentally, at least in a sense. Suppose that agreement and case evolved as a result of gradual evolution–perhaps as the result of a "feedback loop" between adaptive cultural and biological changes. Perhaps this was driven by the cultural need for speakers to disambiguate their utterances by marking dependent nouns and verbs with the relationship that they bear to each other. One possibility is that, due to the limitations of the human cognitive system, when case and agreement evolved, Baker's macroparameters were formed. It allowed for languages to have either upward or downward agreement, and for case to be dependent on agreement or not. This leaves open many questions, of course, but my goal here has been to provide a sketch of how such an approach could play out.

6 Concluding remarks

The fundamental goal of this paper has been to argue against the Strong Minimalist Thesis: that Merge is not the only linguistically proprietary element present in the language faculty of humans. My strategy has been to first present the two consequences assuming the SMT would have. First, that all syntactic variation would be due to the Borer-Chomsky Conjecture, and second, that there can be no cause that makes Merge apply or not apply. I have argued that both of these consequences lead to independent contradictions, implying that the SMT is false.

Admittedly, this does end up opening more problems than it solves. How could unexplained elements of the language faculty, in Chomsky's words, have evolved, in addition to the structure generating and recursive operation Merge? This is a vexing problem, and it will likely require assuming that language evolved gradually in multiple evolutionary steps. My hope is to have at least helped to rule out a specific saltationist account of language evolution by Berwick & Chomsky (2016). I believe that linguists interested in the origins of Universal Grammar ought to instead consider assuming a gradualist approach to its evolution, if the Strong Minimalist Thesis is indeed demonstrably false.

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