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EPP: A New Synthesis

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Preface & Acknowledgements

I wrote this dissertation as I began making the transition into programming, though it doesn't feel like much of a transition—the differences between syntax and computer programming being marginal at best, nonexistent at worst. The only difference is the domain: syntax focusing on natural language, programming on artificial language. This transition, in any case, has brought into my mind, in a very real way, the power of a well-designed algorithm. This is made all the more incredible, when I have considered how mindless Nature has managed to "design" and create the algorithms that govern human language. I hope to have done this thought justice in this dissertation.

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EPP: A New Synthesis

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The core and most interesting question concerning language, and linguistic research more generally, is in my view this—"how 'perfect' is language?" (Chomsky, 1995b: 9). *Perfection*, here, refers to the notion that language does not involve superfluous elements or unnecessary computations. The language algorithm is the best of all possible worlds, in other words. Another way to phrase this question, to quote Chomsky again, is to ask whether language meets the "external constraints" imposed by the its interfaces "as well as can be done"? (Chomsky, 1995a: 383; see also Berwick & Chomsky, 2016, for the relevance of perfection to the evolution of language).[1] If language, in this sense, is perfect or optimal, then there should not be any properties or features which are not met, or motivated, by some external constraint. Conversely, if some properties are found which do not seem to be motivated by external constraints, then it follows that language is not perfect—that it has features that are not interpreted by the interfaces of thought and sound.

In this work, I shall consider one such property—namely, the Extended Projection Principle (Chomsky, 1981), which states that every clause requires a subject. The EPP is, of course, treated as an uninterpretable feature since it is not generally thought to be involved in thought or sound. I shall then consider whether there have been any successful attempts to motivate the EPP by some external desires. Following the work of Martin (2001), I will propose that there is a satisfactory resolution to this problem compatible with the hypothesis that language is perfect. The main argument will rely on work carried out by Uriagereka (1997)—his account of Case—and Martin (2001)—his Case-theory of the EPP. In order to strengthen these accounts, I shall expand the analysis to include quirky subjects and sentential subjects, amongst other issues. Of course, a theory is only as powerful as its explanatory content; and so, I hope therefore, to have strengthened this theory by expanding its explanatory content to include a wider range of phenomena: Quirky and Sentential subjects.

In the first section, I shall describe Martin and Uriagereka's theories. I shall then

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[1]Essentially, the more optimal that language is, or the more perfect, then the easier it will be to develop an evolutionary account of it.

take account of, and resolve, some immediate problems with these accounts, in section 2.

1 EPP and Case

There are a number of arguments that conclude that the EPP is an independent feature of the linguistic system (see Chomsky, 1995). For example, as seen in Chomsky's (1995: 282) explicit remarks partitioning the EPP and LF, "Note that the EPP is divorced from Case." As pointed out in the introduction, if these arguments turn out to be sound, then language cannot be said to be the perfect algorithmic, or programmatic, solution to the challenge of interfacing thought and sound. In order to maintain the plausibility of the view that language is perfect, it must be shown that the EPP is not a legitimate *independent* feature of natural language. This project is exactly what Martin (2001) attempts to begin, and which I am attempting to defend and strengthen. It will be helpful, in any case, to examine Martin's argument, which I do in this section.

I will lay out the logic of Martin's argument first, and then examine the soundness of each premise in sections 1.1 and 1.2. The argument can be expressed as follows.

P1.   There is a redundancy between Case and the EPP
P2.   Case cannot be eliminated
C.   Therefore, the EPP must be rejected

The conclusion, C, follows from the application of Occam's razor to P1 and P2.

1.1 *Premise 1*: Case-EPP Redundancy

Whenever a DP moves to [Spec, TP], according to the standard accounts—let us suppose, for the sake of hypothesis—there are at least two issues at hand: namely, what happens to the DP's Case feature and what happens to the DP's EPP feature. The argument of this section shall involve a claim against the independence of the EPP. That is, against treating Case and EPP as two separate properties of language. Consider (1).

(1)   *John$_i$ is likely [T t_i [t_i is clever]]

The ungrammaticality of (1) needs to be explained, and by hypothesis there are two potential explanations: Case and the EPP. Assume that the EPP is at fault in (1), in some way. Now, as Chomsky (1995: 283) observed, the EPP allows multiple feature

checking; for instance, when DP's cyclically raise through embedded clauses, as *we* does in (2):

(2)   we$_i$ are likely [t_i to be asked [t_i to [t_i build airplanes]]]

Because of this property of the EPP, it follows that there is no reason for the EPP to not be able to move from its base generated position in the *v*P [is clever] in (1) to the lower [Spec, TP] and then onto the higher [Spec, TP], checking the EPP features of both T nodes. However, this property is obviously problematic as it would predict that (1) should be grammatical, contrary to fact. This appears to rule out the EPP; however, before judgment can be drawn on this issue, it should be noted that this argument rests upon the assumption that Last Resort is governed by Enlightened Self Interest, an assumption that has not yet been motivated.[2] Thus, one could argue, that it could be the case that Greed is driving movement in (1). And in fact, this does explain the ungrammaticality of the sentence, thereby preventing the conclusion from following—something Martin (4) observes, "only Greed has any hope of preventing" the sentence in (1). Thus, all that follows so far is that if the EPP is to explain (1), it cannot be with ESI as the interpretation of Last Resort.

However, this means that EPP movement must be driven by Greed, which makes (2) somewhat mysterious, but also incorrectly allows (3).

(3)   *she$_i$ seems to t_i [that coffee is tasty]

Here, Greed-driven movement is completely satisfied by movement of *she* from object position to subject position. So it seems that EPP-movement cannot be driven by Greed on the basis of this evidence (see Lasnik, 1995 for more evidence that Last Resort is not Greed-driven), which raises the question of why (1) should be ungrammatical, again. Now, given that it has been shown that the EPP + ESI cannot account for (1), since it incorrectly rules it as grammatical, and the EPP + Greed cannot account for it (satisfactorily), because that makes inaccurate predictions elsewhere (i.e. in (3)), the obvious solution seems to be to reject the assumption that we began with: namely, that it is the EPP (features) that can explain this data.

Now, if the status of these sentences can be explained by Case, on the other hand, then Case will appear to be doing all the heavy lifting, since sentences like these are the *raison d'être* for the EPP's purported existence. If this is the case, then an argument

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[2]Recalling that Enlightened Self Interest is the principle of Last Resort which states that an element may move to some structural location providing it either satisfy one of its own features or a feature of the target location. This is opposed to Greed which states that an element may only move to a target location if it satisfies its own features—the target's being irrelevant.

can be made that instead of claiming that a DP has both Case and EPP features, it has instead only Case features, making EPP features redundant.

Take (3). As Martin argues, (3) can plausibly be analysed as an instance of Case mismatch. The derivation, at some stage, would have to be as follows.

(4) a. seems to α_i [that coffee is tasty]
     b. α_i seems to α_i [that coffee is tasty]
     c. α_i seems to t_i [that coffee is tasty]

In step (a), α would receive structural Case corresponding to accusative Case. α would then move to [Spec, TP], causing a crash due to [Spec, TP] being the position in which nominative Case is read and assigned. Now, what about (1)? Martin rules out (1) on the grounds that a DP cannot check more than one set of Case features. Chomsky (1995: 282) gives a similar argument concerning Case, that since Case features are -Interpretable it follows that it is erased when checked.[3]

It seems, then, that the EPP is redundant, completing the demonstration of the first premise. This is because, to recap, the EPP cannot explain (1) without being drawn into an inconsistency, but Case can explain (1) without being drawn *prima facie* into inconsistency.

So far, so good. Nevertheless, this is by no means conclusive, as it is only suggestive for finite clauses. For example, Chomsky (1995: 344-46) argues that EPP features are required to explain why expletives are inserted into [Spec, TP]: namely, *overt* movement of a DP violates Procrastinate, and so *there* is inserted to satisfy T's EPP feature. Only when this option is not legitimate is there raising. But this argument for the existence of expletives explicitly requires the EPP. In contrast to this account, Lasnik (1995) proposes that expletives are inserted in order to check Case and ϕ-features. If the data can be explained in this way, as I shall briefly show now, then another support for the EPP has been withdrawn.

I shall begin with Chomsky's account. Consider the sentence in (5).

(5) there$_i$ seems [t_i to be [someone in the room]]

In this derivation, the structure [someone in the room] will be merged with *to* and *be* to create [to be [someone in the room]]. The next step in the derivation faces two possible options: internal or external merge. Chomsky, with economy considerations in mind, argued that the least costly of the two options is to merge a new item. In this

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[3]Of course, this now leaves (2) unexplained, since a DP should not be able to move to more than one position, if Case is driving movement. I shall consider this assumption later on, in section 2.

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case, this item is the expletive *there*. This creates the structure [there to be [someone in the room]]. This structure is then merged with *seems*, creating [seems [there to be [someone in the room]]]. Now the specifier of the clause containing *seems* is empty, and like *to be*, requires something to fill it. Chomsky notes that at this stage "only one legitimate option exists: to raise *there*," producing [there$_i$ seems [t_i to be [someone in the room]]]. This account of (5) crucially depends on some motivation for movement to [Spec, seems] and [Spec, to be], which is, of course, the EPP.

It is worth noting that Case is, in fact, involved in Chomsky's story. Consider the sentences in (6).

(6)   a.   there is someone drinking coffee
        b.   there are two people drinking coffee

What is interesting here is that the verb *be* agrees with the nouns *someone* and *two people*. Furthermore, the Case-assigning position, according to Chomsky, is located where *there* is. Given these facts and the constraint on movement present in Procrastinate, there must be covert movement in which *someone* and *two people* move to *there*, adjoining it—so Case is just not involved in driving overt movement, the EPP is what does that; rather, Case drives covert movement.

As a justification for the existence of the EPP, this argument only goes as far as the explanatory adequacy of the account goes. With that in mind, if an equally compelling account comes along, then simplicity demands that we drop the EPP. Such an account can be found with Lasnik's work on expletives.

Lasnik's analysis relies on the *there* expletive being an LF affix. This affix is then governed by "a general stranded-affix constraint demanding that underlying freestanding affixes ultimately be attached to an appropriate host" (619). Without movement of the associate to the host, the derivation crashes. Lasnik does agree that the expletive satisfies the EPP, but nothing in Lasnik's analysis depends on this. In fact, the analysis is entirely compatible without the EPP. Let us look at what this would look like.

The associate of the expletive, when merged with the verb *be*, checks *be*'s partitive Case (see Belletti, 1988). Once TP is merged, it requires some Case- and ϕ-carrying element to check its Case and ϕ features, which is what *there* does. After spell out, the associate then moves to and adjoins with *there*, satisfying the affixal requirement. Note that nowhere in *this* account is there any mention of movement to [Spec, TP] for EPP reasons.

The first premise of Martin's argument, recall, was that there is a redundancy between Case and the EPP. Section 1.1 then began with the assumption that this premise

was false; that, in fact, there is *not* a redundancy between the two properties of language, since by assumption the EPP is capable of explaining things Case cannot. This assumption has been shown to be false, supporting the soundness of the first premise.

1.2 Case Cannot be Eliminated

As seen in the previous section, there is a redundancy between Case and the EPP. Therefore, if the EPP phenomenon is a result of Case, it is *ipso facto* an imperfection of language unless Case can be explained as having some computational role at one of the interfaces. This position would contrast with Chomsky (1995), who thought Case to be an uninterpretable feature. On the other hand, if Case phenomenon are the result of the EPP, then likewise. Moreover, given the redundancy, if one of the properties can be shown to have a non-trivial computational role, then the other property will be subsumed, reduced to an epiphenomena of the first property by explanatory adequacy.

Uriagereka (1997) has given precisely such an argument about Case, in which it is seen as the optimal solution given the constraints that exist. Uriagereka's argument is fairly straightforward, essentially concluding that Case acts as a kind of index. I will present a brief exposition of it, and then provide an argument as to how this account can explain why *all* arguments must have Case.

Uriagereka (1997: 29) observes that many "statements about the world involve" objects described with the same person, number, and gender: *he went with him*, *she looks like her*, *they saw them*, and so on. Thus, ignoring Case features, all being equal many statements contain sets of formal features that are identical with each other and that are within the same domain or phase. Moreover, it is clear that the LF interface requires some way of distinguishing different sets of formal features. This is because of the set-theoretic Axiom of Extensionality, in which identical sets are eliminated bar one—e.g. $\{\alpha, \alpha, \alpha\} = \{\alpha, \alpha\} = \{\alpha\}$. Without any distinguishing mechanism it follows that the sets of formal features describing "subject" and "object" will sometimes be identical. The Axiom of Extensionality would then predict that "he kissed him" would be interpreted at LF as *x kissed x*. Clearly this would be inadequate description of language and thought, given that the thought *x kissed y* is perfectly thinkable, even when *x* and *y* will have the same ϕ features.

The proposal that Uriagereka makes, solving this problem, is that Case exists because it provides a formal feature which distinguishes two otherwise identical sets of formal features. This works in the following way. Suppose that α and β are sets of formal features, excluding Case. Whenever $\alpha = \beta$, LF would read a derivation containing α and β as $\{\alpha, \beta\} = \{\alpha\}$. Whatever predicate assigned of the two arguments, would

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be reduced to the logical form $P(x)$ instead of $P(xy)$. With the introduction of Case, H and J, LF would read the derivation as $\{\{\alpha, H\}, \{\beta, J\}\}$, which cannot be reduced to a singleton set. This maintains the logical form $P(xy)$, as desired.

Not only does this theory of Case solve the identity problem, but it also solves the problem of Case's existence, motivating it in terms of the external interfaces, "as well as can be done."

Of course, this raises the question as to why Case is involved in sentences in which subject and object, or direct object and indirect object, have distinct formal features, such as *he loves Python*. Uriagereka claims that the cheaper computational option is to maintain a single Case-marked paradigm, rather than bifurcate the syntax into Case-marked and Case-less paradigms. However, Uriagereka does not provide an argument for this claim, as far as I am aware, which I set out to rectify here.

In this case, let *yes* represent the value that the person specification will require Case and *no* represent the value that it does not require Case. There are then two possibilities: *the single Case paradigm* in which Case is *always* marked, and *the double Case paradigm*, in which Case is *only* marked when it is needed to distinguish otherwise identical formal features. For example, applying the single Case paradigm to *he loves it* would yield a result in which *he* and *it* are both Case marked. The double Case paradigm would output no Case here, since the ϕ features satisfactorily distinguish the two arguments at LF. Of course, the double Case paradigm is not an accurate description of language, since these types of sentences do carry Case in subject and object position. But the question is why and whether this explains why Case exists more or less *everywhere*.

Consider the single Case paradigm first.

Single (Case-marked) Paradigm:

Person	Case
1st inc	yes
1st excl	yes
2nd	yes
3rd	yes

In this paradigm, the grammar has set every possible person specification to having Case. If we, for the sake of argument make the unreasonable assumption and, suppose that each Case-marking information requires 1-bit of storage, then this array requires only 4-bits of storage. Of course, it is important to follow Uriagereka's argument

through to the conclusion that the *type* of Case is unimportant—whether it is NOM, ACC, DAT, etc. With this it follows that the permutations of the Single Paradigm are, in fact, $1^4 = 4$. In other words, the Single Paradigm in which arguments are always Case-marked is not a burden on memory. Further, because the possible number of permutations are so low, it does not present a child any learning difficulty. Consider the contrary case in which Case is only required when two or more arguments carry non-distinct ϕ features.

Double (Case-marked and Case-less) Paradigm:

	1st inc	1st excl	2nd	3rd
1st inc	yes	no	no	no
1st excl	no	yes	no	no
2nd	no	no	yes	no
3rd	no	no	no	yes

The Double Paradigm is far more complicated, evidently. For each 2-tuple combination of person features, there is the requirement that if each argument in the tuple is featurally identical, then they must have Case; otherwise, they do not require Case. To store this in memory, on the unreasonable assumption that each "yes" or "no" requires 1-bit of memory, there would need to be space for $2^4 = 16$-bits. This is a massive increase in storage requirements compared to the Single Paradigm. In this case, Uriagereka's argument is sound—a Single Paradigm in which Case is assigned to all arguments is the more optimal option. The only step in the argument needed now is an appeal to Occam's Razor and simplicity in evolution to conclude that the Single Paradigm is the most plausible option.[4]

1.3   Concluding Remarks

In this section, we have seen the argument that the EPP is redundant with Case. This has been achieved through an examination of the motivations of and evidence for the EPP, showing that none of it is incompatible with an explanation relying only on Case.This has led to a situation common in the philosophy of science—the data is compatible with multiple hypotheses, H_1 and H_2. It has then been shown that one of the hypotheses cannot be eliminated when certain assumptions are made about the nature of Case.

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[4]Of course, it is worth noting that this computational saving comes at the cost of burdening the morphological component. This is because the morphological component must now always provide and apply some morphological rule describing what is to happen given a certain Case. The moral of this argument is that LF and PF do not communicate well.

Consequently, this has given support to one of the hypotheses, H_2: namely, that the data is better explained by Case. With a Case-based explanation of the data, the EPP explanation, H_1, ceases to have any theoretical or explanatory value—and so, by Occam's razor, should be rejected. A consequence of this has been that it cannot be the case that subjects move to [Spec, TP] in order to check EPP features on T. Rather, it turns out that subjects must move to [Spec, TP] for different reasons: sometimes to check Case, or sometimes to join an LF affix, as in the case of *there*-expletives.

However, there remain a number of issues that need to be addressed in order to provide a convincing argument for the Case analysis of the EPP, as Martin is well aware. I shall address these issues, amongst others, in the next section.

2 Problems

2.1 Quirky Subjects

Icelandic quirky are typically construed as subjects that carry a "lexically selected non-nominative Case" (Sigurdsson, 1992). Quirky subjects are problematic for the Case-analysis of the EPP, as Martin (17) observes, "questions concerning Icelandic quirky subjects—where it does not seem that Case/ϕ is driving the movement to [Spec, T]—remain to be addressed." Quirky subjects are problematic for Case-driven accounts, as Sigurdsson argues, because they appear to either be in a chain with [Spec, TP] or move to [Spec, TP], whilst not being nominative, the canonical Case for [Spec, TP].
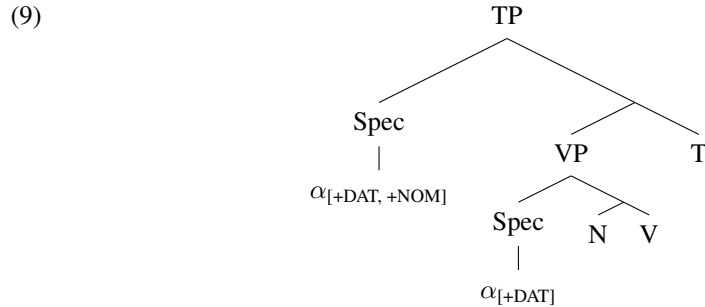
An EPP feature would provide a simple solution to this problem: quirky subjects have inherent Case and only move to [Spec, TP] because of an EPP feature on T—movement nothing to do with Case. However, of course, given the analysis pursued here this will not do. The argument I shall present here relies crucially on Yoon's (1996) account of Case-stacking.

Yoon's analysis is based on Korean data, such as those in (7, 8).

(7) Na-eykey-i paym-i   mwusepta
     I-DAT-NOM snake-NOM fearful   (from Yoon's (2a))

(8) Chelswu-ka/eykey/eykey-i
     Chelswu-NOM/DAT/DAT-NOM (from Yoon's (5a))

In the first example, there are two morphological Cases on *Na*, 'I', and the second example illustrates the three attested possibilities for Case on the noun *Chelswu*, namely, it can have NOM, DAT, or the stacked DAT-NOM, as in the first example. Furthermore,

because these Case-stacked nominals are able to bind reflexives, undergo subject-to-subject movement, and control subject honorifics on verbs, Yoon reasons that these stacked nominals have A-moved to a subject position. These nominals acquire multiple Cases in the following straightforward way: dative Case is checked in [Spec, VP], A-movement takes place to [Spec, TP], where nominative Case is assigned.

(9)

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                              TP
                          /        \
                   Spec             \
                    |           VP       T
          α[+DAT, +NOM]        /   \
                          Spec    N   V
                           |
                        α[+DAT]
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The immediate question that requires an answer is what drives this movement. Yoon notes (114) that movement cannot be because of a lack of Case. But this is only true if Greed is the correct interpretation of Last Resort. If, as Martin and Lasnik have argued, ESI is a better interpretation of Last Resort, then movement *could*, in fact, be driven by Case. This is answer that I will propose here: movement to [Spec, TP] takes place because of ESI and Case. Of course, if ESI is not the correct interpretation, then it does not seem immediately possible to reconcile this data with Martin's account of the EPP. Therefore, *ipso facto*, ESI must be correct. In any case, it has already been established that ESI is the better interpretation of Last Resort.

The next obvious question is whether there are any constraints on Case-stacking. From the perspective of LF, if Case is indeed as Uriagereka has argued—essentially, some kind of index or identity predicate—then there does not seem any reason to impose constraints on the possible number or combinations of stackings. After all, it should not matter whether accusative stacks with nominative or dative with nominative, as far as LF goes ($\{\alpha, J, K\}$ is just as different from $\{\alpha, K\}$ as $\{\alpha, L, K\}$). However, this is not what is observed, as Korean does not permit GEN to stack with NOM (*uy-ka) or ACC with GEN (*lul-uy), amongst other possibilities.[5] The most reasonable interpretation of this, in my view, is that this is because these constraints are not LF constraints. Indeed, instead of this being a constraint at LF, Yoon proposes that this fits with what is known about Korean morphology, if we assume that the constraint

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[5]The syntax also rules out certain combinations by imposing structure and only "upward"-movement. Nothing can have nominative Case and then be assigned accusative case within the same clause without violating the c-command constraint on movement.

is instead morphological in nature. That is, Korean nominals appear to allow recursive inflection on inherent Case, and only singular, non-recursive inflection on structural Case (see Yoon, 1989). In any case, the point is that Korean morphology permits both inherent and structural Case to be morphologically realised. It goes without saying that many languages, such as English, do not permit this.[6] Consequently, there must be some principle which determines how English resolves any competition between Cases, if there is any competition. Yoon proposes (10, his 32), which I will call the *Case Competition Rule*:

(10)   Case Competition Rule: I-Case must be realised

This states that inherent Case *must* be realised; however, the implication is that structural Case only *may* be realised. This immediately provides a solution to the problem of how to accommodate quirky subjects into Martin's theory. Icelandic quirky subjects start with inherent Case, and then move to [Spec, TP] because of enlightened self interest. They then are assigned nominative Case. However, Icelandic morphology is such that it does not permit multiple Cases to be morphologically realised, and so the Case Competition Rule is obeyed and the morphological system deletes the structural Case:

(11)   [+GEN, +NOM] $\rightarrow$ [+GEN]

This is fully compatible with Martin's theory now, as quirky subjects do move to [Spec, TP] for Case reasons. Interestingly, this argument essentially destroys the notion of "quirky subject," as there ceases to be a meaningful difference between quirky subjects and nominative subjects, concurring with work by Wunderlich (2001) and Fanselow (2002).

Abels (pc) has pointed out that something needs to be said for German, as DAT-subjects appear similar to Icelandic quirky subjects in certain respects. So what exactly is the difference between Icelandic and German? For example, consider the German, in (12).

(12)   einem   Schauspieler ist der   Caffee runtergefallen
        an.DAT actor   is the.NOM coffee dropped
        'an actor has dropped the coffee'

Various analyses have been proposed to deal with the fact that the dative is preverbal, with Travis (1984) proposing that nominals can only appear preverbally (in [Spec, CP]) if they serve some special pragmatic function or in the canonical subject position if

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[6]Perhaps, this is best thought of as a parameter on whether inflection can be realised recursively or not.

they are subjects; den Besten (1985), on the other hand, argued that the dative is in the canonical subject position, [Spec, IP]; whilst Sigurdsson (2002), drawing on a range of subjecthood diagnostics that German non-nominative subjects fail[7], argued that the dative-subjects are not actually subjects—according to Fanselow, the standard view of German non-nominative "subjects".

The problem is that (12) can be used as a response to the question: "What has happened?" as Fanselow has observed. The issue here is that the dative is not the topic or focus of the sentence, and so presumably serves no special pragmatic function—yet it is preverbal. Moreover, not only can dative nominals occupy this preverbal position, but so can adverbs, as in (13).

(13)   vielleicht ist einem   Schauspieler der   Caffee runtergefallen
        perhaps   is an.DAT actor   the.NOM coffee dropped
        'perhaps, an actor has dropped the coffee'

Fanselow notes that such sentences can also serve as answers to "what has happpened?" questions. Again, the preverbal position is not necessarily the canonical subject position nor a topic nor focal position. In other words, Fanselow (7) continues, there must be "a non-operator position, an A-position, at the left periphery of German main clauses which is not confined to subjects, but can be occupied by quite diverse types of phrases." *Prima facie*, this appears to be broadly similar to the ability of English sentences to be fronted by CPs and APs—neither canonical subjects, and neither topical nor focal—as I shall examine in the next section.

Following Rizzi (1997), Fanselow proposes that German main clauses are headed by a Fin projection, the specifier position of which must be filled obligatorily. Moreover, Fin is targeted by verb movement—I assume v-V-T-Fin verb movement. Since [Spec, FinP], by assumption, has no selectional requirements, anything can move to the specifier position, so long as it satisfies Closest Attract. This allows non-focal, non-topical, and non-nominative elements to front German main clauses.

The relevant question now is how can this account be synthesised with Martin's?

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[7]For example, the ability to be embedded under control verbs, or the ability to engage in coordination reduction, or bind reflexives (compare (i) and (ii)), which are all used to test for subjecthood.

(i)   *dem Hund mag sich selbst'
       the.DAT dog likes REFL self'
       'the dog likes itself'

(ii)   der Hund mag sich selbst'
       the.NOM dog likes REFL self'
       'the dog likes itself'

To do so, only one additional movement is required. Anything, α, that moves to [Spec, Fin] must pass through [Spec, TP] for Case and ESI reasons. Once α is in [Spec, TP], it then moves to [Spec, FinP]. This is the difference between Icelandic "quirky subjects" and German non-nominative "subjects."

Of course, one substantial question that is raised by all of this is what it is that drives obligatory movement to [Spec, FinP]. Fanselow assumes that there is some EPP feature on Fin, which is obviously not useful here, since the EPP has been eliminated in favour of Case. The answer to this question, unfortunately, will have to wait until further research can pursue this further.

2.2 Sentential Subjects

Sentential subjects in English follow a similar pattern to the German puzzle, providing another challenge for Martin's Case-analysis: there are elements that are not canonical subjects, topical, nor focal, and yet they can occur in a *seeming* subject position. More explicitly, the problem is that if DP arguments move to [Spec, TP] for Case driven, ESI reasons, then how is it possible for there to be non-DP subjects? Such examples, such as AP and CP subjects, are illustrated in (14).

(14) a. [CP that John drinks coffee] is good for him
      b. [CP that England lost the World Cup] disappointed Mary
      c. [AP interesting] is what it is
      d. [AP amazing] seems to be the word

Consider the CP subjects. There has been a large debate over whether sentential CP subjects are in fact subjects or are instead topics (see Lohndal, 2013, for a review). I hope to bring some more evidence to bear on this issue.

Compare (15) and (16) (where a capitalised word is a stressed word, and F indicates focus, purely for the purposes of exposition.)

(15) a. *Context*: that England lost the World Cup shouldn't have bothered Mary
      b. *Answer*: *No! [JOHN]$_F$, that England lost the World Cup shouldn't have bothered t

(16) a. *Context*: that England lost the World Cup shouldn't have bothered Mary
      b. *Answer*: No! [JOHN]$_F$, it shouldn't have bothered t

This is interesting because it shows a clear divergence between DP-subjects and CP subjects, as DP-subjects permit argument fronting and focalisation whilst CP subjects

do not seem to. Rather interestingly as well, CP subjects cannot precede foci.

(17)   a.   *that Mary drinks too much coffee JOHN$_F$ shouldn't have bothered t

These findings are somewhat surprising if CP subjects turned out to actually be topics, as following Rizzi (1980) and Abels (2012) topics and foci are freely ordered. This invites two conclusions of interest (Abels, pc): (i) DP-subjects and CP subjects do not occupy the same position *or* are featurally distinct and (ii) either CP subjects are not topics *or* the ordering of topics and foci relative to each other is not in English as it is observed in Italian (*a la* Rizzi). It should be relatively easy to test these disjunctions.

Consider topicalisation and focalisation in the left periphery in English, as illustrated by the following sentences, with topics preceding focus (18) and contrastive focus (19, 20).

(18)   a.   *A*: Tell me about your sister. What is she/what does she do?
          b.   *B*: My sister, [a DOCTOR]$_F$ she is
          c.   *B*: My sister, [a high school TEACHER]$_F$ she is

(19)   a.   *A*: Tell me about your sister. I know she's a high school teacher and—
          b.   *B*: My sister. No! [A DOCTOR]$_F$ she is

(20)   a.   *A*: Tell me about your sister. I know she's a doctor and—
          b.   *B*: My sister. No! [A high school TEACHER]$_F$ she is

Here, for those speakers that allow fronting in English (Elliot, pc), these sentence are grammatical. I take it that *my sister* is the topic of the discussion and *a doctor* is the focused constituent in the first example, and *a high school teacher* is focused in the second, with stress indicated by capitalisation. This presents evidence that topics can precede foci in English, for those who allow fronting that is. Contrast this to the situation in (21, 22).

(21)   a.   *A*: Tell me about your sister. I know she's a high school teacher and—
          b.   *B*: No! [A DOCTOR]$_F$, my sister, she is

(22)   a.   *A*: Tell me about your sister. I know she's a doctor and—
          b.   *B*: No! [A high school TEACHER]$_F$, my sister, she is

These sentences are at best marginal, or ungrammatical. This, I take it, shows that contrary to Italian, English does not allow free relative ordering of topics and foci, but rather—for those who can front in English—topics can precede foci but foci cannot precede topics:

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(23)   a.   Top > Foc
           b.   *Foc > Top

This confirms the disjunction that topics and foci are not ordered, as they are in Italian, in English. However, if this disjunction is not taken to be exclusive, then it follows that the other disjunct could possibly be true also. This does appear to be the case. Recall the fact that CP subjects are not able to precede foci (17). Now, it has just been shown that English allows topics to precede foci (18)—leading, therefore, to the conclusion that CP subjects cannot be topics, *a la* Leibniz's Law, because topics *can* precede foci.

It is unfortunate that this is the case, as an easy answer would have been to say that CP subjects are actually topics and, thus, do not sit in [Spec, TP]—answering the first disjunct in (i). Something else is needed to be said, then: either CP subjects are not in [Spec, TP] or there is some way to motivate movement of them to TP. This question is made all the harder by the current framework, as noted by Lohndal (2013). Subjects, contrary to topics, are able to trigger agreement on the verb. Therefore, if CP subjects trigger agreement, then they must be subjects or, more meaningfully, in [Spec, TP]. However, agreement can take place at a distance, and so CP subject-verb agreement does not reveal the location of the CP subject.

If subject-auxiliary inversion is considered, then a somewhat confusing picture emerges, one that is not particularly helpful in determining whether CP subjects are in [Spec, TP] or not. As Koster (1978: 53, cited in Lohndal) notes, the following sentences are ungrammatical.

(24)   a.   *did [that John showed up] please you?
           b.   *what does [that he will come] prove?

This would seem to indicate that sentential subjects cannot engage in subject-auxiliary inversion, leading to the conclusion that this is because they are not in [Spec, TP]. However, this is not borne out in all the data, as Delahunty (1983: 387, cited in Lohndal) observes.

(25)   a.   does [that Fred lied to them] bother all of the people who bought stock in his company?
           b.   does [that the world is round] bother as many people now as it did 500 years ago?

This data can be explained if the CP subjects sit in [Spec, TP] and the auxiliary moves from T to C. Presumably, if the CP subjects in both sets of data are in the same position,

it follows that there must be some other mechanism—prosody or parsing (see Davies & Dubinsky, 2009), for example—which causes the first set of data to be ungrammatical. In any case, without going into the other mechanisms, subject-auxiliary inversion does not help determine the location of CP subjects, at least decisively.

However, taken together, there does seem to be some evidence that CP subjects occupy the same position as DP-subjects. They are not topics, they agree with the main verb, and they are able to engage in subject-auxiliary inversion. The simplest explanation is that this is because they *are* in [Spec, TP]. So, what happens if this explanation is followed through? One immediate issue arises, which I believe can be dealt with: namely, what drives movement of the CP subject to [Spec, TP], or why is it, and how can it be, base-generated there?

Picallo (2002) addresses this issue in the following way. CP subjects, if they are assumed to lack ϕ and Case features, are located in [Spec, TP]. In order to prevent the derivation from crashing under the principle of Full Interpretation, T and *v* must enter the numeration lacking any ϕ and Case features. T and *v* enter the numeration, on the other hand, with ϕ and Case features when the argument is nominal. However, this is highly problematic, because it implies that the grammar is able to "look ahead" and determine whether T and *v* need to be featureless or come with the relevant features. This logic also implies that the exact formal features an element has are dependent on other elements in the numeration. This is not desirable for the reason that looking ahead is more costly, computationally speaking, than not looking ahead. That is, any algorithm that contains some look ahead function is *a priori* going to require more steps, more memory, and more processing power than any algorithm not requiring look ahead[8]

The alternative that Picallo proposes provides a computationally efficient solution, which also is compatible with Martin's account of the EPP. The solution is to reject the hypothesis that CP subjects do not have ϕ and Case features. The benefits of this hypothesis are that T and *v* are not required to sometimes be Caseless and sometimes not, that the grammar does not need to have any kind of look ahead algorithm, and that elements in the numeration are not affected by other elements in the numeration—a desirable result.

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[8]I'm really assuming here that an algorithm without "look ahead" is an algorithm which "blindly" goes through the derivation. This is not to say that the algorithm is going to be "as good" as an algorithm with the ability to look-ahead—look-ahead, for instance, can help with errors. But the point is that, in terms of simplicity, blindly proceeding through the steps without any look-ahead is a better option. Of course, an algorithm which looks ahead is going to also "blindly" proceed through its sequence of instructions, but it does so with prior knowledge of what comes.

How this exactly happens, I propose the following. Due to the logic and theory of Case proposed by Uriagereka, outlined above, any argument must have some Case specification so that the grammar can distinguish multiple arguments. If it is admitted that CPs can potentially be arguments, then any CP argument will have to bear some Case feature. I propose that CPs can potentially be arguments for the following reason. CPs subjects essentially describe events—*that John drinks coffee*, *that England lost the World Cup*, etc, are all of the form [that some event *e* took place] and are followed by some predicate which predicates something of the CP/event. Logically, this could be represented in the following way: $P(e, x_n,...,x_{n+m})$, where each x is some other argument. If this line of argumentation is accepted, then the CP will be Case bearing, for interpretation at LF.[9] Then, for the reasons of Enlightened Self Interest discussed above, the CP subject will either move to [Spec, TP] or will be base-generated there. Of course, whether a CP is assigned Case or not is purely a function of whether it is an argument or not. This does not require any look ahead, and is compatible with the theory heretofore discussed and defended.

APs appear to be slightly more tricky to analysis in this vein because they seem even less likely candidates to be considered arguments. But that is precisely what I suggest, when APs are able to occur in [Spec, CP], as I suppose they are in the examples above.

(26) a. [AP interesting] is what it is
      b. [AP amazing] seems to be the word

The pseudo-logical forms of (27), repeated from above, are I argue as follows.

(27) a. $\exists e\, P(e)$
      b. $\exists n\, P(n)$

That is, both *interesting* and *amazing* are arguments of their predicates. *Interesting*, in (27a), logically refers to a *state of affairs* or some *thing*. Moreover, *amazing* refers to a metalinguistic word in a object-meta-language expression. In both of these cases, and any other that involve APs in identical structural locations, the APs are arguments and as such allowed to bear Case. In fact, they *must* bear Case as argued above if they are arguments. This explains why they move to [Spec, TP].

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[9]Why is Case needed on CPs? Surely they are distinct enough from other arguments to not warrant Case. This is where the argumentation in 1.2 comes in: it is more costly to *not* assign them Case.

3   Conclusion

This thesis has considered one of the central problems of linguistic research: namely, how language can be an optimal solution to the problem of interfacing thought and sound when there are features that are not interpretable at the interfaces. Specifically, the question has been aimed at the EPP, and whether it can be reduced to some other non-uninterpretable property. I have argued, following Martin, that this is indeed the case. The aim of this thesis has not been too provide a deductive defense of Martin's Case account of the EPP. Instead, I have attempted to draw on a range of thoughts to provide a compelling narrative that widens, and so strengthens, Martin's account—hoping that the argument is the best explanation.

In doing so, I have considered how Icelandic quirky subjects, German dative subjects, CP subjects, and AP subjects all fit in with Martin's account. Moreover, I have provided an explanation for why *all* arguments—morphologically and otherwise featurally distinct DP arguments, CP arguments, and AP arguments—must, for computational simplicity, carry Case. The one major question mark concerns the German data and the explanation of it that I have given.

One of the most interesting consequences, in my mind, of this work has been the degree to which Case has been pushed back into LF, becoming purely an indexing mechanism which prevents the lose of arguments in the computational system. This mechanism, due to the quirks of morphology, is sometimes realised in speech, but need not be. Future work on German dative subjects is needed, as these do not currently fit well with Martin's account. What is particularly interesting about this is that it has simultaneously eliminated two uninterpretable features from the theory of language. Case is an LF feature, and the EPP is destroyed. This, if this line of argument can be pursued further and applied to the German data, brings us closer to the core and most interesting question of linguistic research in my view. Namely, is language perfect? Given the surrounding interfaces and global architecture of the mind, could there be a better or more optimal language algorithm? As far as Case and the EPP are concerned, the answer seems to be no.

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