Expletives on the interface: Linearization and PF output conditions ⋆

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Abstract

This paper argues that English *there*-type expletives are a function of bare output conditions at PF interacting with AGREE. Specific and extra-linguistic conceptions of interface conditions such as linearization and locality yield a situation where AGREE sets up a linearization paradox where an optimal solution requires displacement. In this way, movement obtains without recourse to EPP.

Key words:
EPP, Expletive, functional dependency, LCA, Linearization, normalization of relations, minimalism, PF interface, syntactic relations

1 Introduction

It has long been assumed that the expletive in existential sentences satisfies a purely formal requirement that every finite clause have an overt subject in SpecTP.[1] This is

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[1] For the sake of convenience, I will use SpecTP as shorthand to denote the locus of EPP effects unless it makes a substantive difference to the argument. Later in this paper I will make a more precise distinction between SpecTP and SpecAgrP.

a particular instantiation of the broader Extended Projection Principle (EPP) requirement that every sentence have a subject. The following examples show that an expletive covaries with the associate.

(1) Matrix clause
  a. A cat was curled on the carpet
  b. **There** was a cat curled on the carpet

(2) Raising
  a. A cat is likely to be curled on the carpet
  b. **There** is likely to be a cat curled on the carpet
  c. *There is likely a cat to be curled on the carpet

(3) ECM
  a. The cat knows **there** to be milk in the fridge
  b. The cat knows milk to be in the fridge

A large body of literature discusses the nature of the expletive and its relation to the associate, however the fundamental reason why the expletive occurs at all remains mysterious: the expletive is merged or moved (depending on the analysis) in order to satisfy the EPP (Chomsky, 1995, 2000, et seq). However, Epstein and Seely (2006) among many others (e.g. Boeckx (2000a); Boskovic (2002); Epstein and Seely (2006); Groat (1995, 1999); Haeberli (2000); Martin (1999); Rooryck (1997); Sabel (2000)) have given voice to a research programme, namely the elimination of the EPP. Epstein and Seely (2006) point out that EPP is typically redundant with other principles and should therefore be eliminated from the Minimalist ontology on grounds of parsimony.

> There are, we think, few cases (at least in English) where there is no redundancy, i.e. where there is alleged to be pure EPP checking.. . . What we would like to suggest, given the problems noted thus far, is that even these 'residues' of the EPP should be analysed not by looking for an independently motivated EPP feature – thus far undiscovered – but by eliminating the EPP. Thus, the general research strategy we adopt is: . . . in the many cases where the EPP applies redundantly, appeal to it is unnecessary (Epstein and Seely, 2006, 52).

This paper aims to contribute towards this programme by addressing some of the 'residues' of EPP that have proven difficult to eliminate. Part of the difficulty is that there are two main components to the EPP problem.

(4)
  a. Movement to SpecTP must be motivated in some way: a syntactic problem
  b. The XP in SpecTP must be overtly spelled out in SpecTP: a PF problem

The movement of the expletive to SpecTP must be motivated in some way; ideally by some property of either the LF or PF interfaces or both. Such a motivation has remained elusive for linguistic theory and in contemporary theory, this problem is handled – but not explained – by the stipulation that certain functional 'phase' heads require a filled specifier. In other words, satisfaction of the EPP is a purely formal process. There have also been sustained attempts to reduce 'pure' EPP to other syntactic dependencies such as Case checking (Epstein and Seely, 2006; Groat, 1995, 1999; Haeberli, 2000; Martin, 1999; Sabel, 2000). To the extent that this is successful – and I find the arguments compelling; see Epstein and Seely (2006) for a review and extension of the arguments– it may answer (4a) but not (4b).

Assuming a motivation for (4a) can be found, movement to this position is not enough: the constituent in SpecTP must be spelled out/linearized in such a way that it precedes T. There can be no covert movement that satisfies EPP. Thus, the EPP problem is actually two inter-related problems: (i) establishing a relationship between the subject DP and SpecTP and (ii) forcing that syntactic category to be spelled out in its moved position: a PF interface problem (see also Merchant, 2001; Van Craenenbroeck and Den Dikken, 2006).This issue is highlighted by the advent of AGREE in current Minimalist theorizing where a syntactic dependency can be established by AGREE without the need for further movement. Generally, it is assumed that the trigger for movement is EPP, which takes us back to the first question above.

1.1 Limitations of this paper

Although the original EPP related specifically to the subject position (EPP of T), over the years it has been applied in other domains e.g. EPP of P (Biberauer, 2008; Biberauer et al., 2008; Svenonius, 2001), EPP of C (Carstens, 2005; Holmberg, 2000; Mathieu, 2006) and more recently as an 'edge feature' in Phase theory. In this paper, I will focus exclusively on EPP of T, leaving the other invocations of the EPP to future research.

I will also distinguish between *there* and *it*-type expletives. In English, there is a morphological distinction between these two types, although this is not necessarily the case in other languages. *It* is (quasi) argumental (Authier, 1991; Chomsky, 1981; McCloskey, 1991; Yoon, 2008) and has a full complement of ϕ features; *There* is a 'pure' expletive, does not function as a pronoun and is taken by many to be ϕ incomplete.

2 *Linearization at PF*

Having outlined the nature of the problem to be tackled in this, perhaps, not-uncontoversial way, a solution to this impasse may be provided by a normalization-driven approach to Minimalist syntax developed in a number of papers (De Vos, 2007, 2008; De Vos, 2009). This approach draws on Relational Database Theory (Codd, 1970, 1983; Dutka and Hanson, 1989) which, in turn, is informed by mathematical set theory. It provides an explicit conception of the LF interface and the constraints it imposes on narrow syntax (De Vos, 2008) and has also been extended to the PF interface (De Vos, 2009). As such, it is a useful tool with which to conceptualize the Strong Minimalist Hypothesis. Since this is a relatively new linguistic framework, I will outline its main principles in this section.

Central to the proposed analysis is the Strong Minimalist Hypothesis informally stated as: the properties of syntax are determined by the LF and PF interfaces and (ideally) nothing else. This entails, that MOVE is determined by interface properties (De Vos, 2008) and as a corollary, that obligatory, overt, EPP-induced movement must be determined by properties of the interface as well. The framework of De Vos (2008, et seq) utilizes three basic notions, each of which will be discussed in turn: (i) An LF interface requirement, namely Normalization of relations; (ii) Syntactic relations (conceptualized as functional dependencies); (iii) and linearization of relations as a PF interface requirement. The LF interface is conceived in relational, information-structure terms and the role of narrow syntax is to create representations that are interpretable to this interface. Relational theory provides extra-linguistic motivation for what counts as 'interpretability' at the interface by means of mathematically strict well-formedness constraints on information structure known as levels of normalization defined over functional dependencies. Consequently, narrow syntax provides normalized set-theoretic representations typically of the form $\{\alpha,\{\alpha,\beta\}\}$ (also notated as $\alpha \rightarrow \beta$); strictly speaking, this notation constitutes a partially ordered set (Fortuny, 2008; Halmos, 1960; Kracht, 2003; Langendoen, 2003; Zwart, 2009). These are functional dependencies.

A functional dependency is, simply put, an ordered pair (Dutka and Hanson, 1989; Halmos, 1960) and can be defined as in (5b).

(5)
a. A functional dependency is a statement of the form $X \rightarrow Y$, where both X and Y are sets of attributes.
b. A relation R satisfies the functional dependency $X \rightarrow Y$ (or $X \rightarrow Y$ holds in R) if for every pair r_1, r_2, of tuples of R, if $r_1[X]= r_2[X]$, then $r_1[Y]= r_2[Y]$ (Sagiv et al., 1981, 437).

The definition in (5) has its roots in relational database theory and was originally designed to define dependencies in relations. This definition can be briefly explained using the following diagram, a relation, R. There are two columns (attributes), X and Y and the rows (tuples) are numbered for ease of reference.

	X	**Y**
r_1	α	β
r_2	α	β
r_3	γ	δ
r_4	α	β
r_5	μ	ν

Consider a pair of rows r_1 and r_2: The value/information content of column X in r_1 is α; the value/information content of column X in r_2 is α. Thus r_1[X]= r_2[X]. Now consider the value/information content of column Y: in row r_1 the value of Y is β and in row r_2 the value of Y is also β. Thus r_1[Y]= r_2[Y]. The same applies to pairs of rows r_4 and r_1 and also to rows r_4 and r_2. What this points to is a deterministic relationship: whenever α occurs in column X then β occurs in column Y. This is a functional dependency and it is informally written out in prose as (6a). Note that rows r_3 and r_5 contain values which are not repeated and therefore do not provide any evidence for or against a functional dependency in this particular relation.

(6) a. **Functional Dependency:** α functionally determines β if the value of α determines the value of β.
b. α and β are syntactic features and their value is the information content of a particular feature (De Vos, 2008, 1869)

Using this definition and graphic interpretation, it can also be demonstrated that functional dependencies exist rather trivially in syntax. They are instantiated by operations such as selection, MERGE, AGREE and MOVE.

2.1 Selection/Merge

First consider selection. Imagine that one collected a corpus of syntactic structures and listed each head and its complement on a separate row of a large table. One might end up with a table something like the following. It would be noted that every time finite T occurs in the table, its complement is *v* (rows r^1 and r^2). Similarly, every time infinitival T occurs in the table, its complement is *v* (rows r^3 r^4).

According to the definition in (5), there exists a functional dependency where X→Y or, more specifically, head→complement. Heads select their complements and thus selection instantiates a functional dependency. As a corollary, since a head must always be merged with its complement as a function of a selectional feature, it follows that MERGE also instantiates functional dependencies.

	X head	Y complement
r^1	T(fin)	*v*
r^2	T(fin)	*v*
r^3	T(inf)	*v*
r^4	T(inf)	*v*
r^5	*v*	V
r^6	*v*	V
r^7	C	T
r^8	C	T
r^9	D	N
r^{10}	D	N

Note that the dependency is from head/selector to complement/selectee and that the reverse does not hold i.e. the selection/MERGE relation is antisymmetric [2]

2.2 AGREE

Now consider AGREE which is MATCH followed by feature deletion (Chomsky, 2001, 4). [3] Using the same corpus of syntactic structures, one might construct a large table of the probes and goals that enter into AGREE relationships. Two things are noted: (a) the probe is always uninterpretable while the goal is always interpretable and (b) the probe and goal are always matched in terms of the type of feature. These characteristics are, of course, part of the definition of AGREE and are therefore unsurprising. Consider

[2] Antisymmetry is defined as if A→B & B→A then A=B; if A≠B then A→B & ¬B→A.

[3] I will leave open the option that AGREE is feature valuation. It's inclusion may have subtle effects which I will not discuss here.

rows r^1 and r^2. The values of X are iNum[SG] respectively fulfilling the first conjunct of definition (5). The values of Y are an empty set respectively, thus conforming to the second conjunct of the definition (5). Consequently there is a functional dependency of the form GOAL→PROBE. Consequently, AGREE instantiates a functional dependency.[4]

	X GOAL	Y PROBE
r^1	iNum[SG]	~~uNum~~∅
r^2	iNum[SG]	~~uNum~~ ∅
r^3	iNum[PL]	~~uNum~~∅
r^4	iNum[PL]	~~uNum~~∅
r^5	iT[PRES]	~~uT~~∅
r^6	iT[PRES]	~~uT~~∅

Thus, it can be demonstrated that selection, MERGE and AGREE all instantiate functional dependencies and the null hypothesis is, then, that these are input to the interfaces, specifically the PF interface, the focus of this paper.

2.3 The PF interface

Since these functional dependencies are inherently part of the grammar, the null hypothesis is that they serve as input to the interfaces as illustrated in figure 1. Narrow syntax computes syntactic (functional) dependencies. These dependencies are encoded as ordered pairs (α,β). These representations are then passed directly to the LF and PF interfaces. At PF, they are linearized, represented here as $\alpha > \beta$.

This model requires a closer consideration of what reasonable interface conditions may exist at the PF interface (De Vos, 2009). A first assumption about the PF interface is that some version of distributed morphology applies (Embick and Noyer, 2001; Harley and Noyer, 1999; Marantz, 1997; Marantz and Halle, 1993); narrow syntax, utilizing, selection, MERGE, MOVE and AGREE, operates over feature bundles which are then sent

[4] It is also worth noting that if AGREE works by feature valuation (Chomsky, 2001, 4), then the inverse does not apply and the relation is asymmetric: there is no deterministic relation from PROBE to GOAL. In either case, AGREE is antisymmetric. While it might be a possibility to exploit this difference, with its concomitant linearization effects to explain parametric variation.

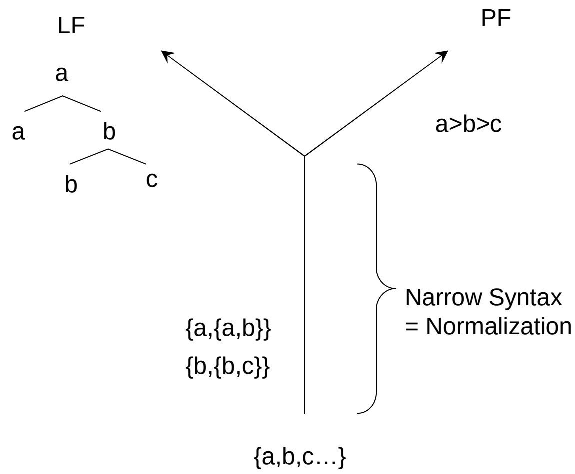


Fig. 1. Model of the grammar

(in phases) to the interfaces. At the PF interface, these bundles are matched to the most highly specified, matching morphological form. In the absence of there being a highly-specified form, the elsewhere condition applies.

A second assumption about the PF interface is that since narrow syntax produces normalized (usually binary) relations which are instantiated by MERGE, MOVE, AGREE and C-selection, that these same relations should be mapped in a one-to-one manner to linear precedence at PF (7). The consequence of this is that if $\alpha \rightarrow \beta$ then α will precede β in linear order.

(7) a. **Dependency Spell Out:** For any fully normalized relation (α,β) where $\alpha \rightarrow \beta$: (α,β) is a PF object and $\alpha > \beta$. (i.e. if α functionally determines β, then α precedes β.)

Dependency Spell Out, (7), maps ordered pairs of functional dependencies onto linear precedence. Dependency Spell Out, (7), is similar in style to the LCA of Kayne (1994) (but not in content). Like the LCA, it takes a pre-existing syntactic relationship as the input for the linearization component (Functional dependencies for Dependency Spell Out, (7), asymmetric c-command for the LCA). Also, just as the LCA is axiomatic, the significance of Dependency Spell Out, (7), depends on the extent to which it allows insight into grammatical phenomena. I wish to point out that the hypothesis does not refute the LCA or impinge upon it in any way; it is simply another possible mapping that needs to be investigated. Taken with the results of the previous section, it comes down to a requirement that (i) interpretable features are spelled out preceding their checked, uninterpretable counterparts and (ii) selectors precede selectees. [5]

Another plausible PF output condition is a requirement that locality be optimally obeyed in PF representations. Since locality is endemic to linguistic systems generally, and phonology and syntax in particular, I don't consider this particularly contentious. Combined with (7), the locality constraint will ensure that α and β are spelled out with α preceding β as locally as possibly. All things being equal α and β will be strictly adjacent.

(8) a. **Locality:** a fully normalized relation (α,β) is a PF object and must be spelled out as locally as possible.

Finally, one can assume that some version of Full Interpretation will be present as a general interface condition. This simply ensures that unconstrained insertions and deletions do not apply as last ditch measures to save dying representations. While every PF object must have some reflex, I assume that such a reflex need not be overt and might, for example, include a trace. [6] Once again, I do not view this as a particularly problematic assumption. [7]

(9) a. **Full Interpretation:** a fully normalized relation (α,β) is a PF object and all components of a syntactic object which is transferred to PF must have a reflex at PF.

In summary, I have outlined a number of plausible PF output conditions which follow more or less directly from the Strong Minimalist Hypothesis. The Strong Minimalist Hypothesis requires an explicit view of the interface conditions which is provided by a normalization approach to grammar combined with the null hypothesis that the representations created by narrow syntax are mapped in a one-to-one manner to the PF interface in particular (and the interfaces in general). This is axiomatized in (7), supported by other relatively uncontroversial assumptions about the PF interface with respect to locality (8) and full interpretation (9).

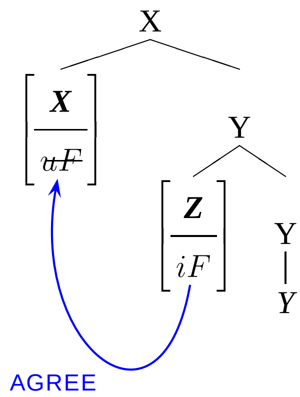
[5] Note that I am not suggesting that uninterpretable features are passed to the PF interface (causing the derivation to crash), merely that AGREE instantiates a functional dependency between the goal and probe. It is these relations that are passed to the interface.

[6] There is a weak implication here that a trace, if it is such a reflex, must be 'visible' in some sense at PF. Evidence for this is provided by the well-known *wanna* contraction effects which demonstrate that traces do have PF consequences.

[7] While it may be possible to conflate the requirements in (7), (8) and (9), I will maintain them as nominally separate for ease of reference.

In order to see how Dependency Spell Out, (7), might work, consider a toy derivation, where X, containing uninterpretable features, has merged with Y(P) while Z(P) is in the specifier of Y(P). The functional dependencies are listed in (10b) for convenience.

(10) a.



b. $Z^F \rightarrow X^F$
$X \rightarrow Y$
$Y \rightarrow Z$

First, let's consider only the AGREE relation between X and Z.[8] Uninterpretable F features on X probe for a goal with suitable interpretable F features which can check the uF on X. The goal is Z in (Spec)Y. AGREE checks the F features. Traditionally, it was at this point that an EPP feature was postulated to motivate movement to (Spec)X. However, this is not necessary given my assumptions above. The existence of the agreement dependency (Z^F, X^F), according to Dependency Spell Out, (7), yields a linearization pattern where the Z precedes X. Note that this does not presuppose immediate precedence; for instance, in the examples below, Q is an arbitrary adjunct to illustrate violations of immediate precedence.

(11) PF economy

a.	<Z, X>	Immediate precedence and an optimal solution
b.	<Z, Q, X>	Obeys general precedence (7) but violates (8)
c.	<X,Z>	Violation of (7)
d.	<X, Q, Z>	Violation of (7)

Immediate precedence is enforced by the locality requirement (8) which requires that ZP be as local as possible to X. Note that within a Minimalist derivational economy approach, (11a) is an optimal solution, conforming to both Dependency Spell Out, (7), and the locality principle (8). (11b) conforms to Dependency Spell Out, (7), but violates

[8] For ease of explication, let us put aside the relations $X \rightarrow Y$ and $Y \rightarrow Z$ for the moment. I will return to them below.

Locality and is consequently less optimal than (11a). (11c,d) both violate Dependency Spell Out, (7), .

Actually, the situation in (10) is more complex because, together, $X \rightarrow Y$ and $Y \rightarrow Z$ and $Z \rightarrow X$ constitute a linearization paradox. Dependency Spell Out, (7), thus requires linearization of the following relations (12). A number of potential solutions are listed below.

(12) (X,Y) (Y, Z) (Z,X) *Linearized as:*

a.	< X , Y , Z , X >	An optimal solution
b.	< X , Y , Z , $\emptyset$ >	Violates (7) and (9)
c.	< X , Q , Y , Z , X >	Violates (7) and (9)
d.	< X , Y , Q , Z , X >	Violates (8)
e.	< X , Y , Z , Q , X >	Violates (8)

Example (12a) is an optimal solution notwithstanding the fact that X is represented twice in the representation. Example (12b) maps the (Z,X) relation to an empty set, effectively resulting in there being no PF expression of that relation. This violates Full Interpretation (9) – and incidentally Dependency Spell Out, (7), as well. Examples (12c,d,e) each violate the Locality requirement because in each case there is an intervening entity that disrupts strict precedence. Having established the optimal solution, principles of Chain Spell-Out may come into operation and mark the highest X for overt spell out, while the lower one is spelled out as a phonetically empty element.

3 Derivations

In the remainder of this paper, I will demonstrate that EPP contexts instantiate exactly this type of linearization paradox and that its optimal resolution along the lines indicated above provides a solution to the EPP problem. The following sections explore this mechanism with respect to English expletives. This section outlines some further derivations of expletive constructions, namely in matrix clauses (section 3.1), ECM (section 3.2) and raising contexts (section 3.3).

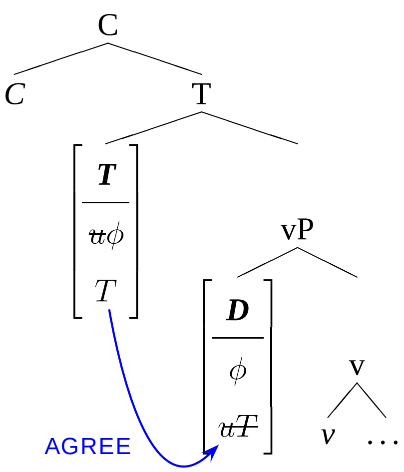
3.1 EPP in matrix clauses

The schema in (10) can be transferred more or less entirely to a matrix clause EPP configuration (where X, Y and Z represent TP, vP and DP respectively). C selects T and

T selects *v*. The subject DP, is selected by *v*. T checks uCase on DP and DP checks uϕ features on T. These dependencies are listed in (13b) for the sake of convenience.

The derivation proceeds until T is merged (before C is merged). Uninterpretable Case features on D probe for a goal and are checked by the interpretable Case features on T by AGREE. Similarly, uϕ features on T probe for a goal and are checked by iϕ features on T by AGREE. These operations instantiate the T→D and D→T dependencies respectively. Traditionally, it was at this point that EPP was postulated to force movement of the DP into SpecTP. However, given my assumptions that there is no EPP feature, this option is no longer available in this derivation. It is, of course, a possibility that MOVE applies and that DP moves to SpecTP since nothing blocks this movement (although nothing really motivates it either). Let's assume that movement does not apply and that the derivation proceeds with the merger of C, exhausting the numeration. The resulting tree would look like that in (13a). [9]

(13) a.



b. C→T (Selection)
T→*v* (Selection)
v→D (Selection)
T→D (Case)
D→T (ϕ agreement)

The set of dependencies in (13b) are sent to PF. The categories C, T and *v* are matched to their respective forms (null, complementizers, auxiliaries, modals or lexical verbs etc) in the usual way. Application of the Dependency Spell Out, (7), yields the linearization possibilities in (14). C precedes T precedes *v* precedes D by selection. However, paradoxically, D must simultaneously follow *v* and precede T. However, a closer look at the agreement relations uncovers a subtle means of solving the paradox in an optimal way: *v* selects the category D and therefore *v* must precede the category D. But the ϕ features

[9] I use the term 'tree' here to informally refer to the graph representation. However, under the proposed analysis, the fundamental unit of derivation is the ordered pair. While this may be represented as a graph for ease of explanation, this is not really necessary (at least, perhaps, not until LF).

of D check agreement on T and therefore it is minimally the ϕ features of D that must be linearized preceding T i.e. it is not necessary that the entire feature bundle D precede T.

At this point, the particular morphological resources utilized by a particular language become important. If there is an underspecified morphological form which can be used to spell out pure ϕ features, then this form is matched to ϕ. In English, this underspecified form is the *there*-type expletive. The remaining feature bundle, D, is matched to its morphological form in the usual way: *a man, a house, three unicorns* etc. In this way, Full Interpretation (9) is satisfied: every feature in the chain has been spelled out at least once and there have been no deletion or insertion of features.

(14) Linearization possibilities in a matrix clause

a.	C	>	ϕ^D	>	T	>	v	>	D	...
			there		is				a man	at the door

It is worth pointing out that in the linearization pattern (14a), strict adjacency is not entirely obeyed, but that locality (8) is optimal. For instance, both C and ϕ must precede T (7). Only one of them will be immediately adjacent to T and therefore one of them will conflict with the locality requirement (8). The point here, is that satisfaction of locality must be optimal. [10]

This derives the expletive construction in (14a) without recourse to EPP and where the solution is framed entirely in terms of the interface requirements of PF interacting with syntactic relationships such as selection and agreement.

There is another linearization possibility that might apply to the structure in (13). In the absence of an expletive, ϕ features can be lexicalized by a fully-spelled-out DP (as is usually the case). In this scenario, the DP would appear to have raised since it precedes T (whether or not the DP actually moved in narrow syntax; although in the previous derivation I assumed it had not). For independent reasons, the 'tail' of the DP chain is spelled out as a trace. This yields the non-expletive pattern (15). [11]

[10] It is a possibility that ϕ precedes C. I will not explore this possibility here, but will limit myself to some remarks on it. (a) If C were to be embedded (selected) beneath a higher predicate, then locality would require that C precede ϕ. Consequently, the configuration in (14) is consistent with embedding. (b) In English, non-embedded C is null and therefore a situation where ϕ>C would not be surface visible in any case. (c) Most interestingly, in languages where non-embedded C is not null (e.g. Icelandic, Dutch, German etc), a linearization pattern where ϕ>C>T would effectively derive V2 under the assumption that C and T are spelled out together by a morphological form that can instantiate both (i.e. the V2 predicate). These consequences would have to be explored in more detail in future research.

[11] In addition, recall that there is also the possibility of MOVE applying in syntax, which would

(15) Another linearization possibility in a matrix clause

a. *C* > ϕ^D > *T* > v > *D* …
 a man is t at the door

3.2 EPP in ECM clauses

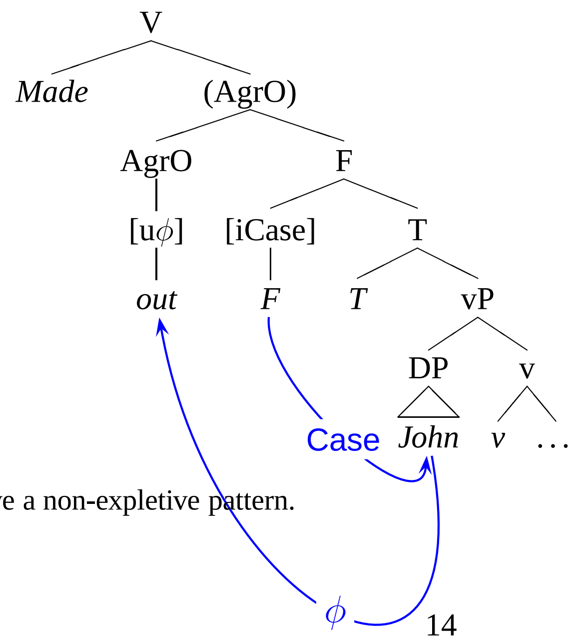
Expletives also occur in ECM contexts where a particular type of verb assigns Accusative case to a DP selected by the embedded clause. The embedded DP raises, either to SpecTP, a position internal to the embedded clause, or to SpecAgrOP which is optionally merged within the matrix clause (Lasnik, 2002a,b). I take this latter position to be a 'low' AgrO position internal to the vP shell. This is demonstrated with respect to a particle-verb construction (16a). I also assume that non-particle ECM verbs to have essentially the same structure (16b).

(16) a. *John made Peter out to be a liar*
John made out Peter to be a liar
SpecAgrOP SpecTP

b. *John believes (Peter) (Peter) to be a liar*
SpecAgrOP SpecTP

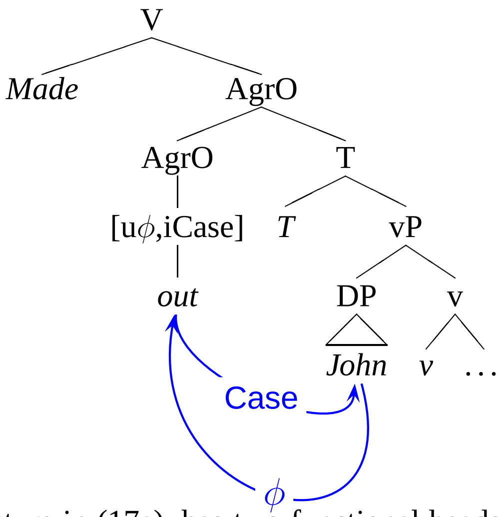
It is debatable which phrase structure is applicable to particle-verb ECM constructions, particularly when it comes to the question of whether Case and Agreement are mediated by the same head or different ones. Two options are illustrated below (note that I, following Epstein and Seely (2006), assume that infinitival T^0 does not enter into any checking relationship with the DP subject of the embedded clause.)

(17) a.



also derive a non-expletive pattern.

b.



The structure in (17a), has two functional heads, namely an optional AgrO and an additional ECM-case-assigning position. Only one of these is ever supplied with phonetic material in English. In the second possibility (17b), the case marker 'out' assigns exceptional case to the DP of the embedded clause by AGREE. The preposition is, in addition, optionally specified with uϕ features and these probe the interpretable ϕ features of the DP by AGREE. This is not problematic in itself since there is cross-linguistic evidence for ϕ features on so-called 'agreeing' prepositions. The advantage of this approach is that it requires only a single functional head, 'out' and in addition, it capitalizes on the fact that prepositions normally assign case. Both of these structures can derive the attested facts, but since the first (17b) is more parsimonious, it is this one that I will assume in the derivations that follow.

In order to linearize the structure in (17b), let's consider only the subset of relations that are immediately relevant, namely the selectional relations V→ AgrO, AgrO→T, T→*v* and *v*→DP and the AGREE relations DP→AgrO (ϕ checking) and AgrO→DP (Case checking). By (7), V precedes AgrO precedes T precedes *v* as illustrated in (18b). However, the DP presents a paradox for the linearization strategy: it must simultaneously follow *v* and at least its ϕ features must precede AgrO. This is also illustrated in (18b). Note that this structure obeys locality (8) in an optimal fashion but that there are still two violations of locality: V is not strictly adjacent to AgrO and AgrO is not strictly adjacent to T.

In the case of a non-expletive construction, the ϕ features are matched to a DP which therefore precedes AgrO (18c) which may be spelled out as a particle of a particle verb (or as a null head in the case of non-particle ECM assigners like *believe*). For an expletive construction, the ϕ features may be optionally spelled out either as a *there*-type expletive (18d), just the same as occurred in section 3.1. The remaining segments of the D-chain are spelled out as traces for independent reasons.

(18) a. V→AgrO (Selection)
AgrO→T (Selection)
T→*v* (Selection)
v→DP (Selection)
AgrO→DP (Case)
ϕ^D→AgrO (Agreement)

b. V > ϕ^D > AgrO > D > T > *v* > D

c.

V	>	ϕ^D	>	*AgrO*	>	*Case*^{D}	>	*T*	>	v	>	*D*
made		John		out		t		to		be		a liar

d.

V	>	ϕ^D	>	*AgrO*	>	*Case*^{D}	>	*T*	>	v	>	*D*
made		there		out		t		to		be		a man at the door

According to Lasnik (2002a,b), AgrO can be optionally present or absent. By this, I assume that uϕ on AgrO in the structure above can be optionally present or absent. If this occurs, then the expletive or DP will occur to the right of the case-assigning particle (AgrO). Note that the Case dependency AgrO→DP, in order to satisfy (7), only requires that minimally Case features of the DP be spelled out adjacent to AgrOP. Consequently an expletive may be inserted to lexicalize just these features.

(19) a.

V	>	*AgrO*	>	*Case*^{D}	*T*	>	v	>	*D*	
made		out		John		to		be		a liar

b.

V	>	*AgrO*	>	*Case*^{D}	*T*	>	v	>	*D*	
made		out		there		to		be		a man at the door

c.

V	>	*AgrO*	>	*Case*^{D}	*T*	>	v	>	*D*	
made		out		a man		to		be	t	at the door

A question that arises is why an expletive in an ECM construction cannot occur when the associate is in the 'moved' position (20b). Since the ECM verb uncontroversially assigns case to the embedded DP, the Dependency Linearization Axiom (7) seemingly predicts that the DP should immediately follow the ECM predicate contrary to fact (20b).

(20) a. There was expected to be a proof discovered
b. *There was expected a proof to be discovered

Recall that this type of sentence was problematic for Chomsky (2000), and was excluded by invoking the MERGE-before-MOVE constraint. This requirement has been criticized on empirical and theoretical grounds (Epstein and Seely, 2006; Shima, 2000). There are several ways of excluding this sentence under the present analysis without recourse to MERGE-before-MOVE. The first relies on the assumption of Epstein and Seely (2006) that infinitival T does not check features and therefore, under the assumptions of the current analysis does not trigger movement of the DP. Since the matrix predicate is passive it's 'object' is promoted to subject position and does not receive accusative case. [12] Given the framework developed in this paper this means that a DP cannot follow *expected*. Consequently, there is simply no means of deriving (20b). The grammatical (20a) is derived in the following way: the embedded clause is merged; infinitival T does not check features and does not establish an AGREE relation with the DP. The 'ECM' verb is merged as a passive which means it does not assign exceptional, accusative case to the embedded DP. Matrix T is merged and establishes an AGREE relation with the embedded DP; in essence *was expected* acts like a raising verb in this context. Thereafter Dependency Spell Out, (7), applies yielding either an expletive or a full DP in the matrix clause as described earlier.

The second way of excluding (20b) relies in a counterfactual argument. Let us assume that Nominative case is a reflex of uT on D (Pesetsky and Torrego, 2001) and that Accusative case is a reflex of uAspect on D (Svenonius, 2001, 2002). The ECM verb checks uAspect on the DP, thereby assigning non-nominative case to the DP. Thereafter the DP enters into an AGREE relation with the matrix T. Matrix T discharges nominative case yielding a case clash and causing the derivation to crash.

The third (and to my mind, less compelling) reason why (20b) cannot be derived is that the embedded DP is clearly displaced from its base position. However, given that the expletive in (20b) is the PF realization of the ϕ features of the embedded DP, the configuration involves extraction from a movement island (moved XPs are islands for extraction). This would exclude (20b). [13]

Another question that arises at this point is why the embedded DP, *a proof*, occurs to the right of *discovered* (in the Th/Ex position) and not to its left (21) abstracting away from heavy-NP shift (See Caponigro and Schütze (2004); Chomsky (2001); Rezac (2006) for discussion).

(21) a. There was expected to be a proof discovered
b. *There was expected to be discovered a proof

This linearization pattern is peculiar to contexts with the predicate *be*; it is absent when the auxiliary *have* is used (22).

[12] It is worth mentioning that ECM verbs generally have non-ECM counterparts; the predicate in this instance might simply not be an ECM predicate in the first place.
[13] Since 'displacement' in the current framework is an artifact of PF linearization, this solution would necessarily require that certain islandhood constraints be reconceptualized as being PF related.

(22) a. *I was expected to have a proof discovered (non causal reading)
b. I was expected to have discovered a proof

Consequently, it could be the case that *be* selects a DP as an argument for independent reasons.[14] An analysis along these lines predicts that a DP should also be possible in the matrix clause where the passive auxiliary *be* should license one. This prediction is correct (23a,b) – this data appears to be novel as to the best of my knowledge it has not been discussed elsewhere. Note that in (23c), *a proof* cannot occur in the matrix clause because the Th/Ex is filled by the trace of *I* which has raised through it.

(23) a. There was (a proof) expected to be (a proof) discovered
b. There was (a proof) likely to be (a proof) discovered
c. I was (*a proof) expected to have (a proof) discovered

It has been argued that the Th/Ex position is a specifier of *v** i.e. it is the edge of the phase. If this were the case, then one might expect a Th/Ex position to be available with raising verbs more generally. However while a DP may raise into the matrix clause licensed by *be* (24a), it cannot do so for other raising verbs (24b).

(24) a. There was a proof likely to be discovered
b. *There seems a proof likely to be discovered
c. *There threatened corruption to be discovered
d. *There promised a cure for cancer to be discovered

Consequently, the patterns in (21) can be captured on the assumption that *be* peculiarly selects a DP argument.

3.3 EPP in raising contexts

The distribution of expletives in non-ECM, raising contexts contrasts with that in ECM constructions in that the DP subject of the embedded clause cannot occur left-adjacent to T *to* in raising contexts whereas it can in ECM contexts (contrast (25) with (26)) .

(25) Expletives in ECM constructions
a. I expected a proof to be discovered
b. * I expected to be a proof discovered

[14] I will not propose an analysis beyond this observation but see Rezac (2006) for an interesting account which I believe may be compatible with the assumptions put forward in this paper

(26) Expletives in raising constructions
  a. *There is likely a proof to be discovered
  b. There is likely to be a proof discovered

Under the analysis proposed in this paper, this contrast follows from two things: (i) ECM verbs assign accusative case to the embedded DP whereas raising predicates do not. By (7), this means that an ECM verb case assigner will immediately precede the embedded DP, whereas a raising verb will not because it assigns no accusative case. (ii) The second important aspect to the explanation of the paradigm is that there is no 'pure' EPP i.e. raising to SpecTP solely to satisfy EPP without having to check any other structural relation such as agreement or case. This is consistent with a growing body of literature including Boeckx (2000a); Epstein and Seely (2006); Groat (1995); Martin (1999).

The derivation of a raising construction with an embedded passive such as (26b) proceeds as follows. The embedded clause is merged as usual, but following Epstein and Seely (2006) infinitival T does not check any features and consequently there is no AGREE relationship between T and the DP (27a). Then the matrix, raising predicate is merged followed by the merging of matrix T with uϕ features (27b). T probes for a goal and AGREE applies between matrix T and the DP in the embedded clause thus instantiating the dependency DP→T. Simultaneously, T checks nominative case on the DP instantiating a dependency T→DP.

(27) a. [$_{TP}$ to be a proof discovered]
  b. [$_{TP}$ is likely to be a proof discovered]

Linearization of this set of dependencies yields the following pattern (28) for the entire sentence.[15] The DP subject in the matrix clause precedes T (by virtue of DP→T (ϕ agreement). There is a trace of the DP following matrix T (by virtue of T→D (Case checking). As for the derivations in the previous sections, the ϕ features of the DP can be lexicalized with a *there*-type expletive.[16]

(28)

ϕ^{DP_1}	>	T_1	>	ϕ^{DP_1}	V_1	>	T_2	>	v	>	DP_1	V_2	>	DP_1
there		is		t	likely		to		be		a proof	discovered		t
a proof		is		t	likely		to		be		t	discovered		t

[15] Note that nothing prevents linearization from taking place cyclicly or in phases; I have simply represented the entire derivation here in one fell swoop for the sake of convenience.

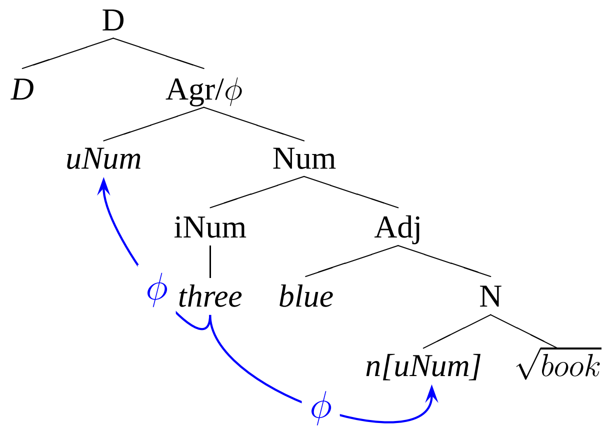
[16] The Case features immediately following the matrix T cannot be spelled out as a full DP in English for the same reason that (20b) is excluded: it involves extraction from a moved category.

This style of analysis makes a (probably too strong) prediction that the controllers of agreement follow the dependent (abstracting away from subsequent movements which may mask the original configuration and also from the existence of agreement types which, perhaps, do not instantiate functional dependencies). Instances where controllers of agreement follow the dependent are problematized e.g. English demonstratives, locative inversion and nominative agreement in Icelandic Quirky Case constructions amongst others. Although full analyses of these constructions cannot fit into this paper, I will outline potential analyses that arise from the assumptions of this paper.

In English, demonstratives agree in number with the nouns which follow them (29a,b). This apparent problem is an artifact of the assumption that it is the noun that controls agreement and it dissolves on a nuanced application of current syntactic theory about nominals (Van Koppen et al., 2009). A root is merged with *n* establishing a nominal category. Since nominals must be specified for number, but a root has no inherent number specification, there is presumably uNum on *n*. Following this, Num^0 is merged to establish number and it is reasonable to assume that if a NUMBER feature is to be intepretable on any head, then it must surely be interpretable on Num^0. Thereafter, an agreement projection, containing uNum (or possibly uϕ features more generally) is merged. The resulting structure is illustrated in (30) and where iNum checks uNum on N and Agr respectively.

(29) a. These[PL] three blue books[PL]
b. This[SG] blue book[SG]

(30) a. These three blue books
b.



The selectional and AGREE dependencies are represented in (31a,b) and their corresponding linearization patterns in (31c). The controller of agreement in these cases is actually, not N but Num. This follows the predictions of the analysis developed in this paper. The remaining Num→Agr relation can then be analysed in exactly the same way as expletives in the clausal domain: iϕ features (of which iNum is one) can be morphologically realized as an expletive *these*.

In fact, the demonstrative *these* can be broken down further if so desired. It will be recalled that in the clausal domain, checked uϕ features are spelled out on T (or, assuming the occurence of verb-raising to T, on V) as morphological agreement. In the same way, checked uNum features on Agr are spelled out as morphological agreement: *-ese/-ose*[PL] or *-is/-at*[SG]. Furthermore, in the clausal domain, iϕ features are spelled out preceding the checked uϕ features as an expletive: *there*. Similarly, in the nominal domain, the iNum features are spelled out preceding the checked uNum features as an expletive: *th-*. The fact that the demonstrative consists of both the expletive component and the agreement component in what is apparently a single head, namely *th+ese* or *th+ose* nevertheless complies with the linearization requirements that are imposed by the underlying syntactic relations. Furthermore, there is now a partial explanation of why both demonstratives and expletives have some phonological similarity. Consequently, the apparent anomaly is resolved under the proposed analysis.

(31) a. D→Agr, Agr→Num, Num→Adj, Adj→N [Selectional Functional dependencies]
b. Num→N, Num→Agr, Num→Adj [Agreement Functional dependencies]
c. *D* > ϕ^D > *Agr* > *Num* > *Adj* > *N*
th + ese three blue books

With respect to nominative agreement in Icelandic Quirky Case constructions (32a,b) there is inadequate space to analyse them in this paper. However, the approach developed in this paper strongly suggests that either (i) the quirky-case-marked DP controls at least one feature with respect to agreement or (ii) subsequent movements have masked an underlying configuration where the controller of agreement preceded the dependent (i.e. usually the predicate).

(32) a. *Henni$_i$ voru (ekki strax) sagðar/gefnar uplýsingarnar*
she-DAT$_i$ were.PL (not immediately) told.PL/given.PL the.news.PL
um að maðurinn sin$_i$ vri dáinn
about that husband REFL$_i$ was dead
'She was not immediately told/given the news that her husband was dead'
Icelandic: (Maling p.c.)

There appears to be some suggestive evidence in favour of the notion that Quirky-case-marked DPs control at least one feature. It has been pointed out in several papers that the

Quirky Case paradigm exhibits restricted agreement options (Boeckx, 2000b; Sigurðsson, 1996; Taraldsen, 1995): agreement with the nominative controller of agreement is in terms of NUMBER (33a). However, when the nominative controller is first person, then agreement fails (33b).

(33) a. *Henni* *leiddust/*?leiddist* *þeir*
her.DAT.3SG bored.3PL/3SG they.NOM.3PL
'She was bored with them' Icelandic: (Taraldsen, 1995, 307)

b. *Henni* **leiddumst/?*leiddust/?*leiddust/?*leiddist* *við*
her.DAT bored.1PL/3PL/default we.1PL.NOM
'She was bored with us' Icelandic: (Boeckx, 2000b, 360)

These facts are interpreted by Boeckx (2000b) as an instance of the Person-Case Constraint and thus of an intervention effect as a result of PERSON agreement between the Quirky-Case-Marked DP and the predicate.

NUM
(34) Predicate DP$^{Quirky-Case}$ DP^{Nom}
PERSON

Consequently, since the Quirky-Case-marked DP does determine some agreement on the predicate, it is possible that it should precede the predicate (see De Vos (2007) for a bit more discussion). In addition, it is entirely possible that subsequent operations (specifically V-T head-movement) have raised the predicate past the Nominative DP.

Similarly, it has been argued that in Locative Inversion constructions, the fronted PP checks features –although the details of the analyses vary, most authors arguing that the PP checks Case, although some authors argue that the PP checks a subset of ϕ (e.g. Loc.) features – (Broekhuis, 2005; Bruening, 2008; Hoekstra and Mulder, 1990; Postal, 2004; Rizzi and Shlonsky, 2006). If this is true then the PP is functionally determined by T, accounting for its apparent movement. Thereafter the PP moves to a topic position in the CP layer, thereby moving past the predicate.

5 Conclusion

This paper has analysed the EPP problem in general, and the distribution of *there*-type expletives in particular as being a function of bare output conditions at the PF interface. Specific and extra-linguistic conceptions of interface conditions yield a system of linearization where AGREE sets up a linearization pattern that results in displacement. The system predicts that case-marked XPs will follow the case assigner while an XP goal for ϕ agreement will precede the head it agrees with. As such, the EPP is an ephiphenomenon of interface requirements.

The advantages of this approach are that there is no need to resort to stipulative EPP features or requirements. It has all the advantages of a movement analysis with respect to expletives, but without the disadvantages of feature-movement per se. In addition, to the extent that it is framed purely in terms of output conditions, it is consistent with the Strong Minimalist Hypothesis.

To the extent that this analysis is successful, it raises serious questions for a number of areas in syntactic theory. Movement theory is problematized and questions arise as to whether all movement is PF-displacement and how to derive the well-known A/A-bar distinction. Similarly, the analysis raises the possibility of analysing head movement in a similar way, namely as an optimal solution to linearization paradoxes. Another area where questions are raised is for Binding theory. Den Dikken (1995) shows from scope effects that associates of expletives do not raise to SpecTP. However, Lasnik (2002a,b) uses binding data to show that when AgrO is merged a DP obligatorily raises in response to EPP. The present paper argues that EPP movement is actually PF displacement and this raises questions for the binding theory. Islandhood is also highlighted by this analysis insofar as if movement is analysed as PF-displacement, then island conditions on such movement must presumably be at least partly related to PF (abstracting away from minimality islands which seem to have a syntactic, as opposed to a PF, basis). It is quite interesting, that the theoretical areas that are problematized by the current analysis are precisely those areas that have remained issues for minimalist theory, namely head-movement, the A/A-bar distinction, binding and islandhood, for none of which is there consensus in the theoretical community. This may suggest we are on the right track.

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