

Cover sheet

Full title: True Optionality: When the grammar doesn't mind

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# True Optionality: When the grammar doesn't mind\*

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## Abstract

Optionality in movement operations is widely held to be fundamentally incompatible with a feature-driven approach to displacement in which movement must be triggered and triggered movement is obligatory. We argue that semantically vacuous alternations in surface order are not an imperfection of the language system but fall out on principled grounds once movement is viewed as internal merge (cf. Chomsky 2004). Minimalist economy principles are then predicted to allow for indeterminacies in the application of movement operations in exactly the same way as they do for external Merge: as long as the relevant formal trigger is motivated, the grammar cannot discern between two (or more) legitimate options for satisfying it, yielding the effect of 'true optionality'. We demonstrate the validity of this prediction with two case studies from the empirical domain of EPP-satisfaction in Germanic (optional verb movement in Afrikaans embedded clauses, and optional expletives in impersonal passives in Afrikaans, Dutch and Faroese), before offering some supporting evidence from *wh*-interrogatives in Afrikaans, LBC violations in Russian and Ancient Greek, and quantifier stranding in Arabic.

## 1. Introduction: A familiar problem

The Minimalist Program (MP) of Chomsky 1995 *et seq.*<sup>1</sup> seeks to eliminate language-specific properties of the computational system by reducing them, so far as possible, to principled explanation in terms of interface conditions (and other general properties). In this light, economy principles reduce to the requirement that elements and operations must contribute to interface interpretations – elements and operations that have no such effects are superfluous and unmotivated (cf. MI:99). Two antagonistic principles thus emerge, representing the two logical poles of superfluousness: (a) 'don't do too much' (cf. Thráinsson 2003:152), which can be termed Last Resort (LR), and (b) 'don't do too little', the principle of Full Interpretation (FI), whose force is captured in such statements as "Minimize superfluous symbols" and " $\alpha$  enters the numeration only if it has an effect on output" (MP:294(76)).<sup>2</sup> The operation Move (internal merge) is therefore rigidly constrained: LR dictates that movement is necessarily motivated, so that an element cannot move in the absence of a feature triggering its displacement (the EPP-feature of MI, DbP, BEA; the strong (D-)feature of MP), whilst FI ensures that an element is *obliged* to move if such a(n EPP-)feature is present (i.e. it cannot *not* move). Together, LR and FI imply that a given set of lexical items, as defined by the numeration, cannot exhibit optionality of the form 'move vs. don't move'. Since movement is the operation that feeds the surface order of constituents, it follows that word-order alternations involving (what appears to be) the same set of lexical items should not exist. Of course, such alternations are abundantly attested in natural language, as exemplified here by German scrambling:

- (1) a. *Er hat oft ein Buch gelesen.*  
He has often a book read  
'He often read a (non-specific) book.'  
[weak reading; cf. Diesing 1992]
- b. *Er hat ein Buch oft gelesen.*

He has a book often read  
'There's a book that he often read.'

[strong reading; cf. Diesing 1992]

If (1b) is the output of the same numeration as (1a), then clearly (1b) violates LR – it is in that sense an ‘uneconomical’ derivation, featuring the unmotivated (non-feature-driven) movement of the direct object. As argued in key works by Reinhart (1995) and Fox (2000), such ‘marked’ operations (QR, scrambling, stress-shift, etc.) are only sanctioned in the case that they give rise to an interpretation that would not otherwise be available (that is, the ‘economical’, ‘unmarked’ derivation, (1a) in the above example, will block the marked derivation, here (1b), unless the latter “meets an interface need” that the former fails to meet).<sup>3</sup>

We therefore expect interpretive differences in alternations of the kind in (1), which is indeed what we find (cf. the weak vs. strong readings indicated). However, whilst the Reinhart/Fox view of interface economy clearly resonates with the definitions of FI given above (i.e. operations cannot be superfluous, but must have an output effect), it clearly involves global computation in the form of comparison and blocking of derivations, lookahead to the interface, etc.; further, as already noted, it implies non-feature-driven movement, which LR excludes (at least if taken as a hard constraint; see Heck & Müller 2000 for an alternative view premised on a soft LR). Chomsky (MI, DbP) removes both of these problems via a single mechanism, the optional EPP-feature, which may be assigned to phase heads in accordance with FI, stated as follows:

- (2) The natural suggestion [for constraining optional operations – MTB, MDR] ... is a general economy principle: an optional rule can apply only when needed to yield a new outcome. (DbP: 34)

As a formal syntactic trigger, the EPP-feature both localizes the application of optional operations and removes the optionality from the computational system itself, placing it back in the numeration (where it more naturally, indeed unavoidably, belongs). Optionality of the kind in (1) is therefore unproblematic in the context of MP: structures featuring what appear to be the same lexical items but having different interpretations are assumed to be the output of different numerations,<sup>4</sup> one with and one without the relevant EPP-feature. Thus, for (1b),  $v^*$  is associated with an extra EPP-feature, whereas  $v^*$  in (1a) lacks this feature (DbP: 34ff). The move (1b) vs. non-move (1a) alternants differ in interpretation, as required by FI and LR.

The assignment of an optional EPP-feature must therefore result in interpretive effects at the interface (either directly, as in the scrambling example, or indirectly, in the form of successive-cyclic movement to a higher phase) – that is, an ‘edge feature’ gives rise to ‘edge effects’ (cf. note 4). This minimalist account of optionality, however, now clearly makes a new prediction: since word-order alternations involving (what appears to be) the same set of lexical items actually imply distinct numerations differing only in the presence vs. absence of EPP-features, there can be no semantically vacuous optionality – i.e. *true* optionality that cannot be ascribed to interpretive differences at the interface and thus to distinct numerations. A given numeration can only give rise to a single PF output (linear string), as distinct PF outputs imply distinct LF outputs (via the mediation of additional EPP-features, as per (2), which in turn imply different numerations).

Such true, semantically vacuous optionality is, however, prevalent in human language. Thus Modern Spoken Afrikaans allows alternations in the placement of finite auxiliaries in embedded clauses, as in (3), which are not associated with interpretive

differences (both the verb-final structure in (3a) and the apparent verb-second (V2) structure in (3b) receive embedded- rather than main-clause interpretations and intonation).<sup>5</sup>

- (3) a. *Ek weet dat sy dikwels Chopin gespeel het.*  
 I know that she often Chopin played has  
*Ek weet dat sy het dikwels Chopin gespeel.*  
 I know that she has often Chopin played  
 ‘I know that she has often played Chopin.’

Since the apparent ‘extra’ V-movement in (3b) has no interpretive effects, the trigger (EPP-feature) is unmotivated – it violates (2)/FI. Alternations of the kind in (3) are therefore unexpected on current assumptions – a given numeration either will or will not contain the EPP-feature required to trigger movement, resulting in respectively different interpretations. How, then, can a single grammar (/numeration) sanction semantically vacuous optionality of this kind?

Our answer to this question proceeds as follows. In section 2 we reassess the notion of ‘costliness’ of operations under current minimalist assumptions and set out the role played by EPP-features in providing the only computationally tractable (i.e. local) evaluation metric. This will allow us to reclaim a good measure of optionality from the numeration and place it back in the derivational component, offering a direct challenge to the view that a given numeration can only yield a single PF output (cf. above). After proposing a minimalist typology of EPP-satisfaction on the basis of Germanic (section 3), section 4 then demonstrates how one of these modes of EPP-satisfaction exploits exactly the kind of syntactic indeterminacy identified in section 2, giving rise to two dimensions of truly vacuous, system(at)ic optionality. Section 5 offers some further evidence that the grammar operates in this way, presenting three further examples of cases where the minimalist computational system simply “doesn’t mind”. Section 6 concludes.

## 2. Assessing the costs

The first clue as to where optionality truly lies can be found by considering those cases that instantiate the reverse of the implication identified in the previous section. The logic of the EPP-introduction rule of (2) is such that there is a 1:1 relation between PF representations and numerations (the view we seek to challenge below; cf. also note 4). However, the relation between PF and LF is only indirect (mediated via numerations, cf. the standard Y-model of MP), so that whilst different PFs correspond to different LFs (by virtue of different numerations), this does not imply that different LFs necessarily correspond to different PFs. Where multiple LFs are the product of the *same* numeration, then the LF:PF ratio will be many:1. This scenario is exemplified in cases of so-called ‘A-reconstruction’, as in (4a).

- (4) a. *Someone must be (someone) in the garden.*  
 must >> someone  
 someone >> must  
 b. *There must be someone in the garden.*  
 must >> someone  
 \*someone >> must

Bobaljik (2002) discusses such structures in a single-cycle, copy-spellout approach to movement and interpretive asymmetries. To account for the fact that LF may interpret

(“privilege”) either copy of *someone* in (4a), hence the scope ambiguity between the existential and the modal, but may interpret only the lower (PF-privileged) copy in (4b),<sup>6</sup> Bobaljik argues that both ways of attaining the narrow-scope interpretation of the existential (*must* >> *someone*) are equally ‘costly’ from the point of view of the interfaces. Assuming (i) a last-resort PF-rule of expletive insertion and (ii) a general, though violable, economy condition (“Minimize Mismatch”, which states that the same copy should be privileged at both PF and LF, so far as this is possible), the narrow-scope reading of *someone* violates (i) in (4b) and (ii) in (4a), hence neither structure blocks the other. The wide-scope reading is then unavailable in (4b) since (i) is blocked by the availability of the more economical alternative (4a) (which, unlike (4b), does not violate (ii) on this reading).

Despite the fact that all the spell-out choices are made ‘locally’, i.e. at PF, there is still a residue of globality about this proposal, since the economy condition (ii) requires PF to ‘know’ which copy LF is going to privilege, implying the comparison of competing PF outputs for faithfulness with LF. Further, we do not subscribe to the view that *there* is a PF-inserted expletive (see section 3 for a syntactic account of the kinds of facts that lead Bobaljik to his PF-based conclusion, and Richards & Biberauer 2005 for more relevant discussion); (4a) and (4b) are therefore the product of different numerations (one with the expletive and one without) and so do not compete in this way. The alternation we are interested in here, then, is not that between the PF outputs of (4a) and (4b), but rather the LF alternation internal to (4a), where a single numeration delivers two distinct LF representations. We would like to pursue the intuition that the two LF interpretations in (4a) are somehow equally costly (economical).

The idea that cost considerations have a role to play in determining the applicability of operations and thus the optimality of derivations (and hence, potentially, optionality) is explored, most notably, in MP (Chapter 2, originally published in 1991) and Kitahara 1997, and its effects can still be felt in the form of the Merge-over-Move constraint, which survives at least until DbP. The basic premise, we believe, is sound from the minimalist perspective; that is, the computational system will determine a single output in so far as it has grounds to choose amongst options, but reserves the right not to be fully deterministic wherever such grounds are lacking (i.e. where a decision cannot be made on grounds of system-internal economy and it is simply more efficient to let the user decide, so to speak). The question is, what constitutes ‘equally costly’ in the current minimalist context?

Formerly (MP: 138-45), cost was computed by the global comparison of competing derivations for compliance with formal economy principles based on the number of steps (where fewest steps would win) or the ‘type’ of operations employed (where UG principles were less costly than language-specific ones). Optionality would then result when two convergent derivations were equally minimal in cost and thus both of them optimal – see, for example, Chomsky’s (MP: 143ff.) analysis of optionality in French infinitival raising. In order to allow for optionality in the Probe-Goal-Agree framework, however, the question of ‘equal cost’ must be re-addressed in terms of the purely *locally* determined, single-cycle computational system of MI/DbP, in which movement (internal merge) is immediately triggered by (generalized) EPP-features, the covert component is eliminated, and accountability to the Strong Minimalist Thesis (SMT) is paramount.

What counts as ‘costly’ is, by definition, a matter of economy – that much stays the same, of course. However, since LR and FI are now the only economy principles to which a strictly local and minimalist (SMT-compliant) system can have recourse (section 1), notions of formal, system-internal economy and thus of derivational optimality are unformulable. Instead, an operation  $\Omega$  will now be equally as costly as any other operation  $\Omega'$  that may potentially apply at a given stage  $\sigma$  of the derivation if  $\Omega$  and  $\Omega'$  are both valid ways of satisfying the formal imperative F driving operations at  $\sigma$  (i.e. both  $\Omega$  and  $\Omega'$  result in a well-

formed structure, obey locality, etc.). LR and FI simply require that F be (immediately) satisfied; they do not specify how. Therefore,  $\Omega$  and  $\Omega'$  are optional operations with respect to each other. (As we will see in section 4, piedpiping offers perhaps the clearest evidence of this indeterminacy in action: Whilst independent constraints on movement may place upper and lower limits on the amount of material that can be piedpiped to satisfy F, variation within those limits is completely free.) In short, minimalist economy principles compute cost not on the formal satisfaction of F, but on the presence of F to begin with (i.e. F's functional motivation) such that, if F goes unsatisfied, a numeration *without* F must be used.

The semantic optionality (ambiguity) of (4a) now follows straightforwardly once we recognize that the F in question here is the obligatory EPP-feature of T. For reasons that are not fully understood, T is obligatorily associated with an EPP-feature (perhaps universally (MI:109); cf. the original Extended Projection Principle of GB (Chomsky 1982), requiring that every clause have a structural subject). Since it is independently and unavoidably present (for whatever reason) and not added by optional rule as in (2), this EPP-feature comes for free and so does not need motivating in the form of obligatory additional interpretive effects at LF (in other words, the PF effect suffices alone, essentially). Thus LF is free to interpret either copy of the A-raised *someone* (unlike the case of the optional EPP in (1), where economy/FI dictates that the top, EPP-associated copy must be interpreted), resulting in the observed interpretive optionality – both LFs are equally costly. The conceptual neatness of the system (an instance of perfect design?) can be summarized as follows:

- (5) Optional rules (operations, EPP-features, ...) feed obligatory interpretations;
- Obligatory rules (operations, EPP-features, ...) feed optional interpretations

EPP-features thus provide us with the requisite evaluation metric for computing cost, one that is fully blind and local in its syntactic implementation (interpretive effects are the result rather than the driving force), with no comparison of outputs or PF-LF interaction or counting of chain links/derivational steps or stipulative statements of the kind “X is cheaper than Y” and so on. The distinction between optional (‘marked’) and obligatory (‘unmarked’) EPP-features opens up a computational loophole in that the economy rationale in (2) says nothing about obligatory EPP. Since it applies specifically to the assignment of *optional* EPP (to phase heads), obligatory EPP is freed from the FI/economy requirement that it be cashed out in the form of (extra) LF effects. Obligatory EPP is present for free in a numeration (perhaps being associated to the relevant functional head already in the lexicon); only optional EPP comes at a cost, detectable at the interface.

In the following sections, we show that obligatory EPP-features are responsible not only for cases of *partial* semantic equivalence as in (4a/b), but that they can also give rise to *total* semantic equivalence (i.e. true optionality) of the kind demonstrated above for Afrikaans embedded clauses. We argue that the satisfaction of T's EPP is at stake in both (3a) and (3b) alike; since this feature is obligatorily present, no ‘new interpretations’ need result from its satisfaction. The optionality arises not from the presence vs. absence of this feature but rather from the (size of the) category that satisfies it – the nature of the Agree relation feeding EPP-satisfaction is such that multiple options are independently available for achieving this.<sup>7</sup> Since it is the same feature being satisfied in both cases, each option is equally costly and thus semantically equivalent. All the grammar requires is that T's EPP-feature be satisfied; it doesn't mind how.<sup>8</sup>

### 3. A case study: the typology of EPP-satisfaction in Germanic

Let us now sketch out a theory of EPP-satisfaction that will define the range of possible options for satisfying this feature on T. Semantically vacuous, free variation will arise just in case a single system allows for more than one option; this is because, as discussed above, the minimalist economy principles (LR/FI) have no way to select between these options. It will emerge that Afrikaans instantiates exactly the kind of underdetermined system predicted by minimalist EPP-theory (that is, the theory of EPP-features in section 2 combined with the typology of EPP-satisfaction developed below).

We start with a brief summary of our technical assumptions, adopting the standard derivational architecture of Chomsky's Probe-Goal-Agree system (MI/DbP/BEA). We assume that 'checking' relations between heads (features) are established by the operation Agree, effecting valuation and deletion of uninterpretable features under matching (nondistinctness) between a probe and a goal. Move to Spec-probe (and the spec-head configurations thus created) is no longer primary; rather it is a composite operation (comprising Agree + Piedpipe + Merge) that only obtains if the probe is associated with an EPP-feature. EPP-features, as we have seen, are nonthematic selector features that can be associated with any functional head, triggering obligatory movement wherever they are present, and come in two 'types': obligatory EPP-features, which are inherently (perhaps lexically) associated with a given functional head – these include the EPP-feature associated with T; and optional EPP-features, which may optionally be assigned to a functional head (perhaps only to *phase* heads – cf. MI: 109 (24)) and which result, where present, in obligatory 'new interpretations'. Since Move (internal merge) is parasitic on Agree, the postulation of such 'generalized' ('pure') EPP-features that can be associated with any functional head is not the same as saying that a given EPP-feature will indiscriminately attract any category to its specifier: only elements which first enter into an Agree relation with the relevant functional head may move to it. Finally, there is the operation Piedpipe, by which Goals (heads) determine a phrasal category P(G) for EPP-driven movement to Spec-Probe.

Given the above, the satisfaction of T's obligatory EPP-feature [EPP(T)] requires an Agree relation to identify the goal category that moves to satisfy it. In the case of T, a set of unvalued  $\phi$ -features functions as probe, and thus the goal in this case is a corresponding interpretable set of  $\phi$ -features c-commanded by T, i.e. the closest accessible nominal category in T's sister domain. This means that, in effect, EPP(T) still acts as the strong D/N feature of MP: it is satisfied by an element bearing the categorial feature [D].

This, however, is as far as it goes – beyond this the minimalist system has nothing more to say about the satisfaction of EPP(T); any further requirements or restrictions can only be stipulated. We would like to argue that there is therefore room for at least two dimensions of parametric variation in the manner in which EPP(T) is satisfied. Specifically, languages vary as to the *source* (location) and *size* of the nominal category that values T's  $\phi$ -set (that is, the goal in the T-initiated Agree relation that feeds the movement operation into Spec-TP).

Regarding the source of the goal, we follow Alexiadou & Anagnostopoulou (1998), henceforth A&A, in assuming that the nominal category that agrees with T may be associated with one of two categories: either (i) the  $\phi$ -features of the DP argument in Spec-*v*P (i.e. the 'standard' procedure), or (ii) the  $\phi$ -features of the agreement morpheme on the verbal head in rich-agreement languages (which A&A describe as "verbal agreement morphology with the categorial status of a pronominal element", i.e. a  $\phi$ -bearing [D]-morpheme, and which Bobaljik & Thráinsson 1998 take to be a "separate agreement morpheme", stored as an independent lexical item). Essentially, then, the goal sought by T may be either D(P) or  $V_D$ , depending on the language.

Granted this much, the minimalist system is actually predicted to allow for two further possibilities for satisfying T's EPP given the availability of the operation Piedpipe. The two

extra possibilities, corresponding to the two ‘sources’ above, affect the size of the category piedpiped by the goal: potentially, either (iii) DP in Spec-*vP* piedpipes along the whole *vP* when it raises, or (iv) V/*v* piedpipes along the whole *vP* when it raises. Both (iii) and (iv), then, will result in the raising of T’s complement (*vP*) to Spec-TP.<sup>9</sup>

Let us refer to the two standard cases of EPP-satisfaction in (i) and (ii) as *spec-raising* and *head-raising*, respectively (the former instantiated by English, the latter by *pro*-drop languages such as Italian). Then, in addition to *spec-* and *head-raising*, we expect to find EPP-satisfaction via *vP-raising* – either *spec-driven* or *head-driven* (characterizing Afrikaans and German, respectively). We dub these modes *spec-piedpiping* (i.e. (iii)) and *head-piedpiping* (i.e. (iv)); the four modes are summarized in (6).

(6) Typology of EPP(T)-satisfaction

	Probe [D]-on-Vf	Probe [D] in outer Spec- <i>vP</i>
– <b>piedpipe <i>vP</i></b>	Head-raising ( <i>Italian</i> )	Spec-raising ( <i>English, MSc</i> )
+ <b>piedpipe <i>vP</i></b>	Head-piedpiping ( <i>German, Icelandic</i> )	Spec-piedpiping ( <i>Afrikaans, Faroese</i> )

<u>Language</u>	<u>Source of <math>\phi</math>-features (goal)</u>	<u>EPP movement</u>
English, MSc	D(P) in outer Spec- <i>vP</i>	DP-to-Spec-TP
Italian ( <i>pro</i> -drop)	$\phi$ -features on V-morphology	<i>v</i> -to-T
German, Icelandic	$\phi$ -features on V-morphology	<i>vP</i> -to-Spec-TP
Afrikaans, Faroese	D(P) in outer Spec- <i>vP</i>	<i>vP</i> -to-Spec-TP

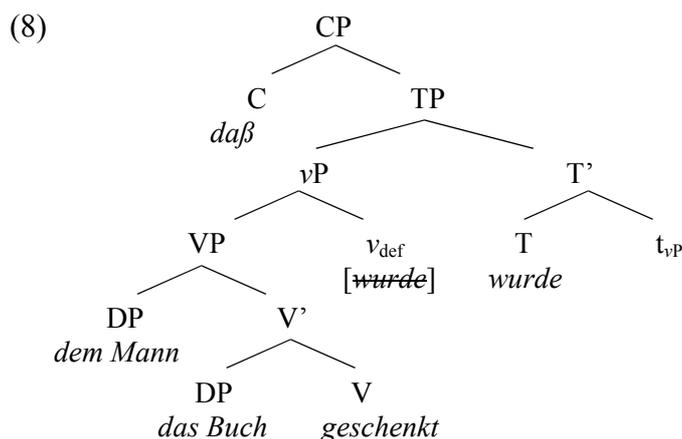
It is important to note that the existence of these ‘extra’ modes is actually the null assumption given the current minimalist technology and its operation Piedpipe – once we adopt the central insight of A&A, the *vP-raising* modes (essentially, ‘Italian + Piedpipe’) can only be excluded by stipulation. Thus a full and principled exploitation of the minimalist technology delivers a four-way rather than simply two-way typology of EPP(T)-satisfaction.

A number of subject-related phenomena that have caused long-standing problems in the literature can be readily accounted for via the proposed parametrization of EPP-satisfaction. In particular, the fact that nominative arguments may remain unraised (i.e. in a low, presumably *vP*-internal position) in a number of Germanic languages (cf. (7)) demands an account of how the EPP is satisfied in these cases, especially since the insertion of an expletive into Spec-TP is categorically barred in German and Icelandic (cf. (7d-e)).

- (7) a. ...*daß dem Mann das Buch geschenkt wurde.* [German]  
that the-DAT man the-NOM book presented became  
‘...that the book was given to the man.’
- b. *Bij dit geluid liepen hem de rillingen over de rug.* [Dutch]  
by this noise leapt him-OBL the shivers over the back  
‘At that sound, shivers crawled up his spine.’
- c. *Í gær voru konunginum gefnir hestar.* [Icelandic]  
yesterday were-3PL king.the-DAT given horses-NOM  
‘Yesterday horses were given to the king.’
- d. *Gestern ist (\*es) ja doch ein Mann gekommen.* [German]  
yesterday is (Expl) indeed a man come  
‘Yesterday there did after all arrive a man.’
- e. *Í gær hefur (\*það) komið strákur.* [Icelandic]  
yesterday has (Expl) come a.boy-NOM

‘Yesterday there came a boy.’

Existing accounts of these facts face a number of problems (see Richards & Biberauer 2005 for full discussion). On our approach, both the ban on expletives from Spec-TP and the lack of nominative ‘subject’-raising receive a simple, unified account. Since, by hypothesis, the languages in question are all [+ piedpipe vP] for the purposes of EPP(T)-satisfaction, Spec-TP is occupied by the entire raised vP, thus bleeding both the insertion of the expletive and the (need for) raising of the subject DP to this position. The resulting structure is illustrated in (8).



The typology of EPP-satisfaction has further implications for the syntax of expletives. In particular, it makes a strong prediction surrounding the conditions under which expletives are introduced into the grammatical system, one that finds considerable support in the diachronic domain (again, we refer the reader to Richards & Biberauer 2005 for full discussion of the diachronic facts).

As stated above, we assume that ‘rich’ verbal inflection reflects an interpretable  $\phi$ -set<sup>10</sup> (‘D-feature’) on V/v which can satisfy T’s morphological requirements (i.e. value T’s uninterpretable  $\phi$ -set and raise for EPP), giving rise to the ‘head-seeking’ type of languages in the left-hand column of (6). We therefore predict that the loss of rich verbal inflection is a sufficient condition for a language to shift from being a “Probe [D]-on-Vf” language to a “Probe [D] in Spec-vP” language, i.e. to shift rightwards in terms of table (6) from the head-seeking type to the spec-seeking type. This is because the loss of agreement morphemes from the verbal paradigm will force the language in question to look elsewhere to find an appropriate category to satisfy T’s morphological requirements: since the V/v head can no longer value T’s  $\phi$ -set, the system must locate a goal in the specifier instead.

This, in turn, implies that the loss of suitably rich verbal inflection will lead to the requirement that Spec-vP be obligatorily filled in order to supply the necessary nominal feature(s). In the absence of an argument (raised or otherwise) in Spec-vP, this requirement must be met by means of a dummy element. Expletives, then, emerge as a necessary consequence of spec-seeking grammars and the inviolable requirement that EPP(T) be formally satisfied; we characterize these elements (Expl) as in (9).

- (9) *Expl* is a last-resort strategy for supplying vP with the nominal feature (‘D’/ $\phi$ ) necessary for feeding piedpiping / spec-raising into Spec-TP and thus the satisfaction of T’s EPP-feature<sup>11</sup>

In the case of head-seeking grammars, such expletives are rendered unnecessary by virtue of the verb's nominal agreement morphology, which guarantees a  $\phi$ -bearing goal for T. It is the loss of such morphology that leads to the emergence of expletives.

That the emergence (and eventual obligatorization) of the *there*-type, nonargumental expletive is a function of morphological erosion is synchronically borne out in the modern inflectionally-impoorished Germanic languages (English, the Mainland Scandinavian (MSc) family, Modern Faroese,<sup>12</sup> and Afrikaans). Thus in Modern Faroese, for example, the expletive *tað* is obligatory in post-V2 position (10a), as it is in MSc (10b), in sharp contrast to inflectionally-rich Icelandic (7e); likewise, Afrikaans (10c) contrasts with German (7d):

- (10) a. *Í dag er \*(tað) komin ein drongur.* [Faroese]  
 today is (Expl) come a boy  
 'Today a boy came.' (Vikner 1995: 227 (14d))
- b. *Igår er \*(der) kommet en dreng.* [MSc (Danish)]  
 yesterday is (Expl) come a boy  
 'Yesterday a boy came.' (Vikner 1995: 185 (35h))
- b. *Gister het \*(daar) in die hawe 'n skip aangekom.* [Afrikaans]  
 yesterday has (Expl) in the harbour a ship arrived  
 'Yesterday a ship arrived in the harbour.'

It is clear, then, that Spec-*v*P must be filled by an expletive in the absence of a (raised) argument in all of these languages, a fact which correlates with their relative morphological poverty. This follows if T probes for [D]/ $\phi$  in Spec-*v*P in both the morphologically impoverished spec-raisers (10a,b) and spec-piedpipers (10c) alike.

The situation is even more interesting in the absence of *any* argument (i.e. in the case of impersonal passives). Here, the behaviour of the spec-raisers departs subtly from that of the spec-piedpipers, a state of affairs which provides independent support for the symmetrical typology in (6). Specifically, the obligatorization of expletives with impersonal passives lags behind other expletive constructions in the spec-piedpiping (i.e. *v*P-raising) languages (both historically and synchronically), giving rise to a further case of semantically vacuous, 'true' optionality. Thus whilst expletives are obligatorily *absent* in head-piedpiping languages (11a,b) and obligatorily *present* in spec-raising languages (11c), they are, by contrast, only *optionally* present in spec-piedpiping languages (11d,e).

- (11) Impersonal passives
- a. *Í gær hefur \*(það) verið dansað.* [Icelandic]  
 yesterday has (Expl) become danced  
 'Yesterday there was dancing.'
- b. *...daß (\*es) getanzt wurde.* [German]  
 that (Expl) danced became  
 '... that there was dancing.'
- c. *...at \*(der) er blevet danset.* [MSc (Danish)]  
 that (Expl) has been danced  
 '... that there was dancing.'
- c. *Blívur (tað) ofta arbeitt hart?* [Faroese]  
 becomes (Expl) often worked hard  
 (Vikner 1995: 150 (47))
- e. *...dat (daar) gedans word.* [Afrikaans]  
 that (Expl) danced becomes  
 '... that there is dancing.'

With our typology of EPP-satisfaction in place, we are now in a position to explain why one particular set of languages, those that instantiate the spec-piedpiping mode of EPP-satisfaction, is characterized by inherent, system-internal optionality of the kind that is normally taken to be excluded on economy grounds under minimalist assumptions, i.e. the semantically vacuous kind. The optionality of embedded clause V2-like orders seen in (3) and the optionality of expletive-insertion in (11d-e) both fall out for free since, as we show in the next section, each involves a computationally innocuous alternation between two independently available options for satisfying the same, obligatory feature – EPP(T). We therefore turn to a demonstration of the exact nature of these options and why it is specifically the spec-piedpipers that allow their full exploitation.

#### 4. Spec-piedpiping and true optionality

In the following subsections, we consider first the expletive-related alternation mentioned in section 3 above and, thereafter, that relating to the word-order alternation in Afrikaans, first mentioned in section 1.

##### 4.1. *Impersonal passives in Dutch, Afrikaans and Faroese*

As noted in the previous section, there are a number of Germanic languages which exhibit synchronic optionality in respect of the realization of expletives in impersonal passives. Faroese and Afrikaans have already been shown to be two of the languages which behave in this manner (cf. (11d-e)), and Dutch is another case in point, as (12) shows:

- (12) *dat (er) gedanst wordt.*  
 that (Expl) danced becomes  
 ‘that there is dancing.’

The explanandum that we now face is why Faroese, Afrikaans and Dutch, all three of which are morphologically (relatively) impoverished languages and thus spec-piedpipers, should permit optionality of this kind. In other words, how can T satisfy its morphological requirements when *tað/daar/er* is omitted in impersonal passives?

Our proposal is that impersonal passives can survive without an obligatory D-bearing expletive in Spec-*vP* because these structures always contain another category bearing appropriate nominal features, namely the passive participle. According to Baker, Johnson & Roberts (1989), passive morphology (in their case, English *-ed/en*) expresses an absorbed argument. Assuming this to be true, passive participles will thus always be D-bearing elements, quite independently of the morphological richness of the language in question. It is therefore to be expected that even languages that have undergone extreme deflection will permit expletives to be optionally absent wherever T can satisfy its morphological requirements by probing a passive participle, precisely the state of affairs that we have observed here in connection with Faroese, Afrikaans and Dutch. That is, a spec-piedpiping language can permit structures in which Spec-*vP* is not filled by an appropriate D-bearing XP on condition that an appropriate D-bearing category is present on the *vP*-head. Essentially, therefore, these languages are *residually head-piedpiping* in the relevant contexts. In the specific case of impersonal passives, the featural make-up of passive participles facilitates this possibility.

The question that now arises, however, is why this possibility is only available to morphologically impoverished *spec-piedpiping* languages and why *spec-raising* languages do not permit this type of optionality (cf. the contrast between (11c) and (11d-e) above). The answer is that the (potential) availability of suitable D-features on the  $\nu$ P-head is immaterial in *spec-raising* languages since the possibility of  $\nu$ P-raising (i.e. *piedpiping*) simply does not exist for them: *spec-raising* grammars obligatorily require raising of the contents of *Spec- $\nu$ P* (i.e. they are effectively ‘DP-raisers’) and they do not sanction *piedpiping* (cf. (6); *spec-raising* grammars are crucially [-*piedpiping*]); therefore, what would otherwise be a potential goal on *V/v* (the D-features on the passive participle) cannot provide a category that can satisfy EPP(T) in the case of these languages.

Having accounted for the difference in the behaviour of *spec-raising* and *spec-piedpiping* languages, let us summarize our characterization of this first point of variation inherent to *spec-piedpiping* grammars as follows:

- (13) *Spec-piedpiping optionality, mode 1: Optionality in the source dimension*  
*Spec-piedpiping* is ‘*backwards compatible*’ with *head-piedpiping* in the absence of a suitable goal in *Spec- $\nu$ P* and the presence of one in the head of  $\nu$ P: both options (*viz.* *spec-* and *head-piedpiping*) are available in principle – they are equivalent from the point of view of the grammar.

In our terms, therefore, impersonal passives in *spec-piedpiping* languages exhibit the optionality that they do by virtue of the fact that these  $\nu$ P-raising languages can draw on their ‘*backwards compatibility*’ with the *head-piedpiping* mode of EPP-satisfaction and probe the *V/v* head when *Spec- $\nu$ P* is empty. In the following subsection, we show that *spec-piedpiping* grammars also entail a second type of optionality, namely what we will describe as ‘*forwards compatibility*’ with *spec-raising*.<sup>13</sup>

#### 4.2. Apparent ‘*embedded V2*’ in Afrikaans

As noted in the introduction to this paper, Modern Spoken Afrikaans (MSA) permits optionality in embedded declaratives (*dat*-clauses; cf. (3) above). At first sight, the relevant optionality may appear to involve alternation between prescriptively correct *V-final* (i.e. *embedded*) ordering and *matrix-like V2* ordering (cf. note 5), but there are a variety of considerations which militate against this analysis of the data (cf. Biberauer 2003). For our purposes, the most important of these is that it is only structures featuring an initial subject and an auxiliary of some description (temporal, passive or modal) in second position that may exhibit this word-order variation *without there being a difference in meaning*; wherever the first-position element is a non-subject and/or the second-position verb is not an auxiliary, the structure in question is necessarily interpreted differently from the corresponding *V-final* structure. Compare (14) and (15) in this connection.

- (14) a. *Ek weet dat sy dikwels Chopin gespeel het.*  
 I know that she often Chopin played has  
 b. *Ek weet dat sy het dikwels Chopin gespeel.*  
 I know that she has often Chopin played  
 ‘I know that she has often played Chopin.’  
 c. *Hy vertel vir my dat dit die waarheid is.*  
 He tells for me that it the truth is  
 d. *Hy vertel vir my dat dit is die waarheid.*  
 He tells for me that it is the truth

- (15) a. *Ek weet dat sy dikwels Chopin speel.*  
 I know that she often Chopin plays  
 b. *Ek weet dat sy speel dikwels Chopin.*  
 I know that she plays often Chopin  
 ‘I know that she often plays Chopin.’  
 c. *Hy vertel vir my dat dit die waarheid verdoesel.*  
 He tells for me that this the truth conceals  
 d. *Hy vertel vir my dat dit verdoesel die waarheid.*  
 He tells for me that this conceals the truth  
 ‘He tells me that this conceals the truth.’

Whereas the (a)/(b) and (c)/(d) pairs in (14) are interpretively equivalent in the absence of any special emphatic intonation, the same is not true of the corresponding pairs in (15): (15b,d) necessarily receive a *matrix-clause* intonation and interpretation and therefore cannot be interpreted as semantically (or pragmatically) equivalent to (15a,c). On the strength of this observation, Biberauer (2003) proposes that structures such as those illustrated in (14b,d) – a structure-type that systematically alternates with the prescriptively correct V-final structure in MSA – are not in fact embedded V2 structures featuring the finite verb (Vf) in C (i.e. these are not instances of what Vikner (1995) designates *limited embedded V2*). Instead, it is argued that they should be analysed as TP-structures in which Vf is located in T and the initial subject occupies Spec-TP. In terms of the analysis we have been outlining here, this entails an analysis in terms of which MSA permits an alternation between the *vP-raising* (14a,c) and the *spec-raising* (14b,d) modes of EPP-satisfaction. In other words, the proposal is that MSA permits a second species of T-related ‘true optionality’: in addition to the expletive-related alternation already discussed above – an alternation which we ascribed to the backwards compatibility of spec-piedpiping with head-piedpiping – MSA also permits word-order optionality which instantiates a ‘forwards compatibility’ of spec-piedpiping with spec-raising.

Before we consider this analysis in more detail, let us firstly consider a relevant empirical fact, namely that the kind of ‘optional V2’ orders exhibited by MSA are entirely absent from German. Consider (16) in this regard:

- (16) *Ich weiß, daß er (\*hat) oft Fußball gespielt \*(hat).*  
 I know that he (has) often football played (has)  
 ‘I know that he has often played football.’

As (16) shows, the option of *not* piedpiping the whole *vP* along with the goal-bearing element (Vf in this case) is not available in German, which is a head-piedpiping language on our analysis. We submit that spec-raising is equally impossible in all languages with head-piedpiping grammars, on the grounds that the relevant [–piedpiping] mode of EPP-satisfaction (i.e. spec-raising) is only available as a licit derivational option  $\Omega$  to languages with spec-seeking grammars (as noted in subsection 4.1 above, it constitutes the *only* option in the case of languages with spec-raising grammars).

Why, then, should the [–piedpiping] mode of EPP-satisfaction be unavailable to head-piedpipers? Our proposal is that precisely the same considerations regulate the availability of optionality in this case as those which determine the possibility of optionality in respect of expletive realization, namely whether the two options are equivalent from the perspective of the grammar or not. Such equivalence, we have argued (section 2), will arise wherever two options are available for satisfying the same feature in the syntax. As we showed in

connection with expletives in impersonal passives in the preceding subsection, the grammar of spec-piedpiping languages cannot mind whether EPP(T) satisfaction is achieved via the spec-piedpiping mode of EPP-satisfaction or via the head-piedpiping mode: as this kind of grammar is not forced to raise the contents of Spec- $\nu$ P in order to satisfy T's EPP-requirement (as spec-raising grammars are), Spec- $\nu$ P has the option of being empty, in which case T will simply 'look elsewhere' to locate the requisite D-bearing element and initiate piedpiping. Wherever appropriate D-features are available on a verbal head, the grammar can then employ a *head-piedpiping* strategy to satisfy T's requirements, a state of affairs which, as we have shown above, obtains in the case of impersonal passives.

By the same token, we now propose that the discrepancy between the availability of the spec-raising mode of EPP-satisfaction in spec-piedpiping languages like MSA and its absence in head-piedpiping languages like German can also be accounted for by appealing to the consideration of equivalence from the perspective of the grammar. The spec-raising option is *not* equivalent to the head-piedpiping option in these languages, for the simple reason that it cannot result in a well-formed structure. To see why this is so, consider Chomsky's (MP: 253) Chain Uniformity Condition:

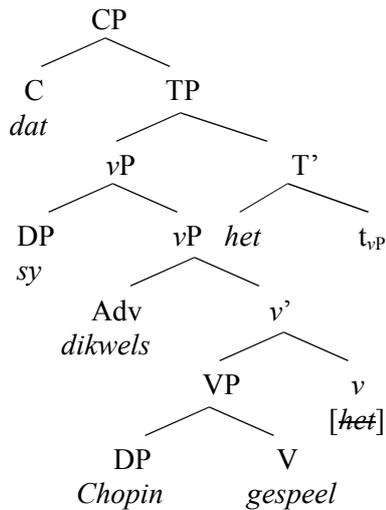
(17) Chain Uniformity Condition

A chain is uniform with regard to phrase structure status

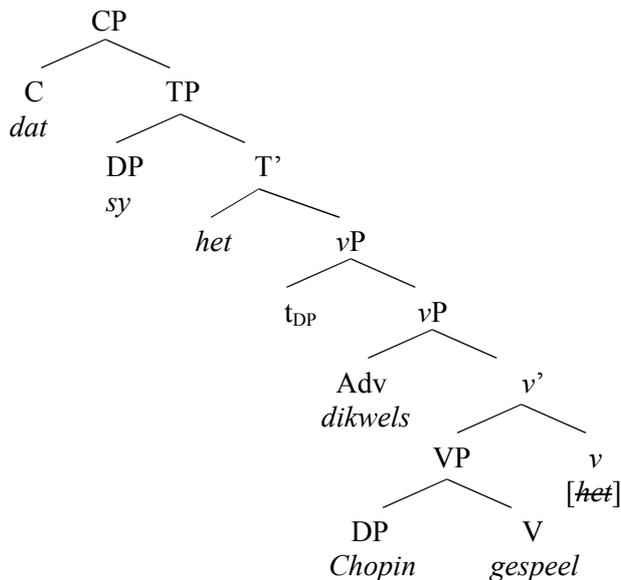
In terms of (17), only [+maximal] projections are able to raise to specifier (= nonprojecting) positions. In the case under consideration here, this implies that head-piedpiping languages like German, where the  $\phi$ -set probed by T is located on Vf, cannot fail to piedpipe as failure to piedpipe the whole  $\nu$ P to Spec-TP will result in a violation of Chain Uniformity (Vf being a minimal node). Vf cannot therefore raise independently to Spec-TP in languages of this type.<sup>14</sup>

By contrast, the fact that the  $\phi$ -set probed by T in spec-piedpiping languages is located on the DP in Spec- $\nu$ P means that [-piedpiping] *is* an option for these languages. In this case, exclusive movement of the goal-bearing specifier material (DP) to Spec-TP will not result in a violation of Chain Uniformity: whether the DP raises independently or whether it piedpipes the entire category that immediately contains it (i.e.  $\nu$ P) is immaterial from the perspective of the grammar since both options involve movement to Spec-TP of a [+maximal] category. Piedpiping is therefore not required in order to ensure convergence in this instance and we would thus expect that the [-piedpiping] option would be freely available to spec-piedpiping languages. In the MSA case, this expectation appears to be borne out as this language exhibits systematic, stable optionality in respect of the embedded structures outlined above. On our analysis, this restricted amount of stable optionality falls out as the product of a *single* underlying grammar, one that probes the DP in outer Spec- $\nu$ P, with Uniformity-trivial optionality in respect of the operation of piedpiping. For us, the structures associated with (14a, b) would therefore be (18a,b) respectively:

(18) a. The spec-piedpiping option



b. The spec-raising option



As these structures show, the superficially very different word orders in (14a,b) which nevertheless receive identical interpretations are, on the analysis proposed here, underlyingly very similar: the only difference is the manner in which EPP(T) is satisfied in the two cases, with vP-raising (i.e. spec-piedpiping) of a kind that is superficially very similar to that which takes place in German (cf. (8) above) delivering the prescriptively correct V-final structure in (14a), and DP-raising (i.e. spec-raising) resulting in the superficially V2-like TP-structure in (14b). Since the vP- and DP-raising operations both serve the same purpose, namely to satisfy EPP(T), and since this EPP-feature is an obligatory one which must be satisfied by an appropriate element in the course of the derivation, the two structures need not differ interpretively (cf. section 2 above): the computational system does not mind which of the two options is employed since they are both legitimate options which are computationally equivalent – LR and FI have no way to tell them apart and thus cannot choose between them.

Furthermore, since there are a great many prescriptively correct structures that are superficially amenable to analysis as spec-raising structures (cf. structures containing unmodified unaccusative verbs, unmodified passives, verbs taking clausal complements, etc.

none of which feature *vP*-internal material over and above what is located in *Spec-vP*, making *spec-piedpiping* and *spec-raising* indistinguishable), there is also no grammar-external reason for speakers to reject the *spec-raising* possibility as a potential alternative to the prescriptively correct *spec-piedpiping* one (contrast the German situation described above, note 14). In terms of our proposal, the prescriptively sanctioned *spec-piedpiping* option merely represents one of two syntactically equivalent alternatives available to the computational system in languages of the kind we have designated ‘*spec-piedpiping*’: *spec-raising* will always deliver the same computational result as *spec-piedpiping* and we interpret the fact that native-speakers automatically and systematically produce structures of the type in (14b,d) in contexts where matrix-style interpretations are inappropriate (and consequently also not postulated by hearers) as evidence in favour of the idea that these structures represent the output of a single grammar (and, moreover, a single numeration) which permits both options.

The relevant point of variation, the second mode of optionality characterizing *spec-piedpiping* grammars, can now be stated as in (19).

- (19) *Spec-piedpiping optionality, mode 2: Optionality in the size dimension*  
*Spec-piedpiping* is ‘*forwards compatible*’ with *spec-raising*: both options are available in principle – they are equivalent from the point of view of the grammar (Chain Uniformity).

To summarize this section: we have considered two superficially very different types of ‘true optionality’ in Germanic and shown that the relevant alternations can be accounted for by appealing to the idea that a certain type of grammar – specifically, the *spec-piedpiping* type – is inherently amenable to limited amounts of system-internal optionality. Specifically, we have proposed that the satisfaction of the obligatory EPP-feature associated with T is subject to optionality along two dimensions in *spec-piedpiping* languages:

- (a) optionality for *source*, where either the head or specifier can supply the required D-features (cf. the impersonal passive case); and
- (b) optionality for *size* ([+/- *piedpiping*]), where either *vP*- or *DP*-raising can take place consequent to Agree (T, D/ϕ) (cf. the embedded-clause word-order alternation case).

Since either option in these two cases will result in T’s morphological needs being satisfied and thus in the satisfaction of an obligatory EPP-feature, the specific choice that is made will not have any interpretive consequences, resulting in the ‘true optionality’ effects which are the central concern of this paper. The different choices deliver different PFs, but identical LFs, from a *single* numeration.

The cases that we have examined here (apparent verb-movement in Afrikaans embedded clauses and optional expletives in impersonal passives) strongly suggest that the grammar does in fact make use of the syntactic indeterminacies left open by LR and FI for the satisfaction of obligatory EPP-features (as claimed in section 2). In the next section, we consider three further empirical cases of ‘true optionality’ in support of this conclusion.

## 5. Further instances of ‘true optionality’ with *spec-piedpiping*

### 5.1. *Wh*-interrogatives in Modern Spoken Afrikaans

In addition to the alternating structures considered in section 4.2, MSA also features a second alternation pattern involving two structures that superficially look very similar to those which we have already considered. Consider (20-21) in this connection:

- (20) a. *Ek weet wat die studente gister gedoen het.*  
 I know what the students yesterday done have  
 b. *Ek weet wat het die studente gister gedoen.*  
 I know what have the students yesterday done  
 ‘I know what the students did yesterday.’
- (21) a. *Ek wonder wat hy nou doen.*  
 I wonder what he now do  
 b. *Ek wonder wat doen hy nou.*  
 I wonder what do he now  
 ‘I wonder what he is doing now.’

As was the case for the structures in (3)/(14), those illustrated in (20-21) appear to involve alternation between a V-final form which is prescriptively sanctioned and a V2 form which is not, but which nevertheless surfaces with great frequency in MSA (cf. Biberauer 2003). In the declarative case, we argued that the non-V-final structures should not, in fact, be analysed as V2 structures, but the same argumentation does not carry over to the *wh*-interrogative structures with which we are concerned here: as shown in (20-21), the restrictions that were seen to apply to the declarative clauses discussed in section 4.1 do not apply in the case of the *wh*-interrogatives at issue here (both subjects and nonsubjects may surface clause-initially and the nature of the second position verb is likewise not subject to any restrictions); therefore it would seem reasonable to analyse these clauses as genuine V-in-C clauses, i.e. as CPs. One characteristic that is, however, shared by the ‘verb-early’ declarative structures considered in section 4.2 and the interrogatives in (20-21) is the fact that they are interpretively equivalent to the V-final structures with which they systematically alternate. Despite superficial appearances to the contrary, the (b) structures in (20-21) therefore constitute indirect questions (i.e. embedded clauses).<sup>15</sup> As was the case with the *dat*-clauses, it is, of course, possible for the superficially matrix-like structures in (20-21) to receive a matrix interpretation, but this interpretation is crucially contingent upon the presence of an appropriate intonational indicator (e.g. a break following the matrix verb); in the absence of an indicator of this kind, the V2 clauses in (20b)/(21b) are interpretively equivalent to their V-final counterparts in (20a)/(21a). We are therefore dealing with another instance of semantically vacuous optionality in Afrikaans here.<sup>16</sup>

In keeping with the analysis we proposed for the semantically vacuous alternation between superficially V2 and V-final *dat*-clauses in section 4.2, we propose that the *wh*-clauses in (20-21) can likewise be analysed as the output of a single numeration. More specifically, we propose that the embedded C initiates an Agree operation that probes for a *wh*-operator (cf. MI: 128). Following Chomsky (DbP: 35), we assume that this *wh*-element undergoes successive-cyclic EPP-driven movement to Spec-CP via the edge of *v*P; *v*P-raising to Spec-TP (i.e. spec-piedpiping) then places the *wh*-goal inside Spec-TP prior to merger of C. This head, which, like T, is associated with an obligatory EPP-feature, thus probes the specifier of *v*P. Since embedded clauses are distinctively V-final in standard Afrikaans, as in other SOV Germanic languages, it is clear that the embedded C-probe must in general employ a piedpiping strategy in order to satisfy its EPP-requirement. Since the goal is an XP located in Spec-*v*P, the piedpiping strategy in question is, once again, that of spec-piedpiping. In accordance with (17) and (19) above, we therefore predict that C, just like T, will have the

choice of either raising just the XP located in Spec-*v*P (i.e. spec-raising), thereby delivering the V2-structures, or of piedpiping the *v*P containing the goal (i.e. spec-piedpiping), thereby delivering the V-final structures. As shown in (20-21), this is indeed borne out.

A question that now arises is why the optionality exhibited in embedded *wh*-contexts is not replicated in matrix clauses, i.e. why don't we see V2 and V-final ordering alternating in matrix contexts?<sup>17</sup> The possibility of raising TP to Spec-CP would then yield V-final *qua* V2 orders in matrix clauses, and thus erroneously predict unattested V-final matrix interrogatives such as (22).

- (22) \**Wat hy by die kantoor gedoen het?* [Afrikaans]  
 What he at the office done has

The solution to this problem will presumably be the same as whatever it is that in general rules out TP from the pre-V2 position (i.e., there is a general restriction across all V2 clause types in Germanic such that the pre-V2 XP may be any XP except TP; cf. Wurmbrand 2004 for discussion):

- (23) \**[Der student das Buch nicht gelesen] hat t<sub>TP</sub>* [German]  
 The student the book not read has

We have no further insights to offer on this matter (though see M. Richards 2004 for a possible analysis, not compatible with our present claims). Nevertheless, it should be noted that the V2/V-final alternations in matrix interrogatives predicted by our analysis of (20-21) are not entirely unsupported empirically. Like the structures in (20-21), exclamatives involve a [+*wh*] C-probe, and here we do indeed find free alternation between V2 and V-final orders in a matrix context:

- (24) a. *Wie riesig sind diese Pflanzen!* [German]  
 How enormous are these plants  
 b. *Wie riesig diese Pflanzen sind!*<sup>18</sup>  
 How enormous these plants are  
 'How enormous these plants are!'

The examples in (24) are particularly telling as they represent two alternative means by which exclamatives can be expressed in German (and, indeed, other Germanic languages) without there being any difference in meaning, i.e. this is another instance of true, semantically vacuous optionality. Since exclamatives are generally regarded as an exclusively matrix phenomenon *par excellence* (cf. i.a. Zanuttini & Portner 2003), examples of this type would seem to vindicate our analysis: 'V-final *qua* V2' is in fact possible in matrix contexts with the relevant type of C-probe.

Lending similar support to our proposal that the embedded *wh*-alternation in MSA involves optional clausal spec-piedpiping is the existence of languages which, like Afrikaans, permit semantically vacuous alternation between *wh*-fronting and so-called *wh-clausal piedpiping* (cf. Nishigauchi 1990, N. Richards 1997: 166ff and Simpson & Bhattacharya 2000, 2003). Basque and various varieties of Quechua have been argued to be languages of this type (cf. de Urbina 1990 and Hermon 1984 respectively), as have Bangla and Marathi (cf. Simpson & Bhattacharya 2000, 2003) and also Kashmiri (cf. Bhatt 1999). The following Bangla and Imbabura Quechua examples illustrate.

- (25) a. *tumi [ke] bhab-cho [CP ~~ke~~ baRI kor-be].* [Bangla]

- You who think-2 house make-FUT-3  
 b. *tumi* [<sub>CP</sub> *ke baRi kor-be*] *bhab-cho* [<sub>CP</sub> ~~*ke baRi kor-be*~~].  
 You who house make-FUT-3 think-2  
 ‘Who do you think will build the house?’  
 (Simpson & Bhattacharya 2000: 5 (15), (17))
- (26) a. *ima-ta-tak* *Maria-ka* [*Juzi miku-shka-ta*] *kri-n?*  
 [Imbabura Quechua]  
 What-ACC-WH Maria-TOP José eat-NL-ACC believe-AGR  
 b. [*ima-ta Juzi miku-shka-ta-tak*] *Maria-ka kri-n?*  
 What-ACC Juzi eat-NL-ACC-WH Maria-TOP believe-AGR  
 ‘What does Maria believe that José ate?’  
 (Hermon 1984: 146)

These examples suggest that piedpiping versus non-piedpiping options of the kind that our analysis of Afrikaans embedded *wh*-clauses entails are options that grammars do actually employ more widely. Thus, in the (a) examples, the *wh*-element alone (*ke* / *ima-ta*) undergoes *wh*-movement, whereas in the (b) examples it is the entire clause whose specifier is occupied by the *wh*-element that undergoes *wh*-movement.

## 5.2. *Wh*-movement in languages permitting Left Branch Condition (LBC) violations

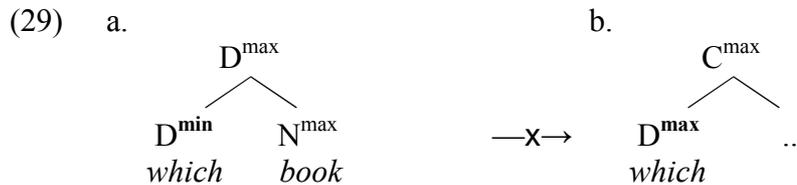
Another phenomenon that would seem to point to grammars actually exploiting an inherent syntactic indeterminacy surfaces in languages such as Russian, which, unlike English (27), famously allow apparent LBC violations of the form in (28).

- (27) a. *Whose book did you read?*  
 b. \**Whose did you read book?*
- (28) a. *Č’ju knigu ty čital?*  
 Whose book you read  
 b. *Č’ju ty čital knigu?*  
 Whose you read book  
 ‘Whose book did you read?’

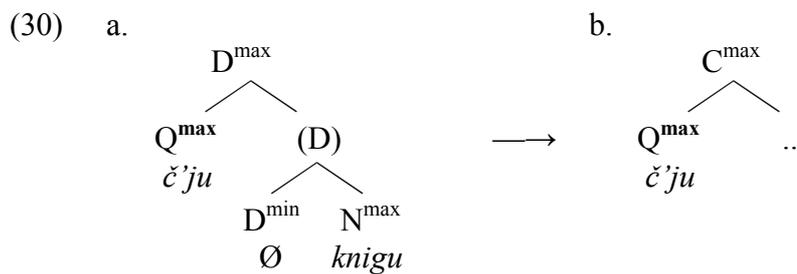
As is well known, movement of the *wh*-element from the left branch (specifier) of the *wh*-DP *whose book* in (27) to Spec-CP requires the whole DP to be piedpiped along in English (a classical example of piedpiping, and apparently one of ‘spec-piedpiping’ in the terms proposed above), a constraint that is inoperative in Russian (28). Thus (28b), the non-piedpiped counterpart of (28a), is perfectly fine. Crucial for our present purposes, however, is the less frequently mentioned fact that such LBC-violations are not obligatory in Russian: as (28a) shows, piedpiping of the entire *wh*-phrase to Spec-CP is also a legitimate derivational option, delivering a fully grammatical *wh*-interrogative that is, moreover, semantically equivalent to its non-piedpiping counterpart. (28a-b) therefore once again represent structures that are interpretively equivalent despite the fact that their derivational history cannot be the same. As (27) shows, the same semantically vacuous alternation is unavailable in English. Why should this be?

Let us consider the nature of the structures underlying the sentences in (27-28), starting with the English case. Firstly, we assume that *wh*-elements such as *what* and *which* are *wh*-determiners: following Abney’s (1987) analysis of the demonstratives *this* and *that* as D-heads, it is reasonable to assume that their *wh*-counterparts are similarly the heads of their

respective (*wh*-)DPs. As such, the familiar Chain Uniformity considerations (cf. (17)) now immediately exclude the possibility of raising such a lexical item to Spec-CP independently of the maximal projection that it heads (cf. also Radford 1997: 276ff.):<sup>19</sup>



Piedpiping of *wh*-DPs in English is therefore, in fact, a case of *head*-piedpiping (not *spec*-piedpiping); like head-piedpiping for satisfaction of T's EPP in German, it is therefore also obligatory (cf. section 4). LBC thus reduces to head-piedpiping under (17), which in turn accounts for the absence of the kind of semantically vacuous alternation that we would expect if *wh*-raising involved *spec*-piedpiping – i.e. exactly the kind of alternation that we *do* observe for Russian (cf. (27)). In terms of our analysis, then, Russian must differ from English in being a genuine *spec*-piedpiper in the domain of *wh*-raising. This in turn implies that Russian *wh*-DPs cannot have the structure in (29); instead, Russian *wh*-elements such as *kakoj* ('what', 'which'), *kotoryj* ('which', 'what') and *čej* ('whose') must occupy the specifier of their respective *wh*-DPs, along the lines suggested in (30). As such, they have the status of maximal projections and are thus able to raise independently to Spec-CP without incurring a uniformity violation (cf. (30b)). LBC-violating *wh*-structures are consequently freely available in Russian.<sup>20</sup>



Thus our *spec*-piedpiping analysis, with its inherent optionality, is immediately able to explain why anti-LBC structures like (28b) are both optional and semantically equivalent to their LBC-respecting counterparts. As soon as Russian is recognized as a *spec*-piedpiper for the purposes of *wh*-raising, we expect that it should exhibit alternation between *spec*-piedpiping (raising of the entire *wh*-DP) and *spec*-raising (raising of the *wh*-element (QP) independently of its containing *wh*-DP): as argued in section 4.2, Chain Uniformity sanctions principled and systematic optionality in *spec*-piedpiping systems. Furthermore, since these alternating XP-raising strategies serve to satisfy an obligatory EPP-feature – that associated with interrogative C – we also expect to find that the piedpiping and non-piedpiping structures that are ultimately derived are interpretively equivalent. Both predictions are borne out.

The above analysis can, moreover, be readily extended to provide a simple account of diachronic changes that have affected the structure of Greek *wh*-interrogatives. Consider the Classical and Modern Greek examples in (31-32).

- (31) a. *Tina dynamin echei?* [Classical Greek]  
 What-ACC-FEM-S power-ACC-FEM-S have-3S  
 (Plato *Laws* 643a; Mathieu & Sitaridou (2005): 2, (1a))

- b. *Tina echei dynamin?*  
 What-ACC-FEM-S have-3S power-ACC-FEM-S  
 (Plato *Republic* 358b; Mathieu & Sitaridou (2005): 2, (1b))
- (32) a. *Ti dinami exi?* [Modern Greek]  
 Which-ACC-FEM-S power-ACC-FEM-S have-3S
- b. *\*Ti exi dinami?*  
 What-ACC-FEM-S have-3S power-ACC-FEM-S  
 (Mathieu & Sitaridou (2005): 3, (2))

As (31) shows, Classical Greek permitted LBC-violating *wh*-interrogatives like (31b) to occur alongside LBC-respecting structures like (31a). This alternation is, however, no longer possible in Modern Greek, as the ungrammaticality of (32b) shows. Mathieu & Sitaridou (2005: 2) argue that *wh*-words and indefinites had the same morphological make-up in Classical Greek, with *tis* meaning both ‘who/what’ (i.e. ‘which person’/‘which thing’) and ‘some x’ or ‘any x’ (cf. also Roberts & Roussou 2003: 161-167). In other words, we can think of Classical Greek *wh*-words as QPs. As such, they can be viewed in the same way as Russian *wh*-elements, i.e. as items that occupy the specifier of DP and can therefore undergo either spec-piedpiping (cf. (31a)) or spec-raising (cf. (31b)) in order to satisfy interrogative C’s EPP-feature. By contrast, Mathieu & Sitaridou (2005: 14ff) observe that Modern Greek *ti* is unambiguously a determiner, i.e. a D-head comparable to English *wh*-determiners like *which*. It is therefore subject to the same restrictions as English *which*, namely that it must obligatorily piedpipe the DP that it heads, with independent raising of *ti* resulting in a violation of Chain Uniformity. Structures like (32b) are thus straightforwardly excluded. Changes in the Greek D-system have therefore resulted in changes in the availability of semantically vacuous alternations. More specifically, the fact that the category probed by interrogative C underwent reanalysis to become a D-head entails that structures that were previously generated via spec-piedpiping were reanalysed as head-piedpiping structures, with a concomitant loss in the availability of the ‘split’ LBC-violating structures that featured in Classical Greek.

What this subsection has shown, therefore, is that morphological and lexical considerations appear to interact with syntactic ones in determining whether LBC-violating structures are available alongside LBC-respecting ones (see also Boeckx 2003: 39ff.). In the next subsection, we will consider another, unrelated case which illustrates the same point.

### 5.3. *Quantifier stranding in Arabic*

Benmamoun (1999) discusses the phenomenon of quantifier stranding in Arabic and records the following patterns in Standard Arabic:

- (33) a. *kull-u t-tullaab-i žaa?-uu.*  
 all-NOM the-students-GEN come-PAST-3MP  
 ‘All the students came.’  
 (Benmamoun 1999: 623, (4a))
- b. *\*t-tullaab-i žaa?-uu kull-u.*  
 the-students-GEN come-PAST-3MP all-NOM
- (34) a. *t-tullaab-u kull-u-hum žaa?-uu.*  
 the-students-NOM all-NOM-them come-PAST-3MP  
 ‘All the students came.’

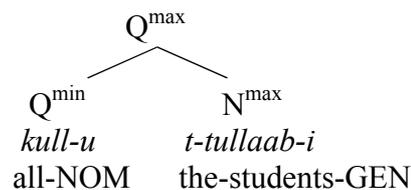
- (Benmamoun 1999: 626, (11a))
- b.     *t-tullaab-u*        *kaan-uu*        *kull-u-hum*        *ya-drus-uun.*  
 the-students-NOM be-PAST-3MP all-NOM-them 3-study-MP  
 ‘The students were all studying.’
- (Benmamoun 1999: 627, (14a))

As comparison of (33) and (34) shows, quantifiers in Arabic appear to surface in two different types of structures, one in which they agree with the subject they modify and cooccur with a resumptive pronoun (cf. (34)) and one in which they fail to agree (cf. (33)). Crucially, the two morphologically distinct quantificational structures permit very different stranding possibilities: the non-agreeing quantifier cannot be stranded, as shown in (33b), while the agreeing quantifier can. Benmamoun (1999: 636) accounts for the discrepancy in stranding possibilities by postulating two different underlying structures for the examples in question. Specifically, he proposes that Standard Arabic quantifier-containing structures are of two types:

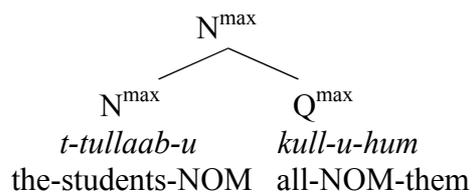
- (35) a.     a construct-state-like Q-NP type in which Q heads a QP; and  
 b.     an NP-Q type in which Q heads an adjunct that modifies the NP.

The two structures can be schematically represented as in (36).

- (36) a.     Construct-state-like Q-NP type (Q = head of argumental QP)



- b.     NP-Q type containing QP-adjunct (Q = head of NP-adjoined QP)



For our purposes, the crucial observation that Benmamoun makes in connection with the structures illustrated in (36a-b) is that they behave differently in respect of Q-float: Q-float is impossible where the quantifier constitutes the head of a non-adjoined QP (cf. the structure in (36a) and the examples in (33)) whereas it is available as an option where the QP is adjoined to the NP that it modifies (cf. the structure in (36b) and the examples in (34)). In our terms, this discrepancy is as expected since Q-float is impossible precisely where Q heads the phrase that moves to the higher specifier position (cf. (33)/(36a)). In other words, this is another case of head-piedpiping correlating with a lack of optionality. In the case of (34)/(36b), by contrast, Chain Uniformity allows NP either to raise alone (giving rise to Q-float, cf. (34b)) or to piedpipe the entire adjunction structure (cf. (34a)). This point of optionality is thus analogous to that which is generally available in spec-piedpiping contexts: because the two options are formally identical from the point of view of the grammar, either can be employed;

because the grammar doesn't mind, a single numeration can give rise to two different PFs containing the same lexical items, i.e. (34a/b).

## 6. Conclusions

Our central concern in this paper has been to argue that limited amounts of system-internal, 'true' optionality are in fact admitted on principled grounds in the minimalist system of DbP. Such optionality arises from how a given EPP-feature is formally satisfied rather than from how it is functionally motivated. This is because the minimalist economy principles LR and FI only serve to exclude optionality in the latter respect (i.e. in the motivation of movement-triggers (EPP-features) via functional pay-off at the interface); they have nothing to say about optionality in the former domain, thus yielding the possibility for free variation in respect of the operation which the syntax actually deploys to satisfy these movement triggers. Our analysis thus provides a principled explanation of when alternative structures will not be associated with distinct interpretations, i.e. when 'true optionality' will occur: on our account, the semantic vacuity of true optionality follows from the fact that both available options satisfy the same EPP-feature. In the case of an obligatory EPP-feature, such as in the two case studies offered in section 4, neither movement operation will yield a new interpretation at LF. Such features do not need to be licensed through 'extra interpretive effects' at the interface – they are obligatorily present and therefore necessarily require satisfaction by whatever means the grammar allows. If alternative strategies are available in the case of a given numeration, then 'true optionality' is the result.

Ultimately, we hope to have shown that free variation is a natural part of stable and individual grammars. That is, at least some kinds of true optionality can be accommodated within a single grammatical system. Our system-internal approach to optionality therefore has no recourse to the conceptually dubious notion of competing grammars, avoiding the kind of 'brute force' explanations that would simply replace optional operations with optional grammars; it further requires no weakening of the feature-driven theory of movement (such as allowing certain amounts of non-feature-driven movement in violation of LR). On our analysis, optionality is simply what results when the grammar doesn't mind, a scenario that obtains whenever LR and FI underdetermine a derivation (or, more specifically, the applicability of derivational options for the satisfaction of a given formal imperative). Moreover, this form of optionality in movement operations is only to be expected and is an entirely natural part of the system once Move is reconceived as (internally-applied) Merge (cf. BEA). Thus, just as it is wholly trivial and unremarkable that we find optionality for the satisfaction of  $\theta$ -selectional features via choices in *external* merge (e.g. *John likes Mary* vs. *Mary likes John*; cf. note 4), so it should be equally trivial and unremarkable if we find optionality for the satisfaction of nonthematic selectional features (i.e. EPP-features) via choices in *internal* merge – it is exactly the same derivational indeterminacy that is exploited in both cases. Optionality, like movement itself, is thus not an imperfection of  $C_{HL}$  but is actually what we predict to find – indeed, it would have to be stipulated *not* to exist (cf. Chomsky 2005 on Move *qua* internal merge). It is the *absence* of optionality, at least of the kind that we have characterized in this paper, that would be the imperfection.

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<sup>1</sup> In the following, MP = Chomsky 1995, MI = Chomsky 2000, DbP = Chomsky 2001, BEA = Chomsky 2004.

<sup>2</sup> LR and FI thus roughly subsume the principles of derivational and representational economy, respectively.

<sup>3</sup> Saying that an operation obligatorily results in a particular kind of interpretation is not, of course, the same as saying that the operation itself is obligatory. Rather, an inherent obligatoriness (of interpretation) is actually the very hallmark of an optional operation (a point that has been persuasively made by Miyagawa (1997, 2003), Bailyn (2001, 2003), Koenenman & Neeleman (2001) and Thráinsson (2003) in addition to the authors cited in the main text. In section 2 we argue that the correlation holds in the opposite direction too, i.e. an obligatory operation is characterized by an inherent *optionality* (of interpretation)). Further, as Reinhart makes clear, a marked operation does not imply a marked interpretation. In a context where the marked operation (and its associated interpretation) is the most felicitous one, then only the ‘marked’ derivation will do – i.e. *failure* to apply the optional (‘marked’) rule would be marked, resulting in deviance/unacceptability. Thus the fact that an unscrambled definite DP is deviant in German is simply down to the general incompatibility of definites with focus (cf. *?Er hat nicht das Buch gelesen*, ‘He did not read the book’), requiring a relatively inaccessible contrastive context in order to be felicitous. The movement in (1b) is not syntactically obligatory in any reasonable sense, or else (1a) would be ungrammatical (violate FI).

<sup>4</sup> Of course, this is not entirely true, since presumably both *John likes Mary* and *Mary likes John* share a single numeration given the undifferentiated Case features on lexical items under the Probe-Goal-Agree system. It might therefore seem necessary to follow Reinhart and Fox in invoking the additional, complex notion of ‘reference set’ (consisting of pairs of numerations and interpretations) as the determiner of a unique output. This would be unfortunate from the current minimalist perspective, in which comparative, transderivational economy has been replaced by local determination. In order to attain deterministic numerations, then, we need some principled way of excluding alternations in *external* merge from the purview of LR/FI/(2). In other words, ‘effect on output’, where LF is concerned, must exclude base relations (thematic, c-/s-selectional, argument structure) and include only logical and discourse relations (scope, old/new, specific/nonspecific, etc.), i.e. what Chomsky (2005) dubs “edge” semantics. The relevant notion, we suggest, is obligatoriness – numerations define unique outputs only for the satisfaction of optional features; obligatory features (such as  $\theta$ -roles) may be satisfied in whatever way and by whatever item the derivational machinery sees fit, yielding an inherent optionality for these cases. This is because LR and FI, our only possible economy principles from the strongest minimalist standpoint (cf. above), have nothing to say about these cases and thus leave them undetermined. As we show in section 2, this, in turn, will allow even certain movement operations to apply entirely optionally (i.e. vacuously at LF) on the basis of a single numeration.

<sup>5</sup> These alternations obtain in bridge contexts and are also acceptable in non-bridge contexts, thus rendering an analysis in terms of limited embedded V2 (cf. Vikner 1995) implausible. Further arguments against such a V-in-C analysis of (3b) are given in section 4.2 below (see also Biberauer 2003).

Thráinsson (2003) gives a competing-grammars analysis (cf. Kroch 1989) of similar semantically vacuous alternations in verb placement in Faroese. We have argued against competing grammars in other work (Richards & Biberauer 2004; see also Koopman & van der Wurff 2000). Since our contention is that free variation (i.e. true optionality) can be the output of a single, stable grammar and thus need not imply distinct numerations (let alone distinct grammars), we shall set such analyses aside here.

<sup>6</sup> Bobaljik assumes that the relevant two-membered A-chain is syntactically created in both (4a) and (4b) alike (his single-cycle analysis effectively replaces associate-raising at LF with expletive-insertion at PF). He thus does not adopt the Agree mechanism of MI/DbP/BEA according to which only a single copy of *someone* would exist in (4b).

<sup>7</sup> In terms of the above, F is present for free where F = obligatory EPP, and so any licit operational option  $\Omega$ ,  $\Omega'$ , ... for satisfying F is equally costly (i.e. our economy principles LR and FI do not care), resulting in free alternations for internal merge. We thus have a neat parallel with the free alternations for *external* merge mentioned in note 4 (*John likes Mary/Mary likes John*, etc.). In both the internal-merge and the external-merge cases, indeterminacy arises where selector features are obligatory and all options thus equally costly (EPP simply being the nonthematic selector feature; thematic selector features, i.e. ‘ $\theta$ -roles’, may also be assumed to be obligatorily associated to the relevant (lexical) heads in the lexicon).

<sup>8</sup> To be clear, then, it is not the obligatoriness *per se* of an EPP-feature that gives rise to semantically vacuous alternations; rather, vacuous optionality is simply the result of two (or more) operations satisfying the *same* EPP-feature. Thus, as long as it is motivated at the interface in the usual manner, an optional EPP-feature may equally give rise to vacuous alternations wherever multiple options for its satisfaction are available. Where the two types of feature differ will simply be in how their respective sets of alternants are interpreted *as a whole*. That is, in the case of an obligatory EPP-feature, the options for its satisfaction will all receive an ‘unmarked’ interpretation; in the case of an optional EPP-feature, the options for its satisfaction will all be interpreted as

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‘marked’ (i.e. with respect to the unmarked, non-move, EPP-less derivation/numeration). We leave the discovery of examples of this latter kind to future research, confining ourselves here to structures involving obligatory EPP.

<sup>9</sup> This would appear to violate the supposed ban on comp-to-spec raising, cf. Pesetsky & Torrego 2001, 2004, Abels 2003, Collins 2003, Kayne 2004, Bošković 2005 and others. Such a constraint, if it exists, has to be shown to follow from deeper principles – there is no primitive, *a priori* comp-to-spec constraint from a minimalist perspective. Whilst several of these authors do indeed attempt to derive this constraint, it is clear that, on the minimal assumptions adopted here, nothing other than stipulation can actually rule out comp-to-spec insofar as the latter piggybacks on a licit Agree relation between a head and the head of its complement, as is the case with *v*P-raising for EPP-satisfaction.

<sup>10</sup> This does not commit us to the view that the agreement morpheme is referential, i.e. bears the  $\theta$ -role of the logical subject. Expletive *it*, for example, is standardly ascribed an interpretable  $\phi$ -set (controlling third-person singular agreement) despite its nonreferential status. Rich agreement, then, may simply be a kind of synthetic expletive.

<sup>11</sup> Note that we use the term ‘last-resort’ here only in an informal sense – insertion of Expl is not ‘expensive’ in any LR-violating sense since expletive-containing and expletive-less derivations are not in competition (they are the product of separate numerations, cf. section 2). (9) can simply be seen as a rationale for why such empty, dummy elements should exist at all in a minimalist grammar. Our discussion of (4a/b) in section 2 provides another such rationale. Obligatory EPP yields LF-ambiguity (optionality); Expl then emerges simply as a disambiguation strategy for forcing the narrow scope (‘non-move’) reading of the associate DP. (Since FI forces the wide-scope (‘moved’) reading with *optional* EPP, a strategy to force the moved reading with obligatory EPP is not computationally viable from the minimalist perspective, hence only the opposite strategy can be deployed, *viz.* Expl.)

<sup>12</sup> Richards & Biberauer (2004) argue that the variation associated with the Faroese ‘dialect split’ of Jonas 1996, analysed in terms of competing grammars in Thráinsson 2003 (cf. note 5), is the product of a single grammar (cf. section 4.1 below); hence our use of the neutral term ‘Modern Faroese’.

<sup>13</sup> Our use of *forwards/backwards* is motivated by diachronic/chronological considerations, reflecting the fact that languages tend, under the appropriate circumstances, to shift from head-piedpiping, to spec-piedpiping, to spec-raising for the purposes of satisfying T’s EPP (cf. Richards & Biberauer 2005 for more detailed discussion of the considerations underlying this typical series of developments).

<sup>14</sup> In addition to the theoretical consideration (Chain Uniformity) that rules out the possibility of the spec-oriented [–pedpiping] option for EPP-satisfaction in head-piedpipers like German, we further submit that acquisitional considerations militate against the implementation of the *head*-oriented [–pedpiping] option (i.e. Italian-style raising to T instead of to Spec-TP). It is reasonable to assume that the grammars postulated by speakers will not be such that they generate structures with surface orders that diverge markedly from the initial input. Thus, if German speakers were, for example, to employ V-to-T raising in order to satisfy T’s EPP-feature – an option which is, in principle, available since German is arguably inflectionally rich enough to license A&A-style EPP-satisfaction – VO structures of a kind that consistently fail to occur in embedded contexts in German would result. This non-attestation consideration, combined with the more general observation that word-order variation and change appear to arise when speakers postulate a new/alternative underlying structure that, crucially, delivers superficially *identical* or at least very *similar* structures to those produced by an existing underlying structure (cf. Lightfoot 1991), suggests that input considerations restrict the computational operations that speakers will postulate in any given situation. The theoretical possibility in terms of which an inflectionally rich language could be amenable to alternation between the head-raising and head-piedpiping modes of EPP-satisfaction therefore fails to arise in practice in the case of German and OV languages more generally.

We would, however, like to note that the same is not necessarily true for VO head-piedpipers like Icelandic. It is a well-documented fact that Icelandic exhibits V1 structures and, additionally, also features V-to-T movement in non-V2 and non-finite embedded clauses. It may therefore be the case that Icelandic represents a head-seeker which permits optionality in the size dimension (i.e., forwards compatibility; cf. (19) below). We leave this possibility for further research.

<sup>15</sup> McCloskey (1992, 2004) and Henry (1995) discuss a very similar phenomenon in various varieties of Hiberno-English, making it very clear that the apparently V2 structures that occur in embedded interrogative contexts in these varieties are genuine embedded clauses which, despite their surface ordering, also receive a non-matrix interpretation. It should, however, be noted that the V2/V-final alternation in Hiberno-English is restricted to the class of *wonder* (i.e. question-taking) predicates, whereas the corresponding alternation in MSA is not subject to this restriction (cf. Biberauer 2003). We presently have nothing to say about this discrepancy.

<sup>16</sup> Schönenberger (2001: 17) cites examples such as (i) below which indicate that the same optionality appears to be available in Swiss German:

- 
- (i) *Weisch* wenn **hät** de Samir Geburtstag – am 1. Januar  
Know-2S when has the Samir birthday on 1 January

Interestingly, Schönenberger (2001: 156) also notes that Swiss German children appear to favour the V2 ordering almost to the exclusion of the V-final alternative until approximately the age of 5.

<sup>17</sup> Thanks to Dorian Roehrs for bringing this question to our attention.

<sup>18</sup> This example is cited in Schwartz & Vikner (1996: 27).

<sup>19</sup> Our reversion to the relational diacritics ‘min’ and ‘max’ in the trees in the remainder of this section is purely for expository purposes, since concerns of Chain Uniformity are at the forefront here.

<sup>20</sup> The structure in (30), with *wh*-specifiers (perhaps QPs) instead of *wh*-determiners, is additionally supported by the fact that Russian lacks overt articles in general, hence null D-heads are independently motivated in the language (cf. Progovac 1998 on Serbo-Croatian).

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