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On the locus and licensing of edge features

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Abstract

Assuming Chomsky's (2000; 2001) phase-based model, this paper deals with the issue of how the features that trigger successive cyclic A'-movement are lexically encoded and licensed. Modifying and expanding on work by Nunes (2014; 2016a), I argue that UG allows these "edge features" to be lexically hosted by phase heads (see Chomsky 2000) or moveable elements (see Bošković 2007) and that each choice has several intricate empirical consequences. In addition, I contend that like any other uninterpretable feature (see, e.g., Pesetsky & Torrego 2007), edge features may be intrinsically valued or unvalued and each of these choices may be associated with distinct types of allomorphy involving phase heads found across languages.

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1 *Why*- and *how*-questions regarding successive cyclic A'-movement

Why there is "movement" in natural languages and *how* it is to be implemented have been central questions throughout the generative enterprise. The consensus that has emerged in the past decades is that movement creates a configuration that allows the establishment of a required relation between two syntactic objects (partially addressing the *why*-question) by linking two syntactic positions (partially addressing the *how*-question). The movement of *what* in (1), for instance, is analyzed as being triggered by a required relation between the embedded interrogative complementizer and the *wh*-constituent and this involves establishing a connection between the embedded [Spec,CP] and the embedded object position.

(1) I wonder what Mary ate.

This general picture still requires further elaboration in view of the body of evidence stemming from Chomsky (1973; 1986) that shows that (A'-)movement generally does not proceed in one fell swoop, but rather in smaller steps. However, the need for such intermediate steps does not seem to follow from either of the partial answers sketched above.

Within the phase-based model, Chomsky (2000; 2001) has provided an interesting rationale for this step-by-step, *Barriers*-style computation with respect to A'-movement, by exploring the tension between the potentially unbounded nature of A'-relations and computational efficiency. On the one hand, we have the empirical fact that syntactic interactions of the A'-type may involve elements that are generated in unbounded distance from one another, as is the case of standard *wh*-movement. On the other hand, computation efficiency leads us to expect that instead of inspecting the whole syntactic object for convergence, the computational system should ship smaller chunks of the structure under construction to the interfaces so that crashing can be locally detected. Assuming that these computational guidelines can be formulated in terms of the Phase Impenetrability Condition (*PIC*) in (2) below, long distance A'-relations can be established in consonance with the PIC if elements that may participate in an A'-relation with elements located in a different phase are repeatedly pushed to the next phase up so that the expected relationship can eventually be established within a configurational span limited by phase heads.[1]

(2) Phase Impenetrability Condition (Chomsky 2001: 14)
The domain of the head of a strong phase H is not accessible at the smallest strong phase dominating HP; only H and its edge are accessible to such operations.

From this perspective, the derivation of (1), for instance, cannot involve a direct relation between the embedded interrogative complementizer Q (a phase head) and the *wh*-phrase in its base position, due to the intervention of *v* (another phase head), as illustrated in (3a) below. However, this minimality effect can be voided if the *wh*-phrase moves past *v* to the lower phase edge, as illustrated in (3b), where it can interact with Q in consonance with the PIC.

(3) a. $[_{CP}$ Q .... $[_{vP}$ Mary ***v*** ate what]]
|_________Agree_________|*

b. $[_{CP}$ Q .... $[_{vP}$ what $[_{v'}$ Mary *v* ate *t*]]]
|___ Agree ___|OK

As Bošković (2007: Section 5.1) notes, the PIC provides a rationale for intermediate steps of A'-movement, but not for the final step (the initial *why*-question above). Given that a local agreeing relation can be established between Q and *what* in (3b), for instance, one would expect (4) below to be grammatical, contrary to fact. Assigning an obligatory EPP-type of feature to Q to trigger movement of *what* in (3b), yielding (1), is actually a way of encoding the problem, rather than providing a solution. To put it in general terms, the ungrammaticality of

1 One finds different views on the relevant landing sites for these smaller steps, though, varying from the *v*P edge only (see, e.g., Rackowski & Richards 2005 and den Dikken 2009) to the Spec of every intervening maximal projection (see, e.g., Bošković 2002). Here I will frame the discussion under Chomsky's (2000; 2001) original proposal that these intermediate landing sites involve the edges of *v*P and CP, leaving a discussion of alternative views to another occasion.

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(4) under the derivation sketched in (3b) is related to the general issue of why local movement is necessary in a system where syntactic relations can be established via Agree.

(4) *I wonder Mary what ate.

This paper focuses on a related *how*-question: Assuming that syntactic movement is featurally driven (see, e.g., Chomsky 1995), how exactly is successive cyclic A'-movement triggered and licensed? More specifically, I will be concerned with the overarching consequences of the answers to the two intertwined questions in (5).

(5) a. What is the lexical host of the feature that triggers successive cyclic A'-movement (the "edge feature")?
b. Are edge features intrinsically valued or unvalued?

I argue that much of the crosslinguistic variation involving *wh*-movement may follow from answers to (5a) and (5b). If the specific answers to be provided in the following sections are on the right track, they pave the way for a unified analysis for why partial *wh*-movement is generally disallowed; why parasitic gaps generally cannot be licensed by *in situ wh*-phrases; why adjunct control may be affected by A'-movement in some languages; why some languages impose restrictions on local subject extraction, whereas others impose restrictions on local object extraction; why one may usually find allomorphy affecting phase heads tied to A'-movement; why this allomorphy may be exclusively related to local A'-extraction in some languages but not in others; why some phase heads in some languages do not allow extraction from their domains, while others require that their domain contain an extraction site; and why A'-movement is subject to anti-locality. Although space limitations prevent me from providing here a detailed case study and a proper comparison with other approaches regarding each of these empirical phenomena (something that is taken up in work in progress with a fuller presentation of this proposal), I hope to show that the fact that the proposal advocated here may connect these apparently unrelated domains under a uniform analysis makes it worth considering.

The paper is organized as follows. In section 2 I examine problems and advantages of placing the feature that triggers successive cyclic movement on phase heads (Chomsky 2000) or moving elements (Bošković 2007). Based on Nunes (2014; 2016a), I propose that these are not mutually excluding possibilities, but actually describe different grammatical options. In section 3 I contrast English and Brazilian Portuguese and show that their differences regarding adjunct control and extraction of subjects and objects follow from their differences with respect to the lexical hosts of edge features (phase heads in English and *wh*-elements in Brazilian Portuguese). In section 4 I discuss cases of allomorphy involving phase heads and propose that they are linked to possibility of phase heads hosting (valued or unvalued) edge features. In section 5 I show how the value of EF on a given functional head may induce anti-locality restrictions on A'-movement. Finally, section 6 concludes the paper.

2 Edge features on either phase heads or moving elements

To account for long distance A'-movement in consonance with the PIC, Chomsky (2000: 108) proposes that after a phase is completed, its head may optionally be assigned an EPP-type of feature, which then attracts a local *wh*-element. Under this proposal, the derivations of the sentences in (6a) and (7a) below, for instance, proceed along the lines respectively sketched in (6b) and (7b) (irrelevant details omitted). In (6b), the embedded C and *v* are not assigned EPP and accordingly, the embedded object remains *in situ*. By contrast, in (7b) all phase heads are assigned EPP, thus triggering successive cyclic movement of the embedded object.

(6) a. Who said that Mary bought what?
b. $[_{CP}$ who said $[_{CP}$ that [Mary $[_{vP}$ *v* bought what]]]]

(7) a. What did John say that Mary bought?
b. $[_{CP}$ what did-$Q_{\textbf{EPP}}$ John $[_{vP}\ t_i\ v_{\textbf{EPP}}$ say $[_{CP}\ t_i$ $that_{\textbf{EPP}}$ Mary $[_{vP}\ t_i\ v_{\textbf{EPP}}$ bought $t_i]]]]$

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Despite being able to encode successive cyclicity, this approach faces some problems of internal cohesion and restrictiveness. Assignment of EPP features in the course of the derivation violates the Inclusiveness Condition (see Chomsky 1995), as these features are not present in the relevant numerations. Furthermore, the optionality of EPP-assignment leads to overgeneration, as particularly emphasized by Bošković (2007). Crucially, assignment of the EPP-like feature to a given phase head is independent from other potential assignments. Thus, a sentence such as (8a) below, for instance, is incorrectly ruled in as a multiple interrogative sentence if an EPP feature is assigned to the lowest phase head, as sketched in (8b). Crucially, the matrix interrogative complementizer is licensed by *who*, as in (6a), and the movement of *what* is licensed by Last Resort, as it checks the EPP of the embedded *v*. In other words, movement of *what* in (8b) is as legitimate as the first movement of *what* in (7b).

(8) a. *Who said that Mary what bought?
b. $[_{CP}$ who said $[_{CP}$ that [Mary $[_{vP}$ **what**$_i$ $v_{\textbf{EPP}}$ bought $t_i]]]]$

To circumvent problems similar to this one, Chomsky (2001: 34) suggests that a phase head is assigned an EPP feature only if this assignment has an effect on the outcome. Although this suggestion correctly prevents EPP-assignment to the lowest phase head in (8b), it must invoke lookahead and global computations (see Bošković 2007: Section 6.1). To see this, let us consider the derivation of the sentences in (9) below. The question is whether EPP-assignment at the step sketched in (10) contributes to convergence. It does in the case of (9a), but not in the case of (9c); hence, movement should be enforced in (9a) but not in (9c) (cf. (9b)). However, this can only be determined much later in the derivation (several phases up), after the structure sketched in (11) has been assembled. EPP-assignment in (10) contributes to convergence if K in (11) merges with an element such as *John* (see (9a)), but not if K merges with an element such as *who* (see (9b) *vs.* (9c)). In other words, computations such as these are completely at odds with the spirit of the phase model, which strives to keep computational decisions within the derivational span defined by the PIC.

(9) a. **What** did John say that Peter thinks that Mary bought?
b. *Who said that Peter thinks that Mary **what** bought?
c. Who said that Peter thinks that Mary bought **what**?

(10) $[_{vP}$ Mary $\boldsymbol{v}_{\textbf{EPP}}$ bought what]

(11) K = $[_{vP}$ *v* say $[_{CP}$ that … $[_{vP}$ *v* think $[_{CP}$ that … $[_{vP}$ **what** [… $v_{\textbf{EPP}}$ bought ***t***]]]]]]

For Bošković (2007), the fundamental problem in Chomsky's (2000; 2001) system is that the EPP feature is hosted by the potential target of movement. He proposes an alternative based on the following assumptions: (i) every uninterpretable feature must function as a probe in order to be licensed; (ii) the PIC holds for Move but not for Agree; and (iii) the uninterpretable feature that triggers successive cyclic movement (*uF*) is hosted by the moving element. The assumption in (iii) is actually a corollary of assumptions (i) and (ii). In a configuration such as (12) below, for instance, each uF feature must be licensed by probing its domain (assumption (i)). The head H can license its uF feature simply by directly agreeing with *wh*, if Agree is not subject to the PIC (assumption (ii)). By contrast, the uF feature on the *wh* can only be licensed if it moves to [Spec,H], arguably the closest position from where *wh* can probe its domain and find a suitable licenser (*per* assumption (i)). However, if Move, as opposed to Agree, is subject to the PIC (assumption (ii)), *wh* is forced to stop at the edge of each intervening phase on its way to [Spec,H]. Therefore, successive cyclic movement is tied to properties of the moving element rather than the target (assumption (iii)).

(12) $[H_{[uF]}$ … $[_{\text{Phase 1}}$ … $[_{\text{Phase n}}$ … $wh_{[uF]}]]]$

As far as crosslinguistic variation goes, Bošković proposes that in multiple *wh*-fronting languages such as Bulgarian, *wh*-phrases always bear uF; in *wh-in-situ* languages such as Korean, *wh*-phrases bear iF (that is, F is interpretable); and in languages like English, which has *in situ wh*-phrases in multiple interrogatives (see (6a) and (9c)), the *wh*-phrases are optionally specified for uF and the interrogative complementizer is obligatorily specified for uF. Under this approach, *what*

must bear uF in (7a) and (8a), but not in (6a); hence, *what* stays put in (6a). As for the contrast between (7a) and (8a), *what* must move all the way to the Spec of an interrogative C so that uF can function as a probe and be appropriately licensed. This is the case of *what* in (7a), as sketched in (13a) below, but not in (8a), as sketched in (13b). Similar considerations apply to the derivation of the sentences in (9).

(13) a. [**What**$_{\sqrt{uF}}$ did John [*t* say [*t* that Mary [*t* bought *t*]]]]?
b. *[Who said [that Mary **what**$_{uF}$ bought *t*]]?

This alternative overcomes the three problems pointed out above regarding Chomsky's (2000) proposal. First, uF in (13a), for example, enters the derivation as part of the feature matrix of *what*; hence, its presence in the structure is fully compatible with Inclusiveness. Second, unwanted cases of partial *wh*-movement such as (13b), for instance, are ruled out with no need to appeal to global lookahead. The presence of an unchecked instance of uF on *what* in (13b) when it undergoes Transfer causes the derivation to crash, regardless of further computations down the road. Finally, the sentence in (4), repeated below in (14) is correctly ruled out without postulating an EPP-feature on the embedded interrogative complementizer: if *what* bears uF, it must move to the embedded [Spec,CP] to have uF licensed; if it doesn't, it shouldn't have moved to the edge of the embedded *v*P to begin with. Furthermore, if *what* does not have uF and remains *in situ*, as in (15), the embedded interrogative complementizer cannot license its uF feature via agreement with another instance of uF and the derivation crashes, as well.

(14) *I wonder Mary what ate.

(15) *I wonder Mary ate what.

Despite its merits, Bošković's (2007) approach raises some issues. The first one is related to his proposal that every uninterpretable feature must function as a probe in order to be licensed (assumption (i) above). Under this approach, a sentence like (16) below, for instance, which has an ECM preposition, should involve agreement between the preposition *for* (arguably the relevant Case licenser) and *him* to license the Case of *for*; then movement of *him* past *for* so that *him* can have its own Case licensed; and finally, movement of *for* to a position above *him* (as indicated by the linear order). As pointed out by a reviewer, an analysis along these lines has indeed been explored by Watanabe (1993), who proposes that the complex *for to* is generated under I and *for* later moves to C (see also Bošković 1997), and may find support in constructions such as (17) in Belfast English (see Henry 1995). Whether such movements and positions can be generalized to constructions analogous to (16) in every language is not obvious, though. Brazilian Portuguese, for instance, allows ECM constructions with the preposition *pra* 'for' (see, e.g., Perini 1974; Lightfoot 1991; and Salles 1997), as illustrated in (18), but there appears to be no independent motivation for postulating that at some point in the derivation of (18), *pra* is generated inside the infinitival or the embedded subject moves past the preposition. To put it broadly, the price to pay for an obligatory overt movement analysis of structural Case in every language is the call for justification for a number of nonobvious movements and positions.

(16) For him to arrive on time would be a real surprise.

(17) *Belfast English* (Henry 1995)
I wanted Jimmy for to come with me

(18) *Brazilian Portuguese*[2]
Levou muito tempo pra mim terminar a tarefa.
took much time for me finish the homework
'It took a long time for me to finish the homework.'

However, it is worth pointing out that it is possible to maintain the gist of Bošković's proposal without necessarily assuming an obligatory overt movement approach to structural Case. If

2 Unless otherwise indicated, throughout the paper the author is responsible for the data and judgements on Brazilian Portuguese.

Case valuation on a DP is just a reflex of ϕ-agreement, as proposed by Chomsky (2001), this may disqualify Case as a probe in Bošković's sense as its specification is dependent on an independent probe-goal relation involving ϕ-features. Under this view, structural Case licensing can always occur in absence of movement, for the ϕ-features on the probe are uninterpretable and the ϕ-features of the goal DP interpretable. This is the position I will take below, for reasons that will become clear.

Let us now consider Bošković's proposal that Agree, as opposed to Move, is not subject to the PIC (assumption (ii) above). Given the computational motivations for assuming the PIC (see section 1), it would be desirable that a crashing result could be detected when Transfer applies, regardless of whether it followed from movement or agreement failure. Thus, from a conceptual point of view, one would expect Move and Agree to be both subject to the PIC (even more so if Move encompasses Agree, as suggested by Chomsky (2000; 2001)). On the empirical side, it is not clear that this assumption is indeed required in the realm of *wh*-movement. In Bošković's system, it is employed in the account of *wh-in situ* languages such as Korean, as sketched in (19), where the interrogative complementizer can license its uF feature by agreeing with the interpretable [iF] feature of the *wh*-element, across an unlimited number of phases.

(19) $[Q_{[uF]} \ldots [_{\text{Phase 1}} \ldots [_{\text{Phase n}} \ldots wh_{[iF]}]]]$

However, in the absence of a proper description of what F really is and what it means to say that it may be interpretable or uninterpretable on a *wh*-element, one may instead simply assume that in languages like Korean, the interrogative complementizer lacks uF and this in turn entails that we may also eliminate the postulation of an additional [iF] feature on *wh*-phrases, as illustrated in (20). Once no uF is involved, no agreement or movement takes place in languages of this type, as desired.

(20) $[Q \ldots [_{\text{Phase 1}} \ldots [_{\text{Phase n}} \ldots wh]]]$

Notice that a configuration like (19) may actually be what underlies the ungrammaticality of (15) *if the PIC applies to Agree, as well.* Suppose, for instance, that the uF on the interrogative complementizer in (15) is an uninterpretable *wh*-feature that may be licensed via agreement with a *wh*-element. If Agree is subject to the PIC, the interrogative complementizer in (15) cannot agree with *what* in object position, which causes the derivation to crash. In short, it is not obvious that the crosslinguistic variation regarding *wh*-movement forces us to abandon the null hypothesis that Move and Agree should be both restricted by the PIC. In the proposal to be advanced below, I will stick to the null hypothesis.[3]

The last point I would like to raise with respect to Bošković's (2007) proposal regards the potential blocking effect that some phase heads impose on A'-movement, as illustrated by the familiar *that*-trace effect in (21) below (see, e.g., Perlmutter 1971). If *who* in (21) were endowed with uF, as represented in (22a), it should move as far as the matrix [Spec,CP] to

3 To be fair, Bošković (2007: Section 5.2.1) discusses data in languages such as Chukchee and Blackfoot where a verb agrees with an argument within a finite clause, interpreting them as showing that Agree is not subject to the PIC. Interestingly, one also find cases where A-movement out of finite clause is possible but simple agreement is not. Brazilian Portuguese, for instance, allows for subject hyper-raising out finite clauses (see Ferreira 2000; 2009 and Martins & Nunes 2005), but not simple agreement between the matrix T and the embedded subject without movement of the latter (see Nunes 2016b), as illustrated in (i).

(i) *Brazilian Portuguese*

a. Os vizinhos parece**m** que viajaram.
the neighbors seem-**3PL** that travelled-3PL

b. *Parece**m** que os vizinhos viajaram.
seem-**3PL** that the neighbors travelled-3PL
'The students seem to have traveled.'

It may be the case that the constructions discussed by Bošković actually involve a series of shorter agreement relations among phase heads (something hinted at in Bošković 2007: Footnote 42), giving rise to what appears to be long distance agreement in violation of the PIC. As for Brazilian Portuguese, it may be the case that the embedded subject moves for independent reasons and on its way to the matrix clause, it establishes a PIC-compatible agreement relation with the matrix T. It is beyond the scope of this paper, though, to look for ways to reconcile these seemingly contradicting facts and I will leave this issue as it stands. What is relevant to our current purposes is that as far as successive cyclic *wh*-movement goes, one need not assume that Agree differs from Move with respect to the PIC, as seen above.

check uF, as shown in (22b), and the presence or absence of *that* in the embedded clause should be completely irrelevant. In other words, Bošković's (2007) system should be supplemented with an independent account of *that*-trace effects,[4] for the presence of an uF feature on a *wh*-element (triggering its movement) makes it oblivious to the specific heads it crosses.

(21) Who did you say (*that) saw Mary?

(22) a. [$_{CP}$ (that) [$_{TP}$ **who$_{uF}$** [*t* saw Mary]]]
b. [**who$_{\sqrt{uF}}$** do-Q [you [*t* [you think [*t* (that) [$_{TP}$ *t* [*t* saw Mary]]]]]]]

Upon reexamination, Chomsky's (2000) approach looks more prone to incorporating *that*-trace effects and similar ECP effects as it crucially takes A'-movement to be dependent on features of phase heads. This in turn suggests that it may be worth considering an approach combining the positive aspects of both proposals. This is the goal I now turn to.

Building on Nunes (2014; 2016a), this paper advances an approach that combines the core aspects of Chomsky's (2000) and Bošković's (2007) proposals, while circumventing the problems seen above. Let us start with the familiar fact that human languages may require that some (A'-)relations be established between elements located in different phasal domains. Take the simple abstract configuration in (23) below, for instance, where the phase head Ph_2 needs to establish an agreement relation with α. For concreteness, let us say that Ph_2 has an uninterpretable feature [α]. Assuming with Chomsky (2000) that Agree is subject to the PIC, the required agreement relation is blocked in (23) due to the intervention of the phase head Ph_1, but it may eventually take place if α moves past Ph_1 to a position c-commanded by Ph_2. It follows from this reasoning that if the agreement relation between Ph_2 and α is to succeed, there must be an independent uninterpretable feature that triggers movement of α and places it within the reach of Ph_2. Let us refer to this feature as an *edge feature* (*EF*).

(23) [Ph_2 … [… Ph_1 … α]]

The question now is to determine which elements may bear EF. I would like to propose that Chomsky's and Bošković's proposals in this regard actually reflect two different grammatical options explored by natural languages, which may interact along the lines of (24).[5]

(24) An edge feature EF may be lexically encoded on (i) *wh*-elements or (ii) phase heads.
If (ii) obtains, the phase head may assign EF to a *wh*-element in its probe domain.

Metaphorically speaking, Chomsky's view is that a strong phase head functions as a border control agent, whose optional EPP-feature may or may not open the gate for a passing *wh*-traveler, whereas Bošković's view is that the *wh*-traveler may or may not have a quick pass (the uF feature) and in case it does, it does not need permission from the control agent to cross the border. Continuing with the border control agent metaphor, (24) says that strong phase heads may or may not stamp the *wh*-traveler's passport (i.e. assign it an edge feature) giving it permission to cross the border. The guiding intuition is that EFs allow communication between two elements located in different phases (Ph_2 and α in (23), for example), but the intervening phase heads do not themselves participate in the relevant relation (like Ph_1 in (23)). In fact, the PIC allows the head of a phase to be accessible to computations in the higher phase, without the help of an edge feature. Thus, if a phase head is lexically endowed with an instance of EF, it will not move itself, but may assign this feature to an appropriate element in its probe domain (section 4.2 below for another possibility), ultimately triggering its movement. One may think of EF assignment as analogous to Case assignment under government within *GB*. That is, EF

4 For different proposals in Bošković's own work, see Bošković (1997; 2011; 2016). As will be shown in sections 3, 4, and 5 below, the alternative I propose based on Chomsky (2000) and (Bošković 2007) actually *predicts* that such effects could be found across languages and provides a unified account for these effects and several other apparently unrelated phenomena. Space considerations prevent me from discussing here how Bošković's specific proposals for *that*-trace effects as well other major works on this topic (see Pesetsky 2016 for a comprehensive review) fare with respect to these phenomena.

5 For concreteness, here I restrict the discussion to *wh*-movement. But the rationale employed here also applies to other types of A'-movement (see section 4.2 below).

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may enter the computation as part of the feature matrix of a phase head and is then transferred to a *wh*-element in the probe domain of the phase head, as sketched in (25).[6]

(25) a. $[Ph_{[EF]} \ldots wh] \rightarrow_{\text{EF assignment}}$
b. $[Ph \ldots wh_{[EF]}]$

Notice that (24) circumvents the problems raised to Chomsky's (2000, 2001) proposal. According to Chomsky's (1995: 228) Inclusiveness Condition, "any structure formed by the computation (in particular, π and λ) is constituted of elements already present in the lexical items selected for N; no new objects are added in the course of the computation, apart from rearrangements of lexical properties". The introduction of EFs in the derivation in a system adopting (24) does not violate Inclusiveness as they are part of the lexical items that feed the computation (phase heads or *wh*-elements); in turn, EF assignment (or EF inheritance; see footnote 6) amounts to a rearrangement of lexical properties, also in consonance with Inclusiveness. Furthermore, if we assume with Bošković (2007) that every uninterpretable feature must function as a probe in order to be licensed, a *wh*-element that is assigned EF by a phase head must also keep moving until it reaches a position where it can license EF via probing. In other words, the PIC entails that an element bearing an unchecked instance of EF in the domain of a phase head H must move to the edge of H; otherwise, the derivation crashes when the domain of H undergoes Transfer. (This basically follows Bošković 2007 in recasting Chomsky's 2000; 2001) reasoning in terms of features of moving elements). Moreover, Last Resort requires that the system employ the minimal number of movement operations; hence, if a single movement to the edge of H suffices to allow EF licensing or avoid a local crash, a single movement will be employed. In the absence of independent motivations for additional movements, Last Resort in tandem with the PIC then ensures that successive cyclic A'-movement proceeds from phase edge to phase edge, as proposed by Chomsky (2000; 2001) (see footnote 1). Finally, no problems of look-ahead or overgeneration arise when EFs are lexically hosted by phase heads, because they ultimately end up associated with *wh*-elements. Thus, if a *wh*-element is assigned EF by a phase head but remains *in situ*, the derivation crashes when the domain containing the *wh*-element undergoes Transfer and this is locally detected at the phase level (exactly as in Bošković's 2007 system).

This conflation of Chomsky's and Bošković's proposals has far-reaching consequences. To illustrate, consider the abstract configurations in (26), with a *wh*-element in object position in (26a) and in the external argument position in (26b).

(26) a. $[_{vP}$ DP $[_{v'}$ *v* $[_{VP}$ V $\mathbf{wh}_{\mathbf{OB}}]]]$
b. $[_{vP}$ $\mathbf{wh}_{\mathbf{SU}}$ $[_{v'}$ *v* $[_{VP}$ V DP$]]]$

If we are examining (26) in a language where EFs are located on *wh*-elements (option (24i)), subjects and objects will behave alike with respect to *wh*-extraction, depending on whether the relevant *wh*-element has EF. By contrast, in a language where EFs are lexically encoded on phase heads (option (24ii)), the *wh*-object in (26a) may undergo *wh*-extraction at this derivational step if it has been assigned EF by *v*. As for (26b), even if *v* were lexically specified for EF, the *wh*-element could not have received it, for it is not in the probe domain of *v* (see (24)). Therefore, in such a language the *wh*-subject of a configuration like (26b) can only undergo *wh*-movement if it is assigned EF by a higher phase head. This in turn creates a potential subject-object asymmetry if one of the relevant phase heads is lexically specified for EF but not the other, paving the way for a straightforward account of *that*-trace effects across languages.

We discuss these possibilities in detail in the next sections.

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6 Alternatively, one may implement EF assignment by a phase head in terms of feature inheritance in the sense of Chomsky (2008). This possibility was actually raised by Chomsky (2008: 151): "Suppose that EF can be inherited from the phase head along with the Agree feature." In this passage, Chomsky is examining the possibility that T could inherit EF from C, but the implications of this hypothesis are wider, as the following quotation from the same paper makes it clear:

> "Suppose that the edge feature of the phase head is indiscriminate: it can seek any goal in its domain, with restrictions (e.g., about remnant movement, proper binding, etc.) determined by other factors. [footnote 49: That should be the case for independent reasons, since EF-probe does not involve feature matching, hence Agree.] Take, say, Topicalization of DP. EF of a phase head PH can seek any DP in the phase and raise it to Spec-PH." (Chomsky 2008: 151).

Once EF can seek any goal in its domain, from a feature inheritance perspective this amounts to saying that any element in the domain of a phase head Ph may in principle inherit EF from Ph. This is exactly the effect of the condition in (24ii).

For the sake of presentation, I will however frame the following discussion in terms of EF-assignment, as it leaves the role played by phase heads more transparent. What is relevant for our purposes is that the motivation for a *wh*-element to move may be ultimately triggered by the local phase head.

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3 Optionality of EF on phase heads *vs.* optionality of EF on moving elements

Let us consider the effects of the options in (24i) and (24ii) by examining two languages that optionally allow *wh-in situ* such as Brazilian Portuguese (henceforth *BP*) and English. As shown in (27) below, *wh-in situ* is a generally available option in BP (see, e.g., Kato & Mioto 2005). In English, on the other hand, *wh-in situ* is much more constrained, being generally restricted to echo and multiple *wh*-questions (see (6a) and (9c)).[7] I take these differences to be related to the possibilities in (24). More precisely, I take BP and English to be specified as in (28).

(27) *Brazilian Portuguese*

a. A Maria disse que o João viu **quem**?
the Maria said that the João saw who

b. **Quem** a Maria disse que o João viu?
who the Maria said that the João saw
'Who did Maria say that João saw?'

(28) a. Brazilian Portuguese: EF may be optionally specified on ***wh*-elements**.
b. English: EF may be optionally specified on **strong phase heads**.

The differences between BP and English stated in (28) make the prediction that they should behave alike with respect to objects but not necessarily so with respect to subjects. In the case of objects, the trigger for *wh*-movement is found phase internally in both languages; that is, given the *v*P phase in (26a), the object will undergo *wh*-movement if it is specified for EF in BP or if it is assigned EF by *v* in English. In the case of subjects, on the other hand, the trigger for *wh*-movement is to be found within the *v*P phase in BP as a matter of lexical specification on the subject itself, but outside the *v*P phase in English, for the external argument is not in the probe domain of *v* (see (26b)). Let us examine these predictions in more detail, by considering some examples of "upward" and "sideward" movement of *wh*-elements in these two languages.

3.1 Upward movement of objects and subjects

(29) and (30) below show that English and BP allow for a *wh*-object to remain *in situ* (see footnote 7) or overtly move, but if movement takes place, it cannot be partial and must reach the checking position.[8]

(29) a. Who thinks that Mary bought **what**?
b. *Who thinks that Mary **what** bought?
c. **What** does John think that Mary bought?

(30) *Brazilian Portuguese*

a. O João acha que a Maria comprou **o quê**?
the João thinks that the Maria bought what

b. *O João acha que a Maria **o que** comprou?
the João thinks that the Maria what bought

c. **O que** o João acha que a Maria comprou?
what the João thinks that the Maria bought
'What does João think that Maria bought?'

7 *In situ wh*-phrases in English may not be as restricted as generally assumed (see, e.g., Pires & Taylor 2007; Zocca DeRoma 2011; and Bobaljik & Wurmbrand 2015 for relevant discussion). Even assuming that this is so, English and BP still differ in that BP need not require the special pragmatic conditions that English must rely on in order to license *wh-in situ* in sentences such as (27a) (see, e.g., Figueiredo Silva & Grolla 2016 for relevant discussion). I take this difference to provide sufficient basis for a distinction between them in terms of (28), which will be further supported by independent differences regarding *wh*-movement and adjunct control, as we will see in section 3.2.1 below. (27a) also shows that BP differs from French, whose *wh-in situ* is generally restricted to main clauses (see, e.g., Bošković 1998 and Cheng & Rooryck 2000 for relevant discussion). I leave a more detailed discussion of the difference between BP and French to another occasion.

8 For an analysis of languages that allow partial *wh*-movement to the Spec of a declarative C that is compatible with the approach explored here, see Barbiers, Koeneman & Lekakou (2010).

From the perspective explored here, the derivations of (29a) and (30a) start with the phase represented in (26a), with no EF; hence no *wh*-movement. By contrast, the derivations of (29b-c) in English and (30b-c) in BP start with the structures in (31) and (32), respectively.

(31) $[_{vP}$ DP $[_{v'}$ $\boldsymbol{v}_{\mathbf{EF}}$ $[_{VP}$ V wh]]]

(32) $[_{vP}$ DP $[_{v'}$ *v* $[_{VP}$ V $\mathbf{wh}_{\mathbf{EF}}$]]]

In the case of English, *v* in (31) assigns EF to the *wh*-object in its probing domain (see (24ii)/(25)), yielding (32). From then on, English and BP behave alike in that the *wh*-phrase must move overtly in order for its EF to probe a head that can license it. This is what happens in (29c) and (30c), where EF can probe and be licensed by an interrogative complementizer, but not in (29b) or (30b). Notice that this discussion basically recasts Bošković's (2007) analysis in terms of the proposal outlined above and hence, the ungrammaticality of (29b) and (30b) can also be accounted for in a local fashion. After the derivation reaches the embedded CP phase, the *wh*-element at the edge of the embedded *v*P must move to the edge of CP. If it doesn't, Transfer applies and the presence of an unlicensed EF in the embedded *v*P of (29b) and (30b) suffices to cause the derivation to crash at the next phase, with no need of lookahead.

Let us now examine *wh*-movement of subjects, starting with BP. If EF is lexically optional on *wh*-elements in BP (see (28a)), we should expect its subjects and objects to behave alike regarding *wh*-movement. The *wh*-word *quem* 'who' in (33) below, for instance, may optionally bear EF. If it does, movement of *quem* to the Spec of the interrogative complementizer is required to license EF (see (33c)) and partial *wh*-movement, as in (33b), for instance, causes the derivation to crash due to the unchecked EF in the matrix [Spec,*v*P]. On the other hand, if *quem* does not have EF, it stays put in the embedded subject position (see (33a)).

(33) *Brazilian Portuguese*

a. O João acha que **quem** criticou a Maria?
the João thinks that who criticized the Maria

b. *O João $\mathbf{quem}_{\mathbf{EF}}$ acha que criticou a Maria?
the João who thinks that criticized the Maria

c. $\mathbf{Quem}_{\sqrt{\mathbf{EF}}}$ o João acha que criticou a Maria?
who the João thinks that criticized the Maria
'Who does João think criticized Maria?'

In English, on the other hand, EF is lexically optional on strong phase heads (see (28b)). In the case of external arguments, the subject is not generated in the probe domain of a transitive *v* (see (26b)) and therefore cannot receive EF from it (see (24)). In the case of internal arguments of unaccusative and passive verbs, the subject is generated in the probe domain of *v*, but it does not count as a strong phase head for being ϕ-incomplete (see Chomsky 2001). This means that a (non-ECM) subject in English should receive EF from the local C.[9] The fact that English has an overt and a null version of declarative C raises the possibility that each version has a different specification regarding EF. Exploring this possibility, I would like to propose that declarative *that* in English is not specified for EF, but the null declarative C may be so, as stated in (34) below. Crucially, English declarative $C_{\emptyset}$, like *v*, cannot be obligatorily associated with EF, for it may also be employed in declarative sentences with no *wh*-movement involved, as sketched in (35).

(34) a. C_{that}: not specified for EF.
b. $C_{\emptyset}$: optionally specified for EF.

(35) [John said $[C_{\emptyset}$ Mary [*v* saw Sue]]

9 Notice that the claim here is that a ϕ-incomplete *v* in English, as a weak phase head, is not lexically associated with EF (cf. (28b)) and accordingly, cannot assign EF to the internal argument. This is not in principle incompatible with the proposal that the *v*P associated with passive and unaccusative verbs may also provide a landing site for A'-movement and reconstruction (see, e.g., Legate 2003). In a sentence such as (i), for instance, which Legate (2003) uses to argue that the PP moves through [Spec,*v*P], the *wh*-element may receive EF from the preposition *at*, if PPs may count as strong phases. I will however leave a detailed discussion of potential phase heads other than C and transitive *v* to another occasion (see footnote 1).

(i) (adapted from Legate 2003)
[At which of the parties that he_i invited $Mary_j$ to] was [every man]$_i$ introduced to her_j?

Bearing the specifications in (34) in mind, let us consider standard *that*-trace effects such as the one illustrated in (36), which shows that only the local *that* creates problems for *wh*-movement of subjects.

(36) Who do you think $C_{Ø}$/that Peter said **$C_{Ø}$/*that** saw Mary?

If the lowest *v*P of (36) were as represented in (37), we would have a nonstarter: a phase head can only assign EF to an appropriate element in its probe domain (see (24)) and *who* is not in the probe domain of *v*. An unchecked EF should then cause the derivation to crash regardless of future computations.

(37) $[_{vP}$ who $[_{v'}$ $\boldsymbol{v}_{\mathbf{EF}}$ saw Mary]

Thus, a convergent derivation of (36) must start with *v* with no EF, as sketched in (38):

(38) $[_{TP}$ who $[_{vP}$ *t* $[_{v'}$ ***v*** saw Mary]]]

Now comes the crucial part. Suppose that the next step following (38) involves the merger of *that*, as illustrated in (39a) below. Since *that* does not have an EF to assign to *who* (see (34a)), *who* cannot undergo further movement. If it does not move, the uninterpretable *wh*-feature of the interrogative complementizer that is introduced later in the derivation (see Bošković 2007) remains unchecked, as shown in (39b), and the derivation crashes. (Recall that I am assuming with Chomsky 2000; 2001 and *contra* Bošković 2007 that Agree is also subject to the PIC). Note that even if the intermediate *v* or the intermediate $C_{Ø}$ in (39b) had EF, the PIC would prevent them from assigning it to *who*.

(39) a. $[_{CP}$ **that** [who $[_{vP}$ *t* $[_{v'}$ *v* saw Mary]]]]
b. *$[_{CP}$ do-**Q_{wh}** [you $[_{vP}$ *v* think $[_{CP}$ $C_{Ø}$/that Peter *v* said $[_{CP}$ that [**who** $[_{vP}$ *t* $[_{v'}$ *v* saw Mary]]]]]]]]

The convergent continuation of (38) must therefore merge a null complementizer, which according to the specification in (34b) may bear EF. If it does indeed, we obtain the configuration in (40a) below. C can then assign EF to *who* in its probe domain (see (40b)) and from then on, *who* can (and must) move as far as the matrix [Spec,CP] to have its acquired EF checked (see (40c)). Notice that once *who* is endowed with EF, the type of C it crosses becomes irrelevant, for it has already acquired the "stamp" on its passport (see section 2). Hence, the intermediate clause in (36) may involve *that* or an EF-less $C_{Ø}$.

(40) a. $[_{CP}$ **$C_{Ø\text{-}EF}$** [who $[_{vP}$ *t* $[_{v'}$ *v* saw Mary]]]] $\rightarrow_{\text{EF assignment}}$
b. $[_{CP}$ $C_{Ø}$ [**who**$_{\mathbf{EF}}$ $[_{vP}$ *t* $[_{v'}$ *v* saw Mary]]]]
c. $[_{CP}$ **who**$_{\sqrt{\mathbf{EF}}}$ do-$Q_{\sqrt{wh}}$ [you $[_{vP}$ ***t*** [~~you~~ *v* think $[_{CP}$ ***t*** $C_{Ø}$/that [Peter $[_{vP}$ ***t*** [~~Peter~~ *v* said $[_{CP}$ ***t*** $C_{Ø}$ [***t*** $[_{vP}$ *t* $[_{v'}$ *v* saw Mary]]]]]]]]]]]]

As is well known, subject relative clauses in English differ from the case of subject extraction in (36) in that they display a local anti-*that*-trace effect, requiring the presence of *that*, as illustrated in (41a) below. This indicates that declarative and relative complementizers in English differ with respect to their specification for EF.

(41) a. the person **that/*$C_{Ø}$** saw me
b. the book **that/$C_{Ø}$** I bought
c. the man **that/$C_{Ø}$** Mary said **$C_{Ø}$/*that** saw me

Rizzi (1990) has proposed an ECP analysis of constructions such as (41a), according to which the relative complementizer *that* has an Agr-feature that makes it able to properly govern the trace of the local subject. Adapting Rizzi's proposal to the current framework, relative Cs in English should have the opposite specifications of their declarative counterparts, as shown in (42) below. This amounts to saying that only the relativization of a local subject requires the overt version of the relative C. In (41b), for instance, *v* assigns its EF to the object, which can then raise regardless of whether or not the relative complementizer is overt. In turn, relativization of the subject in (41a) is only licensed if the relative complementizer assigns EF

to the subject; hence, the overt version of the relative complementizer specified for EF must be employed in (41a) (see (42a)). Finally, the most embedded subject in (41c) can only move if it receives EF from the local *declarative* complementizer, which must then be null (see (34b)). Once it has received EF, the subject then moves and is completely oblivious as to whether the relative complementizer is overt or null.[10]

(42) a. Rel_{that}: optionally specified for EF.
b. $Rel_{\emptyset}$: not specified for EF.

Two apparently unrelated correlations connected to *that*-trace effects may find a common source under the approach proposed here. The first one involves lack of *that*-trace effects in *pro*-drop languages with "strong" agreement (see, e.g., Rizzi 1982). Assuming that declarative complementizers in Romance null subject languages are like declarative *that* in English in not being specified for EF, the relevant Infl head that is associated with "strong" agreement and is able to license null subjects in Romance may be taken to bear EF and assign it to a *wh*-subject within *v*P, rendering it independent from the local complementizer. The second correlation is associated with the fact that *that*-trace effects in English may be circumvented if certain adverbials intervene between the embedded complementizer and the trace of the subject, as illustrated in (43) below (see, e.g., Culicover 1993, Browning 1996, Bošković 2016, Erlewine 2016, and Douglas 2017, for relevant discussion). From the present perspective, the functional head intervening between C and T that hosts these adverbials may be specified for EF and assign it to the *wh*-element in Spec of TP, allowing *wh*-movement to be launched regardless of the inertness of declarative *that*.[11] To put it in general terms, it is no accident that these two correlations make (tacit) reference to a functional head intervening between C and the subject (see section 5 below for further discussion). If C does not bear EF, a *wh*-subject not lexically specified for EF can only undergo A'-movement if it receives EF from a functional head lower than C. These phenomena indicate that some relaxation regarding the type of elements that may bear EF (see (24ii)) is needed. Given the role played by phase heads in blocking or licensing movement, I tentatively suggest that EFs may also be lexically associated with functional heads of the extended projections of phase heads.

(43) (Culicover 1993)
I asked what$_i$ Leslie said that *(in her opinion) t_i had made Robin give a book to Lee

To summarize, upward *wh*-movement of subjects is less restricted in BP than in English because in BP the motivation for movement can be found on the *wh*-subject itself, whereas in English it is dependent on the properties of local complementizers (more specifically, their lexical specification for EF).[12] A related difference between English and BP *wh*-subjects is also observed with respect to "sideward" movement, as we will now see with the derivation of adjunct control and parasitic gap constructions.

10 Under the present proposal, subject *wh*-relatives such as (i) can be derived if the *wh*-subject is assigned EF by Rel_{that} (see (42a)), which then deletes in the phonological component (a doubly-filled Comp effect).

(i) the person who has just arrived

11 As pointed out by a reviewer, this may pave the way for an account of the fact that intervening adverbials and topicalized arguments differ in that only the former are able to circumvent a *that*-trace effect (see, e.g., Browning 1996). Crucially, the mere presence of an additional intervening functional layer is of no avail if its head does not bear EF; hence, the contrast between the relevant adverbial expressions and topicalized arguments may be captured if the functional head that licenses the former bears EF, but not the functional head that licenses the latter.

12 Adjunct extraction may require different answers for different types of adjuncts, depending on the height of the adjunction site, as well as language specific properties. In Malay, for instance, *wh*-arguments may undergo *wh*-movement or remain *in situ*, whereas adverbial *wh*-adjuncts must move obligatorily (see Cole & Hermon 1998). From the perspective of the present proposal, this indicates that in Malay, only *wh*-adjuncts are obligatorily specified for EF. The fact that in English-type languages adjunct extraction does not trigger *that*-trace effects suggests that adjuncts in these languages may be obligatorily specified for EF, as well. Alternatively, low adjuncts may be assigned EF by *v* or some head of the extended projection of *v* and high adjuncts may be base-generated in the [Spec,CP] of the clause they modify (see Rizzi 1990: 46) and undergo movement if they are assigned EF by the next higher phase head (say, *v*). As noted by Rizzi (1990: 47), base-generating high adjuncts in [Spec,CP] accounts for the fact that in French, *porquoi* 'why' cannot be left *in situ*. It may also find support in Lasnik & Saito's (1992) observation (see also Browning 1996) that in English, a topic does not induce intervention effects with respect to the extraction of a clausemate adjunct, but does with respect to a more deeply embedded adjunct, as pointed out by a reviewer. I will leave the choice between these alternatives and a proper analysis of adjunct extraction to another occasion.

3.2 Sideward movement of subjects and objects

In this section I assume Hornstein's (2001) analysis of adjunct control and Nunes's (2001; 2004) analysis of parasitic gaps, which are both based on the notion of sideward movement. Space limitations prevent me from comparing these analyses with other alternatives. What is relevant to our purposes is that the locus of EFs affects sideward movement in the same way it affects upward movement.[13]

3.2.1 Adjunct control

In English, adjunct control typically involves subject but not object control, as illustrated in (44) below. Assuming that the derivation of adjunct control constructions involves sideward movement in the sense of Nunes (2001; 2004), Hornstein (2001) analyzes this asymmetry in terms of economy. In the derivation of (44), for instance, standard applications of Select, Merge, Move, and Agree may lead to the derivational step in (45), where a *v*P phase has been completed and the system selects the verb *greet* from the numeration.

(44) Who$_k$ did John$_i$ greet t_k after [***ec***$_{i/*k}$ entering the room]?

(45) N = {**who**$_1$, greet$_0$, …}
K = greet *v*P = [**John** entering the room]

There are two logical possibilities for the θ-requirements of *greet* to be satisfied in (45): either *who* is selected from the numeration and merges with *greet* or *John* is copied from *v*P and merges with *greet* (an instance of sideward movement). Hornstein argues that in such circumstances Merge-over-Move enforces merger of *who*, as shown in (46) below. If so, the next step is to provide an external argument for *greet*. Under the standard assumption that the internal argument does not qualify as a potential candidate (see Nunes 2001; 2004 and Hornstein 2001 for relevant discussion), the derivation should crash if there is no alternative candidate. If no such element is found in the numeration, *John* is then forced to undergo sideward movement as a Last Resort option, as sketched in (47). Further computations then yield the simplified structure in (48), which gives rise to the subject control interpretation of (44).[14]

(46) N' = {**who**$_0$, greet$_0$, …}
K' = [greet **who**] *v*P = [John entering the room]

(47) a. Copy *John* from *v*P:
K' = [greet who] L = **John** *v*P = [**John** entering the room]

b. Merge K' and L:
K'' = [**John** greet who] *v*P = [John entering the room]

(48) [Who did [~~**John**~~ [[John greet ~~who~~] [after ~~**John**~~ entering the room]]]]

Let us reexamine the step in (45) in more detail, from the perspective of our proposal. There is no intrinsic motivation for *John* to move *at this derivational step*. Surely, its Case must still be valued/checked, but that by itself does not provide sufficient motivation for movement to take place. Recall that I have assumed with Chomsky's (2000; 2001) that Case checking/valuation is a reflex of ϕ-agreement; hence, Case does not qualify as a probe in the sense of Bošković (2007) and may in principle be licensed *in situ* without resorting to movement (see section 2). In other words, *John* could potentially have its Case valued in its current position after the introduction of a relevant ϕ-probe later in the derivation. In this sense, *John* and *who* are indeed on equal footing as candidates to satisfy the θ-requirements of *greet*. Merge-over-Move is then applicable, enforcing the merger of *who* (see (46)); *John* only moves in (47) because there is no other legitimate candidate to be assigned the external θ-role associated with *greet*.

13 To the extent to this is correct, it provides additional support for the proposal embodied in (24) and (28) and for Nunes's (2001; 2004) claim that there is no theoretical difference between upward and sideward movement, both being just a description of the interaction among more basic operations (Copy, Merge, and Delete).

14 See Hornstein (2001: Section 8.3) for a discussion of cases of apparent violations of Merge-over-Move with an object control reading, as in purpose clauses.

This reasoning predicts that things could be different if the subject at a stage analogous to (45) had an intrinsic motivation to move. With this in mind, let us examine the puzzling data in (49), which show that adjunct control constructions in BP allow object in addition to subject control, but only if the matrix object undergoes *wh*-movement (see Modesto 2000; Rodrigues 2004; and Nunes 2013; 2014 for relevant discussion).

(49) *Brazilian Portuguese*

a. [O João]$_i$ cumprimentou **quem**$_k$ depois de [***ec***$_{i/*k}$ entrar na sala]?
the João greeted who after of enter in-the room
'Who did João greet after entering the room?'

b. **Quem**$_k$ [o João]$_i$ cumprimentou t_k depois de [***ec***$_{i/k}$ entrar na sala]?
who the João greeted after of enter in-the room
'Who$_k$ did João$_i$ greet after **he**$_{i/k}$ entered the room?'

The derivation of the subject control reading of both sentences in (49) does not substantially differ from the derivation of the analogous English sentence in (44) (see (45)–(48)). At the derivational step in (50) below, Merge-over-Move applies, triggering selection and merger of *quem* 'who' in the object position of *cumprimentou* 'greeted'; later in the derivation, Last Resort forces *o João* to undergo sideward movement to the external argument position of *cumprimentou*, giving rise to the subject control reading. The difference between (49a) and (49b) hinges on whether *quem* is lexically specified for EF (see N in (50)). If it is, *quem* must move to the matrix [Spec,CP] (see (49b)) so that EF can probe the interrogative complementizer and be licensed; otherwise, *quem* stays put (see (49a)).

(50) N = {**quem/quem**$_{EF}$, cumprimentou$_0$, …}
who greeted
K = cumprimentou *v*P = [**[o João]** entrar na sala]
greeted the João enter in-the room

Let us now examine how the unexpected object control reading of (49b) can be derived. After the *v*P phase in (51) is completed, the computation proceeds with the selection of the verb *cumprimentou* from the numeration.

(51) N = {**o**$_1$**,João**$_1$, cumprimentou$_0$, …}
the João greeted
K = cumprimentou *v*P = [**quem**$_{EF}$ entrar na sala]
greeted who enter in-the room

Again, *cumprimentou* could in principle have its θ-requirements satisfied either via selection of material from the numeration or via sideward movement of the subject from *vP*. All things being equal, Merge-over-Move should apply and selection should be the choice made. However, things here are not equal, due to the presence of an unchecked instance of EF on *quem* in (51). Recall that EFs must fucntion as probes in order to be licensed (see section 2); thus, there is no convergent option for *quem* to remain in its current position and be licensed by being the goal of some probe to be inserted later in the derivation. In other words, the computational system need not resort to look-ahead to determine at this derivational step that *quem* must move from its position. We may take Merge-over-Move to be inapplicable in such circumstances and the *wh*-phrase bearing EF undergoes sideward movement to the object position of *cumprimentou*, as sketched in (52).

(52) N = {o$_1$, João$_1$, cumprimentou$_0$, …}
K' = [cumprimentou **quem**$_{EF}$] *v*P = [~~**quem**~~$_{EF}$ entrar na sala]

Sideward movement of *quem* in (52) provides it with an escape hatch, comparable to an intermediate landing site in successive cyclic upward movement: it does not license EF, but places it in a position from where it can potentially reach the relevant licensing site. Possible continuations of (53) below, after *o João* is plugged in as the external argument of *cumprimentou*, may then yield (49a), if the *wh*-element stays put, or (49b), if it moves to [Spec,CP]. EF can be

checked in (49b) but not in (49a); hence, the contrast between these two sentences under the object control reading. Or to put things in different words, the ungrammaticality of the object control reading of (49a) receives the same analysis as the ungrammaticality of partial *wh*-movement in English and BP (see (29b) and (30b)/(33b)): movement of the *wh*-element does not reach far enough to license EF.[15]

(53) N' = {**o$_0$, João$_0$**, cumprimentou$_0$, …}
K'' = [**[o João]** cumprimentou quem$_{EF}$] L = [~~quem~~$_{EF}$ entrar na sala]

A contrast similar to (49) is also found in the nominal domain in BP (see Nunes 2014). As illustrated in (54) (adapted from Nunes 2014), a null possessor within an adjunct must take the subject for its antecedent if the object remains *in situ* (see (54a)), but may take either the subject or the object as its antecedent if the object undergoes *wh*-movement (see (54b)).

(54) *Brazilian Portuguese*

a. A Maria$_i$ esbofeteou **quem$_k$** por causa d[o irmão **ec$_{i/*k}$**]?
the Maria slapped who by cause of-the brother
'Who$_k$ did Maria$_i$ slap because of **her$_i$**/***his$_k$** brother?'

b. **Quem$_k$** a Maria$_i$ esbofeteou t$_k$ por causa d[o irmão **ec$_{i/k}$**]?
who the Maria slapped by cause of-the brother
'Who$_k$ did Maria$_i$ slap because of **her$_i$/his$_k$** brother?'

Floripi (2003), Rodrigues (2004), and Floripi & Nunes (2009) have argued that null possessors in BP behave like obligatory controlled PROs/A-traces. Assuming this to be so, the subject control reading in both (54a) and (54b) is straightforwardly captured under Hornstein's (2001) Merge-over-Move approach to adjunct control. That is, they both involve the derivational steps sketched in (55)–(58) below, where the computational system first merges material present in the numeration (see (56)) before resorting to sideward movement (see (57)). They only differ with respect to the EF specification on the *wh*-element. If *quem* is not specified for EF, it stays put (see (58a)), yielding the sentence in (54a); if it bears EF, it must move to [Spec,CP] in order for EF to be licensed (see (58b)), yielding (54b).

(55) N = {**quem/quem$_{EF}$**, esbofeteou$_0$, …}
who slapped
K = esbofeteou L = [o irmão **[a Maria]**]
slapped the brother the Maria

(56) K' = [esbofeteou **quem/quem$_{EF}$**] L = [o irmão **[a Maria]**]

(57) K'' = [**[a Maria]** esbofeteou quem/quem$_{EF}$] L = [o irmão ~~**[a Maria]**~~]

(58) a. [Q [[a Maria]$_i$ [[esbofeteou **quem**] [por causa do irmão t_i]]]] (see (54a))
b. [**quem**$_{\sqrt{EF}}$ Q [[a Maria]$_i$ [[esbofeteou ***t***] [por causa do irmão t_i]]]] (see (54b))

15 If *quem* is not specified for EF in a step analogous to (51), as shown in (i) below, it undergoes sideward movement only as a Last Resort option, after *o João* is merged (see (ii)-(iii)). The result is a sentence different from the ones in (49) (see (iv)), with the usual subject control interpretation.

(i) N = {**o$_1$, João$_1$**, cumprimentou$_0$,…}
the João greeted
K = cumprimentou *v*P = [**quem** entrar na sala]
greeted who enter in-the room

(ii) N = {**o$_o$, João$_o$**, cumprimentou$_0$,…}
M = [cumprimentou **[o João]**] *v*P = [quem entrar na sala]

(iii) N = {o$_o$, João$_o$, cumprimentou$_0$,…}
P = [**quem** cumprimentou [o João]] *v*P = [~~**quem**~~ entrar na sala]

(iv) *Brazilian Portuguese*
Quem$_i$ cumprimentou [o João]$_k$ [depois de ***ec***$_{i/*k}$ entrar na sala]?
who greeted the João after of enter in-the room
'Who greeted João after entering the room?'

Relevant to our present discussion is the contrast between (54a) and (54b) with respect to the object control reading. Such a reading must involve a derivational step where *quem* is specified for EF and has been merged in the possessor position, as illustrated in (59).

(59) N = {a_1, Maria$_1$, esbofeteou$_0$, …}
the Maria slapped
K = esbofeteou L = [o irmão **quem**$_{EF}$]
slapped the brother who

Like what we saw with respect to standard adjunct control construction in BP (see (51)–(52)), the presence of EF in (59) provides *quem* with an intrinsic motivation to move, rendering Merge-over-Move inapplicable and enforcing sideward movement to the object position, as illustrated in (60),[16] before later computations exhaust the material from the numeration, as shown in (61).

(60) N = {a_1, Maria$_1$, esbofeteou$_0$, …}
K' = [esbofeteou **quem**$_{EF}$] L = [o irmão ~~**quem**$_{EF}$~~]

(61) N' = {**a**$_0$, **Maria**$_0$, esbofeteou$_0$, …}
K'' = [**[a Maria]** esbofeteou quem$_{EF}$] L = [o irmão ~~quem$_{EF}$~~]

If the *wh*-element remains in the object position, as in (62a) below, EF is not licensed and the derivation crashes. If it moves to [Spec,CP] as in (62b), EF is licensed and derivation converges, yielding the object control reading for (54b).[17]

(62) a. *[Q [a Maria [[esbofeteou **quem**$_{EF}$] [por causa do irmão ***t***]]]] (cf. (54a))
b. [**quem**$_{\sqrt{EF}}$ Q [a Maria [[esbofeteou ***t***] [por causa do irmão ***t***]]]] (cf. (54b))

To sum up, BP differs from English in that it may allow object control into adjuncts, but only if the controlling object undergoes overt *wh*-movement. From the perspective of the approach explored here, these distinctions follow from the proposed difference between English and BP regarding the lexical encoding of EFs (on strong phase heads in English and on *wh*-elements in BP). To put it in different terms, the present proposal is able to subsume the difference between the two languages and the complex interaction between adjunct control and *wh*-movement in BP under Bošković's (2007) analysis of the contrast between full and partial *wh*-movement in English (cf. (13b)): It all boils down to whether or not EF has been moved to a position where it can be licensed.

3.2.2 Parasitic gaps

Let us now consider the contrast in (63), for example, which within *GB* was taken to show that parasitic gaps should be licensed at S-Structure (see Chomsky 1982).

16 If DP also counts as a phase, the *wh*-element in (59) must first move to the edge of DP before undergoing sideward movement. For purposes of simplification, I will ignore this possibility here as it does not affect the gist of the argument.

17 As in the case of standard adjunct control discussed earlier (see footnote 15), if *quem* in (59) does not bear EF, as sketched in (i) below, it only undergoes sideward movement as a Last Resort strategy (see (ii)–(iii)) and a different sentence (with a subject control reading) is derived (see (iv)).

(i) N = {**a**$_1$, **Maria**$_1$, esbofeteou$_0$, …}
the Maria slapped
K = esbofeteou L = [o irmão **quem**]
slapped the brother who

(ii) N' = {**a**$_0$, **Maria**$_0$, esbofeteou$_0$, …}
K' = [esbofeteou **[a Maria]**] L = [o irmão quem]

(iii) K'' = [**quem** esbofeteou [a Maria]] L = [o irmão **quem**]

(iv) *Brazilian Portuguese*
Quem$_i$ esbofeteou [a Maria]$_k$ [por causa do irmão ***ec***$_{i/*k}$]?
who slapped the Maria by cause of-the brother
'Who$_i$ slapped Maria$_k$ because of **his**$_i$/***her**$_k$ brother?'

(63) a. **[Which paper]**$_i$ did you recommend t_i after her reviewing ***PG***$_i$?
b. *Who recommended **[which paper]**$_i$ after her reviewing ***PG***$_i$?

Under the proposal entertained here, the contrast in (63) receives an analysis parallel to that of (29b-c). Assuming that parasitic gap constructions also involve sideward movement (see Nunes 2001; 2004), the derivation of the sentences in (63) includes the derivational steps sketched in (64)–(66).

(64) a. [$_{vP}$ her ***v***$_{\mathbf{EF}}$ [reviewing [which paper]]] $\rightarrow_{\text{EF assignment}}$
b. [$_{vP}$ her *v* [reviewing **[which paper]**$_{\mathbf{EF}}$]]
c. [$_{vP}$ **[which paper]**$_{\mathbf{EF}}$ [her v [reviewing ***t***]]]

(65) K = recommend vP = [**[which paper]**$_{\mathbf{EF}}$ [her v [reviewing ***t***]]]

(66) K' = [recommend **[which paper]**$_{\mathbf{EF}}$] vP = [***t*** [her *v* [reviewing *t*]]]

In (64a), *v* is lexically specified for EF and assigns this feature to the *wh*-phrase in its domain (see (64b)). The *wh*-phrase then moves to the edge of *v*P (see (64c)), where it probes the structure but its EF does not find a suitable goal. The computation proceeds to building another phase, by selecting *recommend* from the numeration (see (65)). Here we find the same type of situation we saw with respect to the derivation of the object control reading in adjunct control constructions in BP (see (51) and (59)). On the one hand, the EF on *which paper* in (65) cannot be licensed as the goal of some higher probe to be introduced later in the derivation, due to its nature as an edge feature (see section 2); hence, at the stage depicted in (65) the computational system already has the information that *which paper* must move from its current position. On the other hand, *recommend* may license an escape hatch for *which paper* as it requires merger of an internal argument. These two requirements are then met with sideward movement of *which paper* in (66).

The derivation then proceeds with further applications of selection, merger, and movement, and a convergent output will only obtain if EF is appropriately checked. This is the case of the derivation sketched in (67) below, where EF probes and is licensed by the interrogative complementizer, but not in (68). Put in broader terms, the proposal explored here derives the generalization, illustrated in (63), according to which a parasitic gap can be licensed by a moved *wh*-phrase but not by a *wh*-phrase "*in situ*" (see footnote 28 below). To be specific, the account of the contrast in (63) is to be subsumed under the account of the contrast between (29b) and (29c) or (30b) and (30c), for instance: movement triggered by EF can only halt after it reaches a position where EF can probe the structure and be licensed; partial movement (be it upward or sideward) is not allowed.

(67) [$_{CP}$ **[which paper]**$_{\sqrt{\mathbf{EF}}}$ did-Q [$_{TP}$ you [$_{vP}$ ***t*** [[~~you~~ *v* recommend ***t***] [$_{PP}$ after [her [$_{vP}$ ***t*** [~~her~~ *v* reviewing ***t***]]]]]]]]

(68) *[$_{CP}$ who [$_{vP}$ [$_{vP}$ ~~who~~ *v* recommended **[which paper]**$_{\mathbf{EF}}$] [$_{PP}$ after [her [$_{vP}$ ***t*** [~~her~~ *v* reviewing ***t***]]]]]]

As for BP, the fact that it allows for null objects (see, e.g., Galves 1989; Kato 1993; Cyrino 1997; and Ferreira 2000) makes it hard to see the effects of the "S-Structure condition" on parasitic gap licensing. However, Nunes & Santos (2009) have argued that the relevant contrasts may be detected if stress retraction is taken into account. Their argument is based on work by Santos (2002; 2003), who has shown that in BP, traces do not block stress retraction, but *pro* does. Assuming this to be so, consider the data in (69), for example.

(69) *Brazilian Portuguese* (adapted from Nunes & Santos 2009)
a. [[que livro]$_i$ você recomendou t_i [depois que com**PROU** ec_i **ON**tem]]?
which book you recommended after that bought yesterday
b. [você recomendou [que livro]$_i$ [depois que com**PROU** ec_i **ON**tem]]?
you recommended which book after that bought yesterday
'Which book did you recommend after you bought yesterday?'

In both sentences of (69), there is an empty category intervening between the verb and the adverb in the adjunct clause, which takes the *wh*-phrase of the matrix clause as its antecedent. Furthermore, the last syllable of the verb and the first syllable of the adverb are both stressed, yielding a stress clash configuration. Interestingly, the stress clash can be resolved via stress retraction in (69a), but not in (69b), as respectively shown in (70) ("*" in (70b) marks phonological unacceptability).

(70) a. [[Que livro]$_i$ você recomendou t_i [depois que **COM**prou *ec*$_i$ **ON**tem]]
b. *[Você recomendou [que livro]$_i$ [depois que **COM**prou *ec*$_i$ **ON**tem]]

Note that the *wh*-phrase is in [Spec,CP] in (69a) but in the matrix object position in (69b); hence, only the empty category of the former can be analyzed as a parasitic gap (see (63)). Nunes & Santos argue that the phonological contrast in (70) can be accounted for if (70a) indeed involves a parasitic gap and (70b), a null pronoun. As a trace, the parasitic gap in (70a) behaves like traces in general in BP in not blocking stress retraction. On the other hand, *pro* in (70b) blocks stress retraction, which explains the phonological oddness of (70b) ((69b) is fine without stress retraction).

From the present perspective, the derivation of (70a) parallels the derivation of the English parasitic gap construction in (63a) (see (64)–(66)). In particular, it involves the (simplified) step in (71) below, where a *wh*-element lexically specified for EF moves to the edge of its phase and then undergoes sideward movement to the object position of *recomendou*. After the *wh*-phrase further moves to [Spec,CP], EF is appropriately licensed and in the phonological component, stress retraction can proceed across the trace of the *wh*-phrase in the adjunct clause.

(71) K = [recomendou **[que livro]**$_{EF}$] *v*P = [***t*** [v [com**PROU** ***t*** **ON**tem]]]
recommended which book bought yesterday

As for (70b), we have to consider two scenarios, depending on where the *wh*-element is generated. Suppose that it is generated within the adjunct clause. If it is lexically endowed with EF, then it moves to the edge of its phase and then undergoes sideward movement to the matrix object position, exactly like what we saw in the case of (70a) (see (71)). Given that such movement leaves a trace (the "parasitic gap") and traces do not block stress retraction in BP, stress retraction in (70b) should be allowed. However, the derivation of (70b) under this scenario independently crashes, for EF cannot be checked in the matrix object position (cf. (68)). Let us then suppose that in the derivation of (70b), the *wh*-element is generated in the matrix object position and a *pro* occupies the object position within the adjunct. As far as the *wh*-element is concerned, the derivation can converge if it is not specified for EF; as for stress retraction, it cannot take place in (70b), for *pro* blocks stress retraction in BP (see Santos 2002; 2003). Hence, (70b) is an acceptable sentence only if stress retraction does not apply within the adjunct clause.

In sum, the present proposal provides an account for an otherwise very surprising correlation in BP involving *wh*-movement in the matrix clause and stress retraction within the adjunct clause. It is worth emphasizing that the reasoning employed above was the same one used to account for the lack of partial *wh*-movement in English and BP (see (29b) and (30b)/(33b)), the additional object control reading associated with *wh*-movement in adjunct control constructions in BP (see (49b)/(54b)), and the fact that parasitic gaps generally cannot be licensed by *wh*-phrases *in situ* (see (63b)). Actually, from the perspective of the current proposal, the object control reading into adjuncts in (44b) and (54b) can be seen as involving a "parasitic gap" in the subject position of the adjunct clause, linked to the matrix object position.[18] Terminological issues aside, the lexical encoding of EF on *wh*-elements in BP may render Merge-over-Move computations regarding sideward movement inapplicable regardless of whether the relevant *wh*-element is the subject (see (51) and (59)) or the object (see (65) and (71)) of its phase. Finally, we have seen that the predictions made above with respect to English and BP are

18 Rodrigues (2004: 222) reports that the similarity between object control into adjuncts and parasitic gaps in BP was first noted by Norbert Hornstein in personal communication to her. See Nunes (2013; 2014) for relevant discussion.

fulfilled: English and BP behave alike with respect to object but not subject extraction and BP differs from English in not displaying subject-object asymmetries.[19]

4 Edge features and morphological realization

4.1 From *that*-trace effects to phase head-trace effects

Let us explore one consequence of the account of *that*-trace effects in terms of lack of EF assignment outlined in section 3.1. All things being equal, in languages where EFs are lexically hosted by phase heads, a (non-ECM) *wh*-subject can cross the most local C only if it receives EF from this C. Interestingly, it is not uncommon to find allomorphy involving C, depending on whether or not the local subject undergoes *wh*-movement. From the current perspective, this is not surprising if this allomorphy is tied to the presence of EF (see declarative C_{that} *vs.* declarative $C_{\emptyset}$ in (34) and Rel_{that} *vs.* $Rel_{\emptyset}$ in (42)). The well-known *que-qui* rule in French illustrated in (72)

19 A reviewer wonders whether a sideward movement analysis of a parasitic gap construction such as (ia), where the *wh*-phrase moves from the embedded clause but the adjunct is attached to the matrix *v*P, incorrectly predicts that a sentence such as (ib) should be acceptable under an object control reading.

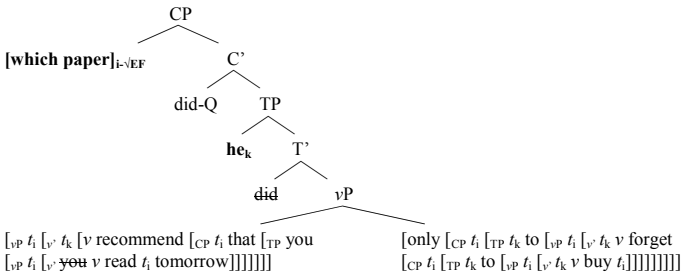
(i) a. Which paper did he recommend that you read tomorrow, only to forget to buy?
b. *Who$_i$ did he recommend that you see t_i tomorrow, after PRO$_i$ reminding him?

Let us consider the relevant steps of (ia) first. The system builds the *v*P phase sketched in (iia) below, with a *v* endowed with EF; *v* assigns its EF to *which paper* (see (iib)), which then moves from phase edge to phase edge until it reaches the [Spec,CP] in (iic). As for *he*, it moves from the embedded [Spec,TP] to the external argument position associated with *forget* and then to the subordinating [Spec,TP]. The system then proceeds by activating the subarray A in (iii) and selecting *read*. Given that *read* requires a complement and *which paper* must get out of the edge of CP in (iic) because of its unchecked EF, *which paper* undergoes sideward movement from [Spec,CP] in (iic) to the object of *read* (see (iiia)). After *v* is introduced, there are two candidates to fulfill its thematic requirements: either *you* is selected from the numeration or *he* undergoes sideward movement from (iic). Since *he* does not have EF, Merge-over-Move is applicable and *you* is plugged in as the external argument (see (iiib)). When the derivation reaches the step in (iiic), *he* is the only candidate to receive the external θ-role and sideward movement is then enforced as a Last Resort procedure (see (iiid)). Further applications of Merge and Move finally yield the structure in (iv), which surfaces as the sentence in (ia) and is assigned the indicated interpretation.

(ii) a. [$_{vP}$ he $\boldsymbol{v}_{\mathbf{EF}}$ buy [which paper]] $\rightarrow_{\text{EF assignment}}$
b. [$_{vP}$ he *v* buy **[which paper]$_{EF}$**]
c. [$_{CP}$ **[which paper]$_{i\text{-}EF}$** [$_{TP}$ **he$_k$** to [$_{vP}$ t_i [$_{v'}$ t_k *v* forget [$_{CP}$ t_i [$_{TP}$ t_k to [$_{vP}$ t_i [$_{v'}$ t_k *v* buy t_i]]]]]]]]

(iii) N = {{$_A$ you$_1$, v_1, read$_1$, tomorrow$_1$}, ...}
a. [read **[which paper]$_{i\text{-}EF}$**]
b. [$_{vP}$ **you** v read [which paper]$_{i\text{-}EF}$]
c. [*v* recommend [$_{CP}$ **[which paper]$_{i\text{-}EF}$** that [$_{TP}$ you [$_{vP}$ t_i [$_{v'}$ ~~you~~ *v* read t_i tomorrow]]]]]
d. [$_{vP}$ **he$_k$** [*v* recommend [$_{CP}$ [which paper]$_{i\text{-}EF}$ that [$_{TP}$ you [$_{vP}$ t_i [$_{v'}$ ~~you~~ *v* read t_i tomorrow]]]]]]

(iv)



As for (ib), the relevant steps of its derivation are sketched in (v) and (vi) below. In (v), *who* is generated in the external argument position and cannot be assigned EF even if *v* were specified for EF, as it sits outside the probe domain of *v*. When the computational system activates the subarray A in (vi) and selects *see*, as shown in (via), both *who* in (v) and *you* in the subarray qualify as competitors to be its internal argument. Since *who* does not have EF, Merge-over-Move applies and *you* is merged (see (vib)); after *v* is added, the only candidate to receive the external θ-role is *who*, which then undergoes sideward movement from (v), yielding (vic). Notice, however, that further computations manipulating (v) and (vic) cannot result in (ib). (ib) would arise only if sideward movement of *who* from (v) to the object of *see* in (via) preceded lexical insertion of *you*, but this is crucially blocked by Merge-over-Move. In other words, the scenario sketched by the reviewer mirrors the ones discussed in footnotes 15 and 17 in Brazilian Portuguese, where an EF-less *wh*-element only undergoes sideward movement as a Last Resort procedure.

(v) [$_{vp}$ who [*v* reminding him]]

(vi) N = {{$_A$ you$_1$, v_1, see$_0$, tomorrow$_1$}, ...}
a. **see**
b. [see **you**]
c. [$_{vP}$ **who** *v* [see you]]

(see, e.g., Kayne 1976; Pesetsky 1982; and Rizzi 1990), for instance, can be subsumed under the present proposal if *qui* but not *que* is a complementizer obligatorily specified for EF:

(72) *French*
Qui crois-tu **qui**/***que** est arrivé?
who believe-you QUI/that is arrived
'Who do you believe has arrived?'

At first sight, this approach to complementizer-trace effects seems similar in spirit to the influential cartographic account proposed by Rizzi (2006) (see also Rizzi & Shlonsky 2007). Assuming Cardinaletti's (2004) Subject Phrase, Rizzi proposes that EPP effects are to be seen as a manifestation of a Subject Criterion. Thus, if a subject satisfies the Subject Criterion by sitting in [Spec,SubjP], the Criterial Freezing constraint should prevent it from moving to satisfy additional criteria. Details aside, under this approach the different form of the complementizer in (72), for example, is taken to indicate that the Subject Criterion is being satisfied by an element other than the subject, which is then free to undergo A'-movement skipping [Spec,SubjP] and satisfy the relevant criterion.

A crucial feature of this line of inquiry is that the relevant extraction restriction is taken to apply only to subjects and not to objects. In Rizzi & Shlonsky's (2007: 116) words, "[m]ovement of objects and other complements is not similarly constrained since there is no Object Criterion, parallel to the Subject Criterion." By contrast, the approach explored here makes a very different typological prediction. Suppose that a given language L has EF associated with phase heads instead of *wh*-elements. This means that in the configurations in (73) below in L, extraction of the *wh*-subject does not interact with *v*, for the subject is not in its probe domain. By contrast, extraction of the *wh*-object can only take place if the object receives EF from *v*. This in turn predicts that if L has allomorphy involving *v*, this allomorphy could in principle be associated with the presence of EF on *v*.

(73) a. $[_{vP}$ **wh**$_{SU}$ $[_{v'}$ ***v*** $[_{VP}$ V DP]]]
b. $[_{vP}$ DP $[_{v'}$ ***v*** $[_{VP}$ V **wh**$_{OB}$]]]

In other words, whereas the cartographic approach takes for granted that effects like the one seen in (72) can only involve subjects because there is no Object Criterion, the approach to complementizer-trace effects in terms of the EF specification on phase heads predicts that one should find similar effects associated with objects, as objects may also receive EF from the local phase head (*v*). Bahasa Indonesia provides a good illustration of this point. Saddy (1991) argues that Bahasa Indonesia is an optional *wh-in situ* language whose *wh*-elements may move to a focus position preceding the particle *yang*, as illustrated in (74).

(74) *Bahasa Indonesia* (adapted from Saddy 1991)

a. **Siapa** **men**-cintai Sally (*wh*-subject *in situ*)
who TRANS-loves Sally

b. **Siapa** yang **men**-cintai Sally (moved *wh*-subject)
who FOC TRANS-loves Sally
'Who loves Sally?'

c. Sally **men**-cintai **siapa** (*wh*-object *in situ*)
Sally TRANS-loves who

d. **Siapa** yang Sally **Ø**-cintai (moved *wh*-object)
who FOC Sally loves
'Who does Sally love?'

The relevant point to our present discussion is that verbs in Bahasa Indonesia are generally prefixed with a "transitivity marker" such as *men-* in (74a–c). Crucially, this prefix must be deleted if the object undergoes movement to the local focus position (see (74d)), but not the subject (see (74b)). This looks pretty much like a *that*-trace effect affecting objects, as the object can only be extracted if some special licensing is available within *v*P. I would like to propose that the allomorphy seen in (74) is tied to the presence of EF. More specifically, the data in (74)

can be captured if *men-* and *Ø-* are allomorphs of *v* (see, e.g., Aldridge 2008 and Sato 2012), with the latter being specified for EF, but not the former. Being generated outside the probe domain of *v*, the *wh*-subject is not dependent on *v* to undergo A'-movement. Hence, whether or not it moves to a focus position, the local *v* remains unaltered in its EF-less form (*men-*), as seen in (74a–b). As for the *wh*-object, if it is generated in the domain of *men-*, it won't be able to undergo A'-movement, for it does not (by assumption) have EF itself nor can it get EF from *men-*. On the other hand, if it is generated within the domain of the null version of *v*, it receives EF and must undergo A'-movement to have EF checked. Hence, local focus movement triggers the apparent deletion of the transitive marker when objects are involved, but not subjects (see (74d) *vs.* (74b)).

In sum, if the approach explored here is on the right track, *that*-trace effects are not intrinsically linked to subjects, but to phase heads. Thus, we expect to find "phase head-trace effects" also involving objects. The fact that this expectation is fulfilled, as illustrated with object extraction in Bahasa Indonesia (see (74c–d)), lends further empirical support to our proposal that phase heads may be the locus for edge features, in addition to *wh*-elements (see section 2). Let us then consider other cases of specialized Cs and *v*s associated with A'-extraction and examine some of the technical details involved in EF licensing.

4.2 Specialized Cs and intrinsically valued EFs

I have assumed with Bošković (2007) that EFs must function as probes in order to be licensed, for they are uninterpretable (see section 2). I have also tacitly assumed (*contra* Chomsky 2001) that the relation between interpretability and intrinsic valuation is not biconditional (see, e.g., Pesetsky & Torrego 2007), for EFs have been taken to be intrinsically valued, despite being uninterpretable. A *wh*-element with an EF intrinsically valued as Q ([EF:Q]), for instance, must move until it reaches a position where EF gets licensed by probing its domain and agreeing with a corresponding interpretable feature on an interrogative complementizer. From this perspective, one need not resort to Spec-head in addition to probe-goal relations in order to capture cartographic criteria. Rather, cartographic Spec-head configurations simply instantiate local probe-goal relations where an element in a Spec has an edge feature with a specific value ([EF:Top] for topic, [EF:Foc] for focus, [EF:Q] for question, [EF:Rel] for relative, etc.) that probes and agrees with the corresponding interpretable feature of the relevant functional head. In a sense, the value of EF defines how far the element bearing EF should move.

Note however that to say that EF must function as a probe does not necessarily mean that an element bearing EF has to move (see section 2). In the abstract derivation in (75a) below, for instance, EF on Ph_1 is valued as Q and should therefore be licensed by a matching interpretable feature. In the absence of such a feature in its probe domain, Ph_1 assigns EF to WH (see (75b)), which then moves to the edge of Ph_1, yielding (75c). Movement of the WH in (75c) voids a local crash when the complement of Ph_1 undergoes Transfer, as it makes it possible for EF to be eventually licensed later in the derivation via probing.

(75) a. $[_{Phase1} \ldots \mathbf{Ph_{1\,[EF:Q]}} [\ldots \text{WH} \ldots]] \rightarrow_{\text{EF assignment}}$
b. $[_{Phase1} \ldots Ph_1 [\ldots \mathbf{WH_{[EF:Q]}} \ldots]]$
c. $[_{Phase1} \mathbf{WH_{[EF:Q]}} [\ldots Ph_1 \ldots \boldsymbol{t} \ldots]$

Questions then arise if the next phase head to be merged is also specified as bearing [EF:Q], as shown in (76a) below. In order to be licensed, EF on Ph_2 must enter into an agreeing relation with a matching interpretable feature. In (76a) there is a matching feature (the EF on WH), but it is also uninterpretable; hence, no EF licensing takes place in (76a). Furthermore, as opposed to what we saw in (75a-b), EF assignment in (76b) is arguably excluded by Last Resort, as WH already has EF. Therefore, if the continuation of (75) is as in (76a), the derivation is doomed to crash.

(76) a. $[_{Phase2} \ldots \mathbf{Ph_{2\,[EF:Q]}} \ldots [_{Phase1} \text{WH}_{[EF:Q]} [\ldots Ph_1 \ldots t \ldots]]]$
b. $*[_{Phase2} \ldots Ph_2 \ldots [_{Phase1} \mathbf{WH_{[EF:Q],\,[EF:Q]}} [\ldots Ph_1 \ldots t \ldots]]]$

A concrete illustration of this scenario is presented by *que-qui* effects in long distance extraction (see, e.g., Kayne 1976; Pesetsky 1982; and Rizzi 1990). Take the derivation of (77), for instance.

(77) *French*
l'homme que je pense **que/*qui** Jean croit **qui/*que** viendra
the-man that I think that/QUI Jean believes QUI /that come.FUT
'the man that I think that Jean believes will come'

In order for the most embedded subject of (77) (for concreteness, a null operator) to undergo A'-movement, it must receive EF from the local C. Refining a suggestion made in section 4.1, assume that declarative *que* in French is not specified for EF, whereas *qui* hosts a valued instance of EF (in the case of (77), [EF:Rel]). A convergent derivation of (77) must then employ *qui* in the lowest clause so that this complementizer may assign EF to the subject, as represented in (78).

(78) a. $[_{CP}$ **qui**$_{\textbf{[EF:Rel]}}$ $[_{TP}$ OP …]] $\rightarrow_{\text{EF assignment}}$
b. $[_{CP}$ qui $[_{TP}$ **OP**$_{\textbf{[EF:Rel]}}$ …]]
c. $[_{CP}$ **OP**$_{\textbf{[EF:Rel]}}$ qui $[_{TP}$ ***t*** …]]

Things change in the next higher clause. If *que* is merged, as in (79a) below, the null operator moves to [Spec,CP] (see (79b)) on its way to a position where EF can probe its domain and be appropriately checked, eventually yielding (77).

(79) a. $[_{CP}$ **que** $[_{TP}$ … $[_{vP}$ OP$_{[EF:Rel]}$ … $[_{CP}$ *t* qui $[_{TP}$ *t* …]]]]]
b. $[_{CP}$ **OP**$_{\textbf{[EF:Rel]}}$ que $[_{TP}$ … $[_{vP}$ ***t*** … $[_{CP}$ *t* qui $[_{TP}$ *t* …]]]]]

If *qui* is merged instead, as shown in (80a) below, it won't be able to check its own EF against the EF of the null operator because the latter is not interpretable, nor will it be able to assign EF to OP, for OP already carries an EF (see (80b)).[20] The derivation then crashes, for upper instance of *qui* in (80a) cannot have its EF feature licensed;[21] hence the contrast between *que* and *qui* in (77) depending on whether or not we have a local extraction site.[22]

(80) a. *$[_{CP}$ **qui**$_{\textbf{[EF:Rel]}}$ $[_{TP}$ … $[_{vP}$ OP$_{[EF:Rel]}$ … $[_{CP}$ *t* qui $[_{TP}$ *t* …]]]]] $\rightarrow_{\text{EF assignment}}$
b. *$[_{CP}$ qui $[_{TP}$ … $[_{vP}$ **OP**$_{\textbf{[EF:Rel], [EF:Rel]}}$ … $[_{CP}$ *t* qui $[_{TP}$ *t* …]]]]]

4.3 Specialized Cs and intrinsically unvalued EFs

Let us now consider another possible continuation of (75c). Suppose that the next phase head to be merged after (75c) is built has an unvalued instance of EF, as sketched in (81).

(81) $[_{Phase2}$ … **Ph**$_{\textbf{2 [EF:u]}}$ … $[_{Phase1}$ WH$_{[EF:Q]}$ [… Ph$_1$ … *t* …]]]

As Ph$_2$ in (81) probes its domain, it finds a valued instance of EF at the edge of the lower phase and can therefore value its own EF, as illustrated in (82a–b) below. Assuming with Chomsky

20 In (80b), the edge features on *qui* and WH have the same value. Suppose this is just an example of a more general ban on multiple occurrences of edge features on the same element, regardless of their values. This would imply that a given element cannot move to more than one EF-checking position, capturing the general effects of Rizzi's (2006) Criterial Freezing.

21 The example discussed here involves A'-movement of a subject, but the same reasoning extends to nonsubjects, as sketched in (i) below, where a *wh*-object in (ia) and a wh-adverbial in (ib) are assigned EF by the local *v* and undergo successively cyclic movement to the edge of the higher *v*P. Like what happens in (80), *qui* in (i) can neither have its own EF licensed nor assign it to the *wh*-elements in its domain, for they are already bearing EF. Similar considerations apply if the adverb is intrinsically specified for a valued instance of EF (see footnote 12).

(i) a. $[_{CP}$ **qui**$_{\textbf{[EF:Q]}}$ $[_{TP}$ … $[_{vP}$ WH$_{i\text{-}[EF:Q]}$ … $[_{CP}$ t_i que … $[_{vP}$ t_i [… [V t_i]]]]]]]
b. $[_{CP}$ **qui**$_{\textbf{[EF:Q]}}$ $[_{TP}$ … $[_{vP}$ WH-AdvP$_{i\text{-}[EF:Q]}$ … $[_{CP}$ t_i que … $[_{vP}$ t_i […*v* $[_{VP}$ $[_{VP\ \ldots}]$ t_i]]]]]]]

22 I have proposed that in English, declarative C$_{\emptyset}$ (see (34b)) and relative *that* (see (42a)) are optionally associated with EF. Being more precise in view of the present discussion, I take both complementizers to be optionally associated with a *valued* instance of EF. Thus, the derivation in (i) below (cf. (36)), for instance, can only converge if the lower instance of C$_{\emptyset}$ is associated with [EF: + Q] (assigning it to the local subject) and the upper instance is not associated with EF; any other combination causes the derivation to crash. This is somewhat masked in English due to the optionality of EF on the null declarative complementizer (see (34b)), but may be clearly seen in cases like *qui* in French (see (77)), which is obligatorily specified for a valued instance of EF.

(i) $[_{CP}$ Who$_{\sqrt{[EF:Q]}}$ [did-Q you say $[_{CP}$ *t* C$_{\emptyset}$ [Mary thinks $[_{CP}$ *t* [C$_{\emptyset}$ [*t* will buy a house]]]]]]

(2001) that the valuation of an uninterpretable feature leads to its deletion with respect to the C-I interface, EF on Ph_2 in (82b) is deleted, but not EF on WH. WH can nonetheless keep moving in search a matching interpretable feature for its EF and on its way, it must pass through the Spec of Ph_2, in consonance with the PIC (see (82c)).

(82) a. $[_{Phase2} \ldots \mathbf{Ph}_{\mathbf{2\,[EF:u]}} \ldots [_{Phase1}\ \mathrm{WH}_{[EF:Q]}\ [\ldots \mathrm{Ph}_1 \ldots t \ldots]]]$
|————Agree————|
b. $[_{Phase2} \ldots \mathbf{Ph}_{\mathbf{2\surd [EF:Q]}} \ldots [_{Phase1}\ \mathrm{WH}_{[EF:Q]}\ [\ldots \mathrm{Ph}_1 \ldots t \ldots]]]$
c. $[_{Phase2}\ \mathbf{WH}_{\mathbf{[EF:Q]}}\ [\ldots \mathrm{Ph}_{2\surd[EF:Q]} \ldots [_{Phase1}\ \boldsymbol{t}\ [\ldots \mathrm{Ph}_1 \ldots t \ldots]]]]$

Although the possibility that EF may be intrinsically valued or unvalued is not something peculiar to EFs but a general property of uninterpretable features (see, e.g., Pesetsky & Torrego 2007), one might rightly ask why the grammar should allow for a situation like the one sketched in (82). It is not immediately clear what the contribution of the unvalued EF on Ph_2 is, for the valued EF on WH seems to suffice for the licensing of its movement. Under the assumption that Last Resort should prevent [EF:u] from being computed vacuously, we are led to the conclusion that it must play some role in the derivational step sketched in (82). Let us pause for a moment to consider what role this could be.

As we have seen above, a phase head may allow communication between syntactic objects located in different phasal domains if it bears an instance of EF and assigns it to the relevant syntactic object in its probe domain (see (24)). Furthermore, if EF is valued, it specifies where the moving element bearing EF has to go, as we saw in section 4.2. Thus, in a scenario such as (81) the EF on WH not only encodes that WH needs to move so that its EF can be licensed via probing, but also that WH should move to the specifier of an interrogative complementizer, as determined by the value of its EF. Thus, given that the need to move and the final landing site are independently specified, the only remaining role to be played by [EF:u] in (81) is the licensing of the Spec of Ph_2 itself. Note however that this must be a marked situation. The default situation under the PIC is for a phase head to license an A'-specifier as an escape hatch, regardless of its specification for EF. Declarative *that* in English, for instance, may license an escape hatch A'-specifier for an element undergoing A'-movement, even though it is not specified for EF (see section 3.1). My conjecture is that if the grammar resorts to [EF:u] to explicitly encode the ability of a given phase head Ph to license an escape hatch A'-specifier, the default situation in this language is that other phase heads of the type of Ph are unable to do so. Put somewhat differently, a language will only formally specify that a phase head permits movement through its specifier if other phase heads of the same type do not.

I would like to propose that the possibility sketched in (82) is behind the type of complementizer allomorphy exhibited by Irish, which McCloskey (2002: 189) describes as follows: (i) "If the clause hosts A'-binding of a trace, it is headed by the particle *aL*" (see (83a) below); (ii) "If the clause hosts A'-binding of a resumptive pronoun, it is headed by the particle conventionally represented as *aN*" (see (83b)); and (iii) "In the absence of any A'-binding, we have (…) a form of the particle *go*" (see (83b)).

(83) *Irish* (McCloskey 2002: 189)
a. an t-ainm **a** hinnseadh dúinn **a** bhí ar an áit
the name **aL** was-told to-us **aL** was on the place
'the name that we were told was on the place'
b. an ghirseach **a**-r ghoid na síogaí **í**
the girl **aN**-PAST stole the fairies her
'the girl that the fairies stole away.'
c. Creidim **gu**-r inis sé bréag.
I-believe **GO**-PAST tell he lie
'I believe that he told a lie.'

In a reanalysis on his previous work on the complementizer system of finite clauses in Irish, McCloskey (2002) makes a proposal that is directly relevant to the present discussion. He contends that the descriptive statements given above can be captured under a slight modification of Chomsky's (2000) analysis of successive cyclicity (see section 2). More specifically, he

proposes (p. 203) that when all the lexical material that defined a phase has been used up, the head of the phase may freely be assigned an operator feature, which enters into an agreement relation with an operator in its domain, and an EPP feature, which forces movement of this operator. Under this view, the descriptive statements in (i)–(iii) above is to be understood as following from (84).

(84) (McCloskey 2002: 203)
- a. C which bears both the Op-feature and the EPP is realized as *aL*; (see (83a))
- b. C which bears only the EPP is realized as *aN*; (see (83b))
- c. C which bears neither the Op-feature nor the EPP is realized as *go*. (see (83c))

By having features that are not present in the numeration optionally assigned in the course of the computation, McCloskey's proposal is subject to the same types of objections raised to Chomsky's (2000) original system (see section 2): it violates Inclusiveness and overgenerates. In particular, there arises the question of what prevents the complementizer *aN* from checking its sole EPP feature (see (84b)) via movement. McCloskey's answer (p. 204) is that "economy considerations (the relative complexity of Move as compared to Merge) will demand that this requirement be satisfied by Merge rather than by movement from within TP". However, this reasoning applies only when there is actually a choice between inserting material from the numeration and moving elements from within the structure already built. If the numeration has already been exhausted, Move should apply to check the EPP feature of *aN*, vacuously satisfying Merge-over-Move, which leads to incorrect results, for *aN* is associated with the presence of a pronoun rather than a trace (see (83b)).

Under the present approach, the differences between *aL* and *go* can be captured if they diverge with respect to their EF specifications, as in (85):

(85)
- a. *aL*: specified for an optionally valued instance of EF ([EF:val] or [EF:u]).
- b. *go*: not specified for EF.

The marked specification of *aL* as [EF:u] amounts to saying that *aL* is lexically specified as being able to license an escape hatch A'-specifier, which in turn means that the default situation for Irish is that complementizer particles not specified for EF cannot license an A'-specifier as an escape hatch. To put in different words, if a complementizer particle in Irish is not specified for EF, it induces an inviolable barrier for movement. Thus, in a standard A'-movement chain, all the complementizers intervening between the operator and the lowest trace must be *aL* rather than *go* (see (83a) *vs.* (83c)).[23] Under this view, the derivation of a construction such as (86), which involves long distance extraction of an object, should proceed along the lines sketched in (87):

(86) *Irish* (McCloskey 2001)
rud **a** gheall tú **a** dhéanfá
thing **aL** promised you **aL** $do_{COND\text{-}S2}$
'something that you promised that you would do'

(87)
- a. $[_{vP}$ SU $\boldsymbol{v}_{\mathbf{[EF:Rel]}}$ V OB$]$ $\rightarrow_{\text{EF assignment}}$
- b. $[_{vP}$ SU v $\mathbf{OB}_{\mathbf{[EF:Rel]}}]$
- c $[_{vP}$ $\mathbf{OB}_{\mathbf{[EF:Rel]}}$ [SU v $\boldsymbol{t}$]]
- d. $[_{CP1}$ $\boldsymbol{aL}_{\mathbf{[EF:u]}}$ … $[_{vP}$ $OB_{[EF:Rel]}$ [… t]]]
- e. $[_{CP1}$ $\boldsymbol{aL}_{\surd\mathbf{[EF:Rel]}}$ … $[_{vP}$ $OB_{[EF:Rel]}$ [… t]]]
- f. $[_{CP1}$ $\mathbf{OB}_{\mathbf{[EF:Rel]}}$ [$aL_{\surd[EF:Rel]}$ … $[_{vP}$ $\boldsymbol{t}$ [… t]]]]
- g. $[_{CP2}$ $\boldsymbol{aL}_{\mathbf{[EF:u]}}$ … $[_{vP2}$ $OB_{[EF:Rel]}$ … $[_{CP1}$ t [$aL_{\surd[EF:Rel]}$ …]]]]
- h. $[_{CP2}$ $\boldsymbol{aL}_{\surd\mathbf{[EF:Rel]}}$ … $[_{vP2}$ $OB_{[EF:Rel]}$ … $[_{CP1}$ t [$aL_{\surd[EF:Rel]}$ …]]]]
- i. $[_{CP2}$ $\mathbf{OB}_{\mathbf{[EF:Rel]}}$ [$aL_{\surd[EF:Rel]}$ … $[_{vP2}$ t … $[_{CP1}$ t [$aL_{\surd[EF:Rel]}$ …]]]]]
- j. $[_{CP2}$ $\mathbf{OB}_{\surd\mathbf{[EF:Rel]}}$ [Rel … [$\boldsymbol{t}$ $aL_{\surd[EF:Rel]}$ … $[_{vP2}$ t … $[_{CP1}$ t [$aL_{\surd[EF:Rel]}$ …]]]]]]

23 The fact that *aL* is compatible with different types of A'-movement suggests that it is not a criterial head. For concreteness, I will assume here that it is a lower head of the extended projection of C. If it is actually a verbal particle, as proposed by Noonan (2002) and Lahne (2009), the gist of the analysis to be developed below can be maintained if *aL* is instead a head of the extended projection of *v*, generated above the external argument.

In (87a–b), *v* assigns EF to the object, which then moves to the edge of *v*P (see (87c)). Next, a complementizer *aL* specified as [EF:u] is merged (see (87d)) and values its EF by agreeing with the EF of the moved object (see (87e)). In (87e) the EF on *aL* is licensed but not the EF on the object, which must then move in search of an interpretable matching feature. Given that *aL* is associated with EF, it licenses a specifier, allowing the object to use it as a temporary landing site (see (87f)). The same happens when another complementizer *aL* specified as [EF:u] is merged later in the derivation (see (87g–i)). Finally, after the relative head Rel is merged, the object moves to its Spec and has its EF feature licensed (see (87j)).

According to (85a), *aL* may also be specified with a valued instance of EF. An illustration of this possibility can be seen in the derivation of the long-distance subject extraction construction in (83a), as sketched in (88).

(88) a. $[_{CP1}\ \boldsymbol{aL}_{\textbf{[EF:Rel]}}\ [\ldots\ SU\ \ldots]] \rightarrow_{\text{EF assignment}}$
b. $[_{CP1}\ aL\ [\ldots\ \textbf{SU}_{\textbf{[EF:Rel]}}\ \ldots]]$
c $[_{CP1}\ \textbf{SU}_{\textbf{[EF:Rel]}}\ [aL\ [\ldots\ \boldsymbol{t}\ \ldots]]]$
d. $[_{CP2}\ \boldsymbol{aL}_{\textbf{[EF:u]}}\ \ldots\ [_{vP2}\ SU_{[EF:Rel]}\ [\ldots\ [_{CP1}\ t\ [aL\ \ldots\ ]]]]]$
e. $[_{CP2}\ \boldsymbol{aL}_{\surd\textbf{[EF:Rel]}}\ \ldots\ [_{vP2}\ SU_{[EF:Rel]}\ \ldots\ [_{CP1}\ t\ [aL\ \ldots\ ]]]]$
f. $[_{CP2}\ \textbf{SU}_{\textbf{[EF:Rel]}}\ [aL_{\surd[EF:Rel]}\ \ldots\ [_{vP2}\ \boldsymbol{t}\ \ldots\ [_{CP1}\ t\ [aL\ \ldots\ ]]]]]$
g. $[_{CP2}\ \textbf{SU}_{\surd\textbf{[EF:Rel]}}\ [\text{Rel}\ \ldots[\boldsymbol{t}\ aL_{\surd[EF:Rel]}\ \ldots\ [_{vP2}\ t\ \ldots\ [_{CP1}\ t\ [aL\ \ldots\ ]]]]]]$

In (88a) *aL* assigns an instance of EF valued as Rel to the local subject, which then undergoes successive cyclic movement until it reaches [Spec,RelP] and has its EF licensed. Crucially, EF in the higher instance of *aL* is unvalued and may be licensed through agreement with the moved subject (see (88d–e)).

Let us finally briefly discuss the complementizer *aN* (see (83b)). The approach entertained here has a precise way of capturing the contrast between *aL* and *go* in terms of (85), but does not make any specific commitments regarding *aN* other than saying that it cannot be specified for EF (otherwise, its Spec could be used as an escape hatch). I won't have much to say on *aN* here. For concreteness, I will assume McCloskey's (2002) characterization of *aN* as bearing only EPP (see (84b)), but take this feature to be the traditional EPP and not Chomsky's 2000 EPP-like feature associated with successive cyclic movement. If so, the EPP-feature on *aN* should in principle be satisfied by Merge or Move. However, given that *aN* heads a finite clause, the relevant DPs within the clause already have their Case checked and are therefore inactive for purposes of additional EPP-checking. In the case of (83b), for instance, *na síogaí* 'the fairies' and *í* 'her' have already valued their Case features and cannot move to check *aN*'s EPP-feature. This entails that *aN* can only have its specifier licensed via Merge; hence the merger of *an ghirseach* 'the girl' in the specifier of *aN* in (83b). To put things in a broader perspective, McCloskey's (2002) economy approach to account for the fact that *aN* cannot be licensed by Move can be adequately reinterpreted in terms of Chomsky's (2000) Activation Condition.[24]

4.4 Specialized vs and intrinsically unvalued EFs: Going Irish on the lower level

Recall that Bahasa Indonesia displays an interesting subject-object asymmetry for local *wh*-movement in that object extraction triggers deletion of the intervening transitive marker, but subject extraction does not (see (74)). I have accounted for this asymmetry in terms of

24 The system proposed here can also account for some of the mixed patterns discussed by McCloskey (2002). The derivation of the sentence in (i), for instance, which involves the pattern $[_{CP}\ aL\ \ldots.\ [_{CP}\ aN\ \ldots\ ]]$, should proceed along the lines of (ii), where the *wh*-movement is launched from the Spec of *aN* thanks to the EF assigned by the local *v*.

(i) *Irish* (McCloskey 2002)
an galar **a** chuala mé **ar** cailleadh bunadh an oileáin leis
the disease ***aL*** heard I ***aN*** died people the island_{GEN} by-it
'the disease that I heard that the people of the island died of (it)'

(ii) a. $[\ldots\ \boldsymbol{v}_{\textbf{[EF:Rel]}}\ \ldots\ [_{CP}\ XP\ aN\ldots]] \rightarrow_{\text{EF assignment}}$
b. $[_{vP}\ \ldots\ v\ \ldots\ [_{CP}\ \textbf{XP}_{\textbf{[EF:Rel]}}\ aN\ldots]]$
c. $[_{CP}\ \boldsymbol{aL}_{\textbf{[EF:u]}}\ \ldots\ [_{vP}\ XP_{[EF:Rel]}\ \ldots\ v\ \ldots\ [_{CP}\ t\ aN\ \ldots]]]$
d. $[_{CP}\ \boldsymbol{aL}_{\surd\textbf{[EF:Rel]}}\ \ldots\ [_{vP}\ XP_{[EF:Rel]}\ \ldots\ v\ \ldots\ [_{CP}\ t\ aN\ \ldots]]]$
e. $[_{CP}\ \textbf{XP}_{\textbf{[EF:Rel]}}\ [aL_{\surd[EF:Rel]}\ \ldots\ [_{vP}\ \boldsymbol{t}\ \ldots\ v\ \ldots\ [_{CP}\ t\ aN\ \ldots]]]]$
f. $[_{CP}\ \textbf{XP}_{\surd\textbf{[EF:Rel]}}\ [\text{Rel}\ \ldots\ [\boldsymbol{t}\ aL_{\surd[EF:Rel]}\ \ldots\ [_{vP}\ t\ \ldots\ v\ \ldots\ [_{CP}\ t\ aN\ \ldots]]]]$

v-allomorphy: the null version of *v* is specified for EF, whereas its overt analogue (the "transitive marker") is not. Given that the subject is not in the probe domain of *v*, local subject extraction cannot be triggered by *v*; hence, local subject extraction is associated with the standard EF-less version of *v* (the "transitive marker"). By contrast, object extraction can only take place if the object receives EF from *v*; hence, object extraction is tied to the presence of the null version of *v*, yielding what appears to be deletion of the transitive marker.

Given the discussion in section 4.3, there arises the question of whether the EF associated with the null *v* in Bahasa Indonesia is intrinsically valued or unvalued. In order to determine this, we need to consider long distance extraction. Interestingly, Saddy (1991) shows that the subject-object asymmetry mentioned above only holds of local *wh*-movement. When long distance extraction is involved, subjects behave like objects in triggering deletion of the transitive markers of the verbs they cross, as illustrated in (89).

(89) *Bahasa Indonesia* (adapted from Saddy 1991)

a. Bill **men**-gira Tom **men**-harap Fred **men**-cintai **siapa**
Bill TRANS-thinks Tom TRANS-expects Fred TRANS-loves who

a'. **Siapa** yang Bill Ø-kira Tom Ø-harap Fred Ø-cintai
who FOC Bill think Tom expect Fred love
'Who did Bill think Tom expects Fred loves?'

b. Bill **men**-beri Tom **men**-harap **siapa** **men**-cintai Fred
Bill TRANS-thinks Tom TRANS-expects who TRANS-loves Fred

b'. **Siapa** yang Bill Ø-beri Tom Ø-harap **men**-cintai Fred
who FOC Bill thinks Tom expects TRANS-loves Fred
'Who does Bill think Tom expects loves Fred?'

The fact that *v*-allomorphy in Bahasa Indonesia is not restricted to the local domain of extraction makes it very similar to the allomorphy between *aL* and *go* in Irish (see (83a) *vs.* (83c)). The data in (74) and (89) can in fact receive a straightforward account if the allomorphy involving *v* makes reference to the intrinsic value of EF, as in (90).

(90) a. $v_{\emptyset}$: specified for an optionally valued instance of EF ([EF:val] or [EF:u]).
b. $v_{men\text{-}}$: not specified for EF.

According to (90a), the null *v* may be specified as [EF:val] or [EF:u]. Like in the case of Irish, [EF:u] is interpreted as a marked encoding of the ability to license an A'-specifier, which entails that the default situation in Bahasa Indonesia is that other *v*s not specified for EF are unable to license an A'-specifier to be used as a temporary landing site for successive cyclic movement. Hence, the impossibility of extraction across *men-*, as illustrated in (91) below, is accounted for under the assumption that *men-* does not license an escape hatch, for it is not specified for EF (see (90b)). In this regard, *men-* is the counterpart of the Irish complementizer *go* (see (85b)) in the *v*P phase.

(91) *Bahasa Indonesia* (adapted from Saddy 1991)
***Siapa** yang Bill **men**-gira Tom **men**-harap Fred **men**-cintai
who FOC Bill TRANS-thinks Tom TRANS-expects Fred TRANS-loves
'Who did Bill think Tom expects Fred loves?'

The derivation of a long distance object extraction such as (89a') must then proceed along the lines sketched (92) below, where the most embedded null *v* is specified as [EF:Foc] and assigns EF to the *wh*-object (see (92a,b)), which then undergoes successive cyclic movement until it reaches [Spec,FocP] and gets licensed (see (92g)). Crucially, the higher intervening null *v*s are specified with an unvalued instance of EF (see (92c,e)). As such, they can be licensed by having their EFs valued by the moving WH (see (92d,f)). The valued EF on WH, on the other hand, must still be checked against an interpretable matching feature. The *v*s of $v\text{P}_2$ and $v\text{P}_3$ can license an A'-specifier due to their [EF:u] specification, providing WH with an escape hatch (see (92e,g)) and allowing it to move through each of these specifiers and reach the licensing position (see (92g)). Notice that the derivation in (92) is the exact parallel of the derivation of (86) in Irish (cf. (87)); in other words, the null *v* in Bahasa Indonesia specified as in (90a) is the counterpart of Irish complementizer *aL* (see (85a)).

(92) a. $[_{vP1}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\,\mathbf{[EF:Foc]}}$ …WH$]$ $\rightarrow_{\text{EF assignment}}$
b. $[_{vP1}$ $v_{\emptyset}$ … $\mathbf{WH}_{\mathbf{[EF:Foc]}}]$
c $[_{vP2}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\,\mathbf{[EF:u]}}$ … $[_{CP1}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]$
d. $[_{vP2}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\surd\,\mathbf{[EF:Foc]}}$ … $[_{CP1}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]$
e. $[_{vP3}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\,\mathbf{[EF:u]}}$ … $[_{CP2}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]$
f. $[_{vP3}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\surd\,\mathbf{[EF:Foc]}}$ … $[_{CP2}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]$
g. $[_{FocP}$ $\mathbf{WH}_{\surd\,\mathbf{[EF:Foc]}}$ Foc … $[_{vP3}$ ***t*** $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP2}$ ***t*** … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]]$

As the reader might have by now anticipated, the long distance extraction of subjects exemplified in (89b) also finds a parallel with long distance extraction of subjects in Irish (see (83a)/(88)), as shown in (93).

(93) a. $[_{CP1}$ $\mathbf{C}_{\mathbf{[EF:Foc]}}$ $[_{TP}$ WH $[_{vP1}$ *t men-* …$]]]\rightarrow_{\text{EF assignment}}$
b. $[_{CP1}$ C $[_{TP}$ $\mathbf{WH}_{\mathbf{[EF:Foc]}}$ $[_{vP1}$ *t men-* …$]]]$
c. $[_{vP2}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\,\mathbf{[EF:u]}}$ … $[_{CP1}$ $\text{WH}_{[EF:Foc]}$ … C $[_{TP}$ *t* $[_{vP1}$ *t men-* …$]]]]$
d. $[_{vP2}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\surd\,\mathbf{[EF:Foc]}}$ … $[_{CP1}$ $\text{WH}_{[EF:Foc]}$ … C $[_{TP}$ *t* $[_{vP1}$ *t men-* …$]]]]$
e. $[_{vP3}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\,\mathbf{[EF:u]}}$ … $[_{CP2}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]$
f. $[_{vP3}$ $\boldsymbol{v}_{\boldsymbol{\emptyset}\surd\,\mathbf{[EF:Foc]}}$ … $[_{CP2}$ $\text{WH}_{[EF:Foc]}$ … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]$
g. $[_{FocP}$ $\mathbf{WH}_{\surd\,\mathbf{[EF:Foc]}}$ Foc … $[_{vP3}$ ***t*** $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP2}$ ***t*** … $[_{vP2}$ *t* $[v_{\emptyset\surd[EF:Foc]}$ … $[_{CP1}$ *t* … $[_{vP1}$ *t* $[v_{\emptyset}$… *t*$]]]]]]]]$

The *wh*-subject is generated outside the probe domain of the lowest instance of *men-* (see (93a)), which according to the proposal in (90b) is not associated with EF. Thus, A'-extraction of the subject is not affected by *men-*'s incapability of licensing an A'-specifier. After receiving a valued instance of EF from the local complementizer (see (93a,b)), the *wh*-subject then undergoes successive cyclic movement, passing through the intervening A'-specifiers licensed by the null *v*s thanks to their intrinsic specification as bearing [EF:u] (see (93c,e)).[25]

Another case of Irish upside down is provided by focus movement in Defaka.[26] As shown by Bennett, Akinlabi & Connell (2012), focused local subjects in Defaka are immediately followed by the particle *ko*, while other types of focused phrases are followed by the particle *ndo*:

(94) *Defaka* (Bennett, Akinlabi & Connell 2012)
a. ì kò Bòmá ésé-kà-rè
I FOC.SUBJ Boma see-FUT-NEG
'**I** will not see Boma.' (focused subject)
b. Bòmá ndò ì ésé-kà-rè-**kè**
Boma FOC I see-FUT-NEG-KE
'I will not see **Boma**.' (focused object)

Relevant to the current discussion is the fact that if the focus-moved phrase is anything other than a local subject, a special post-verbal clitic *-ke* appears obligatorily, as illustrated in (94b). Interestingly, this *-ke* particle must surface on any verb crossed by the moved focused phrase, as shown in (95).

(95) *Defaka* (adapted Bennett, Akinlabi & Connell 2012)
a. ándù$_i$ ndò Bòmá fàà-**kè** [ìní t_i été-**kè**]
canoe FOC Boma say-KE they have-KE
'It's a canoe that Boma said they have.' (embedded object in matrix FocP)

25 Notice that the sentences in (89) all involve a null complementizer. In fact, according to Saddy (1991: 189), "[n] either objects nor subjects may be moved over an overt complementizer". From the perspective of the current proposal, this can be interpreted as indicating that Bahasa Indonesia explores allomorphy associated with EF at the CP phase, as well. In other words, the specifications in (90) seem to be replicated by C, as sketched in (i). If the null but not the overt complementizer bears the marked [EF:u] specification, as in (ia), the default situation is for a complementizer lacking of specification for EF to be unable to license A'-specifier; hence, the ban on extraction across *bahwa*. As suggested by a reviewer, Selayarese and noncolloquial Russian seem amenable to a similar analysis in that extraction must proceed over a null rather than an overt complementizer (see Finer 1997 and Bošković 2008 for relevant discussion).

(i) a. $C_{\emptyset}$: may bear an optionally valued instance of EF ([EF:val] or [EF:u]).
b. C_{bahwa}: not specified for EF.

26 The similarity between Irish and Defaka was noted by Bennett, Akinlabi & Connell (2012: 298).

b. Bruce$_i$ ndò Bòmá jírí-**kè** [t_i á ésé-mà]
Bruce FOC Boma know-KE her see-NFUT
'Boma knows (that) **Bruce** saw her' (embedded subject in matrix FocP)

From the perspective of the proposal explored here, the data in (94) and (95) can receive a straightforward account if the particle *-ke* in Defaka is actually the allomorph of *v* when it is associated with EF. In other words, *-ke* and $v_{\emptyset}$ are also examples of counterparts of Irish *aL* and *go* (see (85)) within *v*P:

(96) a. v_{ke}: specified for an optionally valued instance of EF ([EF:val] or [EF:u]).
b. $v_{\emptyset}$: not specified for EF.

Given the specifications in (96), sentences involving long object movement like (95a) and long subject movement like (96b) unfold along the lines of what we have seen for Bahasa Indonesia in (92) and (93), respectively. Crucially, if in Defaka *-ke* but not $v_{\emptyset}$ is associated with the marked [EF:u] specification, $v_{\emptyset}$ does not license a specifier, blocking extraction from within its domain.[27]

To summarize: Reinterpreting McCloskey's (2002) analysis of the complementizer allomorphy found in Irish in terms of the intrinsic valuation of EF, the proposal advocated here paved the way for a unified account of allomorphy at CP and vP levels. Furthermore, the fact that some phase heads do not allow A'-extraction from their domains was derived from a nonvacuous interpretation of the marked specification [EF:u].[28]

27 From the perspective of the proposal laid out here, other morphophonological phenomena tracking successive cyclic movement such as *wh*-agreement of the Chamorro-type (see, e.g., Chung 1998) or downstep in Kikuyu (see, e.g., Clements 1984, Sabel 2000), for instance, should be linked to an [EF:u] specification on (a functional head of the extended projection of) *v*. Due to space limitations, I leave further explorations of this hypothesis to another opportunity.

28 In the cases discussed above, an unvalued instance of EF on a phase head is licensed by agreeing with a valued instance of EF in its probe domain. If there is no such goal, could the phase head then assign its EF to an appropriate element in its domain? I would like to suggest that this possibility is what underlies constructions where an "*in situ*" *wh*-phrase is able to license a parasitic gap, as illustrated in (i).

(i) (Nissenbaum 2000: 12)
?[which kid]$_1$ did you give [which candy bar]$_2$ to t_1 [without first telling a parent of ***PG***$_1$ about the ingredients in ***PG***$_2$?

As discussed in detail by Nissenbaum (2000), these cases are only possible if there is more than one parasitic gap within the adjunct. From the perspective of the current proposal, the derivation of a sentence like (i) proceeds along the (simplified) lines of (ii)–(iii) below. In (iia), *v* is associated with a valued instance of EF and the preposition *in* with an unvalued one. These heads assign their EFs to the *wh*-elements in their domain, as shown in (iib). The *wh*-phrase *which candy bar* then moves to [Spec,*v*P] for the usual reasons, yielding (iic). Recall that like any uninterpretable feature, an unvalued EF may be licensed by a valued EF under agreement, but a valued EF can only be licensed after it probes a corresponding interpretable valued feature (see section 3.2). This means that in the configuration in (iic), the unvalued EF on *which candy bar* can probe the structure and be licensed by the EF on *which kid*, as shown in (iid), but the latter remains unlicensed even after it moves to the edge of *v*P in (iie). The system then proceeds to building the *v*P phase of the matrix clause and the two *wh*-phrases at the edge of the *v*P in (iie) undergo sideward movement to the matrix derivational workspace, as shown in (iiia) and (iiib). The relevant point for our discussion is that after the *v*P in (iiic) is built, the *wh*-phrase *which kid* must move to its edge, as shown in (iiid), and keep moving until it reaches the matrix [Spec,CP] (see (i)); otherwise, its EF won't be licensed. By contrast, the EF of *which candy bar* in (iiid) has already been licensed; thus, this *wh*-phrase does not undergo further A'-movement, yielding a licit case of parasitic gap licensed by an antecedent in an A-position (see Nissenbaum 2000 for relevant discussion).

(ii) *Construction of the adjunct* v*P:*
a. [$_{vP}$ PRO telling$_i$-$\boldsymbol{v}_{\mathbf{[EF:Q]}}$ [$_{VP}$ [a parent of [which kid]] t_i [about the ingredients **in**$_{\mathbf{[EF:u]}}$ [which candy bar]]]] $\rightarrow_{\text{EF assignment}}$
b. [$_{vP}$ PRO telling$_i$-*v* [$_{VP}$ [a parent of **[which kid]**$_{\mathbf{[EF:Q]}}$] t_i [about the ingredients in **[which candy bar]**$_{\mathbf{[EF:u]}}$]]]
c. [$_{vP}$ **[which candy bar]**$_{\mathbf{[EF:u]}}$ [$_{v'}$ PRO telling$_i$-*v* [$_{VP}$ [a parent of [which kid]$_{[EF:Q]}$] t_i [about the ingredients in $\boldsymbol{t_2}$]]]]
d. [$_{vP}$ [which candy bar]$_{\sqrt{\mathbf{[EF:Q]}}}$ [$_{v'}$ PRO telling$_i$-*v* [$_{VP}$ [a parent of [which kid]$_{[EF:Q]}$] t_i [about the ingredients in t_2]]]]
e. [$_{vP}$ **[which kid]**$_{\mathbf{[EF:Q]}}$ [$_{v'}$ [which candy bar]$_{\sqrt{[EF:Q]}}$ [$_{v'}$ PRO telling$_i$-*v* [$_{VP}$ [a parent of $\boldsymbol{t_1}$] t_i [about the ingredients in $\boldsymbol{t_2}$]]]]]

(iii) *Construction of the matrix* v*P (via sideward movement from (iie)):*
a. [to **[which kid]**$_{\mathbf{[EF:Q]}}$]
b. [**[which candy bar]**$_{\sqrt{\mathbf{[EF:Q]}}}$ give [to [which kid]$_{[EF:Q]}$]]
c. [$_{vP}$ you give$_i$-*v* [[which candy bar]$_{\sqrt{\mathbf{[EF:Q]}}}$ t_i [to [which kid]$_{\mathbf{[EF:Q]}}$]]]
d. [$_{vP}$ **[which kid]**$_{\mathbf{[EF:Q]}}$ [$_{v'}$ you give$_i$-*v* [[which candy bar]$_{\sqrt{[EF:Q]}}$ t_i [to $\boldsymbol{t_1}$]]]]

5 Edge features and anti-locality

Assuming that English interrogative complementizer has an uninterpretable *wh*-feature (see, e.g., Bošković 2007), let us compare the derivation of the sentences in (97) with the derivation of (98).

(97) a. *I wonder Mary ate what.
b. *I wonder Mary what ate.
c. I wonder what Mary ate.

(98) I wonder who ate the cake.

From the perspective of the proposal made in section 2, the PIC prevents the embedded interrogative complementizer from agreeing with *what* in (97a). If the embedded *v* bears EF, it may assign it to *what*, allowing *what* to move to its edge, yielding (97b). The interrogative complementizer can agree and be licensed with *what* in (97b), but *what* still needs to license the EF it received from *v*. Thus, the derivation should crash unless *what* moves to the embedded [Spec,CP], yielding (97c). The derivation of (98), on the other hand, need not resort to movement. As illustrated in (99), the interrogative complementizer can license its *wh*-feature by probing and agreeing with *who*, in compliance with the PIC; *who* then remains in its position, as it does not have any other features to be licensed.

(99) a. [$\mathbf{Q_{wh}}$ [$_{TP}$ who ate the cake]]
$|_{\text{Agree}}|^{OK}$
b. [$\mathbf{Q_{\surd wh}}$ [$_{TP}$ who ate the cake]]

Recall however that I have proposed that EFs may be optionally associated with phase heads in English. So, in principle, a derivation of (98) along the lines of (100) below should also be permitted. In (100), Q exercises the option of bearing EF as it enters the derivation and assigns it to *who* after licensing its *wh*-feature (see (100b–c)); *who* must then move to the specifier of Q (see (100d)), much like what we saw with respect to *what* in (97b–c).

(100) a. [$\mathbf{Q_{wh,EF}}$ [$_{TP}$ who ate the cake]]
$|_{\text{Agree}}|^{OK}$
b. [$\mathbf{Q_{\surd wh,EF}}$ [$_{TP}$ who ate the cake]] $\rightarrow_{\text{EF assignment}}$
c. [$Q_{\surd wh}$ [$_{TP}$ $\mathbf{who_{EF}}$ ate the cake]]
d. [$\mathbf{who_{\surd EF}}$ $Q_{\surd wh}$ [$_{TP}$ *t* ate the cake]]

Arguably, we cannot resort to economy considerations to rule out the more complex derivation in (100) in view of the simpler possibility in (99), for they are based on different numerations, with distinct lexical entries for the interrogative complementizer (see Chomsky 1995). However, the derivation in (100) may be independently excluded if the movement of *who* in (100d) counts as too local, violating some anti-locality restriction on movement (see, e.g., Abels 2003; Grohmann 2003; Bošković 2016; Erlewine 2016; and Douglas 2017 for relevant discussion). Take Erlewine's (2016) formulation of anti-locality in (101) below, for instance. According to (101), movement of *who* in (100d) is to be excluded, for it crosses no maximal projection other than TP.

(101) Spec-to-Spec Anti-Locality (Erlewine 2016: 432)
A'-movement of a phrase from the Specifier of XP must cross a maximal projection other than XP.

In this section I would like to briefly discuss the relevance of the locus of EFs for anti-locality, showing that the effects of (101) can in fact be deduced. Recall that the role of EFs is to allow communication between two syntactic objects in different phase domains (see section 2). As uninterpretable features, EFs must function as probes in order to be licensed (see Bošković 2007), which entails that an element bearing EF may have to move in order to license its EF via probing. Recall also that the value of EF ultimately specifies how far the element bearing EF should move (see section 4.1). Notice, however, that if two syntactic objects are within a phasal span conforming to the PIC, they need no extra help from edge features to interact with each other. The absence of EFs on phase heads in this scenario can be taken to follow from

a general economy condition barring superfluous features (features whose role is to require the establishment of a relation that is independently established). Suppose this condition is formulated along the lines of (102).

(102) Anti-locality Restriction on Feature Bundling: *$X_{[EF:X]}$
A given functional category X cannot be lexically associated with an edge feature valued as X.

What (102) amounts to saying is that specifications like $Q_{[EF:Q]}$, $Top_{[EF:Top]}$, etc. are redundant in a system that adopts Agree and takes it to be subject to the PIC. Q and Top, for instance, can find a proper goal in their probe domains defined by the PIC, without forcing the goal to be dislocated to a position within their projection. Once $Q_{[EF:Q]}$ is lexically excluded by the Anti-locality Restriction on Feature Bundling in (102), the issue of EF assignment in a derivation like (100) does not arise, capturing the effects of (101).[29]

From this perspective, the fact that English allows local object topicalization, but not local subject topicalization (see Lasnik & Saito 1992) may also be taken to follow from (102). A sentence such as (103a) below, for instance, can be derived along the lines of (104), where *v* assigns the object an EF valued as Top, which triggers movement of *Mary* to [Spec,TopP] to license EF.

(103) a. Mary, John likes
b. *John, likes Mary

(104) a. [$_{vP}$ John $\boldsymbol{v}_{[EF:Top]}$ likes Mary] $\rightarrow_{\text{EF assignment}}$
b. [$_{vP}$ John *v* likes **Mary**$_{[EF:Top]}$]
c. [$_{TopP}$ Top [$_{TP}$ John [$_{vP}$ **Mary**$_{[EF:Top]}$ [~~John~~ *v* likes *t*]]]]
d. [$_{TopP}$ **Mary**$_{\surd[EF:Top]}$ Top [$_{TP}$ John [$_{vP}$ *t* [~~John~~ *v* likes *t*]]]]

As for the ungrammatical subject topicalization sentence in (103b), *John* is generated outside the probe domain of *v* (see (105a) below) and therefore could not be assigned [EF:Top] by *v* even if it were so specified (see (24)). The subject then moves to [Spec,TP] and the Top head is merged. The Anti-locality Restriction on Feature Bundling prevents Top from lexically bearing an EF valued as Top. Thus, *John* does not have any motivation to move to [Spec,TopP] and therefore cannot be interpreted as a topic or be assigned the prosodic contour presumably induced by the Top head (see (103b)).

(105) a. [$_{vP}$ John [*v* likes Mary]]
b. *[$_{TopP}$ Top [$_{TP}$ John [$_{vP}$ *t* [*v* likes Mary]]]]

To put things in a broader perspective, whenever a given element Y with an uninterpretable edge feature valued as X ($Y_{[EF:X]}$) moves overtly to check [EF:X] against the head X, either (i) Y is intrinsically specified for [EF:X] (e.g. *wh*-phrases in BP; see section 3) or (ii) there is a head Z intervening between X and Y that assigns [EF:X] to Y, triggering Y's movement (e.g. *v* in (104); also see the discussion around (43)). As we should by now expect, the presence of EF on the intervening Z may have morphological reflexes. In this regard, let us reexamine focus in Defaka. As discussed in section 4.4, focalization of a local subject involves the particle *ko* (see (106a)), whereas any other type of focalization involves the particle *ndo* (see (106b,c)), including focalization of nonlocal subjects (see (106c)):

(106) *Defaka* (Bennett, Akinlabi & Connell 2012)
a. ì **kò** Bòmá ésé-kà-rè
I FOC.SUBJ Boma see-FUT-NEG
'**I** will not see Boma.'

29 To be precise, what the Anti-locality Condition on Feature Bundling in (102) actually does is to exclude a movement analysis of a local *wh*-subject to the Spec of an interrogative complementizer based on a putative [EF:Q] feature of the interrogative complementizer. It is therefore compatible with approaches in which movement to [Spec,CP] is driven by different motivations. See, for instance, the recent proposals by Bošković (2016) and Messick (2020), where movement of the *wh*-subject (from within *v*P) to [Spec,CP] is triggered by (lack of) labelling.

b. Bòmá **ndò** ì ésé-kà-rè-**kè**
Boma FOC I see-FUT-NEG-KE
'I will not see **Boma**.'

c. Bruce$_i$ **ndò** Bòmá jírí-**kè** [t_i á ésé-mà]
Bruce FOC Boma know-KE her see-NFUT
'Boma knows (that) **Bruce** saw her.'

Bennett, Akinlabi & Connell (2012) propose that *ko* stands for a syncretic form conflating a focus head (Foc) and a head responsible for subject licensing (Subj), allowing the subject to move to its Spec and satisfy both its focus and Case requirements. When an element other than the local subject is focused, each head hosts a different element in its specifier and the focus head is spelled out as *ndo*. Reinterpreting Bennett, Akinlabi & Connell's (2012) proposal in terms of the current system, a moved focused element must have been assigned an EF valued as Foc ([EF:Foc]). Crucially, it cannot have received from the Focus head itself. In the case of objects and nonlocal subjects, such assignment would violate the PIC; whereas in the case of local subjects, it would comply with the PIC, but the putative specification of the Foc head in this situation ($Foc_{[EF:Foc]}$) would violate the Anti-locality Restriction on Feature Bundling in (102). Thus, given that focalization of a local subject is possible in Defaka, there must be a head bearing [EF:Foc] intervening between the focus head and the local subject. For concreteness, let us follow Bennett, Akinlabi & Connell (2012) and assume that such head is Subj, as sketched in (106).

(106) [Foc [$Subj_{[EF:Foc]}$ [SU …]]]

In (106), Subj assigns [EF:Foc] to SU, which must then move to [Spec,FocP] to license the edge feature. We may take *ko* to be the allomorph of Subj when it is lexically specified as bearing [EF:Foc] and the Focus head *ndo* to be deleted in the morphological component when adjacent to Subj (even if the focused subject moves to [Spec,SubjP], it must still move to [Spec,FocP], which leaves Foc adjacent to Subj after the copy of the subject in [Spec,SubjP] is deleted). In short, we have here another case of allomorphy conditioned by the presence of EF lexically associated with a given head.

6 Concluding remarks

Two related questions have been at the center of the generative enterprise in one way or another: (i) why does successive cyclic movement exist? and (ii) what kind of features must be postulated to ensure that successive cyclicity obtains? Chomsky's (2000; 2001) phase model has proposed a very interesting answer to (i), by exploring the tension between unbounded A'-relations and computational efficiency (see section 1). Assuming that the reasoning behind phase-based computations brackets the question in (i), the question in (ii) comes to the fore. Chomsky (2000; 2001) has proposed that the relevant trigger for successive cyclicity resides on phase heads, whereas Bošković (2007) argues instead that it should be located on the moving elements. Exploring the positive aspects of both approaches, I have modified and expanded on a proposal by Nunes (2014; 2016a), arguing that UG allows for such "edge features" to be lexically hosted by either phase heads or moving elements and that the choice for one or the other option has interesting empirical consequences (*that*-trace effects and additional interpretations for adjunct control, for example). Under the assumption that edge features are uninterpretable, I have also examined the two logical possibilities for their characterization in the lexicon (as intrinsically valued or intrinsically unvalued). The conclusion was again that UG allows for both types of specification, with each specification associated with different empirical consequences (the ability to license an A'-specifier as an escape hatch, for instance).

If the general approach sketched above is on the right track, we may have a unified analysis for why partial *wh*-movement is generally disallowed and why parasitic gaps generally cannot be licensed by *in situ wh*-phrases (EF must function as a probe); why adjunct control may be affected by A'-movement in some languages (an EF lexically hosted by a *wh*-element may preempt Merge-over-Move and trigger sideward movement, giving rise to object control into adjuncts); why some languages impose restrictions on local subject extraction, whereas others impose restrictions on local object extraction (subjects and objects may be assigned EF by the local

phase heads); why one may usually find allomorphy affecting phase heads tied to A'-movement (EFs may be lexically hosted by phase heads); why this allomorphy may be exclusively related to local A'-extraction in some languages but not in others (EFs may be intrinsically valued or unvalued); why some phase heads in some languages do not allow extraction from their domains, while others require that their domain contain an extraction site (an instance of [EF:u] signals that only heads bearing EF can license an escape hatch for A'-movement); and why A'-movement is subject to anti-locality (edge features are not required for relations defined within a derivational span conforming to the PIC).

The proposal outlined above is admittedly programmatic and has skirted many important issues. However, to the extent that it has for the most part stuck to the logical possibilities made available by the theory (whether edge features are hosted by phase heads or moving elements and whether they can be intrinsically valued or intrinsically unvalued), its rich empirical coverage over apparently unrelated domains makes it look worth exploring.

Abbreviations

ø = phonetically null, 3PL = third person plural, COND = conditional, EF = edge feature, F = feature, FOC = focus particle, FUT = future, GEN = genitive, i = interpretable, NEG = negation, NFUT = nonfuture tense, OB = object, PAST = past tense, Q = interrogative, S2 = singular second person, REL = relative, SU = subject, SUBJ = head of SUBJP, Top = topic, TRANS = transitivity marker, U = unvalued, VAL = valued.

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