

THEORETICAL ESSAY

EDGE FEATURES AND MULTIPLE WH-QUESTIONS

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ABSTRACT

Building on Chomsky's (2000) proposal that A'-movement is triggered by an EPP-type of feature added to phase heads and Bošković's (2007) proposal that the relevant feature is to be found on the moving element itself, Nunes (2021) has argued that these two apparently conflicting views ultimately instantiate different grammatical options available at UG. He shows that much of the crosslinguistic variation regarding single *wh*-questions hinges on whether edge features (features that trigger successive cyclic A'-movement) are lexically associated with *wh*-elements or phase heads and whether the edge features are intrinsically valued or unvalued. In this paper, I extend this approach to multiple *wh*-questions, showing that these factors also derive the basic typology of multiple *wh*-questions found in natural languages.



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RESUMO

Baseado na proposta de Chomsky (2000) de que movimento-A' é desencadeado por um traço similar ao EPP adicionado a núcleos de fases e na proposta de Bošković (2007) de que o traço desencadeador de movimento se encontra no próprio elemento que se desloca, Nunes (2021) desenvolve uma alternativa em que essas propostas aparentemente conflitantes na verdade concretizam diferentes opções gramaticais disponíveis na GU. Nessa alternativa, grande parte da variação translinguística no que diz respeito a perguntas-*wh* simples se segue da interação de dois fatores: se os *edge features* (os traços que desencadeiam movimento-A') se encontram lexicalmente associados a elementos-*wh* ou a núcleos de fase e se são intrinsecamente valorados ou

não-valorados. Este trabalho estende essa abordagem a perguntas-*wh* múltiplas, mostrando que a tipologia básica das interrogativas-*wh* múltiplas encontrada nas línguas naturais também se segue da interação desses fatores.

KEYWORDS

Multiple Wh-Questions; Edge Features; Superiority Effects;
Multiple Wh-Fronting; Wh-In Situ.

PALAVRAS-CHAVE

Perguntas-Wh Múltiplas; Edge Features; Efeitos de Superioridade;
Fronteamento Múltiplo de Whs; Wh-In Situ.

INTRODUCTION

This paper addresses the issue of how to account for the typology of multiple *wh*-questions across languages with the goal of couching the existing empirical diversity on the same factors that are responsible for the crosslinguistic variation encountered with respect to single *wh*-questions.¹ The task is challenging as it is not always the case that the two types push in the same direction. On the one hand, languages such as Serbo-Croatian and Chinese, for example, are convergent in that they allow both types of *wh*-questions and either front all *wh*-constituents (Serbo-Croatian) or none of them (Chinese). On the other hand, languages such as Italian are nonconvergent in the sense that they allow single *wh*-questions, but not multiple *wh*-questions. Between these groups, we find partially convergent languages such as English and Bulgarian, which also allow both types of *wh*-questions, but do not treat all the *wh*-constituents alike and use structural hierarchy to single out one *wh*-constituent to move to a designated position, giving rise to superiority effects.

Our starting point will be Nunes's (2021) approach to the locus and licensing of "edge features" – features that trigger successive cyclic A'-movement in general and *wh*-movement, in particular. Building on Chomsky's (2000) proposal that *wh*-movement is triggered by an EPP-type of feature added to phase heads and Bošković's (2007) proposal that the relevant feature is to be found on the moving element itself, Nunes (2021) argues that these two apparently conflicting views ultimately instantiate different grammatical options available to UG. Focusing on single *wh*-questions, Nunes contends that much of the crosslinguistic variation involving (the lack of) *wh*-movement follows from the specific answers different languages may give to the two questions in (1):

- (1) a. What are the lexical hosts of edge features?
- b. Are edge features intrinsically valued or unvalued?

Extending this approach, I would like to propose that the answers to these two questions also account for much of the variation involving multiple *wh*-questions. For instance, I show that multiple *wh*-fronting is enforced when the relevant edge feature is intrinsically unvalued and lexically hosted by *wh*-elements and that intrinsically valued edge features induce intervention effects, with different empirical consequences depending on whether they are lexically hosted by *wh*-elements or phase heads.

¹ Here I will leave aside echo and quiz questions.

The paper is organized as follows. In section 1, I briefly review Nunes's (2021) account of single *wh*-questions in terms of (1). In section 2, I show how the answers to the questions in (1) may account for much of the crosslinguistic diversity found in the realm of multiple *wh*-questions. Finally, section 4 summarizes the discussion.

1. THE LOCUS AND INTRINSIC VALUE OF EDGE FEATURES IN SINGLE WH-QUESTIONS

Within the Agree-based model (CHOMSKY, 2000, 2001, *et seq.*), *wh*-movement is generally motivated by the need of a feature checking or feature valuation operation involving an interrogative complementizer and a *wh*-phrase. This in fact accounts for the final step of the movement operation but not the intermediate steps involved in successive cyclic movement. Assuming that syntactic movement is featurally driven (CHOMSKY, 1995), Chomsky (2000) proposes that after a phase is completed, the phase head may be optionally assigned an EPP-type of feature, triggering successive cyclic movement, as sketched in (2) (throughout the paper irrelevant details will be omitted in the representations).

(2) [_{CP} what_i did-Q_{EPP} John [_{VP} *t_i* V_{EPP} say [_{CP} *t_i* that_{EPP} Mary [_{VP} *t_i* V_{EPP} bought *t_i*]]]]

The major problem with this proposal is that without look-ahead, it overgenerates (see e.g. BOŠKOVIĆ, 2007 and NUNES, 2021 for relevant discussion). As EPP-assignment is optional and assignment at a given phase is independent from potential assignments at other phases, the derivation sketched in (3), for example, is incorrectly ruled in, if the embedded *v* is assigned EPP, but not the other phase heads.

(3) * [_{CP} C John [_{VP} *v* said [_{CP} that Mary [_{VP} what_i V_{EPP} bought *t_i*]]]]

It is worth noticing that Chomsky's EPP-assignment has nothing to say on the lack of multiple *wh*-questions in languages like Italian, for instance. Given that Italian has (successive cyclic) *wh*-movement in single *wh*-questions, we would be led to conclude, based on Chomsky's proposal, that EPP-assignment at the phase level is at play. That being so, one could imagine that the availability of EPP-assignment should permit movement of at least one *wh*-phrase, as in English (see (8) below), contrary to fact. The ungrammaticality of sentences such as (4) below in Italian, for example, should thus be ascribed to an additional

requirement that would be satisfied in English but not in Italian.² As will see in section 2.2 below, the availability or unavailability of multiple *wh*-questions in a given language will receive a uniform analysis in our proposal, in terms of the *locus* and valuation specifications of edge features.

(4) *Italian* (CALABRESE, 1984)

*Chi ha scritto che cosa?
who has written what
'Who has written what?'

Bošković (2007) proposes an alternative analysis according to which the uninterpretable feature that triggers successive cyclic movement (*uF*) is hosted by the moving element and must function as a probe in order to be licensed. This amounts to saying that a *wh*-phrase specified for *uF* must end up in the specifier of an interrogative complementizer *Q*, where *uF* can probe *Q* and be appropriately licensed. The contrast between (2) and (3) is now captured without invoking look-ahead. In order to move, the *wh*-phrase must be endowed with *uF*. If this is so, it must move to a position where it can probe the structure and check/value *uF*. This is what happens in the sentence corresponding to (2), but not (3), as illustrated in (5a) and (5b), respectively. Crucially, the crashing status of (5b) due to the unlicensed instance of *uF* is detected as soon as the complement of the next higher phase undergoes Transfer, with no need for look-ahead.

- (5) a. [_{CP} **what**_{i-uF} did-Q John [_{VP} *t*_i *v* say [_{CP} *t*_i that Mary [_{VP} *t*_i *v* bought *t*_i]]]]
b. *[[_{CP} C John [_{VP} *v* said [_{CP} that Mary [_{VP} **what**_{i-uF} *v* bought *t*_i]]]]]

As Nunes (2021) observes, the price of placing *uF* on the moving element is that the system fails to predict that in some languages, successive cyclic *wh*-movement may be sensitive to the phase heads it crosses, as illustrated in (6) and (7) below. The familiar *that*-trace effect in (6) shows that all things being equal, extraction of a local subject in English must proceed across a null rather than an overt complementizer (see (58)-(59) below for further discussion). (7) in turn shows that when an object undergoes *wh*-movement in Bahasa Indonesia, the “transitivizer” prefix of the verb it crosses (*men-*) gets deleted. Assuming that *men-* and \emptyset are allomorphs of *v* (see e.g. ALDRIDGE, 2008), (7) may be taken to show that *wh*-movement in Bahasa Indonesia is also sensitive to the phase heads it crosses. However, this is completely unexpected from the perspective of Bošković’s (2007)

2 In his review of the present paper, Carlos Muñoz Pérez suggests that the problem with sentences like (4) in the relevant languages could, for instance, be the licensing of the *in situ wh*-phrase. In sections 2.2 and 2.3 below, I will however show that no additional mechanisms are necessary and it is possible to provide a unique account for the English and Italian patterns of multiple *wh*-questions based on the specifications of their edge features.

proposal, for once the *wh*-phrase itself has the motivation to move by bearing uF , it should be completely oblivious to the specific phase heads it crosses.

(6) Who do you think $\{C_{\emptyset}/that\}$ Peter said $\{C_{\emptyset}/*that\}$ saw Mary?

(7) *Bahasa Indonesia* (SADDY, 1991)

- a. Sally **men**-cintai **siapa**
Sally TRANS-loves who
b. **Siapa** yang Sally \emptyset -cintai
who FOC Sally. loves
'Who does Sally love?'

As far as crosslinguistic variation goes, Bošković proposes that *wh*-elements are obligatorily specified for uF in languages like Bulgarian (triggering multiple *wh*-fronting), obligatorily specified for iF (an interpretable instance of F) in languages like Korean (precluding *wh*-movement), and optionally specified for uF in languages like English. The optionality in the case of English has the same motivation as in Chomsky's (2000) proposal, namely, to account for the fact that English multiple *wh*-questions require both *wh*-movement and *wh-in situ*, as illustrated in (8) below. In Bošković's system, *what* in (8) must have been specified for uF , but not *who*. Given that the optionality is a lexical property, there remains the issue of why *what* and *who* can't be both specified for uF , triggering multiple *wh*-fronting. Bošković (2007, fn. 75) suggests that this is to be excluded by whatever accounts for the fact that English complementizers only license one specifier, as opposed to Bulgarian, for instance. Although not discussed by Bošković (2007), this suggestion could be extended to account for languages lacking multiple *wh*-questions like Italian (see (4)), if in these languages *wh*-phrases are obligatorily specified for uF , but C cannot license more than one specifier.

(8) What did John send to who?

In the account I will develop below, the lack of multiple *wh*-fronting in languages like English or multiple *wh*-interrogatives in languages like Italian will indeed be related, but will be shown to follow from the specifications of edge features themselves, with no need to invoke additional principles. The account is based on Nunes's (2021) proposal for the locus and computation of edge features given in (9).

(9) (NUNES, 2021)

- 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.

(9i) is borrowed directly from Bošković's (2007) system and inherits its most important contribution, namely, that unwanted instances of *wh*-movement are ruled out without look-ahead. Assuming with Bošković (2007) that an EF must function as a probe in order to be licensed, a *wh*-phrase bearing EF must move from phase edge to phase edge until it reaches a position where EF can probe its domain and be licensed; if it doesn't reach such a position, the derivation crashes when the complement of the phase containing the *wh*-phrase undergoes Transfer (cf. (5b)). (9ii) is in turn adapted from Chomsky (2000) and makes it possible that crossed phase heads may have an impact on *wh*-movement, fixing the problem noted with respect to Bošković's (2007) system (see (6) and (7)).

From this point of view, crosslinguistic variation in the domain of single *wh*-questions follows from the interaction between two factors: a) whether a *wh*-element or phase head is obligatorily specified for EF, optionally specified for EF or not specified for EF; and b) whether EF is intrinsically valued, intrinsically unvalued or optionally valued or unvalued. Nunes (2021) further contends that these options may be morphologically distinguished, yielding allomorphy. Consider the contrast between Brazilian Portuguese and English, for instance. Nunes (2021) proposes that EFs are optionally specified on *wh*-elements in Brazilian Portuguese, but on phase heads in English. In the case of single *wh*-questions in Brazilian Portuguese, this amounts to saying that both *wh*-movement and *wh-in situ* are allowed (see e.g. KATO; MIOTO, 2005; PIRES; TAYLOR, 2007; ZOCCA DeROMA, 2011; and FIGUEIREDO SILVA; GROLLA, 2016), as shown in (10), and there is no subject-object asymmetry with respect to *wh*-extraction, as the motivation for movement (the edge feature) is to be found on the *wh*-element itself.

(10) *Brazilian Portuguese*

- a. O João disse que a Maria vai contratar **quem**?
the João said that the Maria goes hire who
- b. **Quem** o João disse que a Maria vai contratar?
who the João said that the Maria goes hire
'Who did João say that Maria is going to hire?'
- c. O João disse que **quem** vai contratar o Pedro?
the João said that who goes hire the Pedro
- d. **Quem** o João disse que vai contratar o Pedro?
who the João said that goes hire the Pedro
'Who did João say is going to hire Pedro?'

As for English, EFs are taken to be optionally specified on phase heads. In the case of object extraction, if the local phase head (*v*) is specified for EF, it assigns it to the *wh*-object, as sketched in (11) below, which then moves in search of a licenser for EF. The intuition here is the same one in Chomsky's (2000) system. An edge feature on a phase head (like the EPP-

feature in Chomsky (2000)) ultimately allows the establishment of a syntactic relation that would otherwise be blocked by the Phase Impenetrability Condition (the relation between the matrix interrogative complementizer and the embedded object in (11d), for instance). But the phase head itself does not participate in the relation; it just provides the fuel for the *wh*-element to move.³

- (11) a. [_{VP} John **v**_{EF} saw who] →_{EF assignment}
 b. [_{VP} John v saw **who**_{EF}]
 c. [_{VP} **who**_{EF} [_{VP} John v saw *t*]]
 d. [_{CP} **who**_{-vEF} [did-Q [_{CP} *t* that John [_{VP} *t* v saw *t*]]]]]

In the case of an external argument, on the other hand, it is generated outside the probe domain of the head of its phase (*v*) and must therefore be assigned EF by a higher phase head if it is to move. Nunes proposes that the allomorphy involving declarative complementizers in English reflects their different EF specifications, as stated in (12) below. Given (12), the *wh*-subject of (13a) can be assigned EF by the null complementizer and then it moves to license EF (and to check the uninterpretable *wh*-feature of the interrogative complementizer), yielding the well-formed structure in (13c). By contrast, if the embedded complementizer is *that* instead, as in (14), the derivation crashes because the uninterpretable *wh*-feature of the interrogative complementizer to be introduced later in the derivation (see (13c)) will remain unchecked. Crucially, *who* in (14) cannot undergo *wh*-movement. Since it is not lexically specified for EF, it must receive EF from some phase head if it is to move. However, it cannot receive EF from the embedded *v* (which may bear EF, as

3 Here I am following Nunes (2021) in technically implementing the activation of a *wh*-phrase by a phase head in terms of EF assignment, in a way analogous to Case assignment within *GB*. Other technical implementations more congenial to an Agree-based framework are also worth considering. Chomsky (2008:157), for instance, raises the possibility 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).

A more restrictive alternative was suggested to me by Carlos Muñoz Pérez in his review: “If only *wh*-elements can be assigned [EF:Q], one can model this as an unvalued feature [wh:u] that can receive a value [EF:Q] to become [wh:[EF:Q]]”. As far as I can see, this suggestion seems to cover the same ground as EF-assignment in the basic cases, under some modifications of the inner workings of Agree. In particular, a probe (the phase head) with a valued uninterpretable feature would be allowed to be deactivated by valuing an unvalued uninterpretable feature in its probe domain ([wh:u]), which would then be required to undergo movement to license its recently acquired value. If multiple *wh*-fronting with superiority effects involves a combination of [EF:val] and [EF:u], as I propose in section 2.5 below, further refinements will also be necessary.

For the sake of the presentation, I will however not pursue this discussion here and keep Nunes’s (2021) technical implementation in terms of EF-assignment, as it leaves the role played by phase heads more transparent. What is relevant for our purposes is that in some languages, the motivation for a *wh*-element to move may be ultimately triggered by the local phase head.

seen in (11a)) because it lies outside its probe domain. It is within the probe domain of the complementizer *that*, but *that* is not specified for EF (see (12a)). Finally, even if a phase head above *that* were specified for EF (like the matrix *v*, for instance), EF assignment to *who* would be prevented by the Phase Impenetrability Condition.^{4,5}

(12) a. C_{that} : not specified for EF.

b. C_{\emptyset} : optionally specified for EF.

(13) a. [$C_{\emptyset-EF}$ [TP *who* [v_P t [v saw Mary]]]] \rightarrow EF assignment

b. [C_{\emptyset} [TP **who**-EF [v_P t [v saw Mary]]]]

c. [CP **who**-VEF [did -Q_[wh] [you [v_P t v say [CP t C_{\emptyset} [TP t [v_P t v saw Mary]]]]]]]]]]

(14) [CP **that** [TP *who* [v_P t [v saw Mary]]]] \rightarrow *

In sum, as opposed to EF-specification on *wh*-elements in Brazilian Portuguese, which do not distinguish subjects and objects with respect to *wh*-movement, EF-specification on phase heads in English may create a subject-object asymmetry depending on the complementizers' lexical specifications regarding EF.⁶ Similar considerations apply to local *wh*-extraction in Bahasa Indonesia. Nunes argues that the allomorphy between *men*- and \emptyset seen in (7) is also to be tied to EF specification. More specifically, he proposes that *men*- is not specified for EF, but \emptyset is obligatorily so. Under the assumption that *wh*-elements in

4 The two versions of the Phase Impenetrability Condition (PIC) in Chomsky (2000) and Chomsky (2001) have the same effect in the matter under discussion. The embedded TP containing *who* in (14) is transferred when the embedded CP is completed under Chomsky's (2000) version or when the next phase head (*v*) is introduced under Chomsky's (2001) version. In either case, *who* cannot be assigned EF from a higher phase head.

5 In his review, Carlos Muñoz Pérez correctly observes that the *that*-trace effect in (ia) should indicate that the embedded C is the source of EF-assignment to the *wh*-phrase, rather than the passive *v*. That being so, he asks what the source of EF-assignment to the *wh*-phrase in (ib) is, given that there is no *that*-trace effect. I tentatively suggest that PPs may count as strong phases and as such, P may be lexically associated with EF. If this is correct, P in (ib) assigns EF to the *wh*-phrase, triggering its movement. For relevant discussion, see NUNES, 2021: footnotes 9 and 28.

(i) a. Who did you say (*that) was killed?

b. To whom do you think (that) the book was given?

6 Brazilian Portuguese also differs from English in that it may allow object control into adjunct clauses if the controlling object undergoes *wh*-movement, as illustrated in (i) below (for relevant discussion, see MODESTO, 2000; RODRIGUES, 2004; and NUNES 2013, 2014, 2018). For an analysis of this difference in terms of the difference between Brazilian Portuguese and English regarding the lexical hosts for edge features in each language, see NUNES, 2021.

(i) *Brazilian Portuguese*

a. [O João]_i cumprimentou quem_k depois de [se_i entrar na sala]_j?
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 [se_i entrar na sala]_j?
who the João greeted after of enter in-the room
'Who_k did João_i greet after he_i entered the room?'

Bahasa Indonesia are not generally associated with EF, an object can undergo movement only if it receives EF from the local ν ; hence, the contrast in (7), where *wh*-movement of the object can proceed across \emptyset , but not across *men*. Furthermore, given that the external argument is not in the probe domain of ν , it may undergo local A'-movement in the presence of the EF-less version of ν , as illustrated in (15) below. The comparison between (7) and (15) shows once again that the optionality of EF specification on phase heads may give rise to subject-object asymmetries depending on whether specific phase heads differ with respect to being specified for EF.

(15) *Bahasa Indonesia* (SADDY, 1991)

- | | |
|---|---------------------------------------|
| a. Siapa men -cintai Sally | (<i>wh</i> -subject <i>in situ</i>) |
| who TRANS-loves Sally | |
| b. Siapa yang men -cintai Sally | (moved <i>wh</i> -subject) |
| who FOC TRANS-loves Sally | |
| ‘Who loves Sally?’ | |

Obligatory *vs.* optional EF specification also has different empirical consequences, as illustrated by differences between *that*-trace effects in English and the *que*-to-*qui* rule in French. Nunes proposes that whereas declarative C_{\emptyset} in English is optionally specified for EF (see (12b)), the complementizer *qui* in French is obligatorily specified for EF. Thus, in English movement of a *wh*-subject is selective with respect to the local complementizer, but not with respect to a nonlocal one, as seen in (6), repeated below as (16). In French, on the other hand, the two analogous complementizers do not alternate, regardless of whether or not they are local to the subject extraction site, as illustrated in (17).

(16) Who do you think $\{C_{\emptyset}/\text{that}\}$ Peter said $\{C_{\emptyset}/*\text{that}\}$ saw Mary?

(17) *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’

From the point of view of the system reviewed here, in (16) the lower C_{\emptyset} is specified with EF and assigns it to the embedded subject, but not the upper C_{\emptyset} . This is consistent with EF being lexically optional on C_{\emptyset} and is independently required by sentences such as (18) below, which involves C_{\emptyset} but is not an interrogative sentence. In (17), on the other hand, the most embedded subject (a null operator, for concreteness) moves after receiving EF from *qui*, as shown in (19a-c), but the derivation halts when it reaches the step in (19d). As the upper instance of *qui* is also obligatorily specified for EF, it must assign it to a *wh*-element in its probe domain. The problem is that the relevant element is already carrying an EF-feature. Under the natural assumption that an element cannot bear more than one valued EF, the

EF on the higher *qui* is not assigned and as this feature is not licensed, the derivation crashes (see section 2.5 below for further discussion).⁷ A convergent derivation must then resort to the EF-less complementizer *que* in the upper clause, as seen in (17).

(18) [John said C_∅ Mary left]

- (19) a. [CP **qui**<sub>[EF:Rel]] [TP OP ...]] →EF assignment
 b. [CP *qui* [TP **OP**<sub>[EF:Rel]] ...]]
 c. [CP **OP**<sub>[EF:Rel]] *qui* [TP *t*...]]
 d. [CP **qui**_{[EF:Rel]] [TP ... [VP OP_{[EF:Rel]] ... [CP *t qui* [TP *t*...]]]]]}}</sub></sub></sub>

In all the cases examined above, I have tacitly assumed that the relevant EFs are intrinsically valued. In a sense, the value of EF determines how far its bearer has to move in order to license EF (an element bearing [EF:Q] must move as far as [Spec,Q]; an element bearing [EF:Top] must reach [Spec,TopP], etc.). However, Nunes (2021) argues that there are also marked cases where a phase head may be lexically associated with an unvalued instance of EF. The unmarked case for a phase head is to allow its edge to be used as an escape hatch in successive cyclic movement. Declarative *that* in English, for instance, allows its Spec to be used as an escape hatch (cf. the upper *that* in (16)) even though it is not specified for EF (see (12a)). Nunes proposes that the specification of [EF:u] on a phase head is to be interpreted as explicitly indicating that it can license an escape hatch specifier. Given that this is the default situation, in order for this specification not to be vacuous, all phases heads of the same type not specified for EF must be unable to license an escape hatch specifier. Nunes claims that this is what is behind the type of complementizer allomorphy found in languages such as Irish. As is well known (see e.g. McCLOSKEY, 2001, 2002), Irish distinguishes a complementizer-like particle that is crossed by A'-movement (see *aL* in (20a)) from a complementizer particle that does not allow an A'-relation across it (see *GO* in (20b)). The derivation of (20a) under this view proceeds along the lines of (21), where the escape hatch licensing complementizers value their EF against the moving *wh*-element (cf. (21d-e) and (21g-h)).

(20) *Irish*

- a. rud **a** gheall tú **a** dhéanfá (McCLOSKEY, 2001)
 thing **aL** promised you **aL** do_{COND-S2}
 'something that you promised that you would do'
 b. Creidim **gu-r** inis sé bréag. (McCLOSKEY, 2002)
 I-believe **GO-PAST** tell he lie
 'I believe that he told a lie.'

7 As pointed out by Nunes (2021), the ban on multiple instances of valued EFs on a single element has an effect similar to that of Rizzi's (2006) Criterial Freezing in the sense that a given element cannot enter into a licensing relation with more than one A'-head. But see section 2.5 and footnote 12 below for some refinements.

(21) Derivation of (20a):

- a. [_{VP} SU $\nu_{[EF:Rel]}$ V OB] \rightarrow EF assignment
- b. [_{VP} SU ν OB_[EF:Rel]]
- c. [_{VP} OB_[EF:Rel] [SU ν t]]
- d. [_{CP1} $aL_{[EF:u]}$... [_{VP} OB_[EF:Rel] [... t]]]
- e. [_{CP1} $aL_{\nu[EF:Rel]}$... [_{VP} OB_[EF:Rel] [... t]]]
- f. [_{CP1} OB_[EF:Rel] [$aL_{\nu[EF:Rel]}$... [_{VP} t [... t]]]]]
- g. [_{CP2} $aL_{[EF:u]}$... [_{VP2} OB_[EF:Rel] ... [_{CP1} t [$aL_{\nu[EF:Rel]}$...]]]]]]
- h. [_{CP2} $aL_{\nu[EF:Rel]}$... [_{VP2} OB_[EF:Rel] ... [_{CP1} t [$aL_{\nu[EF:Rel]}$...]]]]]]
- i. [_{CP2} OB_[EF:Rel] [$aL_{\nu[EF:Rel]}$... [_{VP2} t ... [_{CP1} t [$aL_{\nu[EF:Rel]}$...]]]]]]]]
- j. [_{CP2} OB_[EF:Rel] [Rel ... [t $aL_{\nu[EF:Rel]}$... [_{VP2} t ... [_{CP1} t [$aL_{\nu[EF:Rel]}$...]]]]]]]]]]

Extending this proposal to the νP phase, Nunes revisits the allomorphy involving ν in Bahasa Indonesia (see (7a) vs. (7b)), suggesting that *men-* is not specified for EF, whereas \emptyset is specified for an optionally valued instance of EF ([EF:val] or [EF:u]). The possible specification of [EF:u] on the allomorph \emptyset implies that the licensing of an escape hatch specifier is not the default property for ν in this language, which in turn means that *men-* cannot license such a specifier as it is not specified for EF. This accounts for the fact that in long distance extraction, the subject-object asymmetry observed in local extraction (see (7b) vs. (15b)) disappears: all νP s on the path of an extracted subject or object must be headed by the \emptyset -allomorph, as illustrated in (22) below. In other words, the null allomorph of ν in Bahasa Indonesia patterns like the aL complementizer in Irish.

(22) Bahasa Indonesia (SADDY, 1991)

- a. **Siapa** yang Bill \emptyset -kira Tom \emptyset -harap Fred \emptyset -cintai
 who FOC Bill think Tom expect Fred love
 ‘Who did Bill think Tom expects Fred loves?’
- b. **Siapa** yang Bill \emptyset -beri Tom \emptyset -harap **men-**cintai Fred
 who FOC Bill thinks Tom expects TRANS-loves Fred
 ‘Who does Bill think Tom expects loves Fred?’

Table 1 summarizes the possible EF specifications discussed above.

Lexical host of EF	EF specification	Example
Phase heads	obligatorily specified for a valued instance of EF: [EF:val]	. complementizer <i>qui</i> in French
	obligatorily specified for an optionally valued instance of EF: [EF:val] or [EF:u]	. complementizer aL in Irish . null ν in Bahasa Indonesia
	optionally specified for a valued instance of EF: ([EF:val])	. null declarative C in English . null ν in English
	not specified for EF	. declarative <i>that</i> in English . complementizer <i>GO</i> in Irish . ν -allomorph <i>men-</i> in Bahasa Indonesia
<i>Wh</i> -elements	optionally specified for a valued instance of EF: ([EF:val])	. <i>wh</i> -elements in Brazilian Portuguese
	not specified for EF	. <i>wh</i> -elements in English

Table 1. Different types of EF specification across languages.

Although Table 1 is not meant to be comprehensive, the fact that it displays a much more diversified picture with respect to phase heads is not a coincidence.⁸ Thus far, we have only discussed single *wh*-questions (and relative clauses) and the major empirical consequences for different EF specifications on *wh*-elements actually arise in the domain of multiple *wh*-questions. Let us then examine some of the consequences of the system proposed by Nunes (2021) for multiple *wh*-questions.

2. EF SPECIFICATIONS ON WH-ELEMENTS AND THE TYPOLOGY OF MULTIPLE WH-QUESTIONS

2.1. NO [EF:Q] SPECIFICATIONS

Let us start by considering languages where neither phase heads nor *wh*-elements are specified for EF valued as Q, that is, [EF:Q] is not part of the inventory of EFs of the language. In such case, there is no featural motivation for *wh*-elements to undergo *wh*-movement as they are not themselves lexical hosts for [EF:Q] and cannot be assigned [EF:Q] by phase heads. Such languages display *in situ wh*-phrases regardless of whether we have single or multiple *wh*-questions. Chinese (see e.g. HUANG, 1982) and Japanese (see e.g. SAITO, 1985) are well-known examples of such languages, as illustrated in (23) and (24).

(23) *Chinese* (BOŠKOVIĆ, 2002)

John gei-le shei shemme?
John give-PERF who what
'What did John give to who?'

(24) *Japanese* (SAITO, 1985)

Taroo-ga dare-ni nani-o ageta no?
Taroo-NOM who-DAT what-ACC gave Q
'Who did Taroo give what?'

⁸ With respect to the specifications on *wh*-elements, I am here representing just the general tendency of the relevant languages, leaving for another opportunity a discussion of the exceptional behavior of individual *wh*-elements in different languages. 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), which suggests that only *wh*-adjuncts are obligatorily specified for EF in this language. Likewise, aggressively non-D-linked *wh*-elements such as *what the hell* in English or *que diabo* 'what the hell' in Brazilian Portuguese, for instance, may be taken to be obligatorily specified for [EF:Q], despite the fact that the general tendency of each language is different, as shown in Table 1. I will also leave for another occasion a discussion of the amelioration of superiority effects when D-linked *wh*-phrases are involved (see e.g. PESETSKY, 1987), as well as the intervention effects induced by quantificational elements in the licensing of *in situ wh*-phrases (see e.g. BECK, 1996).

The so-called *wh*-phrase in this type of language is generally an indefinite that is interpreted as an interrogative constituent in the domain of an interrogative complementizer (see CHENG, 1997 for relevant discussion). From the perspective of the current system, such morphological ambiguity may reflect the lack of [EF:Q] in the language.

2.2. WH-ELEMENTS OBLIGATORILY SPECIFIED WITH [EF:VAL]

On the opposite side of the spectrum of typological possibilities for multiple *wh*-questions, we have languages where *wh*-phrases are obligatorily specified for a valued instance of EF ([EF:val]). In such languages, all *wh*-phrases must move overtly to check their EF. Let us then consider the details of the relevant derivations.

Chomsky (2008) has proposed that traces do not induce intervention effects; only a whole chain does. According to this view, Y can cross the trace of X in a configuration such as (25a) below even if they are of the same type (that is, even if they satisfy the requirements for some version of Rizzi's (1990) Relativized Minimality to apply), but not the whole chain (X_i, t_i) (see (25b)). A problem for this proposal is that movement of Y across the trace of X in (25a) is not cyclic, violating the Extension Condition (see CHOMSKY, 1995). Crucially, if movement of Y proceeds in a cyclic fashion, X is a full (trivial) chain at the derivational step where Y should move, as sketched in (26). Sticking to the Extension Condition, Chomsky's (2008) solution is to compute minimality violations only at the phase level, after all movement operations have taken place. Although the proposal captures the wanted contrast between (25a) and (25b), it is conceptually unattractive as it invokes a representational computation in a model that strives to enforce a derivational approach to syntactic computations.

- (25)a. [$X_i \dots Y_k \dots t_i \dots t_k \dots$]
 b. * $[Y_k \dots X_i \dots t_i \dots t_k \dots]$

- (26)* $[Y_k \dots X_i \dots t_k \dots]$

However, there is a way to capture the contrast between (25a) and (25b) in a cyclic fashion, still keeping to a uniform derivational approach. The most common situation involving nontrivial chains is that a less specified element moves to a position where it becomes more specified. In (27) below, for instance, an element X with an unvalued feature moves to a position where this feature becomes valued. Suppose that the relevant distinction is not between traces and whole chains, but between being fully specified and not being fully specified. One may then naturally assume that if a given element has an unvalued feature, it can't be properly taken into account for minimality computations. In the derivational step in (28a), for instance, Y can cross X even if they are of the same type, because X is not sufficiently specified to count as a proper intervener; in (28b), on the other

hand, the relevant feature of the upper instance of X is valued and induces a minimality violation, for X has now become a fully specified element.

(27) [$X_{\sqrt{[F:val]}}$... $X_{[F:u]}$...]
 \uparrow _____

(28)a. [Y_k ... $X_{[F:u]}$... \hat{t}_k ...]
 b. * [Y_k ... $X_{\sqrt{[F:val]}}$... $X_{[F:u]}$... \hat{t}_k ...]

Although conceptually different, both proposals make the same predictions when we are dealing with unvalued uninterpretable features. Things change when we consider *valued* uninterpretable features, instead. As argued by Pesetsky and Torrego (2007), among others, the relation between interpretability and valuation is not biconditional (*contra* CHOMSKY, 2001) and we also find cases of valued uninterpretable features (which must still be checked against matching interpretable features in order to be licensed). In this scenario, movement of Y across X with a valued uninterpretable feature, as sketched in (29) below, should yield a minimality violation. Despite the fact that X still has to move later to check F against a matching interpretable feature F' , it is already fully specified at the derivational stage in (29).

(29)* [Y_k ... $X_{[F:val]}$... \hat{t}_k ...]

I would like to propose that this is exactly what happens in languages where *wh*-elements are obligatorily specified with a valued instance of EF. The relevant value for EF associated with *wh*-phrases is generally *Q* (for question) or *Foc* (for focus). But regardless of the specific value, if a *wh*-element is specified for a valued instance of EF, it must move to a position where it can have its EF licensed. In single *wh*-questions, this implies that *in situ wh*-phrases are excluded. In the case of multiple *wh*-questions, the highest *wh*-phrase moves to check its EF against an appropriate head, as sketched in (30a-b) below with EF valued as *Q* for concreteness, but the other *wh*-phrases cannot follow suit, due to the fully specified trace left by the highest *wh*-phrase, as shown in (30c).

(30)a. [Q ... $WH_{1-[EF:Q]}$... $WH_{2-[EF:Q]}$... $WH_{3-[EF:Q]}$]
 b. [$WH_{1-\sqrt{[EF:Q]}}$ [Q ... $WH_{1-[EF:Q]}$... $WH_{2-[EF:Q]}$... $WH_{3-[EF:Q]}$]]
 \uparrow _____
 c. [[$WH_{1-\sqrt{[EF:Q]}}$ [Q ... $WH_{1-[EF:Q]}$... $WH_{2-[EF:Q]}$... $WH_{3-[EF:Q]}$]]]
 \uparrow _____

In other words, in languages where *wh*-phrases are obligatorily specified for a valued instance of EF, there is no convergent output for multiple *wh*-questions. If any *wh*-phrase remains *in situ*, the presence of an unchecked instance of EF causes the derivation to crash; on the other hand, multiple *wh*-fronting is blocked, for a valued instance of EF on a given WH (or its trace) renders its bearer a proper intervener for the movement of the lower *wh*-phrases. To put this in broader terms, the system proposed here allows us to capture the generalization according to which languages that do not allow multiple *wh*-questions do not allow *wh-in situ* either (see STOYANOVA, 2008). Irish (see e.g. McCLOSKEY, 1979), Italian (see e.g. CALABRESE, 1984), Somali, and Berber (see e.g. STOYANOVA, 2008), for instance, are typical examples of languages that disallow multiple *wh*-questions, as illustrated in (31)-(34), and all of them also disallow *in situ wh*-phrases.⁹

(31) *Irish* (McCLOSKEY, 1979)

*Cé aL rinne caidé?
who C did what
'Who did what?'

(32) *Italian* (CALABRESE, 1984)

*Chi ha scritto che cosa?
who has written what
'Who has written what?'

(33) *Somali* (STOYANOVA, 2008)

*yaa yimid goorma?
who-FM came time-which
'Who came when?'

9 Somali and Berber are especially interesting in this regard as they are at odds with Cheng's (1997) generalization according to which languages that have *yes-no* particles are *wh-in situ* languages. As pointed out by Stoyanova (2008), Somali and Berber do have *yes-no* particles, but do not allow *wh-in situ*, as respectively shown in (i) and (ii).

(i) *Somali*

a. Muu kúu dhiibay? (SAEED, 1999)
Q-he you-to hand
'Did he hand it to you?'

b. *Maryan baa kuma arkay? (STOYANOVA, 2008)
Maryan FM who saw
'Who did MARYAN see?'

(ii) *Berber* (STOYANOVA, 2008)

a. Is y-sghu Mohand adlis?
Q 3MS-bought Mohand book
'Did Mohand buy a book?'

b. *t-sga tarbat min?
3FS-bought girl what
'What did the girl buy?'

- (34) *Berber* (STOYANOVA, 2008)
 *Wiy yzrin may?
 who-CM saw-PART what-CM
 'Who saw what?'

A very influential hypothesis for the lack of multiple interrogative in these languages is that their *wh*-phrases must move to a focus position (which is independently supported by phonological and morphological properties associated with focus found in single *wh*-questions), but there is only one position for focus in these languages (see e.g. CALABRESE, 1984 and STOYANOVA, 2008). Although very plausible, this hypothesis raises the question of why multiple *wh*-movement should be restricted in this way. After all, multiple *wh*-fronting languages like Serbo-Croatian exhibit just the opposite pattern: all *wh*-phrases must move to a focus projection (see e.g. BOŠKOVIĆ, 2002). Furthermore, from the perspective of bare phrase structure (see CHOMSKY, 1995), there is in principle nothing that bars multiple specifiers.

The proposal above in terms of minimality in fact outlines an answer for *why* there is only one specifier for Foc in these languages. Under the standard assumption that focus cannot be base-generated (see e.g. CINQUE, 1990), elements occupying a Spec of Foc must have reached this position via movement. However, if *wh*-phrases in the relevant languages are specified for EF valued as Foc ([EF:Foc]), no *wh*-phrase can cross (the trace of) the other without violating minimality. Furthermore, given that EF must function as a probe in order to be licensed, they cannot be licensed *in situ*. Hence, *wh*-questions in these languages must involve a single *wh*-phrase.

2.3. OPTIONAL [EF:VAL] ON WH-ELEMENTS OR PHASE HEADS

Let us now examine multiple *wh*-questions in languages like Brazilian Portuguese and English. Recall that Nunes (2021) has proposed that [EF:Q] is lexically optional on *wh*-elements in Brazilian Portuguese and on phase heads in English (see section 1). Consider Brazilian Portuguese, first. (35) illustrates the logical possibilities for multiple questions with two *wh*-phrases: no [EF:Q] on either WH (see (35a)); [EF:Q] on both WHs (see (35b)); [EF:Q] only on WH₂ (see (35c)); and [EF:Q] only on WH₁ (see (35d)).

- (35)a. [Q ... WH₁ ... WH₂ ...]
 b. [Q ... WH₁[EF:Q] ... WH₂[EF:Q] ...]
 c. [Q ... WH₁ ... WH₂[EF:Q] ...]
 d. [Q ... WH₁[EF:Q] ... WH₂ ...]

If no WH in (35a) bears EF, none can undergo *wh*-movement, yielding a grammatical multiple *wh*-question with both WHs *in situ*, as illustrated in (36) below.¹⁰

(36) *Brazilian Portuguese*

Você acha que **quem** comprou **o quê**?
you think that who bought what
'Who do you think bought what?'

If the two WHs in (35b) are specified for [EF:Q], both must move, which should give rise to a multiple *wh*-fronting construction. However, neither possibility in (37) below yields a grammatical output. The first movement of the object to the edge of the embedded *vP*, sketched in (38), is unproblematic, as both the subject and the object sit in the minimal domain of *v*, thus being equidistant from one another (see CHOMSKY, 1995). The problem shows up when *o que* is required to move to the next phase edge; as shown in (39), the instance of *quem* in [Spec,TP] prevents *o que* from moving, as they are not in the same minimal domain. Nothing changes if *quem* moves to the edge of CP first, as sketched in (40), for the trace of the subject counts as a proper intervener by being fully specified (see section 2.2). In other words, the ungrammaticality of the sentences in (37) are to be subsumed under the same explanation for the lack of multiple *wh*-questions in Irish, Italian, Somali or Berber (see section 2.2).

(37) *Brazilian Portuguese*

- a. ***Quem o que** você acha que comprou?
who what you think that bought
b. ***O que quem** você acha que comprou?
what who you think that bought
'Who do you think bought what?'

(38) [_{vP} o que_[EF:Q] [_v quem_[EF:Q] [_v comprou o que_[EF:Q]]]]

(39) [_{CP} Q [_{TP} quem_[EF:Q] T [_{vP} o que_[EF:Q] [_v quem_[EF:Q] [_v comprou o que_[EF:Q]]]]]]
↑ _____*_____ |

(40) [_{CP} [quem_[EF:Q] [Q [_{TP} quem_[EF:Q] T [_{vP} o que_[EF:Q] [_v quem_[EF:Q] ...]]]]]]
↑ _____*_____ |

10 In this section I will use examples involving extraction of embedded clause as they make it clear whether or not a *wh*-subject has undergone movement. For a discussion of lack of movement of a *wh*-subject to a local [Spec, CP] (Chomsky's (1986) Vacuous Movement Hypothesis) from the perspective of the current system, see NUNES, 2021, sec. 5.

The possibility in (35c) should have an *in situ wh*-subject and a moved *wh*-object, yielding (41) below. The ungrammaticality of (41) receives the same explanation as the ungrammaticality of the sentences in (37) under the derivational route sketched in (39). Given that edge features on *wh*-elements in Brazilian Portuguese are optional, the upper instance of *quem* in (42) counts as a proper intervener for the movement of *what*, for all of its features are fully specified. Movement of *o que* across *quem* in (42) thus induces a minimality/superiority effect, as seen in (41).

(41) *Brazilian Portuguese*

*O que você acha que quem comprou?
what you think that who bought
'Who do you think bought what?'

(42) [CP que [TP quem T [VP o que_[EF:Q] [V quem [V comprou o que_[EF:Q]]]]]
↑-----'-----|

Finally, (35d) yields a grammatical output, as illustrated in (43) below. Once *o que* does not have EF, it stays put; *quem*, on the other hand, is specified as bearing [EF:Q] and moves from the embedded [Spec,TP] to the matrix [Spec,CP], passing through every phase edge on its way, as sketched in (44).

(43) *Brazilian Portuguese*

Quem você acha que comprou o quê?
who you think that bought what
'Who do you think bought what?'

(44) [CP quem_{√[EF:Q]} Q [VOCê [VP t [V acha [CP t que [t [VP t [V comprou o quê]]]]]]]]

As for English multiple *wh*-questions, they display the Brazilian Portuguese pattern, with the only exception being that the possibility with all *wh*-phrases *in situ* is not allowed, as exemplified in (45).

(45)a. *you think who bought what?

- b. *Who what do you think bought?
- c. *What who do you think bought?
- d. *What do you think who bought?
- e. Who do you think bought what?

Recall that *wh*-phrases in English are not lexically encoded with EF. So, the ungrammaticality of (45a) is not to be ascribed to the *wh*-phrases themselves. Furthermore,

given that declarative C_\emptyset and ν are optional EF-bearers, if they exercise their EF-less option in (45a), they won't have EF to assign to the *wh*-phrases, and again no *wh*-movement should take place. The source of the ungrammaticality of (45a) seems to be found on the interrogative complementizer Q in English. Assuming that Q has an uninterpretable *wh*-feature (see e.g. BOŠKOVIĆ, 2007), it should have a *wh*-phrase in its domain in order to be licensed via Agree. Under the assumption that Agree is subject to the Phase Impenetrability Condition, Q in (46) is unable to check its *wh*-feature, as the *wh*-phrases are buried within the lower phases.

(46) $[_{CP} Q_{[wh]} \text{you } [_{\nu P} \nu \text{thought } [_{CP} C_\emptyset [\text{who } [_{\nu P} \nu \text{bought what}]]]]]$
 |-----*Agree-----|

Other than this difference with respect to the matrix interrogative complementizer, the minimality computations will be exactly like the ones in Brazilian Portuguese, the only difference being that the *wh*-phrases may acquire EF from the local phase heads. If both the embedded C and the embedded ν are each specified for EF and assign it to the *wh*-phrase in their probe domain, as sketched in (47) below, multiple *wh*-fronting should be enforced to check the two instances of EF, but *what* cannot move across *who* (or its trace) because it is fully specified (see section 2.2). Thus, sentences such as (45b) and (45c) are both ruled out.

(47) a. $[_{CP} Q_{[wh]} \text{you } [_{\nu P} \nu \text{think } [_{CP} C_{\emptyset-[EF:Q]} [\text{who } [_{\nu P} \nu_{[EF:Q]} \text{bought what}]]]]]$ →EF assignment
 b. $[_{CP} Q_{[wh]} \text{you } [_{\nu P} \nu \text{think } [_{CP} C_\emptyset [\text{who}_{[EF:Q]} [_{\nu P} \nu \text{bought what}_{[EF:Q]}]]]]]$

Another superiority effect arises if only the embedded ν is specified for EF, as sketched in (48).

(48) a. $[_{CP} Q_{[wh]} \text{you } [_{\nu P} \nu \text{think } [_{CP} C_\emptyset [\text{who } [_{\nu P} \nu_{[EF:Q]} \text{bought what}]]]]]$ →EF assignment
 b. $[_{CP} Q_{[wh]} \text{you } [_{\nu P} \nu \text{think } [_{CP} C_\emptyset [\text{who } [_{\nu P} \nu \text{bought what}_{[EF:Q]}]]]]]$

In (48), *what* must move after it is assigned EF but *who* blocks its movement. Although *who* in (48b) has not been assigned EF, all of its features are fully specified. This renders it an appropriate intervener for the movement of *what*, ruling out the sentence in (45d).

The only relevant convergent output thus results from a numeration where only the embedded C is specified for EF, as sketched in (49) below. *What* remains *in situ* as it is not assigned EF and *who* undergoes successive cyclic movement to [Spec,Q], making it possible for *who* to check its EF (and for Q to check its uninterpretable *wh*-feature). The result is the acceptable sentence in (45e).

- (49)a. [_{CP} Q_[wh] you [_{VP} v think [_{CP} C_∅-[EF:Q] [who [_{VP} v bought what]]]]] →EF assignment
 b. [_{CP} Q_[wh] you [_{VP} v think [_{CP} C_∅ [who_[EF:Q] [_{VP} v bought what]]]]]

2.4. WH-ELEMENTS OBLIGATORILY SPECIFIED WITH [EF:U]

Let us now consider languages that allow multiple *wh*-fronting with no superiority effects such as Serbo-Croatian (see e.g. RUDIN, 1988; RICHARDS, 2001; and BOŠKOVIĆ, 2002).

(50) *Serbo-Croatian* (BOŠKOVIĆ, 2002)

- a. Ko koga voli
 who whom loves
 b. Koga ko voli
 whom who loves
 ‘Who loves who?’

If the *wh*-phrases in Serbo-Croatian must all move, it is reasonable to assume that the motivation for movement (i.e. EF) is to be found on the *wh*-elements themselves (see BOŠKOVIĆ, 2007). However, we have already seen that if a language has all of its *wh*-elements inherently associated with a valued instance of EF, multiple *wh*-questions are actually ruled out, due to minimality/superiority (see section 2.2). We are then left with the possibility that *wh*-elements in a language such as Serbo-Croatian are obligatorily specified for an unvalued instance of EF ([EF:u]). By being associated with EF, the relevant *wh*-phrases must move to have EF checked; furthermore, by having an unvalued instance of EF, one *wh*-phrase will not count as a proper intervener for the other, for it is not fully specified (see section 2.2). The derivations of the sentences in (50a) and (50b), for example, share the derivational steps sketched in (51a-d) below, where the object *koga* moves to the edge of *VP*, the subject *ko* moves to [Spec,TP], and a Focus head is merged. Given the close-knit relation between focus and questions, it is not surprising that languages often move *wh*-elements to a focus position (see section 2.2). We will see evidence for such a possibility for Serbo-Croatian in section 2.5. For now, it suffices to note that by being unvalued, the EFs in (51) are not “picky”; the *wh*-phrases can then move to [Spec,FocP], value EF as Foc, and receive a coherent semantic interpretation. If the object *koga* moves first, as shown in (52), the order in (50a) is derived. If the subject moves first instead, as shown in (53), we obtain the order in (50b).

- (51) a. [_{VP} ko_[EF:u] [_{VP} voli koga_[EF:u]]]
 b. [_{VP} koga_[EF:u] [_{VP} ko_[EF:u] [_{VP} voli koga_[EF:u]]]]
 c. [_{TP} ko_[EF:u] T [_{VP} koga_[EF:u] [_{VP} ko_[EF:u] [_{VP} voli koga_[EF:u]]]]]]
 d. [_{FocP} FOC [_{TP} ko_[EF:u] T [_{VP} koga_[EF:u] [_{VP} ko_[EF:u] [_{VP} voli koga_[EF:u]]]]]]]]

(52)a. [_{FocP} **koga**_{v[EF:Foc]} Foc [_{TP} ko_[EF:U] T [_{VP} koga_[EF:U] [_{ko}_[EF:U] [_vvoli koga_[EF:U]]]]]]

↑ _____|

b. [_{FocP} **ko**_{v[EF:Foc]} [**koga**_{v[EF:Foc]} Foc [_{TP} ko_[EF:U] T [_{VP} koga_[EF:U] [_{ko}_[EF:U] [_v...]]]]]]]

↑ _____|

(53)a. [_{FocP} **ko**_{v[EF:Foc]} Foc [_{TP} ko_[EF:U] T [_{VP} koga_[EF:U] [_{ko}_[EF:U] [_vvoli koga_[EF:U]]]]]]

↑ _____|

b. [_{FocP} **koga**_{v[EF:Foc]} [**ko**_{v[EF:Foc]} Foc [_{TP} ko_[EF:U] T [_{VP} koga_[EF:U] [_{ko}_[EF:U] [_v...]]]]]]]

↑ _____|

Crucially, neither the subject in (52a) nor its trace in (53b) count as a proper intervener for the movement of the object from the edge of *vP*, because they are not fully specified as their EFs are unvalued (see section 2.2). In turn, the highest instances of *koga* in (52b) and *ko* in (53b) are fully specified but are in the same minimal domain as the target of movement (the outer [Spec,FocP]), therefore not counting as proper interveners (CHOMSKY, 1995).

2.5. COMBINING [EF:U] AND [EF:VAL]

In her classical work on multiple *wh*-questions, Rudin (1988) observes that Bulgarian and Serbo-Croatian allow multiple *wh*-fronting, but only Bulgarian displays superiority effects, as illustrated in (54), which should be compared with the Serbo-Croatian data in (50).

(54) *Bulgarian* (RUDIN, 1988)

a. Koj kogo vižda?
who whom sees

b. *Kogo koj vižda?
whom who sees
'Who sees whom?'

This intriguing contrast between very closely related languages has generated a lot of discussion in the literature and has been analyzed in terms of *ad hoc* or conceptually questionable mechanisms. In Rudin's (1988) work, for instance, the highest *wh*-phrase in Bulgarian moves to [Spec,CP] and the other *wh*-phrases right-adjoin to it, whereas in Serbo-Croatian, the *wh*-phrases are taken to adjoin to IP in any order. For Bošković (1999), the relevant parameter has to do with the number of constituents a given functional head attracts: Bulgarian sets the option Attract-1, resulting in superiority effects, whereas Serbo-Croatian sets the option Attract-All, yielding no superiority effects. Finally, Richards (2001) proposes that highest *wh*-phrase in Bulgarian moves to [Spec,CP] and the remaining *wh*-phrases move to lower specifiers, "*tucking in*", in violation of Chomsky's (1995) Extension Requirement. This brief description of some of the most influential analyses of multiple *wh*-

questions in the literature makes it clear that the topic is still in need of an approach that does not tacitly take multiple *wh*-question constructions as a theoretical primitive, relying on more basic properties of the system.

From the point of view of the present paper, a pattern such as (54) also looks very challenging. On the one hand, in order for all *wh*-phrases to be fronted, the *wh*-phrases must be obligatorily specified as bearing an unvalued instance of EF ([EF:u]); see section 2.4). On the other hand, minimality/superiority effects were analyzed in terms of *wh*-phrases bearing a valued instance of EF ([EF:val]; see sections 2.2 and 2.4); hence, the superiority effect seen in (54) should somehow involve the computation of [EF:val]. This apparent contradiction dissolves once we take into account the lexical hosts of the relevant features. It could be the case, for instance, that all *wh*-elements in Bulgarian are obligatorily specified for [EF:u], as in Serbo-Croatian, and the relevant [EF:val] responsible for the observed superiority effect is associated with some phase head.

Before we examine this logical possibility with respect to Bulgarian, let us consider the Serbo-Croatian data in (55).

(55) *Serbo-Croatian* (BOŠKOVIĆ, 2002)

- a. Ko li koga voli
who C whom loves
- b. *Koga li ko voli
whom C who loves
'Who on earth loves whom?'

As discussed by Bošković (2002), Serbo-Croatian displays superiority effects when the complementizer-like element *li* is present. Under the reasonable assumption that it is *li* that is ultimately responsible for the observed superiority effect in (55), it is tempting to conjecture that Bulgarian involves a null head with the properties of Serbo-Croatian *li*. Let us then see the ingredients of such an analysis, taking (55) in Serbo-Croatian as a starting point.

We have seen in section 2.4 that *wh*-phrases in Serbo-Croatian are obligatorily specified for [EF:u], which implies that all *wh*-phrases must move in order to check EF and once EF is unvalued, one *wh*-phrase does not count as a proper intervener for the movement of another *wh*-phrase. So, the derivation of (55) is identical to the derivation of (50) until TP is built, as shown in (56) (cf. (51)).

- (56)a. [_{VP} ko_[EF:u] [_Vvoli koga]_[EF:u]]
- b. [_{VP} koga_[EF:u] [_{KO}[EF:u] [_Vvoli koga]_[EF:u]]]
- c. [_{TP} ko_[EF:u] T [_{VP} koga_[EF:u] [_{KO}[EF:u] [_Vvoli koga]_[EF:u]]]]]

The next question is to determine if *li* should be treated as an instance of Foc or C. If it were Foc, the derivation should proceed exactly as in the derivation discussed in section 2.4, with all the *wh*-phrases moving past *li*, yielding an incorrect output (see (55a)). So, the conclusion is that *li* should be analyzed as C on top of FocP. In other words, multiple *wh*-fronting in (55) still targets [Spec,FocP], as in the version without *li* (see (50)), but it is coupled with an additional movement (of the highest *wh*-phrase) to [Spec,CP]. Given that in this system, overt A'-movement is triggered by EF, one wonders whether *li* could be obligatorily specified as [EF:Q] and assign it to a *wh*-phrase in its domain, attracting it to its Spec. There are reasons to assume that this possibility is not available, though.

First, the Anti-Locality Restriction on Feature Bundling in (57) below, proposed by Nunes (2021), excludes the specification $li_{[EF:Q]}$ if *li* is an interrogative complementizer in (55). The rationale behind (57) is that the role of EFs is to establish a relation that would otherwise be blocked by the Phase Impenetrability Condition (see section 1). In a system that allows syntactic relations to be established by Agree only (without movement), EF should be postulated just in case it wouldn't be vacuous. This is exactly the effect of (57). In the present case, if *li* has a [-interpretable] *wh*-feature (like English interrogative Q; see section 1), this suffices for *li* to be able to establish a relation with a *wh*-phrase in its domain, with no need to trigger movement of this constituent.

(57) (NUNES, 2021)

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.

A second reason not to associate *li* with an EF is that it is not trivial how to restrict movement to the highest *wh*-phrase. Crucially, the subject and the object can occupy the outer [Spec,FocP], as seen in (50).

The conclusion is that Foc is the lexical host of [EF:Q], not *li*. This is not unprecedented, though. Nunes (2021) has reinterpreted anti-*that*-trace effects such as the one illustrated in (58) below exactly in these terms. Recall that declarative *that* in English is not specified for EF (see (12a)) and this is what ultimately prevents local subject extraction (see (14) and section 1). That being so, Nunes proposes that the head H that hosts the adverbial in (58) is specified for [EF:Q] and assigns it to the embedded subject which can then undergo successive cyclic movement despite the inertness of *that*, as sketched in (59).¹¹

¹¹ As observed by Nunes (2021), the specification of EF on H in (59) suggests that EF may also be lexically associated with functional heads of the extended projection of phase heads. The same applies to the specification of Foc in (60) below. In his review, Tom Roper observes that H in (59) must have a filled specifier, for otherwise *that*-traces effects would never arise; he also asks if H could be a topic head specified as $Top_{[EF:Q]}$. Although I will not have much

(58)(CULICOVER, 1993)

I asked what_i Leslie said that *(in her opinion) *t*_i had made Robin give a book to Lee.

- (59)a. [_{CP} that [_{HP} [in her opinion] H_[EF:Q] [_{TP} what had made ...]]] →EF-assignment
 b. [_{CP} that [_{HP} [in her opinion] H [_{TP} **what**_[EF:Q] had made ...]]]
 c. [_{CP} **what**_[EF:Q] that [_{HP} [in her opinion] H [_{TP} *t* had made ...]]]

Foc in Serbo-Croatian must be optionally specified as bearing [EF:Q]. If it doesn't bear this specification, we have derivations like the one discussed in section 2.4, with multiple *wh*-fronting and no superiority effects (see (52) and (53)). Let us then see how the derivation unfolds when Foc is specified as bearing [EF:Q]. After the derivational step in (60a) below is reached, the subject *wh*-phrase is the closest potential target for EF-assignment. Foc then assigns EF to the subject, yielding (60b).¹²

- (60)a. [_{FocP} **Foc**_[EF:Q] [_{TP} ko_[EF:u] T [_{VP} koga_[EF:u] [ko_[EF:u] [v voli koga_[EF:u]]]]]] →EF-assignment
 b. [_{FocP} Foc [_{TP} ko_{[EF:u]-[EF:Q]} T [_{VP} koga_[EF:u] [ko_[EF:u] [v voli koga_[EF:u]]]]]]

The higher instance of *ko* in (60b) is not fully specified as it still has an unvalued instance of EF. Thus, the object can move across it and value its own EF, as shown in (61a) below. The subject can then move the outer [Spec,FocP], valuing its unvalued EF, yielding (61b). Crucially, although the object in the inner [Spec,FocP] is fully specified, the subject moves to the minimal domain that includes the object (CHOMSKY, 1995). Finally, after *li* enters the structure in (61c), it licenses its *wh*-feature via Agree, as shown in (61d), and the subject moves to [Spec,CP] to check the edge feature it has received from Foc, as shown in (61e), yielding the surface order in (55a).

- (61) a. [_{FocP} **koga**_[EF:Foc] Foc [_{TP} ko_{[EF:u]-[EF:Q]} T [_{VP} koga_[EF:u] [ko_[EF:u] [v voli koga_[EF:u]]]]]]
 ↑ _____OK_____ |
 b. [_{FocP} **ko**_{[EF:Foc]-[EF:Q]} [_{Foc'} koga_[EF:Foc] Foc [_{TP} ko_{[EF:u]-[EF:Q]} T ...]]]]
 ↑ _____OK_____ |
 c. [_{CP} **li**_[wh] [_{FocP} ko_{[EF:Foc]-[EF:Q]} [_{Foc'} koga_[EF:Foc] [Foc [_{TP} ko_{[EF:u]-[EF:Q]} T ...]]]]]]
 d. [_{CP} **li**_[wh] [_{FocP} ko_{[EF:Foc]-[EF:Q]} [_{Foc'} koga_[EF:Foc] [Foc [_{TP} ko_{[EF:u]-[EF:Q]} T ...]]]]]]
 |____Agree____|
 e. [_{CP} **ko**_{[EF:Foc]-[EF:Q]} [_{li}_[wh] [_{FocP} ko_{[EF:Foc]-[EF:Q]} [_{Foc'} koga_[EF:Foc] [Foc ...]]]]]]
 ↑ _____OK_____ |

to say on the content of H here, it is certainly compatible with a topic head associated with an optional [EF:Q] in that it would not violate the Anti-Locality Restriction on Feature Bundling in (57). As for the obligatoriness of its Spec, it seems to fall under An's (2007) proposal that the edge of an intonational phrase cannot be empty. I will leave further discussion of H for another occasion, though.

¹² We have already seen that an element cannot assign a valued instance of EF to an element already specified for a valued instance of EF (see the discussion of *que*-to-*qui* in French in section 1). Notice that this is not the case in (60), for at the point where EF assignment takes place, *ko*'s EF is unvalued.

Suppose instead that after the derivational stage in (60b) is reached, the subject moves to [Spec,FocP] before the object, as represented in (62a). The object then moves from [Spec,νP] to [Spec,FocP], as shown in (62b), without violating minimality: the copy of *ko* in [Spec,TP] is not fully specified as it has an unvalued EF and the higher copy is fully specified but is equidistance from the moved object. The subject in the inner [Spec,FocP] then moves to [Spec,/*l*] to license the edge feature it has received from Foc in (60b), as shown in (62c), and the crossed object in the outer [Spec,FocP] does not intervene due to equidistance. Interestingly, the final order of the output is again the one that complies with superiority (see (55a)), but the superiority effect stems not from movement (the object actually crosses the subject in (62b)), but from EF-assignment (Foc in (60) assigns its EF to the closest appropriate element in its domain – the *wh*-subject).

- (62)a. [_{FocP} **ko**_{√[EF:Foc]-[EF:Q]} [_{Foc} [_{TP} **ko**_{[EF:ν]-[EF:Q]} T [_{νP} **koga**_[EF:ν] [**ko**_[EF:ν] [_{νP} **voli koga**_[EF:ν]]]]]]]
 ↑ _____OK_____ |
 b. [_{FocP} **koga**_{√[EF:Foc]} [_{Foc} **ko**_{√[EF:Foc]-[EF:Q]} [_{Foc} [_{TP} **ko**_{[EF:ν]-[EF:Q]} T [_{νP} **koga**_[EF:ν] ...]]]]]]
 ↑ _____OK_____ |
 c. [_{CP} **ko**_{√[EF:Foc]-√[EF:Q]} [_{/i/wh}] [_{FocP} **koga**_{√[EF:Foc]} [_{Foc} **ko**_{√[EF:Foc]-[EF:Q]} [_{Foc} ...]]]]]]
 ↑ _____OK_____ |

Returning to the Bulgarian data in (54), their derivations will be essentially like the ones discussed regarding the Serbo-Croatian data with *l* in (55), the only difference being a null C with a [-interpretable] *wh*-feature instead of *l*. To put things in broad terms, the discussion above shows that superiority effects in multiple *wh*-questions show up depending on the lexical locus of EFs and their values; different results may arise even within the same language depending on how these possibilities are fixed.

3. CONCLUDING REMARKS

Table 2 below summarizes the typology discussed in section 2. Although it is not meant to be comprehensive, Table 2 provides a good illustration of the diversity that may arise from specific answers given to the two questions listed in (1): (i) what are the lexical hosts of edge features in a given language?; and (ii) are the relevant edge features intrinsically valued or unvalued? We have seen, for instance, that edge features on *wh*-elements may yield radically different results in languages such as Italian, which does not allow multiple *wh*-questions, and Serbo-Croatian, which has multiple *wh*-fronting, depending simply on whether they are intrinsically valued or unvalued.

Lexical host of EF	EF specification	Example
<i>Wh</i> -elements	. obligatorily specified for a valued instance of EF: [EF:val] → no multiple <i>wh</i> -questions	. Irish, Italian, Somali, Berber
	. optionally specified for valued instance of EF: ([EF:val]) → no multiple <i>wh</i> -fronting → <i>wh</i> -in situ only is possible → superiority effects	. Brazilian Portuguese
	. obligatorily specified for an unvalued instance of EF: [EF:u] → multiple <i>wh</i> -fronting → no superiority effects	. Serbo-Croatian with a null interrogative complementizer
Phase heads	. optionally specified for a valued instance of EF: ([EF:val]) → no multiple <i>wh</i> -fronting → superiority effects	. English
<i>Wh</i> -elements + (functional heads of the extended projection of) phase heads	. WH obligatorily specified for an unvalued instance of EF: [EF:u] → multiple <i>wh</i> -fronting . Foc specified for a valued instance of EF: [EF:Q] → superiority effects	. Bulgarian, Serbo-Croatian with <i>li</i>
	. no specification for EF on either WH or phase heads → no <i>wh</i> -movement	. Chinese, Japanese

Table 2. EF specification and multiple *wh*-questions.

I have kept to basic cases and put more complex interactions aside (see footnote 8). Still, I hope to have shown that the initial empirical coverage reached is encouraging and the fact the overall system attempts to couch the existing typological diversity on properties that must be independently determined (the answers to the questions (i) and (ii) above) makes the proposal conceptually appealing.

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