

# Free Merge and superiority effects on *wh*-movement<sup>1</sup>

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## 1 Introduction

In this paper, I will explore superiority effects on *wh*/A'-movement observed in examples like (1) under the free-Merge hypothesis proposed in Minimalist theory:

- (1) a. Who bought what?      a'. John wonders who bought what.  
b. \*What did who buy?      b'. \*John wonders what who bought.

As shown, of the two *wh*-phrases, the one that moves into CP is merged higher than the other. Three major approaches proposed in the generative framework (the Superiority Condition, the Empty Category Principle, and Shortest Move/Attract Closest) give “syntactic” explanations to superiority effects. In Minimalism, it has been assumed that Merge is syntactically unconstrained and applies freely, both externally and internally, as far as it works most simply. This implies that a lower *wh*-phrase can be moved (i.e., internally merged) over a higher *wh*-phrase without any problem and that unlike what has been widely entertained in the literature, minimality or locality does not play a role in constraining *wh*-movement: both (1a,a') and (1b,b') can be produced in syntax. In this paper, I claim that superiority violations are reducible to violations of interface conditions due to the transfer of unvalued features to the interfaces, being extrasyntactically explained by interface conditions on the side of the Sensory-Motor (SM) system. I argue that this supports the Minimalist hypothesis that the properties of language follow from the interplay of unconstrained Merge and interface conditions imposed by the external systems,

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Conceptual-Intentional (CI) and SM, with which language or syntax is interfaced.

## **2 Theoretical background**

Minimalist theory is based on the methodological desideratum of simplifying Universal Grammar or UG (unexplained elements of  $S_0$ ) as much as possible and attributing the properties of language to UG-independent/UG-external factors listed in (2), which are independently motivated and are considered the elements of principled explanation in Minimalism (Chomsky 2004 *et seq.*):

- (2) a. Interface conditions imposed by the CI and SM systems (the principled part of  $S_0$ )
- b. General principles not specific to language (so-called “third-factor” principles, which yield minimal/simple computation)

To the extent that the properties of language are deducible from the interplay of the bare minimum UG and (2), language will be a perfect system, meeting interface conditions in a way satisfying third-factor principles. This hypothesis, called “the Strong Minimalist Thesis,” constitutes the backbone of Minimalist theory and is also a hallmark which prominently distinguishes it from the other syntactic theories.

Minimalist theory assumes Merge as an irreducible and bare minimum part of UG under the recognition that language is a recursive system with discrete infinity. Merge, a simple set-formation operation, iteratively takes  $n$  syntactic objects, SOs, already formed and creates a new SO (an  $n$ -membered set) out of them. Without any further assumptions, Merge is unconstrained and applies freely. Given third-factor principles, however, Merge will be executed most simply as shown in (3), constructing a new SO by pairing any two SOs in such a way that it satisfies the No-Tampering Condition, leaving the two SOs merged unchanged, and the Inclusiveness Condition, which bans adding new objects (indices, traces, bar levels, labels) in the process of Merge:

$$(3) \quad \text{Merge}(\alpha, \beta) = \{\alpha, \beta\}$$

SOs created by recursive Merge are hierarchically structured expressions that are free from linear order, labels or endocentricity (projection), all of which are stipulated properties of phrase structure and which can be assigned independently when SOs are mapped to SEM and PHON through Transfer (Chomsky 2013).

Under (3), selectional properties of merged elements are reduced to CI interface conditions and the convergence/well-formedness of the SO  $\{\alpha, \beta\}$  is judged based on the interface conditions after Transfer, with syntax applying without caring about objects to be derived (Chomsky 2004, Fortuny 2008, Ott 2010;

but see Adger 2003). Under the Strong Minimalist Thesis, Merge is free (the free-Merge hypothesis) but its application is constrained by third-factor principles and derived outputs, or SOs, are filtered in or out by interface conditions after Transfer.<sup>2</sup>

One of the important consequences of free Merge is that Merge can apply internally inside an SO ( $\{\alpha, \beta\} \rightarrow \{\beta, \{\alpha, \beta\}\}$ ) as well as externally, with movement reformulated as one form of Merge (that is, Internal Merge, IM). Since movement is Merge, it is as free as External Merge (EM) and applies freely in derivation: like EM, no stipulated trigger (say, EPP, the edge feature) is required for movement and movement is not operated by the Last Resort. Furthermore, free Merge implies that unlike Chomsky (2000), IM is not Agree + Merge: probe-goal/agreement relations are not presupposed and do not constrain IM through minimal search.

### 3 Superiority under free Merge

With free Merge in place, the derivation where a lower *wh*-phrase is moved over a higher *wh*-phrase as in (4) is syntactically unproblematic: the movement (IM) abides by third-factor principles and no violation of (2b) is incurred in the process:

- (4)  $[XP \dots [YP \dots [ \dots \langle XP \rangle \dots ]]]$  (XP and YP are *wh*-phrases)
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Thus, Merge can produce the ill-formed examples in (1b,b'), along with the well-formed ones in (1a,a'). In this section, I claim that the ill-formedness in question is attributable to interface conditions.

#### 3.1 Transfer of unvalued features

I assume the Uniformity Principle, i.e., SOs created and transferred to the CI interface do not vary across languages (Chomsky 2001). Given this principle, in multiple *wh*-questions, all *wh*-phrases move to the CP edge and form operator-variable chains for interpretation at the CI interface; the pronunciation of *wh*-phrases is reducible to the problem of externalization and can vary from language to language (Bobaljik 1995, Groat and O'Neil 1996, Pesetsky 1997, 1988, 2000). Thus, the syntax of *wh*-movement is uniform across languages.

With this assumption in mind, we now consider the derivations of (1a,b) as our examples. On its way to the CP edge, the object *wh*-phrase *what* is moved to the *v*\*P edge for cyclic transfer of VP (=5a). At this point, free Merge allows two Merge choices: in one, *who* moves first from the *v*\*P edge and then *what*, which produces (5b) and is externalized as (1b), on the assumption that in English, only one *wh*-phrase, the one in the outermost edge of CP, is actually pronounced, with

<sup>2</sup> Under this thesis, syntax is not crash-proof (Chomsky 2004 *et seq.*, Ott 2010).

all the rest pronounced in situ; in the other, *what* moves first and then *who*, which yields (5c) and is spelled out as (1a) since *who* is in the outermost edge of CP:<sup>3</sup>

- (5) a. [<sub>v\*P</sub> what [who [<sub>v\*</sub> [<sub>VP</sub> bought ⟨what⟩]..]]  
 b. [CP what [who [C [<sub>TP</sub> T<sub>{φ}</sub>] [<sub>v\*P</sub> ⟨what⟩] [⟨who⟩ [<sub>v\*</sub> [<sub>VP</sub> bought ⟨what⟩]..]]]  
 c. [CP who [what [C [<sub>TP</sub> T<sub>{φ}</sub>] [<sub>v\*P</sub> ⟨what⟩] [⟨who⟩ [<sub>v\*</sub> [<sub>VP</sub> bought ⟨what⟩]..]]]

Note that the Merge producing (5b,c) conforms to third-factor principles and the two SOs can be generated by Merge without any problem. The Merge choice that yields (5b), however, will invite the transfer of unvalued features. As shown in (6), if *who* moves first, *what* would intervene to block φ-feature agreement between T<sub>{φ}</sub> and *who*, with the result that the φ-features cannot be valued; also the Case feature of the subject cannot be valued, either, since φ-feature agreement values Case:

- (6) [CP C [<sub>TP</sub> T<sub>{φ}</sub>] [<sub>v\*P</sub> what [who [<sub>v\*</sub> [<sub>VP</sub> bought ⟨what⟩]..]] \*Agree(T<sub>{φ}</sub>, *who*)

These features will be left unvalued in the derivation and eventually, shipped off to the interfaces unvalued when they are transferred, causing crash: unvalued features are unspecified and hence, illegible at the interfaces, violating interface conditions.<sup>4</sup>

On the other hand, if *what* is moved first as in (5c), the φ-feature agreement can be successfully implemented thanks to copy invisibility: the lower occurrence (or copy) of *what* created by IM is part of a discontinuous element and is invisible to syntax (Chomsky 2013, Kitahara 2011, Ott 2012), thanks to which *who* can be located by minimal search and can agree with T<sub>{φ}</sub>:

- (7) [CP what [C [<sub>TP</sub> T<sub>{φ}</sub>] [<sub>v\*P</sub> ⟨what⟩] [who [<sub>v\*</sub> [<sub>VP</sub> bought ⟨what⟩]..]]]

Thus, the φ-features of T and the Case feature of *who* can be valued in the derivation and can be transferred to the interfaces valued, which converges the derivation. The same explanation applies to superiority effects in embedded clauses (= (1a',b')).

In this subsection, I have argued that superiority effects in (1b,b') are reducible to the UG-external factor (2a) under the free-Merge hypothesis: the undervaluation of φ-features and a Case feature caused by the failure of φ-feature agreement, which violates interface conditions and causes crash when the derivation is transferred, is the cause of superiority effects.<sup>5</sup>

I have claimed that superiority effects can be given a principled account

<sup>3</sup> In this paper, labels are used only for expository purposes. Also, I assume, following Mizuguchi (2014b), that a subject *wh*-phrase does not move to the TP edge in subject *wh*-movement.

<sup>4</sup> As we will discuss in 4.2, the undervaluation of features is problematic only at the SM interface.

<sup>5</sup> Kitahara's (2011) "syntactic" approach to *wh*-movement superiority effects based on the probe-goal theory of agreement also implies that superiority effects are attributable to the interfaces.

along the Strong Minimalist Thesis. The proposed analysis, unlike Richards (2001), does not have to assume tuck in, hence a literal violation of the No-Tampering Condition in the application of Merge, keeping the operation in its simplest form (=3). In fact, aside from this theoretical problem, Richards's analysis of multiple *wh*-movement faces problems in that it makes wrong empirical predictions under phase syntax, where a subject raises to the TP edge at the phase level and phase-head complements are cyclically transferred. The problems we noted here do not arise at all under the analysis proposed in this paper.

### 3.2 Predictions: Absence of superiority effects

The proposed analysis, as it argues that superiority effects can be reduced to unvalued features at the interfaces, predicts that if T's  $\phi$ -features and the subject's Case feature can be valued, superiority effects will not arise. This prediction is supported by (8-9), where T does not agree with a *wh*-phrase for valuation:

(8) a. What did you buy where?    b. Where did you buy what?

(9) a. What did you buy when?    b. When did you buy what?

In (8-9), the  $\phi$ -feature agreement between  $T_{\{\phi\}}$  and the subject *you* can be executed as far as the partially moved *what* in the  $v^*P$  edge, as I argued in (7), is moved derivationally prior to the subject. Importantly, the order of *wh*-movement from the edge does not affect the  $\phi$ -feature agreement: as illustrated in (10), either of the two *wh*-phrases can move first to the CP edge without blocking the agreement:<sup>6</sup>

(10) a.  $[_{CP} \text{ what } [_{wh_{ADJ}} [C [_{TP} T_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle ] [_{\langle wh_{ADJ} \rangle} [you [_{v^*} \dots] \dots]]$   
       b.  $[_{CP} wh_{ADJ} [what [C [_{TP} T_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle ] [_{\langle wh_{ADJ} \rangle} [you [_{v^*} \dots] \dots]]$

Bulgarian multiple *wh*-movement also endorses the prediction. As shown in (11), the order of multiple *wh*-phrases other than a subject *wh*-phrase is free:

(11) a. Koj kogo kak e tselunal?    b. Koj kak kogo e tselunal?  
       who whom how is kissed  
       ‘Who kissed whom how?’ (Bošković 2002: 366)

In the derivations of (11),  $T_{\{\phi\}}$  can agree with the subject *koj* if, as we have argued, the partially moved *kogo* in the  $v^*P$  edge and  $v^*P$ -adjoined *kak*, both of which are

<sup>6</sup> Free Merge allows either of the two *wh*-phrases to move first to the  $v^*P$  edge from within VP. For our purpose, in (10), *where/when* is internally merged first. See also our discussion in 4.1.

interveners for  $\phi$ -feature agreement, are moved before the subject.<sup>7</sup> As in (8-9), however, the  $\phi$ -feature agreement does not depend on the order of the movement of the non-subject *wh*-phrases: as far as they move from the edge, the  $\phi$ -feature agreement can be executed. Thus, both (11a) and (11b) are ruled in as well-formed at the interfaces for the valuation of the  $\phi$ -features and the Case feature of *koj*.

The proposed interface-based analysis can correctly predict that superiority effects are observed with a subject *wh*-phrase while other *wh*-phrases can allow variations in *wh*-movement: in the latter case, regardless of the order of *wh*-movement, the  $\phi$ -features of T and the Case feature of the subject can be valued by  $\phi$ -feature agreement. This confirms our proposal that superiority effects are caused by the transfer of unvalued/unspecified features to the interfaces. Moreover, the proposal can provide a simpler solution to (8-9) and (11) than minimality-based accounts, say, Bošković (1997) and Richards (2001).

## 4 Superiority in VP

### 4.1 Cyclic Transfer and order preservation

In this section, we consider superiority in VP and further explore the way free Merge interacts with the external systems to derive superiority effects. As shown in (12-13), superiority effects are also observed with VP-internal *wh*-phrases:

(12) a. Who did you give what?      b. \*What did you give who?

(13) a. Whom did John persuade to eat what?  
b. \*What did John persuade whom to eat?

For our purpose, we assume (14) as the structure of the double object/double complement construction, where there are two  $v^*P$  phases and the object OBJ is merged with lower  $v^*P$ , hence merged higher than the direct object OBJ<sub>direct/CP</sub>:

(14) [ <sub>$v^*P$</sub>  SUBJ [ <sub>$v^*$</sub>  [<sub>VP</sub> V [ <sub>$v^*P$</sub>  OBJ [ <sub>$v^*$</sub>  [<sub>VP</sub> V OBJ<sub>direct/CP</sub>].].]

With (14) in mind, take (12) for discussion. In the derivation, the two VP-internal objects are moved to the edge of higher  $v^*P$  for cyclic Transfer. As we have argued with (8-9), the  $\phi$ -feature agreement between T<sub>{ $\phi$ }</sub> and the subject will be possible as far as the object *wh*-phrases at the edge are moved prior to the subject and become invisible to T<sub>{ $\phi$ }</sub>. Recall that the order of the movement does not affect

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<sup>7</sup> Carstens and Diercks (2013) argue that an adverbial *wh*-phrase *how*, which is  $v^*P$ -adjoined, agrees in  $\phi$ -features with the subject in Bantu languages like Lubukusu and Lussamia. I thus assume that *kak* also blocks agreement between T<sub>{ $\phi$ }</sub> and *koj* unless it moves out of the search domain of T<sub>{ $\phi$ }</sub>.

the  $\phi$ -feature agreement, and either of the two *wh*-phrases can be moved first thanks to free Merge: without the transfer of unvalued features, both (12a) and (12b) should converge at the interfaces. However, only (12a) is well-formed.

I submit that (12b) is ill-formed because it violates an SM interface condition. SOs, free from linear order, have to be linearized for externalization. For this purpose, I assume Kayne's (1994) Linear Correspondence Axiom (LCA) as an algorithm mapping hierarchical relations into linearization, which operates at the phase level when Transfer applies. Since Transfer applies derivationally, SOs are cyclically linearized in the course of derivation (Fox and Pesetsky 2005). Focusing on the edge, given two edge elements  $\alpha$  and  $\beta$ , if  $\alpha$  is hierarchically higher than  $\beta$ , then this relation is mapped by LCA as  $\alpha < \beta$  (read as:  $\alpha$  precedes  $\beta$ ). In (15a) and (15b), which are derivations of (12a) and (12b), respectively, the two object *wh*-phrases in the edges are then mapped through Transfer as shown below:<sup>8</sup>

- (15) a. [CP who [what [C [TP you [T<sub>{ $\phi$ }</sub> [<sub>v\*P</sub> <who> [<what> [<you> [<sub>v\*</sub> [VP ...]..]]]]]]]]  
 $\Rightarrow$  *who*<*what*  $\Rightarrow$  *who*<*what* (= (12a))
- b. [CP what [who [C [TP you [T<sub>{ $\phi$ }</sub> [<sub>v\*P</sub> <who> [<what> [<you> [<sub>v\*</sub> [VP ...]..]]]]]]]]  
 $\Rightarrow$  *what*<*who*  $\Rightarrow$  *who*<*what* (= (12b))

I argue that in (15b), conflicting information will be sent out to the SM interface as regards the linear order of the two *wh*-phrases and that the derivation will crash for ordering contradictions (*what*<*who*  $\neq$  *who*<*what*). I propose (16) as an SM interface condition: once SOs are cyclically linearized by the externalization algorithm upon cyclic Transfer, their linear order is assigned and determined:

- (16) Order Preservation Constraint  
 The order of SOs must be preserved at the SM interface.

The ordering contradiction causes the ill-formedness of (15b). (15b), which can be produced by free Merge without any problem, violates (16) and is ruled out by the SM interface. The same explanation applies to the examples in (13).

Note that the argument here does not face problems with (8-9) discussed in the last section. Recall that superiority effects are absent in these examples. Here, free Merge of *what* and *where/when* to the *v\*P* edge from within VP for cyclic Transfer does not affect  $\phi$ -feature agreement in VP, and the  $\phi$ -features of V and the Case feature of the object can be valued whether *what* or *where/when* is moved first to the edge. Thus, the two derivations in (17) do not cause undervaluation. In the next CP phase, if free Merge yields (18a) from (17a) and (18b) and (17b), the order of the two *wh*-phrases will be preserved when transferred to the SM interface:

<sup>8</sup> I will discuss order in the lower *v\*P* edge in the next subsection.

- (17) a.  $[_{v^*P} \text{ what } [_{\text{whADJ}} [\text{you } [_{v^*} [_{\text{VP}} [_{\text{VP}} \text{ buy } \langle \text{what} \rangle] \langle \text{whADJ} \rangle] \dots]]]$   
 b.  $[_{v^*P} \text{ whADJ } [\text{what } [\text{you } [_{v^*} [_{\text{VP}} [_{\text{VP}} \text{ buy } \langle \text{what} \rangle] \langle \text{whADJ} \rangle] \dots]]]$
- (18) a.  $[_{\text{CP}} \text{ what } [_{\text{whADJ}} [\text{C } [_{\text{TP}} \text{ you } [\text{T}_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle] [\langle \text{whADJ} \rangle] [\langle \text{you} \rangle [_{v^*} \dots ] \dots]]]]]$   
 b.  $[_{\text{CP}} \text{ whADJ } [\text{what } [\text{C } [_{\text{TP}} \text{ you } [\text{T}_{\{\phi\}} [_{v^*P} \langle \text{whADJ} \rangle] [\langle \text{what} \rangle] [\langle \text{you} \rangle [_{v^*} \dots ] \dots]]]]]$

As illustrated above, in (8-9), free Merge can be executed in a way satisfying (16).

## 4.2 Ordering contradictions and their implications

I have argued that VP superiority in (12b) and (13b) is reducible to the SM interface condition proposed in (16). This proposal, however, may face a problem if we go back to (1). As illustrated in (19), ordering contradictions will arise in (1a) but not in (1b): given (16), (1a) would be ruled out while (1b) would be ruled in:

- (19) a.  $[_{\text{CP}} \text{ who } [\text{what } [\text{C } [_{\text{TP}} \text{ T}_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle] [\langle \text{who} \rangle [_{v^*} [_{\text{VP}} \text{ bought } \langle \text{what} \rangle] \dots]]]]]$   
 $\Rightarrow \text{who} < \text{what} \qquad \qquad \qquad \Rightarrow \textbf{what} < \textbf{who} \qquad \qquad \qquad (= (1a))$
- b.  $[_{\text{CP}} \text{ what } [\text{who } [\text{C } [_{\text{TP}} \text{ T}_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle] [\langle \text{who} \rangle [_{v^*} [_{\text{VP}} \text{ bought } \langle \text{what} \rangle] \dots]]]]]$   
 $\Rightarrow \text{what} < \text{who} \qquad \qquad \qquad \Rightarrow \text{what} < \text{what} \qquad \qquad \qquad (= (1b))$

In fact, ordering contradictions will also be detected in the derivations of (12a) and (13a) in the edges of lower and higher  $v^*P$  phases. I illustrate this with (12a) in (20):

- (20)  $\dots [_{v^*P} \langle \text{who} \rangle [\langle \text{what} \rangle] [\langle \text{you} \rangle [_{v^*} [_{\text{VP}} \text{ V}_{\{\phi\}} [_{v^*P} \langle \text{what} \rangle] [\langle \text{who} \rangle [_{v^*} [_{\text{VP}} \dots ] \dots]]]]]$   
 $\Rightarrow \text{who} < \text{what} \qquad \qquad \qquad \Rightarrow \textbf{what} < \textbf{who}$

I argue that this problem is only apparent.<sup>9</sup> Take (1) for discussion. Recall that as illustrated in (6-7), the  $\phi$ -features of T and the Case feature of *who* can be valued in (1a) but not in (1b). Thus, in the derivation of (1a), the valuation can be successfully executed while Order Preservation is violated; on the other hand, in the derivation of (1b), the valuation fails but Order Preservation is satisfied. I claim that valuation of features takes precedence over (16) because externalization (or pronunciation) of SOs will be impossible unless unvalued features are specified through valuation: unvalued features are unspecified and cannot be externalized; ordering for externalization is possible only when unvalued features are valued and phonologically specified. In (1b), T's  $\phi$ -features and the subject's Case feature are transferred to the interfaces unvalued and cannot be externalized for undervaluation. In (1a), on the other hand, the IM of *what* before the IM of *who* allows the features to be valued, thanks to which they can be subject to externalization. The ordering

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<sup>9</sup> This part of the paper has been substantially revised and freshly written.



contradiction in (19a) is a derivational consequence of valuation and *who*<*what* is ruled in as a legitimate order for externalization, which allows the violation of (16).

I have submitted that valuation for externalization explains the violability of (16) in (1a); at the same time, it can also explain the ill-formedness of (1b) even though Order Preservation is satisfied in (1b). The precedence I have proposed is reasonable in that phonological constraints are known to be violable under certain restricted conditions (Bošković 2002, Pesetsky 1997, 1998, Richards 2010). For instance, in multiple *wh*-movement languages like Bulgarian and Serbo-Croatian, all *wh*-phrases are externalized in the CP edge; Bošković (2002), however, points out that when homophonous *wh*-phrases are in the edge, only one of them (the one in the outermost edge of CP) can be pronounced in the edge, with the rest externalized in situ just as in English. Consider the following Bulgarian examples:

(21) a. Kakvo obuslavlja kakvo?      b. \*Kakvo kakvo obuslavlja?  
       what conditions what  
       ‘What conditions what?’ (Bošković 2002: 364)

(22) a. Koj kakvo e kupil?                    b. \*Koj e kupil kakvo?  
       who what is bought  
       ‘Who bought what?’ (Bošković 2002: 355)

(21a) argues that phonological constraints (hence, SM interface conditions) can be violated when certain conditions are met. Thus, the violability of (16) can be reduced to the problem of externalization at the SM interface: valuation is prerequisite to ordering and Order Preservation can be violated for valuation. (1a) is one illustration of well-formed violations of phonological constraints.

Our argument here is further bolstered if, as argued in Epstein, Kitahara and Seely (2010), unvalued features, whether they are syntactically valued or not, are simply irrelevant and hence ignored at the CI interface, undervaluation causing no problems at this interface. Undervaluation is then a problem only at the SM interface and valuation comes out only to be a phonological constraint. The precedence in question can be reduced solely to the SM interface, with valuation at the CI interface being irrelevant.

As a consequence of this argument, I propose that superiority effects are attributable to the SM interface alone (valuation and ordering). Thus in (1), both (1a,a’) and (1b,b’), which can be syntactically produced by Merge, are ruled in as well-formed and converge on the side of the CI interface, as the two *wh*-phrases are internally merged with CP and move into CP, forming operator-variable relations with their copies; in (1b,b’), undervaluation of  $\phi$  and Case features is irrelevant to the CI interface and the ill-formedness is phonological in nature.

On the other hand, note that Order Preservation cannot be violated in (15b):

the Case features of *who* and *what* have already been valued by the time the *wh*-phrases are moved to the higher  $v^*P$  and CP edges, and they do not engage in  $\phi$ -feature agreement in these edges. Thus, (16) applies to (15) at the SM interface and (15b) is ruled out as ill-formed for the violation of (16).

### 4.3 Multiple *wh*-movement in Bulgarian

As with English (12-13), VP superiority is also found in Bulgarian *wh*-movement:

- (23) a. Kogo kakvo e pital Ivan?    b. ?\*Kakvo kogo e pital Ivan?  
       whom what is asked Ivan  
       ‘Whom did Ivan ask what?’                                    (Bošković 2002: 366)

Recall from section 3, however, that the order of non-subject *wh*-phrases is free when the subject is a *wh*-phrase (what Pesetsky 2000 calls “the AC tax effect”):

- (24) a. Koj kogo kakvo e pital?        b. Koj kakvo kogo e pital?  
       who whom what is asked  
       ‘Who asked whom what?’                                    (Bošković *op.cit*)

The ill-formedness of (23b) can be explained on par with that of (12b) and (13b) for the violation of Order Preservation at the SM interface. The question, then, is why (24) does not violate Order Preservation and does not incur VP superiority.

Consider the derivation of (24). In the course of the derivation, syntax produces (25) as its intermediate stage, where the direct object *kakvo* moves from its first-merged position to the edge of lower  $v^*P$  for cyclic Transfer of lower VP:

- (25) ... [ $v^*P$  kogo [kakvo [koj [ $v^*$  [ $VP$   $V_{\{\phi\}}$  [ $v^*P$   $\langle$ kakvo $\rangle$  [ $\langle$ kogo $\rangle$  [ $v^*$  [ $VP$  ... ]..]  
       => *kogo*<*kakvo*<*koj*                                    => *kakvo*<*kogo*

As we discussed, *kakvo* has to move from the edge to the edge of higher  $v^*P$  before *kogo*; otherwise, the  $\phi$ -feature agreement between higher  $V_{\{\phi\}}$  and *kogo* would be blocked for the intervention by *kakvo*. Thus, the order between *kakvo* and *kogo* can be reordered in the higher  $v^*P$  phase for valuation and (16) can be violated.

In the next CP phase, the same argument applies: the movement of *kogo* and *kakvo* to the CP edge should come before the movement of *koj*; otherwise, the derivation would crash for undervaluation: the  $\phi$ -feature agreement between  $T_{\{\phi\}}$  and *koj* will be blocked by *kogo* and *kakvo*, with the  $\phi$  and Case features transferred unvalued and unable to be externalized. Thus in the CP phase, the order between *koj* and *kogo/kakovo* can also be reordered for valuation, which allows the violation of (16) and explains the well-formedness of (26), hence, (24a):

- (26) [CP koj [kogo [kakvo [C [TP T<sub>{φ}</sub>] [v\*P ⟨kogo⟩] [⟨kakvo⟩] [⟨koj⟩] [v\* [VP ... ]..]]  
 => koj<kogo<kakvo                      => kogo<kakvo<koj                      (=24a))

In (25) and (26), legitimate violations of Order Preservation follow, as I argued, from the precedence of valuation over Order Preservation for externalization.

As for the well-formedness of (24b), where the order of *kogo* and *kakvo* is not preserved in the CP and higher v\*P edges, I argue that the violation of Order Preservation is attributable to the fact that the movement of *koj* from the higher v\*P edge to the CP edge violates the order of the three *wh*-phrases in the relevant edges: provided that Order Preservation applies to cyclically linearized SOs not partially but as a whole, the “legitimate” violation of Order Preservation by *koj* for the valuation of the φ-features of T and its Case feature also allows the order of *kogo* and *kakvo* to be reordered together with *koj* without violating (16); to put it differently, the order in the CP edge comes out as the legitimate order for externalization thanks to the valuation, which accounts for the violation of (16) by *kogo* and *kakvo*. Consequently, (27) as well as (26) is ruled in as well-formed at the SM interface and VP superiority is not observed:

- (27) [CP koj [kakvo [kogo [C [TP T<sub>{φ}</sub>] [v\*P ⟨kogo⟩] [⟨kakvo⟩] [⟨koj⟩] [v\* [VP ... ]..]]  
 => koj<kakvo<kogo                      => kogo<kakvo<koj                      (=24b))

Note that the proposed analysis can explain the AC tax effect under the assumption of free Merge, where neither Shortest Move nor Attract Closest plays a role in constraining movement. The effect in question follows as one consequence of the precedence of valuation over Order Preservation for externalization: the legitimate violation of Order Preservation by a subject *wh*-phrase for valuation allows the violations by other *wh*-phrases.

## 5 D-linking and superiority

It has been noted that superiority violations do not always incur ill-formedness. One illustration of such well-formed superiority violations is found in *wh*-interrogatives with D-linked *wh*-phrases. Consider (28), cited from Pesetsky (1987, 2000):

- (28) a. Which book did which person buy? (cf. (1))  
 b. Which book did you persuade which man to read? (cf. (13))

The well-formedness of (28) will fall into place if D-linked *wh*-phrases, as Pesetsky (1987, 2000) argues, can be interpreted without moving into CP: D-linked *wh*-phrases are not quantifiers and need not form operator-variable chains for interpretation at the CP edge. For instance, consider (28a). As illustrated in (29),

the derivation of (28a) is analyzed on par with that of (30): the movement of *which book* from the  $v^*P$  edge before the movement of *which person* allows  $T_{\{\phi\}}$  to agree with the subject (see (7)); unlike in the derivation of (1), however, the subject, being a D-linked *wh*-phrase, can move to the edge of TP without causing interpretive problems at the CI interface, hence not moving over *which book* in the CP edge:

(29) [CP *which book* [C [TP *which person* [ $T_{\{\phi\}}$  [ $v^*P$  ⟨*which book*⟩ [⟨*which person*⟩ [ $v^*$  [ $v_P$  buy ⟨*which book*⟩]..]

(30) What did the man buy?

The argument that D-linked *wh*-phrases are allowed not to move to the CP edge is supported by the fact that (28a), unlike (31), cannot have a pair-list answer; only a single pair reading is available for (28a) (Barss 2000):

(31) Which person bought which book? (pair-list/single-pair answers)

Provided that a pair-list answer is possible only for *wh*-phrases in the CP edge (as argued in, say, Bošković 2002), lack of a pair-list answer in (28a) endorses the argument that the D-linked *wh*-phrase *which person* does not move to the CP edge.

The proposed analysis of superiority violations by D-linked *wh*-phrases can also explain the ill-formedness of (32a), where the D-linked object does not cancel superiority effects (Ishii 2000):

(32) a. \*Which book did who read?    b. Who read which book?

In (32), the non-D-linked *wh*-subject *who* has to move to the CP edge for operator-variable interpretation at the CI interface. Thus, unlike a D-linked *wh*-subject, it has to be internally merged with CP, not with TP, for legitimate interpretation after *which book* has moved into CP and it has agreed with  $T_{\{\phi\}}$ ; being in the outermost edge of CP, it is externalized in its derived position, which explains the well-formedness of (32b) and the ill-formedness of (32a). If *who* were moved to the CP edge from the  $v^*P$  edge prior to *which book* to derive (32a), it would form an operator-variable chain, which satisfies a CI interface condition; the  $\phi$ -features of T and the Case feature of *who*, however, would be left unvalued for the intervention by the partially moved *which book* in the  $v^*P$  edge and the derivation would crash for the undervaluation at the SM interface, as we have argued with (1b,b'). Syntax thus cannot generate (32a) in a way satisfying both CI and SM interface conditions.

Likewise, (28b) will turn ill-formed if the indirect object is not a D-linked *wh*-phrase; the object, being non-D-linked, has to move to the edge of CP in (33a) and the ill-formedness is explained on par with (13b): ordering contradictions will

arise in the course of the derivation through movement of both *which book* and *who* to the CP edge, with the result that (33a) is ruled out for the violation of Order Preservation (see (15b)). The examples in (34) are explained likewise:

- (33) a. \*?Which book did you persuade who to buy?  
 b. Who did you persuade to buy which book? (Ishii 2000: 315)
- (34) a. \*Which book did you give who?  
 b. Who did you give which book? (Barss and Lasnik 1986: 349)

The cancellation of superiority effects by D-linked *wh*-phrases can correctly follow from the analysis I have proposed in this paper.<sup>10</sup>

## 6 Conclusion

In this paper, I have maintained that superiority effects are attributable to interface conditions imposed by the SM interface (i.e., valuation and ordering) under the assumption of free Merge and argued that the effects can be given a principled account by the UG-external factor (2a). I have demonstrated that superiority effects can be explained by the interplay of free Merge (bare minimum UG) and the SM interface system, concluding that language is a perfect system satisfying third-factor principles, with the convergence or crash of derived SOs only determined by interface conditions, as assumed by the Strong Minimalist Thesis.

To the extent that the proposal in this paper is correct, it suggests that ill-formed examples in A-movement like (35) can also be generated by Merge without any problem (here, XP and YP in (4) are DPs) but that the ill-formedness also follows from violations of interface conditions, hence from the factor (2a):

- (35) a. \*A record was given Ann (by Debbie). (Stowell 1981: 325)  
 b. \*John seems that it was told that his mother was beautiful.

I argue in Mizuguchi (2014a) that A-movement superiority effects are in fact reducible to interface conditions. I demonstrate that in (35), the successive-cyclic movement of a DP to a phase edge on its way to the TP edge for cyclic Transfer

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<sup>10</sup> Well-formed superiority violations are also observed with non-binary *wh*-questions. Consider (i):

- (i) a. What did who give to whom?  
 b. ?Who did who give what to?  
 c. \*What did who give to Mary? (Pesetsky 2000: 49)

In this paper, however, I have to leave detailed exploration of (i) for future.

yields a copy with an unvalued Case feature in its externally merged position, which is transferred unvalued, violating interface conditions and causing crash at the interfaces.<sup>11</sup> Superiority effects observed in A- and A'-movements can thus be given a unified, extrasyntactic account in terms of the interfaces through the transfer of unvalued features, which strengthens the claim that the properties of language follow from the interaction of free Merge and (2).

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<sup>11</sup> In Mizuguchi (2014a), I assume that undervaluation causes crash at both CI and SM interfaces. Given our discussion in this paper, however, the undervaluation of Case features is irrelevant to the CI interface and causes ill-formedness only at the SM interface; (35) is phonologically ruled out.

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