CONDITIONS ON COPY REALIZATION

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This paper examines four articles out of the volume, focusing on the following issues: (i) preference for pronunciation of the topmost copy, (ii) implementation of copy deletion/realization within the phase-based model, and (iii) motivation for morphological reanalysis of copies. While Bošković and Nunes derive (i) from economy considerations, Van Koppen attempts to reduce it to an asymmetry between copies with respect to their feature structures. Addressing the issue (ii), Fujii attempts to accommodate copy deletion within the phase-based framework. Kandybowicz discusses (iii) and demonstrates that morphological reanalysis occurs only when it is phonologically triggered. After examining some advantages and disadvantages of these studies, this paper suggests an alternative analysis that deals with the three issues.*

Keywords: copy deletion/realization, phase, fusion, linearization, feature valuation

1. Introduction

The book under review grew out of the workshop “The Copy Theory of Movement on the PF Side,” held at Utrecht University on December 14–15, 2004. This is a collection of 10 separate papers that deal with empirical and conceptual issues in the copy theory of movement, initially advocated in Chomsky (1995a), with particular focus on the computations in the phonological component. It begins with an introduction by the editors, which

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provides an overview of the copy theory of movement and questions that arise with respect to its relation to the PF side of the grammar. The volume is divided into four parts, each of which deals with a specific issue concerning the treatment of copies.

Part I “The copy theory of movement on the PF side” consists of just one paper (“The copy theory of movement: A view from PF” by Željko Bošković and Jairo Nunes). This paper plays a pioneering role in the volume. In addressing central issues such as how and why copy deletion takes place, and why the head of a chain is given priority in pronunciation, it advocates a theoretical apparatus to account for various patterns in the phonetic realization of copies.

Part II “On multiple realization of copies” contains four papers: “Double realization of verbal copies in European Portuguese emphatic affirmation” by Ana Maria Martins; “On fusion and multiple copy spell-out: The case of verbal repetition” by Jason Kandybowicz; “Verb copying in Mandarin Chinese” by Lisa Lai-Shen Cheng; and “Dutch ᵇs-prolepsis as a copying phenomenon” by Norbert Corver. As the title suggests, this part focuses on cases where a lexical item is pronounced more than once in a sentence. Based on discussion of data from languages like European Portuguese, Nupe, Chinese, and Dutch, these papers attempt to demonstrate that multiple copy realization is made possible as a result of fusion, a morphological reanalysis process that makes some copies invisible to Kayne’s (1994) Linear Correspondence Axiom.

Part III “On lower copy realization” has two papers: “Free word order and copy theory of movement” by Sandra Stjepanović, and “Variable pronunciation sites and types of wh-in-situ” by Chris H. Reintges. Here cases are examined in which the head of a chain is subject to deletion. Stjepanović argues that lower copy realization in Serbo-Croatian is due to a PF requirement whereby a constituent bearing new information focus is given priority in pronunciation. On the basis of Coptic wh-in-situ phenomena, Reintges attributes lower copy realization to an economy filter similar to the Doubly-Filled Comp Filter in English.

The papers in Part IV “Further issues: cyclicity, accessibility and unavailability of copying” extend the scope of the investigation to interactions between the copy theory of movement and other properties of grammatical computation. Adopting the phase and multiple Spell-Out model, Tomohiro Fujii’s paper (“Cyclic chain reduction”) proposes that copy deletion applies in a cyclic manner. Marjo van Koppen’s paper (“Agreement with (the internal structure of) copies of movement”) casts doubt on the main presuppo-
sition underlying the copy theory of movement, that is, the non-distinctness between copies. Treating reflexives as phonetically realized copies, Norbert Hornstein’s paper (“Pronouns in a minimalist setting”) argues that the complementarity between reflexives and pronouns can be accounted for by considering derivations involving movement and reflexivization to be more economical than those involving pronoun use.

Due to the variety of topics and phenomena as well as space limitations, a detailed examination of each paper would not be appropriate. Instead, this article discusses several papers selectively. Section 2 deals with Bošković and Nunes’s paper. It is an influential work in that it provides both a theoretical and empirical framework for the other papers in this volume. I will review their analysis in some detail, and raise three issues that may need reconsideration: (i) the (ir)relevance of economy to the asymmetric application of copy deletion; (ii) the need for a reexamination of the copy deletion machinery within the phase-based approach to syntactic derivation; and (iii) the motivation for fusion. Section 3 pays attention to the papers dealing with these issues. Van Koppen’s paper will be discussed in relation to (i), Fujii’s paper in relation to (ii), and Kandybowicz’s paper in relation to (iii). Section 4 attempts to provide an alternative analysis that will account for these issues. Section 5 summarizes and concludes the article.


Bošković and Nunes discuss conditions that govern the phonetic realization of copies, and propose mechanisms that implement copy deletion. Section 2.1 summarizes these mechanisms and their application to standard cases of copy deletion. Section 2.2 turns to constructions that involve seemingly exceptional patterns of copy realization, namely, multiple copies and lower copy realization. Section 2.3 raises possible questions and problems.

2.1. Conditions on Copy Deletion

The initial assumption adopted in the copy theory of movement is that a category undergoing movement leaves a copy (or copies) in the position(s) from which it is moved, and that the final structure of a sentence is derived by deleting all but one copy in the phonological component. The passive sentence (1), which represents the simplest case of DP-movement, has the derivational history given in (2a–c):

(1) The book was found.
(2) a. was found [the book]
   b. [The book], was found [the book],
   c. [The book], was found [the book],

The DP *the book*, initially merged with the verb (see (2a)), moves to Spec-
TP, yielding the (pre-Spell-Out) structure (2b). Copy deletion is applied in
the phonological component as indicated by (2c) to derive the surface word
order.

(2c), however, does not represent the only way to apply copy dele-
tion. There are other logically possible patterns. One could conceive of
a case like (3a) where no copy is deleted, and hence pronunciation of more
than one copy occurs. Another possibility is what may be called “scattered
deletion,” by which different parts of different copies are deleted, as illus-
trated by (3b). A third possibility is to delete the higher copy rather than
the lower as in (3c):

(3) a. [The book], was found [the book],
   b. [The book], was found [the book],
   c. [The book], was found [the book],

In light of these (unrealized) possibilities, Bošković and Nunes address the
following questions:

(4) a. Why is it generally not allowed to pronounce more than one
copy?
   b. Why is scattered deletion disallowed in most cases?
   c. Why is there a preference for pronouncing the topmost copy
while deleting others?

Capitalizing on an idea originally developed in Nunes (1995, 1999, 2004),
Bošković and Nunes attempt to answer (4a) by appealing to a convergence
requirement on derivation. Adopting Kayne’s (1994) Linear Correspon-
dence Axiom (LCA), they observe that a syntactic object fails to converge if
its elements are not linearized. The LCA is meant to regulate the mapping
of a hierarchical structure to a linear one in order to ensure that all elements
contained in a syntactic object are properly linearized at the PF interface:

(5) Linear Correspondence Axiom (Kayne (1994: 33))

Let X, Y be nonterminals and x, y terminals such that X domi-
nates x and Y dominates y. Then if X asymmetrically c-com-
mands Y, x precedes y.

The application of the LCA to a structure like (3a) yields contradictory re-
results with respect to the ordering of lexical items, which in turn prevents
the whole structure from being linearized. Since the DP *the book* in Spec-
TP asymmetrically c-commands *was* in (3a), the LCA requires both *the* and
book to precede was. However, since was asymmetrically c-commands the lower occurrence of the book, it should precede both the determiner and head noun. This leads to a contradiction: was simultaneously precedes and follows the same set of lexical items the and book. Likewise, the higher DP the book asymmetrically c-commands the non-distinct copy in a lower position, giving rise to another contradiction: the book precedes itself. Consequently, (3a) cannot be linearized and the derivation crashes.

Bošković and Nunes argue that deletion comes into play in order to avoid this undesirable result. If the lower copy of the book in (3a) is deleted, the ordering between the book and was is unambiguously determined, and the LCA will dictate that the and book precede was. Moreover, the problem of reflexive precedence does not arise. Nevertheless, deletion of the lower copy is not the only option. It has yet to be determined why options (3b, c) are not available. This in turn leads to the issues noted in (4b, c).

Bošković and Nunes’s solution is contingent on the economy-based approach developed in Nunes (1995, 1999, 2004), where it is argued that copy deletion should be applied as few times as possible. According to Bošković and Nunes, the version of copy deletion (called Chain Reduction¹) designed to comply with this condition will resolve the issue raised in (4b) successfully. Compare (2c) and (3b), both derived from the same structure, and both free of the problems faced by (3a). They are properly linearized. Nonetheless, while (2c) yields the well-formed result (6a), the output of (3b) is the ill-formed (6b):

(6) a. The book was found.
   b. *The was found book.

Since the derivations in (2c) and (3b) do not encounter a convergence problem, they qualify for assessment in terms of economy. (2c) involves just one application of deletion, but (3b) involves two. Therefore, the latter is excluded for being less economical than the former.

We now turn to question (4c). (2c) and (3c) are equally economical in that they both involve one application of copy deletion. Still, while the former yields the grammatical sentence (6a), the latter results in ungrammaticality (7):

(7) *Was found the book.

¹ The precise definition of Chain Reduction is given below:

(i) Chain Reduction (Nunes (1999: 27))

Delete the minimal number of constituents of a nontrivial chain CH that suffices for CH to be mapped into a linear order in accordance with the LCA.
Bošković and Nunes argue that this asymmetry can be attributed to different derivational costs with respect to elimination of formal features in the phonological component. According to Chomsky (1995b), although formal features sent to the phonological component after Spell-Out feed morphological computations, they must be eliminated before the derivation reaches the articulatory-perceptual interface, as they are not legible there. According to Bošković and Nunes, the derivation yielding (7) is more costly than that of (6a) because the former requires more applications of feature elimination than the latter.

Let us now examine how the contrast between (6a) and (7) is accounted for in Bošković and Nunes’s analysis. The derivation starts from the structure (8a), in which the DP the book carries an uninterpretable Case feature. This DP moves to Spec-TP, leaving its copy behind (see (8b)). At this point, the Case feature carried by the upper copy is checked under the Spec-Head relation and rendered invisible (see (8c)):2

\[
\begin{align*}
(8) & \quad \text{a.} \quad \text{was found [the book]-CASE} \\
& \quad \text{b.} \quad \text{[The book]-CASE was found [the book]-CASE} \\
& \quad \text{c.} \quad \text{[The book]-CASE was found [the book]-CASE}
\end{align*}
\]

Two options are available when (8c) is sent to the phonological component:

\[
\begin{align*}
(9) & \quad \text{a.} \quad \text{[The book]-CASE was found [the book]-CASE} \\
& \quad \text{b.} \quad \text{[The book]-CASE was found [the book]-CASE}
\end{align*}
\]

In (9a), the lower copy is deleted along with the Case feature. Since the resulting structure does not contain any offending Case feature,3 the derivation converges and the grammatical sentence (6a) is obtained. If, on the other hand, deletion is applied to the higher copy as in (9b), the resulting structure does not constitute an optimal output since an offending Case feature remains in the lower copy. To eliminate this feature, (9b) needs one more application of feature deletion, which Nunes (2004: 31) calls Formal Feature Elimination (FF-Elimination). This is shown in (10):

\[
(10) \quad \text{[The book]-CASE was found [the book]-CASE}
\]

This derivation, however, is less economical than (9a) and must be ruled

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2 Following Bošković and Nunes’s notation, unchecked features are given in bold type and checked/deleted ones in subscripts.

3 Extending Chomsky’s (1995b) checking theory, Bošković and Nunes assume that uninterpretable formal features, when checked, are made invisible not only at LF but at PF. On this assumption, since the Case feature of the topmost copy has been checked in the narrow syntax and become invisible, it does not cause the derivation to crash at the PF interface.
out. The preference for lower copy deletion is thus reduced to an economy condition on deletion in the phonological component.

2.2. Seemingly Exceptional Cases

Chain Reduction and FF-Elimination explain why pronunciation of the highest copy is preferred. However, while cases like (3a–c) are ruled out in English, it is reported that such seemingly exceptional patterns are attested in other languages.

2.2.1. Multiple Copy Realization

Some languages are known to allow the phonetic realization of more than one copy of the same syntactic object in a single sentence (multiple copy realization). One case discussed in Bošković and Nunes is the so-called wh-copying construction found in German, Afrikaans, Romani, Frisian, and Child English (cf. du Plessis (1977), Hiemstra (1986), McDaniel (1986), Thornton (1990), Fanselow and Mahajan (2000), among others). In this construction, an intermediate wh-copy as well as the topmost one can be pronounced, as illustrated below:

(11) German wh-copying construction

\[ Wen \text{ glaubt } Hans \text{ wen Jakob gesehen hat? } \]
\[ whom \text{ thinks } Hans \text{ whom Jakob seen has } \]

‘Who does Hans think Jakob saw?’

(Bošković and Nunes (under review: 48))

Nevertheless, as discussed in section 2.1, a structure containing more than one pronounced copy should not linearize, and hence fail to converge. An immediate question is why (11) linearizes successfully despite the fact that it contains two occurrences of wen ‘whom.’

Following Nunes (1999, 2004), Bošković and Nunes propose to solve this problem by means of a morphological reanalysis operation, fusion, postulated in Distributed Morphology (Halle and Marantz (1993)). Fusion is a post-syntactic operation that takes two sister terminal heads under a single category node as input and converts them into a single terminal node. The resulting object constitutes an opaque domain in which no further morphosyntactic operation can apply. In regard to the structure (11), Bošković and Nunes argue that one of the copies undergoes fusion and becomes invisible to the LCA. Specifically, the wh-movement in (11) proceeds via head adjunction to C, as illustrated in (12a). The second occurrence of WH is then fused with a [−wh] C in the morphological component, forming a blended terminal head (as represented by “# … #” in (12b)): 
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(12) a. \([CP [c^0 WHi [c^0 Q]] \ldots [CP [c^0 WH_i [c^0 C_{[-wh]}]] [TP \ldots WH_i \ldots]]\]

b. \([CP [c^0 WHi [c^0 Q]] \ldots [CP [#[c^0 WH_i [c^0 C_{[-wh]}]#]] [TP \ldots WH_i \ldots]]\]

Since the fused \(wh\)-copy is not subject to the LCA and does not prevent linearization, it is exempt from deletion. Apart from this copy, (12b) still has two \(wh\)-copies visible to the LCA, the topmost WH and the lowest one, but the latter is deleted by Chain Reduction. Consequently, two copies out of three are phonetically realized.

2.2.2. Lower Copy Realization and Scattered Deletion

Another exceptional case, called lower copy realization, involves a copy phonetically realized in a lower position rather than the head position of a chain. Consider the following examples:

(13) Romanian

a. Cine ce precede?
   who what precedes
   ‘Who precedes what?’

b. *Cine precede ce?
   who precedes what

(Bošković and Nunes (under review: 17))

Romanian is a language in which multiple \(wh\)-fronting occurs. Two \(wh\)-phrases are obligatorily moved to sentence-initial position in (13a). Otherwise, the sentence becomes ungrammatical as in (13b). Still, there are cases where multiple \(wh\)-fronting is blocked:

(14) a. Ce precede ce?
   what precedes what
   ‘What precedes what?’

b. *Ce ce precede?
   what what precedes what

(Bošković and Nunes (under review: 17))

Bošković and Nunes observe that the ungrammaticality of (14b) is attributable to a PF constraint against consecutive homophonous \(wh\)-phrases. Following Franks (1998), they argue that this constraint can be circumvented by deleting the higher copy of the object \(wh\)-element, leaving only its lower copy instead, as illustrated in below:

(15) \([Ce \, ee_i \, precede \, ce_i]\]

Generalizing from data like (14a, b), they conclude that, although pronunciation of the topmost copy is preferred as most economical, the economy condition can be overridden if (and only if) lower copy realization saves a derivation that would otherwise crash.
Yet another example of exceptional deletion discussed in Bošković and Nunes is “scattered deletion,” attested in languages such as Bulgarian (see also Bošković (2001)). Consider the following examples:\(^4\)

(16) Bulgarian
a. Dal \( li \ si \ mu \ (gi) \ parite? \)
   given Q are him-Dat them the-money
   ‘Have you given him the money?’

b. \(*Si \ mu \ (gi) \ dal \ li \ parite?\)
   are him-Dat them given Q the-money

(Bošković and Nunes (under review: 37))

Two properties of Bulgarian clitics are relevant to the present discussion. First, auxiliary and pronominal clitics (\(si\) ‘are,’ \(mu\) ‘him-Dat,’ and \(gi\) ‘them’) form a complex head with the main verb and undergo head movement with it. Second, cliticization in Bulgarian is subject to a phonological requirement whereby clitics must \textit{encliticize}. (17b) is therefore ruled out because the clitic cluster \(mi go\) ‘me-Dat it-Acc’ does not have a host onto which it can attach:

(17) Bulgarian
a. Petko \( mi \ go \) dade včera.
   Petko me-Dat it-Acc gave yesterday
   ‘Petko gave me it yesterday.’

b. \(*Mi \ go \) dade Petko včera.

(Bošković and Nunes (under review: 36))

Bearing these points in mind, let us examine Bošković and Nunes’s analysis of the contrast in (16a, b). They assume that the complex head \(si+mu+gi+dal\) ‘are+him-Dat+them+given’ left-adojins to the interrogative complementizer clitic \(li\), leaving a copy behind. This movement results in the following structure:

(18) \([si \ mu \ gi \ dal], \ li \ [si \ mu \ gi \ dal], \ parite\)

As (16b) illustrates, deletion of the lower copy, though clearly the most economical option, leads to ungrammaticality due to the phonological requirement specific to Bulgarian. Deleting the higher copy while realizing the lower one is also illicit, because it leaves no phonetically realized element onto which the clitic cluster \(li \ si \ mu \ gi\) ‘Q are him-Dat them’ can

\(^4\) The following abbreviations are employed throughout the present article: Acc = accusative; Dat = dative; Nom = nominative; Top = topic; Q = question; 2P = second person; 3P = third person; SG = singular; PL = plural.
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The phonological system then resorts to scattered deletion, as illustrated below:

(19) [si mu gi dal], li [si mu gi dal], parite

Here partial deletion of the higher copy prevents a violation of the phonological condition on Bulgarian cliticization and provides the complementizer clitic li with a host element dal ‘given.’ Simultaneously, the clitic cluster si mu gi ‘are him-Dat them’ can be realized after li, allowing the former to attach to the latter.

2.3. Problems

Although the mechanisms proposed by Bošković and Nunes are inventive and appealing, several aspects are potentially problematic. For one thing, the preference for deleting lower copies is derived from economy considerations in their analysis. However, as pointed out by Oku (2009), this approach presupposes a type of global economy. Recall that the surface word order of a passive sentence is obtained by deleting the lower copy of the subject (see (2c)). This pattern of copy deletion is chosen as the most economical option because it involves the fewest applications of deletion. In order to make this calculation, however, the computational system must also evaluate the frequency of copy deletion in other possible derivations such as (3a–c). This makes linguistic computation unnecessarily complex.

There is another factor that increases the computational complexity in Bošković and Nunes’s model. Their analysis presupposes that copy deletion is applied after the entire sentence is constructed. In standard cases of successive-cyclic wh-movement, copy deletion is thus applied to a structure like the one given in (20b):

(20) a. What do you think Mary ate?

b. [CP2 what, do [TP2 you think [CP1 what, C [TP1 Mary ate what,]]]]

On the other hand, Chomsky (2000, 2001, 2004, 2008) assumes that derivations proceed in a piecemeal fashion, targeting a smaller portion of the structure, the phase, in order to reduce the computational burden. Viewed in this light, Bošković and Nunes’s analysis imposes a considerable burden on the computational system.

It even makes a wrong prediction within the phase-based model, where a derivation is interpreted/evaluated step by step on the basis of phases. Consider the following structure, where HP and ZP are phases:

(21) [ZP Z [WP ... [HP α [H YP]]]]

Chomsky (2001: 14) proposes the following condition with respect to interpretation/evaluation. Here, Ph1 means a strong phase and Ph2 means a
next higher strong phase:

(22) Ph1 is interpreted/evaluated at Ph2.

Applied to (21), (22) entails that HP is subject to interpretation/evaluation once ZP is assembled by merging Z with WP. Chomsky further assumes that at this very point, YP undergoes Spell-Out and is handed over to the phonological component, after which it is inaccessible to further syntactic operations.\(^5\)

With this as background, let us return to (20a). It is derived as follows in the phase-based model:\(^6\)

(23) a. \([\text{CP1 C1 [TP1 Mary T1 [vP1 what, v1 [vP1 \text{ ]]} [vP1 ate what,]]]} \text{ Spell-Out}\]

b. \([\text{vP2 v2 [vP2 think [CP1 what, C1 [TP1 \text{ ]]} [TP1 Mary T1 [vP1 what, v1]]}} \text{ Spell-Out}\]

c. \([\text{CP2 C2 [TP2 you T2 [vP2 what, v2 [vP2 \text{ ]]} [vP2 think [CP1 what, C1]]}} \text{ Spell-Out}\]

d. \([\text{CP2 what, C2-do [TP2 you T2 [vP2 what, v2]]}} \text{ Spell-Out}\]

When the phase CP1 is constructed, VP1 is spelled out and sent to the phonological component, as illustrated in (23a). At the next higher phase vP2, Spell-Out applies to TP1 (see (23b)). Likewise, when the derivation reaches (23c), VP2 is spelled out. Finally, when the wh-phrase moves to Spec-CP2, (23d) undergoes Spell-Out.

Computations in the phonological component including linearization are performed on each unit that has been spelled out. Since (23d) contains two copies of *what*, Chain Reduction applies and the lower copy is deleted. However, reduction of a wh-chain does not take place in the other spelled-out units, VP1, TP1, and VP2. These contain only one copy of *what* respectively, and no violation of the LCA occurs. Consequently, each unit is appropriately linearized with a wh-phrase being phonetically realized. This leads to an incorrect prediction whereby the wh-phrase is pronounced not only in the topmost position but also in the lower ones:

(24) *What do you think what Mary what ate what?*

\(^5\) Crucially, YP is spelled out and becomes inaccessible to further operations from outside, as soon as Z is merged with WP in (21). Put another way, Spell-Out applies to YP before operations at ZP take place (such as attraction of α to Spec-ZP).

\(^6\) Strictly speaking, the verbs *ate* and *think* move to v1 and v2 respectively. We ignore these instances of movement, however, because they do not bear on the present discussion. Similarly, the copies of *Mary* (in vP1), *you* (in vP2), and *do* (in T2) are also omitted for the sake of expository convenience.
Finally, although Bošković and Nunes ascribe multiple copy realization to fusion, it is not clear what makes this operation available. For instance, while German has a *wh*-copying construction, English does not. If *wh*-copying is dependent on fusion, the diversity among languages with respect to its availability certainly calls for a principled account. Additionally, it is reported that German sentences with *wh*-copying also have long-distance extraction counterparts (Fanselow and Mahajan (2000), Felser (2004), among others):

(25) German
a. Weniglaubst du [CP t′i [C dass] [TP sie t liebt]]?  
   ‘Who do you believe that she loves?’

b. Weniglaubst du [CP wen [C Ø] [TP sie t liebt]]?  
   (Felser (2004: 565))

This alternation suggests that fusion is optional in German. However, unless the circumstances under which it is applicable are clarified, it remains an arbitrary process. A theory should thus be provided that sufficiently restricts its applicability in order to exclude arbitrariness.

3. Three Alternative Analyses

The previous section reviewed Bošković and Nunes’s article and pointed out three issues deserving close examination: (i) the computational complexity arising from an economy-based approach with regard to the asymmetric application of copy deletion; (ii) its (in)compatibility with a phase-based model of syntactic derivation; and (iii) the necessity of a restrictive theory of multiple copy realization. This section reviews three articles, each of which deals with one key issue: Van Koppen’s article (section 3.1) has to do with (i), Fujii’s (section 3.2) discusses (ii), and Kandybowicz’s (section 3.3) addresses (iii).

3.1. The Asymmetry between Copies: Van Koppen “Agreement with (the Internal Structure of) Copies of Movement”

Van Koppen provides an alternative account for the fact that lower copies usually undergo deletion, based on the agreement that holds between complementizers and coordinated subjects in Dutch and German dialects. She observes that the topmost and lower copies are intrinsically distinct: the latter are not a full copy of the former, but rather only a subpart of it. She argues that this distinction underlies the preference for lower copy deletion.
Some Dutch and German dialects exhibit a phenomenon called Complementizer Agreement (Haegeman (1992), Zwart (1993), among others). As illustrated below, the complementizer of the embedded clause agrees with the subject of that clause:

(26) Tegelen Dutch
Ich dink de-s doow morge kum-s.
‘I think that you will come tomorrow.’

(Van Koppen (under review: 328))

One notable contrast emerges when coordinated nominal categories appear as subject. The complementizer can either agree with the first conjunct (First Conjunct Agreement) or with the coordinated subjects as a whole (see (27a, b)). However, First Conjunct Agreement is impossible when the coordinate phrase is moved before the complementizer (see (28a, b)):

(27) Bavarian
a. … daβ-sd du und d’Maria an that-2P.SG [youSG and the Maria]2P.PL the Hauptpreis gwunna hab-ds.
first.prize won have-2P.PL
b. … daβ-ds du und d’Maria an that-2P.PL [youSG and the Maria]2P.PL the Hauptpreis gwunna hab-ds.
first.prize won have-2P.PL
‘… that you and Maria have won the first prize.’

(28) Bavarian
the first.prize won have-2P.PL
the first.prize won have-2P.PL
‘You and Maria I think that have won the first prize.’

(Van Koppen (under review: 330))

The agreement pattern in (27a) can be reduced to Agree between the complementizer and the first conjunct. More specifically, the complementizer is introduced into the derivation with an unvalued φ-feature. As a result of Agree with the second person singular pronoun du ‘you,’ the
φ-feature value of the complementizer is specified as second person singular. If, on the other hand, Agree takes place between the complementizer and the entire coordinate phrase, the former will exhibit plural agreement, as illustrated in (27b). The question is why the same mechanism is not available in (28). Before the coordinate phrase is preposed, the sentence has a structure parallel to that of (27a, b), where the coordinate phrase is positioned immediately after the complementizer. Why then does Agree not take place between the complementizer and the first conjunct?

To solve this puzzle, Van Koppen assumes (i) that a lower copy does not have an internal structure per se but is reduced instead to a bundle of φ-features of the moved category, and (ii) that Agree only takes place at Spell-Out. According to (i), when the entire coordinate phrase specified as second person plural is preposed as in (28a, b), the resulting structure looks like (29):

(29) [Du und d’Maria]i ... C0 <φ=2P.PL>i ...

Due to (ii), the complementizer enters into Agree only with the feature bundle <φ=2P.PL> and is realized as daß-ds ‘that-2P.PL.’

There are, however, some problems with this analysis. First, it is not sufficiently specified how movement serves to reduce a copy to a φ-feature set. Given the null hypothesis of copy theory that the moved element is left unaffected, it is unclear which interface condition requires the pre-Spell-Out reduction of lower copies. Second, the idea of “delayed Agree” makes an incorrect prediction in relation to the grammaticality of a sentence involving remnant movement. Consider (30) and its (partial) derivation in (31):

(30) He doesn’t understand how serious the health issues are.
(31) a. T<υφ> BE [AP the health issues how serious]
   b. [TP the health issuesi T<υφ> BE [AP <φ=3P.PL>i how serious]]
   c. [CP [AP <φ=3P.PL>i how serious]j C [TP the health issuesi
     T<υφ> BE <F<AP>j>]]
   d. [νP v [νP understand [CP [AP <φ=3P.PL>i how serious]j C
     [TP ]]]] Spell-Out

At the stage of (31a), T with an uninterpretable φ-feature (indicated as <υφ>) is merged. In Van Koppen’s analysis, the subject moves to Spec-TP prior to Agree, giving rise to the structure (31b), and the copy of the subject will be reduced to a φ-feature set <φ=3P.PL>. Subsequent wh-movement of the AP remnant yields (31c). When the matrix νP phase is assembled, Spell-Out applies to the embedded TP (see (31d)). At this point, Agree
allegedly applies. Notice, however, that this analysis predicts that the lower copy of the AP should also be reduced to a feature set (indicated as \(<F_{AP}>\) in (31c, d)), its internal structure being rendered inaccessible to Agree. Since T cannot have its \(<uφ>\) checked against the reduced copy of the subject DP, (30) will be incorrectly ruled out.

Van Koppen’s implementation of First Conjunct Agreement cannot be maintained in its present form, but her analysis constitutes an alternative to Bošković and Nunes’s (this volume) model of copy deletion. Whereas they associate the preference for lower copy deletion with economy considerations, she claims that it is reducible to the fundamental distinctness of a lower copy from the topmost one. Since the lower copy consists of only φ-features (i.e. no phonological features), it is intrinsically ineligible for pronunciation. As a result, neither economy conditions nor copy deletion need be postulated. Given the shortcomings of the economy-based approach (see section 2.3), Van Koppen’s idea deserves further consideration. The question is how the asymmetry between copies should be captured. This issue will be taken up again in section 4.2.

3.2. The Phase-Based Theory of Copy Deletion: Fujii “Cyclic Chain Reduction”

As discussed in section 2.3, Bošković and Nunes (this volume) assume that copy deletion applies after the whole derivation is completed. In contrast to this global model of copy deletion, Fujii explores the possibility of assimilating it to a cyclic model of syntactic derivation. Employing the notions of phase and Spell-Out proposed in Chomsky (2001), he argues that (32) is derived as in (33): 7

(32) What do you think Mary ate?

(33) a. \([\text{CP}_2 \text{ what}_i \text{ do you think } [\text{CP}_1 \text{ what}_i [\text{TP Mary ate what}_i]]]\)
b. \([\text{CP}_2 \text{ what}_i \text{ do you think } [\text{CP}_1 \text{ what}_i [\text{TP Mary ate what}_i]]]\)
c. \([\text{CP}_2 \text{ what}_i \text{ do you think } [\text{CP}_1 \text{ what}_i [\text{TP Mary ate what}_i]]]\)
\(\text{[TP Mary ate]}\) Spell-Out
d. \([\text{CP}_2 \text{ what}_i \text{ do you think } [\text{CP}_1 \text{ what}_i]]\)

A caveat is in order on Fujii’s account with respect to the ordering between wh-movement, Chain Reduction, and Spell-Out. He assumes that Chain Reduction and Spell-Out are applied to CP1 after wh-movement to Spec-CP2, contrary to Chomsky’s (2001) view that Spell-Out occurs prior to the

7 Fujii does not refer to vP phases, though this does not affect his argument.
relevant step of *wh*-movement. Bearing this in mind, let us examine the derivation in (33). First, what moves up to Spec-CP2, as illustrated in (33a). Chain Reduction applies to CP1 at this point, and the lowest copy of what undergoes deletion (see (33b)). Spell-Out then applies, sending the embedded TP (the domain of phase CP1) off to the phonological component (see (33c)). Chain Reduction applies to CP2 as well, deleting what in Spec-CP1 (see (33d)). Finally, the remaining part of (33d) is spelled out.

Fujii’s analysis is significant in that it addresses the issue of reducing computational complexity. Nevertheless, there are potentially problematic aspects as well. For example, notice that Chain Reduction precedes Spell-Out in his analysis of *wh*-movement. Chain Reduction was originally postulated as a means for removing copies that prevented linearization. At the same time, linearization is a phonological process that maps a hierarchical structure to a linear one in accordance with the LCA. On the other hand, computations in the narrow syntax are meant to construct hierarchical syntactic objects independently of linearization. Given these considerations, a pre-Spell-Out application of Chain Reduction does not seem to be sufficiently motivated.8

Although pre-Spell-out Chain Reduction is untenable, the alternative is not promising either. As discussed in section 2.3, post-Spell-Out Chain Reduction in a phase-based model ends up predicting wrongly that a sentence like (24) should be well-formed, with the lower copies of what being unexpectedly pronounced:

(24) *What do you think what Mary what ate what?

It is therefore necessary to resolve this quandary in order to maintain a phase-based approach. In section 4.3 I will propose an alternative analysis that meets this requirement.

3.3. Motivating Fusion: Kandybowicz “On Fusion and Multiple Copy Spell-Out: The Case of Verbal Repetition”

Based on data from verbal repetition in Nupe, Kandybowicz adds some refinement to Nunes’s (1999, 2004) analysis of multiple copy realization. Nupe verbal repetition constructions like (34) are emphatic declaratives that assert the truth-value of a proposition or a presupposition:

8 Fujii suggests in this regard that Chain Reduction may not necessarily involve actual copy deletion but instead only mark relevant copies for deletion. Still, this would also entail that pre-Spell-Out operations are carried out while anticipating linearization.
Kandybowicz claims that (34) involves verb raising, and that the second token of the verb is a phonetically realized copy of a raised one.

While adopting the fusion-based approach to multiple copy realization advanced by Nunes (1999, 2004), Kandybowicz departs from it in two respects. First, while Nunes’s analysis does not specifically refer to the motivation for fusion, Kandybowicz proposes that fusion is triggered by phonological and/or prosodic requirements. Secondly, he argues that the invisibility of fused copies to the LCA is a stipulation forced by theory-internal considerations. As an alternative, he suggests ascribing multiple copy realization to the distinctness of a fused copy from a non-fused one. He observes that, in the verbal repetition construction, some prosodic effects can be detected on the lower copy but not on the higher one. In the following examples, tones on the lower copy tend to be somewhat depressed compared with those on the higher one:

(35) Nupe

a. Wun nú nú.
   3P.SG be sharp be sharp
   ‘It IS sharp.’

b. Nānā́ wā́ róma wā́.
   Nana want soup want
   ‘Nana DOES want soup.’

(Kandybowicz (under review: 142–143))

While the verbs nú ‘be sharp’ and wā ‘want’ are lexically specified as bearing a high tone, tonal lowering takes place on the second verbal occurrence, such that it surfaces with a mid tone.

Kandybowicz attributes the relevant tonal change to fusion of the lower verbal copy with a suprasegmental entity located in a functional head, namely, Focus (Foc). This element (called floating tone) is devoid of segmental content, and cannot be phonetically realized on its own. Instead, it requires an overt prosodic element onto which it can be “docked.” The docking is attained by raising the verbal root to Foc and subsequently fusing the two elements. These processes are illustrated by the following diagrams, where the symbol √ stands for the verbal root, ˚ indicates a floating low tone hosted by Foc, and # indicates the boundary between terminal nodes:
Fusion in (36b) enables the floating low tone to be coarticulated with the tone on the verb. Thus in (35a, b), tonal coarticulation converts the high tone borne by a lower verbal copy to a mid tone. Viewed in this light, fusion is a process that occurs in a highly restricted environment, that is, one which is triggered by a phonological requirement that would otherwise not be satisfied.

Fusion in Nupe constructions entails that a fused verbal copy is morphophonologically distinct from one that does not undergo this process. The former undergoes a tonal change whereas the latter does not. Kandybowicz argues that the dichotomy between distinct and non-distinct copies is the primary factor that underlies multiple copy realization. This dichotomy is also intrinsic to Nunes’s (1999, 2004) theory of chain linearization: given that phonetic realization of non-distinct copies ends up in linearization failure, Chain Reduction will delete all copies but one to attain the desired result. A natural corollary of this reasoning is that if two or more copies are distinct in any way, they will be exempt from deletion. Kandybowicz concludes that his analysis deals with multiple copy realization by means of a device that is already present in the copy theory of movement without appealing to additional assumptions such as the invisibility of fused copies.

Kandybowicz’s analysis offers a principled account of the motivation for fusion by associating it with an interface condition. It is triggered by a phonological requirement that would otherwise not be satisfied, and produces an output that is legible to the articulatory-perceptual system. This characterization has significant consequences that deserve further elaboration and development. In particular, it opens up the possibility of unifying an account of lower copy realization with that of multiple copy realization. This will be taken up again in section 4.4, where some of its implications will be
4. Toward an Alternative Account

Section 2.3 addressed some potential problems with Bošković and Nunes’s analysis (this volume), that is, the computational complexity intrinsic to their account of copy deletion, as well as arbitrariness of a fusion-based account of multiple copy realization. In the previous section, it was also shown that Van Koppen’s and Fujii’s attempts to sort out the complexity issue are not tenable. While Van Koppen attributes the superiority of the topmost copy to pre-Spell-Out reduction of the lower one to a φ-feature set via movement, it is not clear exactly how movement motivates such a process. Moreover, Fujii’s proposal that Chain Reduction applies cyclically to a pre-Spell-Out derivation is inconsistent with the original characterization of Chain Reduction as a phonological process that facilitates linearization.

This section puts forward an alternative analysis of copy realization. Sections 4.1, 4.2, and 4.3 demonstrate (i) that phonetic realization of a copy does not involve deletion but rather results from appropriate association of its formal feature values with phonological ones and (ii) that computations regarding copy realization take place phase by phase. Section 4.4 further explicates how multiple and lower copy realization can be handled by the proposed analysis. Expanding Kandybowicz’s observation that fusion is a highly restricted process, it will be argued that not only lower copy realization but also multiple copy realization is a phonologically triggered last resort strategy that repairs an otherwise doomed derivation.

4.1. Feature Valuation

Before examining these issues in detail, we first take a brief look at the treatment of features in minimalist theory, and sketch out the gist of the proposal concerning the phonetic realization of copies. Building on and extending the classification of features proposed in Chomsky (1995b), Chomsky (2000, 2001) postulates that formal features are classified in terms not only of their LF-interpretability, but also of their values. While interpretable features are fully valued in the lexicon, uninterpretable ones are valueless, and only assigned values via Agree. Agree thus plays two roles in this framework: it renders uninterpretable features invisible to the LF interface, and it assigns values to unvalued features.

Formal features sent off to the phonological component after Spell-Out are utilized for morphological computations, whereby their values are as-
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associated with appropriate phonological features. In this way, for instance, φ-feature values \(<\text{third person, singular, masculine}\>) and the Case feature value \(<\text{accusative}\>) of the lexical item \textit{him} will come to be associated with phonological features. Successful association eventually leads to the phonetic realization of this item. Although (the values of) formal features are utilized for morphological computation, they are not legible to the articulatory-perceptual system: \textit{all of them} must be eliminated after the morphological computations, and before the derivation reaches the interface level.

One important point to keep in mind is that there is an LF-PF asymmetry with respect to the interpretability of formal features. The interpretable/uninterpretable distinction only makes sense in relation to their interpretability at the LF interface. On the other hand, they are uniformly uninterpretable at the PF interface, and hence subject to elimination. Consequently, they are sent to the phonological component solely for the purpose of performing the morphological computations described above.

Bearing this in mind, let us now consider what motivates preferential pronunciation of the topmost copy. Our proposal shares some basic insight with that of Bobaljik (1995) and Groat and O’Neil (1996) in treating copy realization in terms of pronunciation rather than deletion. We suggest that a copy is phonetically realized due to the successful association of its formal feature values with phonological values in the morphological subcomponent. This means that unrealized copies will not be deleted, but rather left unpronounced owing to the failure of the relevant association process.

4.2. Phonetic Realization of Copies

Although the proposed analysis is built on the theory of Agree and valuation assumed in current minimalist frameworks, there are some technical difficulties to be sorted out. First, consider (37a) and its pre-movement structure (37b), where Agree takes place between T and the DP \textit{the book}:

(37)  
\begin{align*}
  \text{a.} & \text{ The book was found.} \\
  \text{b.} & \text{ T was found the book}
\end{align*}

This instance of Agree leads to valuation of the DP’s uninterpretable Case feature. Consequently, the Case feature value (along with the φ-feature values) will successfully be associated with phonological values, and the DP can be pronounced in situ, contrary to fact. Secondly, according to the Activation Condition, which requires an element to have an (unchecked) uninterpretable feature to be visible for movement (see Chomsky (2000, 2001), Bošković (2007), among others; see also Rizzi (2006) for a similar proposal), the DP will never be allowed to undergo subsequent movement if the
Case feature is checked in situ. This in turn will leave the EPP property of T unsatisfied, which could not be the case for (37a).

One possible solution to this quandary is to assume that Agree and the various operations needed to satisfy the EPP requirement are unordered. In other words, the two operations are equally available at the stage of (37b): either Agree precedes EPP-satisfaction, or the other way around. As we saw above, the former option fails to derive the correct outcome. Thus, the latter option is chosen. Let us consider what this choice leads to:9

\[(38) \begin{align*}
\text{a. } & T_{<φ=0><EPP>} \text{ was found [the book]}_{<φ=3P.SG><Case=0>} \\
\text{b. } & [\text{the book}]_{<φ=3P.SG><Case=0>} T_{<φ=0><EPP>} \text{ was found [the book]}_{<φ=3P.SG><Case=0>} \\
\text{c. } & [\text{the book}]_{<φ=3P.SG><Case=0>} T_{<φ=0>} \text{ was found} \\
& \quad \underline{\text{Agree}} \\
\text{d. } & [\text{the book}]_{<φ=3P.SG><Case=Nom>} T_{<φ=3P.SG>} \text{ was found [the book]}_{<φ=3P.SG><Case=0>}
\end{align*}\]

DP-movement applies rather than Agree at the stage of (38a). After the EPP requirement on T is satisfied (see (38b)), Agree takes place between T and the higher copy of DP (see (38c)). Consequently, the DP’s uninterpretable Case feature will be valued in the higher copy position, and T’s uninterpretable φ-features will also be valued, as indicated by the bold-faced feature values in (38d).

Now, given that the probe must c-command the goal, and that T does not c-command the higher DP copy in Spec-TP, one may reasonably ask why Agree can ever take place between these two elements in (38c). Here, however, Agree is naturally derived from the notion of projection in bare phrase structure theory (Chomsky (1995b, c)). The fundamental hypothesis of this theory is that the full matrix of lexical information carried by a head is inherited by its projection. Thus, when T is merged with a previously-constructed syntactic object as in (38a), its lexical information, including <EPP> and <φ=0>, percolates to its projection. Let us refer to the projection as T’ just for ease of exposition. As soon as the DP the book is attracted and merged with T’ (due to the EPP feature inherited by T’), the two elements enter into Agree under c-command.

The mechanism sketched out above is in a sense a resurrection of Spec-Head Agreement in terms of the probe-goal relation. Although Spec-Head

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9 Unvalued φ- and Case features are indicated as <φ=0> and <Case=0>. Valued features are represented as <φ=3P.SG> and <Case=Nom>.
is no longer employed as the primary structural relation for implementing agreement in the current framework, there is in fact a class of phenomena in which it seems to play a crucial role in accommodating agreement patterns. In British English, the verb can show up with either singular or plural agreement when the subject is a certain type of collective noun:

(39)  
   a. The present government has been in power since 1997.  
   b. The government have been reluctant to reform the law.

When a collective noun like government refers to an entire group, the verb exhibits singular agreement. When the noun is understood as referring to members of the group, on the other hand, the verb exhibits plural agreement. The latter case is known as notional concord (Quirk et al. (1985)).

Sauerland and Elbourne (2002) report that while a subject which triggers normal agreement can appear either in Spec-TP or as the associate of an expletive, one that triggers notional concord cannot occur in the expletive construction:

(40)  
   a. A committee was holding a meeting in here.  
   b. There was a committee holding a meeting in here.  
   c. A committee were holding a meeting in here.  
   d. *There were a committee holding a meeting in here.  

(Sauerland and Elbourne (2002: 292))

(40a) and (40b) are derived from the same underlying structure (41):

(41)  
   T was a committee holding a meeting in here

Still, if (40c) were derived from the structure analogous to (41), it would not explain why notional concord is not licensed in the expletive construction.

The contrast between (40c) and (40d) receives a straightforward account if the subject triggering notional concord is considered to have a number value “plural” and be directly merged in Spec-TP. Direct merger of the subject here means that T’s EPP requirement is satisfied prior to Agree. This is similar to what happens in the case of DP-raising discussed above. As soon as the subject is merged, T' acting as probe undergoes Agree with it in much the same way as in (38c). The probe’s unvalued φ-feature set is thus valued as “third person plural,” yielding plural agreement.

The discussion so far has shown that feature valuation takes place asymmetrically in that it targets only the head of a chain. In the case of A-movement, this means that whereas the topmost DP copy has its Case feature valued, the lower copy does not. (37a), therefore, has the following structure in the phonological component:

(42)  
   [The book]_{3P.SG=Nom} T was found [the book]_{3P.SG=0}
As discussed in section 4.1, phonetic realization of a category requires all of its formal features to be properly valued and associated with phonological values. In (42), the valued Case feature of the topmost copy, along with its lexically valued φ-features, is properly associated with phonological values, enabling the copy to be pronounced. By contrast, the lower copy has no Case value, meaning that it is insufficiently specified for association of formal and phonological features. Therefore, it is not qualified for pronunciation.

4.3. Wh-Movement

One issue left unsolved in sections 2.3 and 3.2 was how to account for successive-cyclic wh-movement (43) within a phase-based model while at the same time correctly ruling out an unwanted output like (24):

(43) What do you think Mary ate?
(24) *What do you think what Mary what ate what?

Following Chomsky (2000), let us suppose that the formal feature set of a wh-phrase contains an uninterpretable wh-feature as well as an interpretable Q-feature that matches an uninterpretable Q-feature belonging to an interrogative complementizer. The derivation proceeds as follows (Valued and unvalued wh-features are indicated as <wh=WH> and <wh=0> respectively):

10 An anonymous EL reviewer suggested the inclusion of θ-features postulated in Bošković and Takahashi (1998) in the formal feature set. Although the present article remains uncommitted to this possibility, further investigation is certainly necessary in order to clarify precisely what formal features a category carries.

11 V-to-v movement and copies of Mary, you, and do are ignored here due to their irrelevance to the main point of the present discussion. Additionally, Case- and φ-features, as well as the Q-feature, are also left out. Note in passing that being the object of the verb ate, what has its Case feature valued via Agree with v1 in (44a). Still, valuation of the Case feature alone is not sufficient for what to be pronounced in situ. Given that phonetic realization of a category requires valuation of all the formal features it carries, what is not phonetically realized until its wh-feature is valued in the matrix Spec-CP. I am grateful to an anonymous EL reviewer for bringing to my attention the treatment of the Case feature of what.
When phase CP1 is constructed, VP1 is spelled out (see (44a)). At the next higher phase vP2, Spell-Out applies to TP1 (see (44b)). Since no interrogative complementizer is involved in steps (44a, b), the uninterpretable wh-feature of what is not yet valued. When the derivation reaches (44c), the interrogative complementizer C2 is merged, and VP2 undergoes Spell-Out. After movement of what to Spec-CP2, its wh-feature becomes valued (see (44d)). Finally, Spell-Out applies to (44d). What is worth noting is that the spelled-out units in (44a–d) contain unvalued wh-features. Similarly to the situation in (42), these unvalued features are not associated with phonological ones, leading to the non-realization of all copies that carry them. On the other hand, since the valued wh-feature of the topmost copy can be successfully associated with phonological features, the wh-phrase will eventually be pronounced in this position.

The analysis described above leads us to question how a wh-phrase can be pronounced in wh-in-situ languages like Japanese. Consider (45a) and its derivation (45b):

(45) a. Taroo-ga nani-o katta no?
   Taro-Nom what-Acc bought Q
   ‘What did Taro buy?’

---

12 See section 4.2 for reasons why valuation must follow movement.

13 One issue that deserves attention is why a pronunciation pattern such as (ii) is not allowed. (i) and (ii) show that the adjective serious must be pied-piped with the wh-adverb how so that the whole AP can be pronounced in the upper position:

(i) He doesn’t understand [how serious] the health issues are [how serious].

(ii) *He doesn’t understand [how serious] the health issues are [how serious].

It should be noted, however, that only the wh-element has an unvalued formal feature, whereas the adjective carries lexically valued features. As pointed out by an anonymous EL reviewer, under the generalization made here that a syntactic object is pronounced when its formal features are fully valued, the adjective should be eligible for pronunciation in the pre-movement position, contrary to fact.

One possible solution to this problem is to assume that the AP obligatorily inherits the relevant wh-feature from how through feature percolation (see Cowper (1987), Grimshaw (2000), among others). Then neither how nor serious could be pronounced in situ due to the unvalued wh-feature the AP takes on. This account can be extended to a case like (iv), called “scattered deletion” by Bošković and Nunes (this volume):

(iii) [The book] was found [the book].

(iv) *[The book] was found [the book].

Suppose that the Case and φ-features carried by the noun book percolate up to the DP level. For the same reason applicable to (i) and (ii), pied-piping is forced and scattered deletion is ruled out.
When the CP phase is assembled, VP is spelled out. In contrast to English wh-questions, the wh-phrase in (45a) is pronounced inside this VP. In (45b), however, its wh-feature has not yet been valued. How can an unvalued wh-feature be associated with phonological features?\(^\text{14}\)

Watanabe (1992, 2001) argues that a wh-phrase in a language like Japanese consists of two parts, a null operator that undergoes movement,\(^\text{15}\) and a wh-element that acts as a variable bound by it. This decomposition is based on the observation that Japanese wh-elements are not inherent operators but rather indeterminate elements. As is well-known, Japanese wh-elements can be used as indeterminate quantificational expressions in conjunction with a particle. For instance, when dare ‘who’ takes the particle -ka, it acts as a quantifier (as in dare-ka ‘someone’).

Adopting Watanabe’s characterization of wh-movement in Japanese, let us suppose that the null operator, rather than the wh-element, carries both an unvalued wh-feature and a lexically valued Q-feature. On the other hand, being an indeterminate pronoun, the in-situ wh-element nani in (45a) carries a formal feature set consisting of an unvalued Case feature and lexically valued φ-features, as pronouns generally do. Keeping these assumptions in mind, let us reconsider how (45a) is derived. For ease of exposition, the Q-features carried by the null operator and the complementizer are omitted in the representations below:

\[(46) \quad \begin{align*}
\text{a.} & \quad \left[ \text{CP} \left[ \text{TP} \text{Taroo-ga } \left[ \text{vP} \left[ \text{v} \right] T \right] \text{no}\right]\right] \\
& \quad \downarrow \text{Spell-Out} \\
& \quad \left[ \text{vP} \left[ \text{OP}_{1<\text{wh}=0>} \text{nani-o}_{<\text{wh}=0>} \text{katta}\right]\right]
\end{align*}
\]

Although nani is trapped inside the spelled-out unit in (46a), it is eligible for pronunciation because its Case feature is valued in situ via Agree with \(v\) before Spell-Out (see footnote 11). In (46b), the null operator moves to Spec-CP, where its wh-feature is valued.\(^\text{16}\)

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\(^{14}\) I would like to thank an anonymous EL reviewer for raising this issue.

\(^{15}\) The involvement of operator movement is detectable by the presence of a Subjacency effect, as exemplified below (see Nishigauchi (1990), Watanabe (1992, 2001)):

\[(i)\text{??Taroo-wa } [\text{Jiroo-ga nani-o katta kadooka} ] \text{ oboeteiru no?}
\text{Taro-Top Jiro-Nom what-Acc bought whether remember Q}
\text{‘What does Taro remember whether Jiro bought?’}\]

\(^{16}\) Although the null operator in Spec-CP is by definition not overtly realized, this does not result from the failure of association between its formal and phonological fea-
4.4. Lower Copy Realization as a Repair Strategy

Next, we consider how the proposed model deals with lower copy realization and multiple copy realization. Bošković and Nunes (this volume) treat these as separate phenomena: while the former is regarded as a repair strategy triggered by phonological requirements that force the lower copy to be pronounced, the latter lacks such motivation and is simply regarded as a by-product of fusion, whereby the lower copy becomes invisible to the LCA. As discussed in section 3.3, however, pronunciation of the lower copy in a multiple copy construction also constitutes a repair strategy that salvages an otherwise doomed derivation. This means that multiple copy realization can be grouped with lower copy realization since both involve pronunciation of a lower copy directly triggered by a convergence requirement.

This view is reinforced by the following data concerning the German wh-copying construction. Fanselow and Mahajan (2000) note that an overt wh-copy inside an intermediate CP is obligatory in the absence of an overt complementizer. Leaving the embedded CP-edge phonetically empty gives rise to an ungrammatical sentence:

(47) German

a. Wen denkst du [CP daß [TP sie liebt]]?  
   who think you that she loves  
   ‘Who do you think that she loves?’

b. Wen denkst du [CP wen [TP sie liebt]]?  
   who think you who she loves

c. *Wen denkst du [CP Ø [TP sie liebt]]?  
   who think you she loves  

(adapted from Fanselow and Mahajan (2000: 221))

From this paradigm a generalization can be drawn whereby the embedded CP-edge in German must be filled by a phonetically overt element in wh-movement constructions. This condition can then be seen to force the lower copy to be realized in (47b).

In this connection, recall that Bošković and Nunes’s (this volume) fusion-based analysis fails to account for the lack of a wh-copying option in languages like English (see section 2.3):

An empty category such as a null operator presumably carries phonological features that contribute to its non-overt realization in much the same way as overt lexical items carry the phonological features responsible for their overt realization.
(48) Who do you think (*who) she loves?
While their analysis demonstrates how fusion exempts multiple occurrences of \(wh\)-copies from the LCA in German, it does not offer a principled account of why the same machinery cannot be employed in English. By contrast, the view of multiple copy realization as a repair strategy can successfully account for the absence of \(wh\)-copying in English. As illustrated below, the complementizer that is optional in English \(wh\)-questions, in contrast to their German counterparts:

(49) Who do you think (that) she loves?
Optionality entails that the derivation will converge in English even if the embedded CP-edge is not occupied by a phonetically overt element. Since there is no need for the embedded CP-edge to be overtly realized, multiple \(wh\)-copying as a repair strategy cannot be employed in English.

Having shown that multiple copy realization and lower copy realization can both be regarded as a repair strategy, we are now in a position to demonstrate how various instances of lower copy realization are implemented within a framework that treats copy realization as a consequence of pronunciation rather than deletion. The cases to be examined are given below:

(50) Multiple copy realization in German
\[
\text{Wen}_{\text{wh}=\text{WH}} \text{ glaubt Hans wen}_{\text{wh}=\text{0}} \text{ Jakob gesehen hat?}
\]
whom thinks Hans whom Jakob seen has
‘Who does Hans think Jakob saw?’ (cf. (11))

(51) Lower copy realization in Romanian
\[
\text{Ce } \text{ e}e_{\text{wh}=\text{WH}} \text{ precede } ce_{\text{wh}=\text{0}}?
\]
what what precedes what
‘What precedes what?’ (cf. (15))
The \(wh\)-features of the lower copies in (50) and (51) remain unvalued, since valuation only takes place in the topmost copy position (see section 4.2). Given that the phonetic realization of a category requires association of formal feature values with phonological features in the morphological subcomponent, it is unclear how the lower copy is ever pronounced.

Recall, however, that a \(wh\)-element carries not only an unvalued \(wh\)-feature but also a lexically valued Q-feature. This means that the phonological features of a lower \(wh\)-copy can be associated at least with the Q-feature value, even though they are not associated with a \(wh\)-feature value. Suppose that this instance of (partial) association enables the lower copy to be phonetically realized. It is important to keep in mind here that partial feature association does not take place unconditionally. It is tolerated only when the phonetic realization of a lower copy is required in order to salvage
an otherwise doomed derivation.\footnote{17}

As it turns out, there is good evidence for considering partial feature association to be a repair strategy. Consider the following examples, where accusative rather than nominative Case is the only possible grammatical

\footnote{17} An anonymous EL reviewer posed the question of how lower copy realization in (50) and (51) is reconciled with a phase-based derivation. As illustrated below, since the topmost and lower copies belong to different spell-out units, it may be too late for the computational system to choose the lower one as candidate for phonetic realization after the derivation reaches the highest CP stage:

(i) \[
\begin{align*}
\text{CP} \quad \text{Wen}_{\text{wh-WH}} & \quad \text{glaubt Hans} \quad [\text{vP v [VP \quad \text{]]}]] \\
\text{whom} & \quad \text{thinks Hans} \quad \downarrow \text{Spell-Out} \\
\text{VP} \quad \text{[CP wen}_{\text{wh-0}} & \quad \text{Jakob gesehen hat]} \\
\text{whom} & \quad \text{Jakob seen has} \quad \text{(cf. (50))}
\end{align*}
\]

(ii) \[
\begin{align*}
\text{CP} \quad \text{Ce}_{\text{wh-WH}} & \quad \text{...} \quad [\text{vP v [VP \quad \text{]]}]] \\
\text{what} & \quad \text{what} \quad \downarrow \text{Spell-Out} \\
\text{VP} \quad \text{[CP precede ce}_{\text{wh-0}} & \quad \text{]} \\
\text{what} & \quad \text{precedes what} \quad \text{(cf. (51))}
\end{align*}
\]

Still, there is good reason to suppose that the decision to pronounce the lower copy is made within the relevant spell-out unit in the multiple copy construction (i). Recall that phonetic realization of the lower \textit{wh}-copy is forced for the purpose of filling the embedded CP-edge with an overt item in the German \textit{wh}-movement construction. Thus, the computational system employs a repair strategy as soon as it becomes clear that the \textit{wh}-copy in the embedded Spec-CP is the only candidate that will satisfy the relevant requirement. This procedure is completed within the spell-out unit containing the embedded CP.

In (ii), on the other hand, unwanted consecutive homophonous \textit{wh}-phrases appear in sentence-initial position. It is not clear how repairs can be carried out on the lower copy. Although a full-fledged solution to this problem requires further investigation, there is a clue. One conspicuous property of multiple \textit{wh}-questions is that movement of the second \textit{wh}-phrase does not display Subjacency effects, as illustrated below (see Richards (1997), Pesetsky (2000), Bošković (2002), among others for this observation):

(iii) Bulgarian

\begin{itemize}
\item a. *[Koja kniga], otreče senatorat [DP mălvata \quad [\text{CP} \quad \text{če iska da zabraniti}]]
\text{ Which book did the senator deny the-rumor that wanted to ban } t_i]?
\end{itemize}

\begin{itemize}
\item b. ?Koj senator [koja kniga], otreče [DP mălvata \quad [\text{CP} \quad \text{če iska da zabraniti}]]
\text{ Which senator denied the-rumor that wanted to ban which book?} \quad \text{(Pesetsky (2000: 25–26))}
\end{itemize}

The insensitivity to Subjacency in (iiiib) indicates that the second instance of \textit{wh}-movement can take place in one fell swoop without regard to phases. If so, as far as second \textit{wh}-movement is concerned, the entire sentence would count as the domain in which various patterns of copy realization are determined.
form for pronouns:

(52) a. What? {Her/*She} cheat on you? Never!
    b. It’s not my fault that things are like this. It’s {them/*they}, not {me/*I}.
       Speaker B: {Me/*I}, too. (adapted from Schütze (1997: 53))

Schütze (1997) points out that the accusative-marked pronouns here have two properties in common. First, since none of them are complements to an accusative Case assigner, their Case is not structurally assigned. Second, they are not in a subject-verb agreement relation. The verb cheat in (52a) fails to show third person singular agreement with the subject. In (52b, c), there is no overt verb that enters into an agreement relation with the accusative-marked pronoun. On the assumption that Case-assignment/mark- ing involves the valuation of a Case feature via Agree, these two properties suggest that the accusative pronouns do not enter into an Agree relation at all,\(^{18}\) and therefore do not have their Case feature valued. The pronominal subject in (52a), for example, will consequently have the following formal features in the morphological component:

\[
(53) <\phi=\text{third person, singular, feminine}> <\text{Case}=0>
\]

If these features were not associated with phonological features at all, the subject could never be phonetically realized. However, as (54) illustrates, the non-realization of a subject causes (52a) to be ill-formed on its intended meaning.\(^{19}\)

---

\(^{18}\) This in turn implies that no probe-goal relation is established between T and the pronominal subject in (52a). Given that T’s uninterpretable \(\phi\)-feature set functions as a probe in A-movement, the absence of the probe-goal relation entails that T in (52a) completely lacks \(\phi\)-features.

\(^{19}\) The ungrammaticality of (54) may be attributed to the non-satisfaction of the EPP. A caveat may be in order as to the nature of this requirement, however. The present paper presupposes that the EPP is a property that is to be satisfied syntactically (i.e. before Spell-Out) by merger, whether or not the merged category is phonetically realized. If so, the ungrammaticality of (54) needs to be ascribed to a factor other than the EPP.

By contrast, if one regards the EPP as a purely phonological constraint which can be satisfied only by a phonetically overt element (see Landau (2007) for this view), (54) is ruled out due to the non-satisfaction of this requirement. Still, this characterization of the EPP fails to account for how intermediate steps of successive-cyclic movement are triggered. Given that intermediate copies are not pronounced, intermediate steps need to be triggered by a factor other than the EPP on this approach. Admittedly, the nature of the EPP is the subject of much controversy, and the total reconciliation of the two approaches mentioned above is beyond the scope of this paper.
5. Concluding Remarks

This article has examined various analyses from four different papers in the book under review, paying particular attention to the following questions: why the topmost copy is given priority in phonetic realization; how copy realization is implemented in a phase-based approach to syntactic derivation; and what triggers fusion.

Bošković and Nunes’s paper provides a general framework for investigation into the mechanisms of copy realization and deletion. According to them, pronunciation of the topmost copy is the most economical option in that by selecting it, a derivation will involve fewer applications of copy deletion. Phonetic realization of a lower copy is tolerated only on condition that it satisfies a phonological requirement that cannot otherwise be met. Another exceptional case, the phonetic realization of multiple copies, is considered to be the result of fusion, a morphological reanalysis operation that renders a copy invisible to the process of linearization.

The three papers discussed in section 3 offer alternative analyses. Van Koppen argues that while the topmost copy is a full-fledged category with a complete set of features, the lower one consists only of the φ-feature residue of movement and therefore is unpronounceable. In an attempt to assimilate copy deletion into a phase-based model of derivation, Fujii argues that copy deletion does not target the entire syntactic object, but rather only its subparts. While adopting a fusion-based approach to multiple copy realization, Kandybowicz shows that fusion is triggered by phonological requirements, and that multiple copy realization can be reduced to the distinctness of a fused copy and a non-fused one.

Section 4 proposed some modifications to the analyses presented in the reviewed papers. It was argued that a copy can be phonetically realized as a result of successful association of its formal feature values with phonological features in the morphological subcomponent. This analysis was shown
to be compatible with a phase-based model of derivations involving long-distance wh-movement. Since (lower) copies trapped in spelled-out units do not have their wh-features valued, they are not eligible for pronunciation. Furthermore, it was shown that the phonetic realization of lower copies is a repair strategy that saves an otherwise illegitimate derivation. Exceptional pronunciation is then allowed by partial feature association in the morphological subcomponent.

REFERENCES


In the proposed model, computations governing copy realization apply to each spelled-out unit in the early stage of the phonological component (i.e. in the morphological subcomponent). An anonymous EL reviewer pointed out that there should be another type of PF process, such as intonation assignment, which applies later and targets the entire PF output. An interesting prediction, then, is that the copy realization algorithm applying in a phase-by-phase fashion should behave differently from processes like intonation assignment. A full investigation of this possibility is left for future research.


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