The Copy Theory of Movement: A view from PF[*]

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Based on previous work by Bošković (2001, 2002, 2004a,b) and Nunes (1999, 2004), this chapter discusses a considerable amount of evidence involving A-movement, A'-movement, head movement, and remnant movement that points to the conclusion that "traces" (i.e. copies structurally lower in the syntactic representation) may be phonetically realized. In addition, the issues regarding phonetic realization of copies are shown to be determined by conditions of the phonological component and not of syntax (movement) *per se*. As a result, the chapter is able to explain a variety of complex phenomena that cannot be captured by trace theory. The chapter starts by reviewing several pieces of evidence that show that the phonetic realization of copies is similar to the LF interpretive procedure in the sense that it allows activation of lower copies, as well as instances of "scattered deletion", where different pieces of different chain links are realized. It is argued that convergence requirements related to linearization and morphological fusion interact with economy computations regarding applications of deletion, yielding a complex crosslinguistic pattern whereby chains in the general case have only their highest link phonetically realized, but they may also trigger pronunciation of a lower link or even pronunciation of multiple links if convergence so demands.

1. Introduction

Chomsky (1993) revives the copy theory of movement, according to which a moved element leaves behind a copy of itself, rather than a trace. The conceptual underpinning for the revival of the copy theory is provided by the Inclusiveness Condition (see Chomsky 1995), a conceptually appealing condition that confines the power of syntax to (re-)arrangements of lexical items, banning syntax from creating new objects. Traces are prime examples of creationism in syntax and, as such, violate the Inclusiveness Condition. Chomsky (1993) demonstrates that in addition to conforming to the Inclusiveness Condition, the copy theory considerably simplifies the analysis of reconstruction phenomena. Furthermore, by making it possible to treat reconstruction as an LF phenomenon, the copy theory contributes to the research attempt to eliminate non-interface levels of representation. Another attractive feature of the copy theory is that, by eliminating traces, it reduces the number of theoretical primitives in our inventory. If traces are copies, they are either lexical items or complex objects built from lexical items; they are not new primitives. Replacement of traces by copies thus leads to an overall simplification of the grammar and this by itself explains why the copy theory became one of the pillars of the minimalist framework.

As is the case with any rearrangement in the architecture of the model, the reintroduction of the copy theory also brings in its package some new questions. For instance, one must determine which copies reach the interfaces and why this is so. Elements undergoing movement are generally pronounced and interpreted only in one position and the pronunciation and interpretation positions do not have to coincide. To ensure this under the copy theory, it is

standardly assumed that all but one copy of an element X undergoing overt movement is deleted in PF and LF, so that only one copy of X remains at the interface levels. The question is then which copy should survive deletion.

It is generally assumed that on the LF side, we have at least some choice in deciding where deletion should take place in nontrivial chains, with a preference for deletion in the head of operator-variable chains. Take the ambiguity of the anaphor in (1) below, for instance. Chomsky (1993) argues that the upstairs reading of *himself* is obtained after the tail of the *wh*-chain is deleted, as shown in (2a),[1] where *himself* is locally bound by *Joe*.[2] On the other hand, under the downstairs reading, *himself* is deleted in the head of the *wh*-chain and remains in its tail, as shown in (2b), where *himself* is locally bound by *Jim*.

(1) Joe$_i$ wondered which picture of himself$_{i/j}$ Jim$_j$ bought

(2) a. Joe wondered [$_{CP}$ [which picture of himself]^k [$_{IP}$ Jim bought ~~[which picture of himself]~~^{k}]]
   b. Joe wondered [$_{CP}$ [which ~~picture of himself~~]^k [$_{IP}$ Jim bought [~~which~~ picture of himself]^k]]

Chomsky argues that there is actually a preference for minimizing operator restriction in LF, which normally leads to deletion in the head of A'-chains. The preference for the deletion in the operator position is motivated by the impossibility of coreference between *he* and *Tom* in sentences such as (3a) below (see its LF representation in (3b)). To exclude (3a) while allowing the upstairs reading of *himself* in (1), Chomsky suggests that in (2a), *himself* undergoes LF anaphor movement into the matrix clause from the head of the *wh*-chain; deletion in the head of the *wh*-chain along the lines of (2b) is then blocked because it would break the anaphor movement chain. By contrast, in (2b) the lower copy of *himself* undergoes LF anaphor movement within the lower clause so that the deletion within the head of the *wh*-chain is permitted.[3]

(3) a. *Mary wondered which picture of Tom$_i$ he$_i$ liked.
   b. *Mary wondered [$_{CP}$ [which ~~picture of Tom~~]^k he liked [~~which~~ picture of Tom]^k]

On the LF side we thus have some choice in deciding where deletion should take place in nontrivial chains. By contrast, it is standardly assumed that no such choice is available in PF, the

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[1] From now on, copies will be annotated with superscripts.

[2] Chomsky (1993) actually assumes that LF deletion in cases such as (2a) needs to leave a variable (without internal structure) behind, at least for θ-theoretic reasons. This however might become unnecessary under Bošković and Takahashi's (1998) feature approach to θ-roles (see also Lasnik 1995, Hornstein 1999, 2001, Manzini and Roussou 2000, and Boeckx in press, among others.).

[3] As pointed out by Ferreira (2000), this analysis tacitly assumes that Principle C should be computed after LF. Given that economy only chooses among convergent derivations (see Chomsky 1995), if Principle C were a convergence condition at LF, its violation in (3b) should license deletion of *picture of Tom* in the tail of the *wh*-chain, contrary to fact. In order to ensure a consistent analysis for the Principle A and Principle C cases, it must then be assumed that Principle C applies to the output of LF and is not taken into consideration for the workings of syntactic computation proper (the same must hold for Principle B). See Hornstein, Nunes, and Grohmann 2005:chap. 8 for further discussion.

head of a nontrivial chain always being the sole survivor. The following paradigm provides empirical justification for the standard assumption:

(4) a. [[the student]^k was arrested ~~[the student]~~^{k}]
     b. *[[~~the student~~]^k was arrested [the student]^k]
     c. *[[the student]^k was arrested [the student]^k]
     d. *[[the ~~student~~]^k was arrested [~~the~~ student]^k]
     e. *[[~~the~~ student]^k was arrested [the ~~student~~]^k]

Despite its general conceptual appeal and adequate handling of interpretation phenomena, the copy theory thus leaves us with a heavy burden: the stipulation that lower copies cannot be phonetically realized. The stipulation is particularly unfortunate because it tacitly resuscitates traces by making extraneous distinctions among copies and ends up undermining the whole enterprise of LF-interpretation in terms of copies.

   This paper brings a more optimistic light to this picture. We will discuss a considerable amount of evidence that points to the conclusion that "traces" may indeed be phonetically realized. In addition, the issues regarding phonetic realization of copies will be shown to be determined by conditions of the phonological component and not of syntax (movement) *per se*. As a result, we will be able to explain a variety of complex phenomena that cannot be captured by trace theory.

   The paper is organized as follows. In section 2, we review several pieces of evidence that show that the phonetic realization is similar to the LF interpretive procedure discussed above in the sense that it allows activation of lower copies, as well as instances of "scattered deletion", where different pieces of different chain links are realized, as in the LF procedure discussed above with respect to (2b). We also show that a system that allows lower copy pronunciation has a number of more general, conceptually and empirically appealing consequences for the operation Move and the overall conception of the grammar, as it provides a completely new look at the interaction among different components of the grammar. In section 3, we present a general approach to phonetic realization in terms of linearization that is able to incorporate the results reported in section 2. In section 4, we provide additional support for this approach by discussing constructions in which multiple copies are phonetically realized. Finally, a brief conclusion is offered in section 5.

2. PF realization of traces
A number of authors have recently argued that in PF we also have a choice concerning which member of a nontrivial chain survives deletion (see Bobaljik 1995, 2002, Brody 1995, Nunes 1995, 1999, 2004, Wilder 1995, Groat and O'Neil 1996, Hiramatsu 2000, Pesetsky 1997, 1998, Richards 1997, Roberts 1997, Franks 1998, Runner 1998, Stjepanović 1999, 2003, Fanselow and Ćavar 2000, Abels 2001, Bošković 2001, 2002, 2004a, Lambova 2002, 2004, Miyoshi 2002, Landau 2003, and Reglero 2004, among others). There are several instantiations of this proposal. For Groat and O'Neil (1996), for example, phonological features are not copied in "lower copy pronunciation". Most of the above-mentioned authors, on the other hand, assume that pronunciation of lower copies is possible even when the relevant phonological features are copied under movement, i.e. when they are present in the head as well as the tail of the chain.

Of particular interest to us is the proposal concerning PF deletion of copies made in Franks 1998. Franks argues that just as in LF there is a preference for deletion in the head position of non-trivial chains (at least with operator-variable chains), deletion of lower copies in PF is just a preference, not the only option. More precisely, Franks argues that a chain is pronounced in the head position, with lower members deleted in PF, unless pronunciation in the head position would lead to a PF violation. If and only if the violation can be avoided by pronouncing a lower member of the chain, the lower member is pronounced and the head of the chain is deleted.[4] We will refer to the mechanism of pronunciation of lower copies motivated by PF considerations as *P(rounounce)L(ower)C(opy)*. Below we discuss a number of empirical arguments for PLC (for additional arguments, see Pesetsky 1997, 1998, Franks 1998, Hiramatsu 2000, Bošković 2001, Bobaljik 2002, and Lambova 2002, 2004, among others).

2.1. Multiple *wh*-fronting

Bošković (2002) provides several arguments for PLC regarding multiple *wh*-fronting (MWF). One such argument is based on Romanian, which is a MWF language, requiring all *wh*-phrases to front in questions, as shown in (5) below. However, as observed in Bošković (2002), the second *wh*-phrase does not appear to move if it is homophonous with the first fronted *wh*-phrase, as illustrated in (6).

(5) a. Cine ce   precede?   (Romanian)
       who   what precedes
    b. *Cine precede   ce?
        who precedes what
       'Who precedes what?'

(6) a. Ce   precede ce?   (Romanian)
       what precedes what
    b. *Ce   ce   precede?
        what what precedes
       'What precedes what?'

Bošković (2002) proposes that Romanian has a low-level PF constraint against consecutive homophonous *wh*-phrases, which rules out (6b).[5] What about (6a)? Here we seem to find an

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[4]   Pesetsky's (1997, 1998) system, which antecedes Franks (1998), has the same result (see also Bobaljik 1995, Hiramatsu 1999, and Bošković 2001). However, Pesetsky is not quite as explicit in the relevant respect as Franks, who explicitly makes the above claim. Also, Franks is more explicit than Pesetsky regarding what happens in nontrivial chains having more than two members when the highest copy cannot be pronounced, an issue that will be considered below.

    Notice also that by the head of a chain we mean here the highest member of a sequence of copies created by movement of the same element. We disregard the fact that in some cases two different chains (an A and an A'-chain) are created by movement of the same element, as in *who$_i$ t$_i$ seems t$_i$ to t$_i$ know French.*

[5]   As discussed in Golston 1995, Billings and Rudin 1996, and Bošković 2001, 2002 similar constraints are found in other languages. It is worth noting that we are dealing here with a morphological, rather than a phonetic effect, as clearly shown by the Serbo-Croatian paradigm in (i) (in particular, the contrast between (ic), due to Peter Svenonius (p.c.), and (ib)).

intricate interplay between phonology and syntax, with phonology apparently overriding syntax, more precisely, the need to satisfy a PF requirement apparently overriding the need to satisfy a syntactic requirement. This kind of phonology-syntax interaction cannot be implemented in a derivational, syntax-feeding-phonology framework like Minimalism, which furthermore does not have violable constraints. Bošković (2002), however, shows that PLC provides us with a straightforward way of resolving this phonology-syntax conflict. Given that Romanian has a syntactic requirement that forces all *wh*-phrases to move overtly, which Bošković argues involves focalization, the second *wh*-phrase must move in the syntax. The overt structure underlying (6a) is thus the one in (7), ignoring irrelevant copies.

(7) [ce ce^i precede ce^i]

If we pronounce the highest link of the second *wh*-chain in (7), as we would normally do, a PF violation obtains (we end up with a sequence of homophonous *wh*-elements). This is precisely the situation where we are allowed to pronounce a lower copy under Franks's (1988) approach to the pronunciation of non-trivial chains. Deletion of the upper copy of the object *wh*-chain then yields (8).

(8) [ce ~~ce^i~~ precede ce^i]

The PLC analysis thus enables us to derive (6a) from (7) and account for the contrast between (5b) and (6a) without violating the syntactic requirement that forces all *wh*-phrases to move overtly in Romanian, without look-ahead from the syntax to the phonology, and without any PF movement. The analysis also resolves the problem of the phonology-syntax interaction raised by (6a), without having phonology override syntax.

Bošković (2002) gives another MWF argument for PLC, based on Romanian echo *wh*-phrases. As noted by Comorovski (1996), Romanian obligatorily fronts even echo *wh*-phrases. Thus, (9a) below is unacceptable even as an echo question.[6] Interestingly, Comorovski observes that exceptionally, echo *wh*-phrases have to stay in situ in questions that require a question as an answer. (10b), for instance, is only acceptable as an echo question; a true, non-echo question would require movement of *CE*, as in *Cine ce a uitat să deschidă*.

(9) a. *Ion a adus CE?   (Romanian)
        Ion has brought what

(i) a. ?Ko,   koga   Marija voli, mrzi Petra.   (Serbo-Croatian)
       who.nom who.acc Mary   loves hates Petar
       'Who, whom Mary loves, hates Petar.'
   b. *Koga,   koga   Marija voli, Petar mrzi.
       who.acc who.acc Mary   loves Petar hates
       'Whom, whom Mary loves, Petar hates?
   c. Gospodina Koga, koga Marija voli,   Petar mrzi.
       Mr.   Koga who Mary   loves Petar hates
       'Mr. Whom, whom Mary loves, Petar hates.'

[6]   Below, echo *wh*-phrases are given in capital letters. As noted in Bošković (2002), not all speakers share Comorovski's judgment. We are focusing here on the dialect in which (9a) is unacceptable as an echo question.

    b. CE   a   adus   Ion?
       what has brought Ion
       'Ion has brought WHAT?'

(10) a. Q: Cine a   uitat   să deschidă paraşuta?   (Romanian)
          who has forgotten to open   the-parachute
          'Who forgot to open the parachute?'
    b. Echo Q: Cine a   uitat   să deschidă CE?
             who has forgotten to open   what
             'Who forgot to open WHAT?'

    Comorovski shows that we are dealing here with a PF effect, for it is impossible to assign a proper melodic contour to (10b) if *CE* is fronted. True questions in Romanian have a melodic peak on the *wh*-phrase, which is immediately followed by a falling contour. However, the intonation cannot start falling immediately after a true question *wh*-phrase if it is immediately followed by an echo *wh*-phrase, because echo *wh*-phrases are pronounced with a sharp rise in pitch. As Comorovski shows, a proper melodic contour can however be assigned if the echo *wh*-phrase is pronounced in situ, as in (10b).

    Bošković (2002) reinterprets the contrast between (9a) and (10b) in terms of PLC. Given that even echo *wh*-phrases must be fronted overtly, as seen in (9), this should also hold in (10b). In other words, (10b) should be associated with the syntactic representation in (11a) below (ignoring the copy left by fronting the first *wh*-phrase). As discussed above, if the head of the chain created by the fronting of the echo *wh*-phrase is pronounced, the construction cannot be assigned a proper melodic contour, resulting in a PF violation. This violation can however be avoided if the tail of the chain is pronounced instead, as shown in (11b).[7]

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[7]   Bošković (2002) also gives a PLC account of Comorovski's (1996) observation that Romanian echo *wh*-phrases can exceptionally remain in situ within islands, as illustrated in (i). Notice that overt *wh*-movement out of the island in question is disallowed regardless of the reading (echo or non-echo), as shown in (ii).

    (i) Ion a   auzit zvonul   că Petru a   cumparat CE?   (Romanian)
       Ion has heard rumor-the that Peter has bought   what
       'Ion heard the rumor that Peter bought WHAT?'

    (ii) *Ce/*CE a auzit Ion zvonul   că Petru a   cumparat?   (Romanian)
       what   has heard Ion the-rumor that Peter has bought
       'What did Ion hear the rumor that Peter bought?'/'Ion heard the rumor that Peter bought WHAT?'

Given that Romanian *wh*-phrases must move overtly even on the echo reading, Bošković (2002) concludes that (i) also has to involve movement of the echo *wh*-phrase in overt syntax and proposes that the head of the chain created by such movement is deleted in PF, with a lower copy pronounced, as sketched in (iii) below.

    (iii) [~~CE~~ ... [NP ... CE]]

        Assuming that islandhood is at least to some extent a PF property (for approaches along these lines, see also Perlmutter 1972, Pesetsky 1997, 1998, Lasnik 2001, and Merchant 2001), Bošković (2002) treats *CE* in (i) as a resumptive of sorts, appealing to the well-known fact that in a number of languages, a locality violation can be saved by phonologically realizing a copy within the island as a resumptive pronoun. Bošković (2002) thus

(11) a. [true-*wh*   echo-*wh*[i] … verb echo-*wh*[i]]
     b. [true-*wh*   ~~echo-*wh*~~[i] … verb echo-*wh*[i]]

There is in fact independent evidence that the second *ce* in (6a) and the echo *CE* in (10b) indeed move in the overt syntax. As is well-known, *in-situ wh*-phrases in multiple questions in languages like English or in single questions in "true" *wh-in-situ* languages like Malay (see Bošković 2002) differ from their moved counterparts in being unable to license parasitic gaps, as respectively illustrated in (12) and (13).[8]

(12) a. What did John read without filing?
      b. *Who read what without filing?

(13) a. *Kamu aturkan buku yang mana tanpa   baca?   (Malay)
        you   filed   book that   which without reading
     b. Buku yang mana kamu aturkan tanpa   baca?
       book that   which you   filed   without reading
       'Which book did you file without reading?'

By contrast, the *in-situ wh*-phrase in sentences such (6a) and (10b) does license parasitic gaps, as shown in (14) and (15) below. This is exactly what we should expect if these sentences in fact involve overt *wh*-movement and lower copy pronunciation. As noted in Bošković (2002), in this respect, the *wh-in-situ* under consideration represents a new type of *wh-in-situ*, different from in-situ *wh*-phrases in non-MWF languages like English and *wh-in-situ* languages. The latter should not be analyzed in terms of PLC given the contrast between (14)/(15) and (12b)/(13a).

(14) Ce   precede ce   fără   să   influențeze?   (Romanian)
     what precedes what without subj.particle influence.3p.sg
     'What precedes what without influencing?'

(15) Cine a   citit CE   fără   să   claseze?   (Romanian)
     who has read what   without subj.particle file.3p.sg
     'Who read what without filing?

2.2. Object shift in Scandinavian
Bobaljik (1995) (see also Bobaljik 2002) provides more evidence for PLC, based on Scandinavian object shift. Holmberg (1986) observed that object shift in Scandinavian can take

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offers a uniform account of the contrast between (i) and (ii) and the contrast in (iv).

  (iv) a. *There is one worker who the company fired the employee that had treated __ badly.
       b. There is one worker who the company fired the employee that treated him badly.   (Pesetsky 1998:364)

[8]   Following Bošković (2002), we avoid using examples from *wh-in-situ* languages that allow null objects such as Chinese and Japanese, since it is difficult to tease apart parasitic gaps and null objects in these languages.

place in matrix main verb V-2 clauses, but not in auxiliary+participle clauses or embedded clauses, which do not involve main verb movement. This can be seen in (16), where object NPs that precede *ekki*, which is standardly assumed to be adjoined to VP (but see Bošković 2001, 2004b,c,d), are taken to have undergone object shift.

(16) a. Í gær   máluðu stúdentarnir húsið$_i$ [$_{VP}$ ekki t$_i$]   (Icelandic)
        yesterday painted the-students the-house   not
       'The students didn't paint the house yesterday.'
      b. *at   Peter den$_i$ [$_{VP}$ læste t$_i$]   (Danish)
          that Peter it   read
      c. at   Peter [$_{VP}$ læste den]
         that Peter   read   it
         'that Peter read it.'
      d. *Hann hefur bókina$_i$ [$_{VP}$ lesið t$_i$]   (Icelandic)
          he   has   the-book   read
      e. Hann hefur [$_{VP}$ lesið bókina]
         he   has   read the-book
         'He has read the book.'

Bobaljik (1994) proposes a morphological merger account of the dependency of object shift on V-movement. Assuming that object shift in Scandinavian is in principle optional, he argues that in clauses in which V-movement does not take place, the object shift option is ruled out due to a violation of the requirement that an (inflectional) affix that is to be phonetically realized on a given stem must be adjacent to it in PF (in more technical terms, the two must undergo morphological merger, the prerequisite for which is PF adjacency). That amounts to saying that even if a verb does not move to I in Scandinavian, the verb and I must still be adjacent in PF. In (16b), the PF adjacency requirement cannot be satisfied due to the intervening shifted object, as shown in (17a); by contrast, adjacency does obtain in (16c), where the object remains in situ, as shown in (17b).

(17) a. *[at [$_{IP}$ Peter [$_{I'}$ I [$_{AgroP}$ den$_i$ [$_{VP}$ læste t$_i$]]]]]
      b. [at [$_{IP}$ Peter [$_{I'}$ I [$_{AgroP}$ [$_{VP}$ læste den]]]]]

As for (16d-e), Bobaljik posits a participial affix located above the shifted object, which must merge with the participle in PF. As can be seen in (18), his account of (16b-c) then readily extends to (16d-e).

(18) a. *[Hann hefur [$_{PartP}$ Part [$_{AgroP}$ bókina$_i$ [$_{VP}$ lesið t$_i$]]]]
      b. [Hann hefur [$_{PartP}$ Part [$_{AgroP}$ [$_{VP}$ lesið bókina]]]]

Bobaljik's (1994) analysis is based on the assumption that Scandinavian object shift is optional. Diesing (1996), however, argues against this assumption. She shows that in V-movement constructions, specific, non-contrastive definite NPs always undergo object shift, as illustrated in (19), in contrast to non-specific indefinite NPs, which never do, as illustrated by

(20) under the existential, non-specific reading of *bækur* (*alltaf* and *ekki* are assumed to be left-adjoined to VP).

(19) Context: Does he know Chomsky's book *Barriers*?
    a. Hann les   *Barriers*$_i$ [$_{VP}$ alltaf t$_i$]   (Icelandic)
       he   reads *Barriers*   always
    b. *?Hann les [$_{VP}$ alltaf *Barriers*]
        he   reads always *Barriers*
      'He always reads *Barriers*.'

(20) a. *Hann las   bækur$_i$ [$_{VP}$ ekki t$_i$]   (Icelandic)
       he   read books   not
    b. Hann las [$_{VP}$ ekki bækur]
      he   reads not books
      'He did not read books.'

Furthermore, in Scandinavian languages that only allow object shift of pronouns, definite pronouns generally must shift, but indefinite pronouns cannot, as can be seen in (21) (*ikke* and *muligens* are assumed to be left-adjoined to VP).

(21) a. Peter læste den$_i$ [$_{VP}$ ikke t$_i$]   (Danish)
      Peter read it   not
    b. *Peter læste [$_{VP}$ ikke den]
       Peter read   not it
      'Peter did not read it.'
    c. Nei, jag har ingen paraply   men jag køper [$_{VP}$ muligens en i morgen] (Norwegian)
      no I   have no   umbrella but I buy   possibly one tomorrow
    d. … *men jag køper en$_i$ [$_{VP}$ muligens t$_i$ i morgen]   (Diesing 1996)
        but I buy one   possibly   tomorrow
      'No, I don't have an umbrella, but I'll probably buy one tomorrow.'

    There are then two semantic classes of direct objects: one class always undergoes object shift, whereas the other class never does. The apparent lack of object shift with specific, non-contrastive definite NPs in auxiliary+participle and embedded clauses not involving V-movement is very surprising under this analysis. Given that there is something about the semantics of such NPs that requires object shift, as Diesing shows, the question is how that something is satisfied in (16c) or (16e), for instance. Once PF is responsible for the paradigm in (16), as argued by Bobaljik (1994), we seem to have here an interaction between phonology and semantics, with phonology overriding semantics. This is very difficult to instantiate under the standard model of the grammar, where phonology and semantics have no direct relationship.
    Bobaljik (1995) however shows that, given PLC, this problem can be resolved without positing phonology-semantics interaction or OT-style violable constraints. He proposes that specific, non-contrastive definite NPs must undergo object shift even in auxiliary+participle and embedded clauses not involving V-movement, which is what one would expect under Diesing's analysis. If, as is normally the case, the head of the object shift chain is pronounced, we get a PF

violation because the shifted object disturbs adjacency between I/Part and the verb. This violation can be avoided, however, if we delete the head of the object shift chain and pronounce its tail, as sketched in (22) and (23), allowing I/Part to be adjacent to the verb. Under Bobaljik's analysis, sentences such as (16c) and (16e) thus provide evidence for PLC.[9]

(22) [at [$_{IP}$ Peter I [$_{AgroP}$ ~~den~~ [$_{VP}$ læste den]]]]

(23) [hann hefur [$_{PartP}$ Part [$_{AgroP}$ ~~bókina~~ [$_{VP}$ lesið bókina]]]]

2.3. Syllabic contraction with Romanian clitics

Bošković (2001) provides another argument for PLC, based on syllabic contraction with Romanian clitics.[10] Romanian clitics must undergo clitic weakening (i.e. syllabic contraction) before an auxiliary beginning with a vowel, which is a procliticization context, as illustrated in (24a-b), but not before a main verb, as shown in (24c).

(24) a. *Îmi   au   ales   articolul.   (Romanian)
           me.dat have chosen article-the
      b. Mi-   au   ales   articolul.
         me.dat have chosen article-the
         'They have chosen my article.'
      c. Îmi   au   articolul   pe masă.
         me.dat have article-the on table
         'They have my article on the table.'

An exception to clitic weakening is the feminine singular accusative clitic *o*. It cannot occur before an auxiliary with an initial vowel, a context of obligatory clitic weakening, though it can occur before a main verb beginning with a vowel, which is not an obligatory clitic weakening

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[9]   Holmberg (1999) observes that V-topicalization (more precisely, remnant VP topicalization; see Bošković 2001, 2004b) can rescue auxiliary+participle constructions involving object shift, as shown in (i) below. Bošković (2001, 2004b) shows that the rescuing effect of V-topicalization can be captured by Bobaljik's (1995) analysis under the multiple Spell-Out hypothesis (see Uriagereka 1999, among others), according to which phonology has multiple derivational access to syntax. In particular, Bošković suggests that the verb undergoes successive cyclic movement to [Spec,CP] and that in the course of this movement, it lands in a position that is adjacent to Part, as sketched in (ii). If the structure represented in (ii) can be sent to the phonological component at this point, certainly a possibility in the multiple Spell-Out model, the participle and Part will be adjacent; hence, they can undergo morphological merger and be licensed at this derivational stage, prior to the next movement of the participle to [Spec, CP] (see Bošković 2004d for additional evidence for Bobaljik's analysis based on object shift within PPs).

  (i) Kysst   har jag henne inte (bara hållit henne i   handen).   (Swedish)
       kissed have I   her   not only held her   by   the hand
       'Kissed her I haven't (only held her by the hand).'

  (ii) [... [$_{VP}$ participle] [$_{PartP}$ Part [$_{AgroP}$ object ...]]]

[10]   The relevance of PLC to the Romanian clitic data was actually noted by Alexander Grosu (p.c.).

context, as shown in (25). Instead of (25a), we get (26), where the clitic encliticizes to the participial main verb, something that is not allowed for other pronominal clitics in this context.

(25) a. *O   am   vazut.   (Romanian)
      her have seen
      'I have seen her.'
   b. O   am.
      her have
      'I have her.'

(26) Am vazut-o.   (Romanian)
    have seen-her
    'I have seen her.'

Bošković (2001) shows that the PLC approach has a straightforward account for the data involving *o*, which were traditionally considered to be totally idiosyncratic. Assume that *o* lacks the ability to take part in the syllabic reduction process when used proclitically. Assume furthermore that like all other pronominal clitics, *o* undergoes clitic climbing in auxiliary+participle constructions, certainly the null hypothesis. Given these assumptions, we are forced to pronounce the lower copy of *o* in a structure such as (27) below. This is the only way to derive a legitimate PF output, for *o* cannot take part in clitic weakening and clitic weakening is obligatory in the context where the upper copy of *o* in (27) finds itself; hence the contrast between (25a) and (26).

(27) [o^i am vazut o^i]

2.4. Greek Imperatives

Additional evidence for PLC is provided by Greek imperatives. Like many languages, Greek displays a ban on negative imperatives, as illustrated in (28). Instead of an imperative verb form, Greek uses a subjunctive in the context in question, as illustrated in (29).

(28) a. *Diavase!*   (Greek)
    read.Imp
     'Read!'
   b. **Den/mi diavase!*
     Neg   read.Imp
     'Don't read!'

(29) *Na   mi   diavazis!*   (Greek)
    Subj.Mark   Neg   read.Subj
    'Don't read!'

Interestingly, a similar phenomenon exists in English. English also has a verbal form that is not allowed to co-occur with negation. In particular, English disallows negative finite verbs, as

shown in (30a-b) below. (We will refer to English finite verbs as indicatives.) As illustrated in (30c), English switches to another verbal form in the environment in question, namely, infinitive.

(30) a. John laughed.
       b. *John not laughed.
       c. John did not laugh.

Abstractly, we have the same pattern in both Greek and English. Both languages disallow a particular verbal form to co-occur with negation, switching to another verbal form in the negative context. Miyoshi (2002) (see also Bošković 2004a) provides a uniform account of the ban on negative imperatives in Greek and the ban on negative indicatives in English (see Miyoshi 2002 for references to alternative accounts of the ban on negative imperatives, which however cannot be extended to the ban on negative indicatives). More precisely, he extends the PF merger account of the ban on negative indicatives in English (see Chomsky 1957, Hale and Marantz 1993, Bobaljik 1995, and Lasnik 1999) to the ban on negative imperatives in Greek. Focusing for the moment on the ban on negative indicatives, consider the structures of (30a-c) given in (31) before PF merger and *Do*-Support apply.

(31) a. [$_{IP}$ John$_i$ I (ed) [$_{vP}$ t$_i$ laugh]]
       b. [$_{IP}$ John$_i$ I (ed) [$_{NegP}$ not [$_{VP}$ t$_i$ laugh]]]

Assuming that English I is a verbal PF affix, it must merge with a verbal element in PF under adjacency. The adjacency requirement is not met in (31b) due to the intervening negative head, which blocks PF merger. *Do*-Support, a last resort operation, then takes place to save the stranded affix, deriving (30c). In (31a), the merger is not blocked since no phonologically realized element intervenes between I and the verb. I then merges with the verb, deriving (30a). The crux of the analysis is that indicatives cannot co-occur with negation in English because the co-occurrence results in a violation of the Stranded Affix Filter.

Miyoshi (2002) puts forward the same explanation for the ban on negative imperatives. He proposes that imperatives in languages like Greek contain a functional head, the precise identity of which is not important for our current purposes (for Miyoshi, it is an imperative C), which is a PF affix that must merge with a verb under adjacency. PF merger can proceed without any problems in (28a), where the verb and the functional head in question, which we will refer to as F, are adjacent. However, the negation in (28b) disrupts the necessary adjacency relation between F and the verb, as illustrated in (32) below. PF merger is then blocked and the construction is ruled out due to the presence of a stranded affix, just like (30b)/(31b).[11]

(32) F$_{[+affix]}$ *den/mi diavase*

Greek does not have the language specific rule of *Do*-Support, which English employs in (30c) to save the stranded affix. Instead, Greek uses a different verbal form, namely subjunctive. We

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[11]   See Miyoshi (2002) and Bošković (2004a) for further discussion as well as discussion of languages that do not have the ban on negative imperatives.

can assume either that the affix head F is not present in subjunctive imperatives or that it is supported by the subjunctive marker *na*.

Miyoshi extends this analysis of (28) to the often observed difference in clitic placement in imperative and non-imperative contexts. It is well-known that whereas Greek clitics generally precede the verb in indicatives, they follow it in imperatives, as exemplified in (33).

(33) a. *To diavasa.*   (Greek)
       it   read.Ind
       'I read it.'
    b. **Diavasa to.*

(34) a. *Diavase   to!*   (Greek)
       read.Imp it
       'Read it!'
    b. **To diavase!*

Miyoshi proposes a uniform account of (28) and (34) based on the PLC mechanism. He proposes that imperatives and indicatives in Greek do not differ with respect to clitic placement in the syntax. They both have the clitic-V order, with a lower copy of the pronominal clitic following the verb. In indicatives, the higher copy of the clitic can – therefore must – be pronounced. In imperatives, on the other hand, pronunciation of the higher copy of the clitic leads to a Stranded Affix Filter violation: the clitic disrupts the adjacency between F and V, necessary for F to merge with the verb, resulting in a PF violation. The violation can be avoided if we pronounce a lower copy of the clitic, which follows the verb, as sketched in (35).

(35)   F ~~to~~ *diavase to.*

Since the verb and F are adjacent in (35), PF merger can take place. Lower pronunciation of the clitic is thus necessary in (35) to avoid a PF violation.[12]

Bošković (2004a) shows that the PLC analysis can also explain a peculiar clitic switch in Greek imperatives. As illustrated in (36), the dative clitic must precede the accusative clitic when the clitics precede the verb, as in the following constructions involving an indicative verb.

(36) a. *Mou   to   diavase.*   (Greek)
        me.Dat it.Acc   read.3Sg
        'S/he is reading it to me.'
    b. **To mou diavase.*

Interestingly, as observed in Warburton 1977, Joseph and Philippaki-Warburton 1987, and Terzi 1999, in imperatives, where clitics follow the verb (cf. (34)), both the dative-accusative and the accusative-dative orders are possible, as shown in (37).[13]

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[12]   See Miyoshi (2002) and Bošković (2001, 2004a) for further discussion.
[13]   Gerunds behave like imperatives in the relevant respect: the clitics are located postverbally and both the accusative-dative and the dative-accusative clitic order are possible (see Bošković 2004a for discussion of gerunds).

(37) a. *Diavase mou   to!*   (Greek)
        read   me.Dat it.Acc
     b. *Diavase to mou!*

Following Miyoshi's discussion of the basic paradigm in (33)-(34), Bošković (2004a) argues that with respect to clitic placement in the syntax, Greek imperatives are derived just like indicatives, which means that they have the dative-accusative-V order. This is the simplest analysis, since nothing special then needs to be said about the syntax of clitics in imperatives. Recall now that in imperatives, clitics cannot be pronounced in the highest position. If they are pronounced in the highest position they block PF merger of the affix head F and the verb. Clitics then must be pronounced in a lower position in imperatives. Bošković (2004a) capitalizes on the lower pronunciation and propose that this is what licenses clitic switch. In particular, Bošković argues that the order of the clitics in the lower positions can be either accusative-dative or dative-accusative. Since in indicatives the highest copy of the pronominal clitics must be pronounced, we still get only the dative-accusative order in indicatives. On the other hand, since in imperatives lower copies of the pronominal clitics are pronounced for reasons discussed above, we can get the accusative-dative order in imperatives, in addition to the dative-accusative order.[14]

2.5. Serbo-Croatian *je*
Another argument for PLC from Bošković (2001) concerns the exceptional behavior of the Serbo-Croatian third person singular auxiliary clitic *je*. Serbo-Croatian has both auxiliary and pronominal enclitics, which, with a few exceptions noted below, cluster together. Interestingly, in a clitic cluster, *je* must follow all pronominal clitics, whereas other auxiliary clitics must precede them, as shown in (38)-(39) below (clitics under discussion will be marked in italics).

(38) a. Oni *su mu   ga*   predstavili.   (Serbo-Croatian)
         they are him.dat him.acc introduced
     b. *Oni *mu   ga   su*   predstavili.
          they him.dat him.acc are introduced
          'They introduced him to him.'

(39) a. *Ona *je mu   ga*   predstavila.   (Serbo-Croatian)
          she   is him.dat him.acc introduced
     b. Ona *mu   ga   je* predstavila.
        she him.dat   him.acc is introduced
        'She introduced him to him.'

Stjepanović (1998) and Bošković (2001) show that auxiliary clitics that precede pronominal clitics are indeed higher in the structure than pronominal clitics. Take (40) below, for

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[14]   See Bošković (2004a) for the precise location of the lower copies of the clitics, as well as explanation for why both orders are possible in the lower positions.

instance, which shows that VP ellipsis can affect a pronominal clitic without affecting an auxiliary clitic. Stjepanović (1998) observes that given the standard assumption that ellipsis can only affect constituents, (40) indicates the auxiliary clitic is higher than the pronominal clitic. Also pointing to the same conclusion is the contrast in (41), noted in Bošković (2001), which shows that clitic auxiliaries are compatible with both the sentential and the manner reading for the adverb (cf. (41a)), whereas pronominal clitics are only compatible with the manner reading (cf. (41b)). Bošković (2001) interprets this fact as indicating that auxiliary clitics are higher than sentential adverbs, and pronominal clitics are lower than sentential adverbs. Finally, consider (42). As discussed in Bošković (2001), due to prosodic reasons, clause-mate clitics in Serbo-Croatian can only be separated by elements that can be parsed as separate intonational phrases, like the parenthetical in (42). The fact that the auxiliary clitic in (42a) can be stranded above the parenthetical, contrasting with the pronominal clitic in (42b), then provides conclusive evidence that the former is higher than the latter (see Bošković 2001).

(40) Vi *ste ga* poljubili, a   i   mi *smo ~~ga   poljubili~~*   (Serbo-Croatian)
        you are him kissed,   and also we are him kissed
        'You kissed him, and we did too.'

(41) a. Oni *su* pravilno odgovorili Mariji.   (Serbo-Croatian)
          they are correctly answered   Marija.dat
           'They did the right thing in answering Marija.'
           'They gave Marija a correct answer.'
     b. Oni *su joj* pravilno odgovorili
          they are her correctly answered
           '*They did the right thing in answering her.'
           'They gave her a correct answer.'

(42) a. ?Oni *su*, kao što sam vam rekla, predstavili *se* Petru.   (Serbo-Croatian)
          they are   as   am you said   introduced self Petar
           'They, as I told you, introduced themselves to Petar.'
     b. *Oni *se*, kao što sam vam rekla, predstavili *su* Petru.

     Significantly, Bošković (2001) shows that the auxiliary clitic *je,* which, as noted above, in a clitic cluster follows other pronominal clitics, behaves just like other auxiliary clitics with respect to the height tests discussed above. Thus, it may also be stranded under ellipsis, it can occur above sentential adverbs, and it can be separated from other clitics by parentheticals, as respectively shown in (43) and (45).

 (43) Ona *mu   ga   je* predstavila, a   i   on *je ~~mu   ga   predstavio~~*.   (Serbo-
        she him.dat him.acc is introduced and also he is him.dat him.acc introduced   Croatian)
        'She introduced him to him and he did too.'

(44) a. Jovan *je* pravilno odgovorio Mileni.   (Serbo-Croatian)
          Jovan is correctly answered   Milena.dat
           'Jovan did the right thing in answering Milena.'

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'Jovan gave Milena a correct answer.'
   b. On *joj*   *je* pravilno odgovorio.
      he her.dat is correctly answered
      '*He did the right thing in answering her.'
      'He gave her a correct answer.'

(45) a. ?On *je*, kao što sam vam rekla, predstavio *se* Petru.   (Serbo-Croatian)
         he is as   am you said   introduced self Petar
      'He, as I told you, introduced himself to Petar.'
   b. *On *se*, kao što sam vam rekla, predstavio *je* Petru.

How can we account for this syntax-phonology mismatch, with *je* being higher than pronominal clitics in the syntactic component but following them in the final PF representation? Bošković (2001) shows that this apparently conflicting behavior of *je* can be readily captured given PLC. Following den Dikken's (1994) proposal for the auxiliary *be* in English, he proposes that *je* is generated below object agreement projections, which, as claimed by Stjepanović (1999) and Bošković's (2001), host pronominal clitics in Serbo-Croatian; from its base-generated position, *je* then moves to a position higher than pronominal clitics, as sketched in (46).

(46) [… *je*^{i} … [$_{AgroP}$ object clitic(s) … [*je*^{i} …]]]

Bošković (2001) further proposes a low level constraint on the final PF representation requiring that in a clitic cluster, *je* must follow all other clitics, where a clitic cluster is taken to involve clitics contained in the same intonational phrase or a clitic group.[15] Since the pronunciation of the higher copy of *je* in (46) would violate this requirement in the derivation of sentences such as (39a), pronunciation of the tail of the chain is sanctioned, in fact required (cf. (39b)). By contrast, this requirement is inapplicable to the derivations of (45) or to the second conjunct of (43), for there is no cluster in their final PF representation; hence, we have a standard instance of deletion of the lower copy of *je* in these cases. Notice that this proposal can also account for the fact that *je* can precede a subject-oriented adverb only when it does not occur with a pronominal clitic, as illustrated in (44). Recall that pronominal clitics are lower than sentential adverbs (cf. (41b)). Thus, we have pronunciation of the higher copy of *je* in (44a) (in a position higher than sentential adverbs) and of the lower copy in (44b) (in a position lower than sentential adverbs).
      The dual behavior of *je* with respect to pronominal clitics – *je* is structurally higher than pronominal clitics in the syntactic component, but follows them in the final PF representation – thus receives a principled account. It is another case where PLC enables us to resolve an otherwise puzzling syntax-phonology mismatch.

2.6. Some optional movements become obligatory

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[15]   Bošković (2001) provides independent motivation for the PF constraint in question, associating it to the fact that *je* is in the process of losing its clitichood (see Browne 1975, Schütze 1994, Tomić 1996, and Bošković 2001, for discussion). Assuming, as suggested by Klaus Abels (p.c.), that *je* does not allow cliticization across it as a result of being in the process of losing its clitichood but is not strong enough to serve as a clitic host itself, it must be pronounced following all other clitics. (Recall that Serbo-Croatian clitics are enclitics. See Bošković 2001 for additional motivation for the PF constraint on *je*.)

Bošković (2001) shows that PLC also enables us to turn a number of movements that were previously assumed to apply optionally into obligatory movements. This is a desirable result for the Minimalist Program, which has no natural place for optional movement. Consider the data in (47) (from Bošković 1995, 1997a), for instance, which show that Serbo-Croatian auxiliary clitics must occur below sentential adverbs when they are preceded by a participle, as indicated by the loss of the sentential adverb reading in (47b), although otherwise they can occupy a position higher than sentential adverbs, as shown in (47a).

(47) a. Oni *su* pravilno odgovorili Mileni.   (Serbo-Croatian)
          they are correctly answered Milena.dat
          'They did the right thing in answering Milena.'
          'They gave Milena a correct answer.'
      b. Odgovorili *su* pravilno Mileni.
          'They gave Milena a correct answer.'
          '*They did the right thing in answering Milena.'

Bošković (1995, 1997a) interpreted these data as indicating that Serbo-Croatian auxiliary clitics are base-generated below sentential adverbs and optionally move to a position above sentential adverbs, after the participle-auxiliary clitic order is established.[16] That is, auxiliary movement was taken to occur in (47a), but not in (47b).

    However, Bošković (2001) observes that PLC makes possible a new way of analyzing these facts. Suppose that the auxiliary movement that follows the establishment of the participle-auxiliary order is actually obligatory. Auxiliary+participle constructions would then always have the abstract structure in (48a) (disregarding the lower copy of the participle). The configuration in (48b) adds adverbials to the structure in question.

(48) a. aux-clitic^i participle aux-clitic^i
      b. aux-clitic^i [sentential adverb [participle aux-clitic^i [manner adverb

Note now that the auxiliary clitic is an enclitic, in fact, a second position enclitic. If there is phonologically realized material in front of the auxiliary that can host it, the head of the chain created by the movement of the auxiliary can be pronounced without violating the enclitic requirement, which Bošković (2001) argues is a PF requirement. This is illustrated in (49a) below. However, if there is no phonologically realized material in front of the auxiliary clitic, pronouncing the head of the chain would lead to a PF violation since the auxiliary clitic would remain stranded in sentence-initial position without being able to encliticize. This is precisely the kind of situation where we are allowed to pronounce a lower copy, as sketched in (49b). Pronouncing a lower copy of the auxiliary movement chain, which follows the participle, thus makes it possible to avoid the PF violation.

(49) a. X aux-clitic^i participle ~~aux-clitic^i~~
      b. ~~aux-clitic^i~~ participle aux-clitic^i

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[16]   See Bošković (1995, 1997a) for discussion of how the order participle-auxiliary is established and for arguments that the movement in question is obligatory.

Under this analysis, auxiliary movement is always obligatory in Serbo-Croatian. In constructions where the auxiliary clitic appears to occur low, as in (47b), the tail of the chain is pronounced to avoid a PF violation. Where the auxiliary appears to occur high, as in (47a), the head of the chain is pronounced (regarding the position of the adverb, see (48b)).

Bošković (2001) observes that this analysis makes a very interesting prediction. Suppose that the auxiliary in (48) is not a clitic. Then, there would never be any need to pronounce a lower copy of the auxiliary. In other words, with non-clitic auxiliaries, the auxiliary-participle should be the only available order. The prediction is borne out, as illustrated by the contrast between (50a), with a clitic auxiliary, and (50b), with a strong, non-clitic form of the auxiliary.

(50) a. Poljubio *sam* nju.   (Serbo-Croatian)
         kissed   am her
         'I kissed her.'
      b. *Poljubio nisam/jesam nju.
          kissed   not+am/AM her
          'I did not/did kiss her.'

Recall that the auxiliary obligatorily moves to a position above the participle. In (50a), the auxiliary is pronounced in the tail of the chain created by the movement to avoid a PF violation, as sketched in (51a) below. In (50b), on the other hand, there is no need for pronunciation in the tail of the chain, since no PF violation occurs if the head of the auxiliary movement chain is pronounced, the auxiliary not being a clitic; hence the lower copy is deleted, as illustrated in (51b).

(51) a. [~~sam~~^{i} poljubio *sam*^{i} nju]
      b. [*nisam/jesam*^{i} poljubio ~~nisam/jesam~~^{i} nju]

In addition to auxiliary movement, several other movements that Bošković (1995, 1997a) tacitly assumed to be optional can be analyzed as being obligatory with the adoption of PLC. Consider, for instance, the following Serbo-Croatian data (see Bošković 1995, 1997a).

(52) a. Oni *su* zaspali.   (Serbo-Croatian)
         they are fallen-asleep
         'They fell asleep.'
      b. Petar tvrdi da *su* oni zaspali.
         Petar claims that are they fallen-asleep
         'Petar claims that they fell asleep.'
      c. Juče   *su* oni zaspali.
         yesterday are they fallen-asleep
         'Yesterday they fell asleep.'

(52) can be accounted for if we assume either that auxiliary movement across a pre-verbal subject is optional or that subject movement from the pre-verbal position to the pre-auxiliary position is optional. However, Bošković (2001) shows that the PLC enables us to account for

(52) without positing any optional movements. That is, given the PLC, the auxiliary can always be higher than the immediately pre-verbal subject position and the subject can always move from that position to the pre-auxiliary position. Given that *su* is a second position clitic and that, as argued in Bošković (2001), the second position requirement is a PF requirement, deletion of copies proceeds as in (53).

(53)   a. [oni^i *su* ~~oni~~^{i} zaspali]
     b. [Petar tvrdi da ~~oni~~^{i} *su* oni^i zaspali]
     c. [juče ~~oni~~^{i} *su* oni^i zaspali]

As opposed to what happens in (53a), pronouncing the head of the subject chain in (53b) and (53c) would violate the second position requirement on the auxiliary clitic. Deletion of the head of the chain in the latter cases is then sanctioned to satisfy a PF requirement.[17]

    Bošković (2001) shows that the PLC approach can also account for some interesting facts concerning V-2 in Northern Norwegian. Rice and Svenonius (1998) observe that the V-2 requirement in Northern Norwegian is stricter than in other Germanic V-2 languages. In particular, what precedes the verb must be a phonological phrase, which Rice and Svenonius assume minimally contains one foot (i.e. two syllables). This requirement is satisfied in (54a), but not in (54b).

(54)   a. Korsen kom ho hit?   (Northern Norwegian)
       how   came she here
       'How did she get here?'
     b. *Kor   kom du fra?
       where came you from
       'Where did you come from?'

Rice and Svenonius further note that (54b) can be saved by using the *wh*-subject-V order, as shown in (55).

(55)   Kor du kom fra?   (Northern Norwegian)
     where you came from
     'Where did you come from?'

    Under the PLC analysis proposed by Bošković (2001), the verb moves to C in (55) as it does in (54). However, to satisfy the second position requirement, which given its statement is clearly a PF requirement in Northern Norwegian, the upper copy of verb is deleted and the lower one is pronounced, as shown in (56) (irrelevant details, such as additional IP-internal copies of the verb, are omitted[18]).

(56)   [$_{CP}$ kor ~~kom~~^{i} [$_{IP}$ du kom^i fra]]

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[17]   See Bošković 2001 for additional cases and further discussion of pronunciation of lower copies in contexts involving Serbo-Croatian clitics.
[18]   See Bošković 2001, in press: sec. 2.1 for a discussion of PLC in chains with more than two members.

Recall that lower pronunciation is possible only when a PF condition requires it. As a result, (57a), where the verb is needlessly pronounced in a lower position, is ruled out.

(57) a. *Korsen ho kom hit?
          how   she came here
      b. *[CP korsen k̶o̶m̶ⁱ [IP ho komⁱ hit]]

Yet another example of the usefulness of PLC in turning optional movements into obligatory movements is provided by Stjepanović's (1999, 2003, this volume) analysis of scrambling in Serbo-Croatian. Take double object constructions not involving clitics, for instance. In such constructions, all orders among S, V, IO, and DO are in principle possible. However, in an answer to a question like *To whom did Ivan give a book?*, the focalized element, IO, must come last.[19] Stjepanović offers a variety of arguments showing that S, V, IO, and DO all move out of VP overtly in Serbo-Croatian. However, in the context in question, the copy of the focalized IO within the VP is pronounced to satisfy a requirement on sentential stress assignment. More precisely, the focused element has to end up as the most embedded element of the sentence in order to receive stress by a default stress assigning mechanism. This means that in the context in question, the lower copy of the focalized IO within the VP must be pronounced, as sketched in (58).[20]

(58) [S V I̶O̶ DO [VP S̶ V̶ IO D̶O̶]]

2.7. Scattered deletion: Cliticization in Bulgarian and Macedonian
Let us now consider cliticization in Bulgarian and Macedonian, which provides evidence for scattered deletion, where different pieces of different chain links are realized, in a way similar to the interpretative procedure discussed in section 1. The discussion in this section will thus strengthen the parallelism between PF and LF copy deletion.
Consider the following data, which illustrate the basic cliticization pattern in Bulgarian and Macedonian, verbal clitic languages.

(59)	Bulgarian	Macedonian
a. Petko *mi go* dade včera.	OK	OK
Petko me.dat it.acc gave yesterday		
'Petko gave me it yesterday.'		
b. Včera *mi go* dade Petko.	OK	OK
c. *Mi go* dade Petko včera.	*	OK
d. Dade *mi go* Petko včera.	OK	*
e. Včera dade *mi go* Petko	*	*

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[19]   In fact, this quite generally holds for elements bearing simple new information focus.
[20]   Notice also that Stjepanović's (1999) analysis is extendable to the data that prompted Zubizarreta (1998) to argue for prosodically motivated movement, if we replace prosodically motivated movement by PLC.

The contrasts between Bulgarian and Macedonian in (59c) and (59d) indicate that Bulgarian clitics must encliticize, whereas Macedonian clitics can procliticize. Macedonian clitics always precede the verb in the context in question. Bulgarian clitics precede the verb unless preceding it would result in a violation of their enclitic requirement, a PF requirement. In that case they follow the verb. As discussed in Bošković (2001), this state of affairs can be straightforwardly accounted for under PLC, given that a copy of pronominal clitics is present both above and below the verb (see Bošković 2001 for discussion of the precise positions of these copies). Recall that under PLC, the tail of a chain is pronounced instead of the head iff the pronunciation of the tail is necessary to satisfy a PF requirement. This approach straightforwardly captures the generalization that the verb can precede a clitic in Bulgarian only when no other lexical material is located in front of the clitic (cf. (59d) *vs.* (59e)). Only in this situation will we be able to pronounce the lower copy of the clitic, which is located below the verb. If there is lexical material preceding the clitic in its raised position, the head of the clitic movement chain has to be pronounced, as sketched in (60). Since in Macedonian nothing goes wrong in PF if we pronounce the head of the clitic chain, we always have to pronounce it. As a result, the V-clitic order is underivable in Macedonian (cf. (59d)), as shown in (61). The opposite pattern of acceptability for (59c) and (59d) in Bulgarian and Macedonian, as well as the role of phonology in the possibility of the V-cl order in Bulgarian, are thus straightforwardly captured under the PLC analysis.

(60) *Bulgarian*:
 a. [X clitic^i V ~~clitic^i~~]
 b. [~~clitic^i~~ V clitic^i]

(61) *Macedonian*:
 [(X) clitic^i V ~~clitic^i~~]

  We now turn to an argument for scattered deletion from Bošković (2001). As discussed in Bošković (2001), main verbs and auxiliary and pronominal clitics form a complex head (an extended clitic cluster) in Bulgarian and Macedonian, so that the verb carries the clitics along when undergoing head-movement. This is transparent in Macedonian questions such as (62a) below, which Bošković (2001) argues involves leftward adjunction of V to the interrogative complementizer *li*. Of particular interest to us is the Bulgarian counterpart of (62a) given in (62b), which is unacceptable; instead, we get (63b), whose counterpart is in turn unacceptable in Macedonian, as shown in (63a).

(62) a. *Si mu gi dal li* parite?   (Macedonian)
    are him.dat. them given Q the-money
  b. **Si mu (gi) dal li* parite?   (Bulgarian)
    are him.dat. them given Q the-money
    'Have you given him the money?'

(63) a. **Dal li si mu gi   parite?   (Macedonian)
    given Q are him.dat. them the-money

    b. Dal   *li si mu*   *(gi)* parite?   (Bulgarian)
       given Q are him.dat. them the-money
       'Have you given him the money?'

Bošković (2001) argues that the Bulgarian and the Macedonian constructions above have the same syntactic derivation: they both involve left adjunction of the extended clitic cluster to *li*, leaving a copy behind.[21] The two languages however differ with respect to the properties of their clitics in the constructions under consideration: they are proclitics in Macedonian, but enclitics in Bulgarian. Therefore, nothing goes wrong in Macedonian if all the elements forming the extended clitic cluster are pronounced in the highest position, as shown in (64a) below; hence, they must be pronounced there. (62a) is thus ruled in and the sentence in (63a) is ruled out (see section 3 below for further discussion). Turning now to Bulgarian, the interesting property of Bulgarian shown in (64b) is that the pronunciation of either the upper or the lower copy of the extended clitic cluster would lead to an illicit result, for the enclitics *li si mu gi* cannot be licensed. The phonological system then resorts to "scattered deletion", with parts of the complex head undergoing movement pronounced in the higher position, and parts in the lower position (cf. (63b)).

(64) a. [[*si mu gi* dal] *li* [*si mu gi* dal] parite]   (Macedonian)
     b. [[*si mu gi* dal] *li* [*si mu gi* dal] parite]   (Bulgarian)

Constructions such as (63b) thus provide particularly strong evidence for the copy theory of movement.[22] Scattered deletion structures show that what is left behind by movement has internal structure, which is straightforwardly captured under the copy theory, but not under the trace theory. While it might be possible to handle the cases involving pronunciation of lower members of chains from the previous sections under the trace theory with additional assumptions, it is very difficult to see how the scattered deletion case discussed above can be handled under the trace theory, for it cannot be ensured that the element left behind by movement to *li* has the necessary internal structure. It is also worth pointing out that the scattered deletion discussed here mimics the one proposed in Chomsky 1993 on the LF side in the sense that parts of a chain are interpreted in one position and other parts in a different position (recall the discussion of (2b) and (3b)). That we find such a case also on the PF side of the grammar is in fact a welcome result from a conceptual point of view. Given that scattered deletion is admitted on the LF side, it should in principle be also available on the PF side while syntactic structure is still available to the computational system (see section 3 below for further discussion).

2.8. PF affecting word order
A number of constructions have been argued in the literature to involve PF movement, in particular, scrambling and traditional rightward movement constructions (heavy NP shift, right

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[21]   We are simplifying the discussion here by ignoring lower copies created during the formation of the extended clitic cluster, since they do not affect our central point. For relevant discussion, including the exact location of all the copies, see Bošković 2001.
[22] See Wilder 1995, Fanselow and Ćavar 2000, Bošković 2001, and Ticio 2001 for additional arguments for scattered deletion and Nunes 2004 for general discussion.

node raising, and extraposition). In most cases this is not because such constructions are particularly amenable to a PF movement analysis, but because they do not fit well in the syntax, given the syntactic apparatus available. The argument for PF movement from these constructions is thus essentially negative.[23]

There are, however, some instances where the case for PF movement is stronger. Among these, Prosodic Inversion (PI) stands out. PI is a last resort operation that applies when a phonologically weak element is found in the output of the syntax in a position where it cannot be properly supported. The element then moves in PF looking for an appropriate host. Thus, in case of enclitics, PI applies when an enclitic X is found in sentence initial position, and moves X the minimal distance necessary (after the first stressed word) for it to get proper prosodic support. PI seems to us to be the strongest case ever made for PF movement. The reason for this is that in this instance of putative PF movement, we are dealing with a clearly defined last resort movement operation, with a precise phonological motivation and explicitly defined locality restrictions sensitive to phonological information, which is generally not a characteristic of other putative cases of PF movement. Some of the strongest arguments for PI in the literature come from South Slavic cliticization. Bošković (2001) however argues that not only does South Slavic cliticization not provide evidence for PI (or any kind of PF movement for that matter), but it in fact provides strong evidence against it.

To illustrate, Bulgarian (59d) was previously assumed to involve PI, under the assumption that the clitics precede the verb in the output of the syntax. PI then applies, moving the clitics in PF after the first stressed word, namely the verb. Accordingly, Bulgarian (63b) was analyzed as involving rightward adjunction of the extended clitic cluster to *li*, followed by PI placing the enclitics *li si mu gi* after the verb *dal* (see Rudin, Kramer, Billings, and Baerman 1999), as sketched in (65).

(65) a. Syntax output: $[[_{C^0}$ *li* [*si mu (gi)* dal]] parite]
    b. Prosodic inversion: $[[_{C^0}$ *li [si mu (gi)* dal]] parite] $\rightarrow$ [dal *li si mu (gi)* parite]
          |_____↑

However, we have seen above that there is no need to appeal to PI to account for the data in question. The role of PF and the last-resort flavor of the V-clitic order in Bulgarian can be readily captured given PLC. Furthermore, as shown in Bošković 2001, the PLC analysis is also empirically superior to the PI analysis.

Consider, for example, the following Bulgarian data involving Topicalization (the topicalized element is given the subscript T).

(66) a. (Iskam da znam) [taja žena]$_T$ koga šte (*ja*) vidiš   (Bulgarian)
        want to know   this woman when will her see
      'I want to know when you will see this woman.'
    b. (Iskam da znam) [taja žena]$_T$ dali   šte (*ja*) vidiš.
        want to know   this woman whether will her see
      'I want to know whether you will see this woman.'

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[23]   See, however, McCloskey (1999) and Truckenbrodt (1995), who argue for a PF treatment of certain rightward movements, and Kayne (2000) and Taraldsen (1981) for some problems for their positions.

c. Petko_T *si* (*go*) vidjal.
   Petko are him seen
   'Petko, you have seen.'
d. Kolata_T *mi* (*ja*) dade.
   car-the me.dat it.acc gave
   'The car, he/she/you gave to me.'

(66a-b) show that Bulgarian topics occur pretty high in the structure (Rudin 1993 argues that they are adjoined to CP; another possibility is that they occupy an (additional) [Spec, CP]), and (66c-d) show that they can serve as hosts for encliticization of elements following them. Significantly, constructions like (67), where a topic immediately precedes *li,* are unacceptable.

(67) *Kolata_T *li* prodade (Petko včera)?   (Bulgarian)
     car-the Q sold   Petko yesterday
     'Did Petko sell the car yesterday?'

As observed in Bošković 2001, the unacceptability of (67) is unexpected under Rudin *et al.*'s PI analysis, in fact under any analysis that places the host of *li* in acceptable neutral yes-no questions after (i.e. below) *li* in the syntax. Under Rudin *et al.*'s analysis, (67) would be associated with the syntactic structure given in (68) below, which should pass through PF without any violations, with *li* encliticizing to the topic. Since PI is a last resort operation, it would be prevented from taking place, in contrast to (65).

(68) [kolata_T [$_{C^0}$ *li* [prodade]] (Petko včera)]   (Bulgarian)

By contrast, the ungrammaticality of (67) is straightforwardly captured under the PLC analysis, as Bošković (2001) notes, for the (complex) verbal head left-adjoins to *li* instead of right-adjoining to it (cf. (64b)). Under this analysis, there is simply no way of deriving in the syntax a structure in which a topic immediately precedes *li*, since the head moving to *li* will always precede it. We therefore correctly get (69) instead of (67).

(69) Kolata_T prodade li (Petko včera)?   (Bulgarian)

Bošković (2001) shows that other South Slavic constructions that were previously argued to provide evidence for PI are also amenable to a PLC analysis and furthermore provides evidence that the PLC analyses are empirically superior to the PI analyses. Given that PI was the strongest argument for PF movement, this suggests that PF movement in general should actually be eliminated from the grammar, which is what Bošković (2001) concludes.[24]

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[24]   Recall also that Zubizarreta's (1998) prosodically motivated movement is analyzable along the lines of Stjepanović's (1999, 2003, this volume) analysis of scrambling, which replaces Zubizarreta's prosodically motivated movement by PLC. The general theoretical picture Bošković (2001) paints is that PF operations and mechanisms can affect word order, but not through actual PF movement. PLC is one mechanism through which PF affects word order without actual PF movement (see Bošković 2001 for other cases of this type).

2.9. Summary

To sum up the discussion so far, we have seen that PLC enables us to resolve a number of otherwise mysterious phonology-syntax and phonology-semantics interactions where phonology appears to override syntax and semantics, as well as phonology-syntax mismatches where phonology and syntax give conflicting evidence for the structural position of an element. Furthermore, under the PLC analysis, this is accomplished in a principled way without departing from the standard derivational picture of the grammar in which syntax feeds phonology and phonology and semantics do not interact, and without the need to adopt violable constraints. PLC has also proved to be a very useful tool in reanalyzing optional movements as obligatory movements and opens the door for eliminating PF movement.

Given the strength of the empirical and conceptual arguments for the mechanism of pronunciation of lower copies motivated by PF considerations given above, we may now move to the more general discussion of why copies must be deleted.

3. Deletion of copies as optimal linearization of chains

The first question we will address arises in any version of the copy theory of movement: how does the computational system distinguish copies from elements that accidentally have the same set of features? Consider the structure in (70) below, for example. The two occurrences of *Mary* in (70) may have two different derivational histories. The computation may have accessed a numeration with one instance of *Mary* and created a copy of it, as illustrated in (71), or it may have accessed a numeration with two instances of *Mary* and plugged each of them in a different position, as illustrated in (72).

(70) [Mary [was [hired Mary]]]

(71) a. N_1 = {$Mary_1$, was_1, $hired_1$, …}
      b. N_1' = {$Mary_0$, was_0, $hired_0$, …}
      c. [was [hired Mary]]
      d. Copy + Merge: [$Mary^i$ [was [hired $Mary^i$]]]

(72) a. N_2 = {$Mary_2$, was_1, $hired_1$, …}
      b. N_2' = {$Mary_1$, was_0, $hired_0$, …}
      c. [was [hired Mary]]
      d. N_2'' = {$Mary_0$, was_0, $hired_0$, …}
      e. [Mary [was [hired Mary]]]

Chomsky (1995:227) suggests a technical way to distinguish these two possibilities. He proposes that two lexical items *l* and *l'* should be marked as distinct if they enter the derivation via different applications of Select. According to this proposal, the computational system should assign different indices to each selection of *Mary* in (72) and the information of whether two given elements are distinct or not (i.e. whether or not they are copies) would be available throughout the syntactic computation. Slightly modifying Chomsky's suggestion, we will assume, following Nunes (1995, 2004), that it is the copy operation that assigns a nondistinctiveness index; in other words, all elements will be taken to be distinct for purposes of

the computational system, unless they are specified as nondistinct by the copy operation. In the cases discussed above, for instance, the copy operation in (71d) marks the two instances of *Mary* as nondistinct, and the two instances in (72e) are interpreted as distinct by default.[25]

Once the computational system is provided with means to identify copies, we may now consider some tougher issues. Take for example the proposal that traces may indeed be phonetically realized. If so, one should in principle expect all the links of a chain to be phonetically realized. Given a structure such as (73) below, for example, there arises the question of why it cannot surface as in (74a). Furthermore, it is also unclear why there is a preference for deleting traces rather than heads of chains, in absence of additional constraints in the phonological component. In other words, why must (73) surface as (74c) and not as (74b)? Finally, once scattered deletion is available in the system (see section 2.7), why isn't it employed more often? Why can't (73) surface as (74d), for instance?

(73) [[the book]^i [was [found [the book]^i]]]

(74) a. *The book was found the book.
      b. *Was found the book.
      c. The book was found.
      d. *The was found book.

Nunes (1995, 1999, 2004) provides an answer to these questions that, on the one hand, is able to correctly exclude the derivations of (74a), (74b), and (74d), and on the other, is also compatible with the facts documented in the previous sections. His approach involves a combination of a convergence requirement with economy considerations. The convergence aspect of the proposal is related to linearization at PF. The intuition underlying Nunes's proposal is that a syntactic structure containing a chain cannot be linearized if we assume Kayne's (1994) Linear Correspondence Axiom (*LCA*), according to which the linear order of terminals is contingent on asymmetric c-command. The reasoning goes as follows. A (nontrivial) chain is by definition a discontinuous object that simultaneously occupies different structural positions in the syntactic structure. Thus, on the one hand, a chain cannot be assigned a single slot in the PF linear sequence resulting from the LCA; on the other hand, the assignment of multiple slots should create contradictory requirements, preventing the whole structure from being linearized.

Take the structure in (73), for example. Given that the higher occurrence of *[the book]* asymmetrically c-commands *was*, the LCA dictates that both *the* and *book* should precede *was*.[26] Likewise, given that *was* asymmetrically c-commands the lower occurrence of *[the book]*, it should precede *the* and *book* in compliance with the LCA. Given that these occurrences of *[the book]* are nondistinct (they relate to the same lexical resources present in the numeration), we reach a contradiction: *was* should precede and be preceded by *the* and *book*. Similarly, given that the higher occurrence of *[the book]* asymmetrically c-commands the lower one, we obtain the undesirable result that *the* should be required to precede itself. Thus, if nondistinct elements (copies) count as the same for purposes of linearization in virtue of referring to the same items of

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[25] See Nunes (2004:165, n. 15) for a suggestion as to how this indexation mechanism can be dispensed with, in conformity with Chomsky's (1995) Inclusiveness Condition.

[26] We will address the issue of how to linearize lexical heads in a mutual c-command relation in section 4 below.

the numeration, we have an answer for why a structure such as (73) cannot surface as (74a), with the two chain links phonetically realized: it simply cannot be linearized.

Nunes (1995, 1999, 2004) argues that deletion comes into play in this scenario as a rescuing strategy to permit the linearization of structures containing chains. More specifically, deletion of the "repeated" material within chains before linearization circumvents the problem of linearizing *was* with respect to *the* and *book* in (73) discussed above. If the material of chain CH = ([the book]^i, [the book]^i) is deleted in any of the ways depicted in (75) below, the structure in (73) can be linearized without any problems. Following Nunes (1995), let us refer to the computations of the phonological component that "prepare" chains for linearization by deleting syntactic constituents that may induce contradictory requirements as *Chain Reduction*.

(75) a. [[~~the book~~]^i [was [found [the book]^i]]]
    b. [[the book]^i [was [found ~~[the book]^i~~]]]
    c. [[the ~~book~~]^i [was [found [~~the~~ book]^i]]]

If all the structures in (75) can be properly linearized, the question now is why only the deletion sketched in (75b) yields an acceptable sentence (cf. (74b,d)). Nunes (1995, 1999, 2004) proposes that this is where economy plays a big role. More specifically, economy considerations should ensure that deletion applies as few times as possible. Applied to the DP chain in (73), Chain Reduction may yield the output in (75c), with two applications of deletion, or the outputs in (75a) and (75b), with a single application targeting the whole DP node. Since there is no convergence problem resulting from these reductions, the three derivations are eligible for economy comparison and the derivation yielding (75c) is excluded for employing more operations of deletion than necessary.

Thus, the reason why scattered deletion within chains is disallowed in most cases is that it is a costly option. It will be employed just in case competing derivations that employ fewer applications of deletion violate additional requirements of the phonological component so that they do not converge. Recall that this was the case with the splitting of the extended clitic cluster (which includes the verb) in Bulgarian, repeated below in (76a). As we saw in section 2.7, if the computational system employed just a single instance of deletion, eliminating the higher or the lower copy of the complex head, the clitics *li*, *si*, *mu*, and *gi* would not all have their enclitic requirements satisfied; hence, scattered deletion has to be employed (cf. (76b)). By contrast, in the case of Macedonian, scattered deletion is blocked by the more economical option of eliminating the lower link of the chain with a single application of deletion, as shown in (77), which allows the phonological requirements of the clitics to be satisfied (Recall that in Macedonian, *li* is an enclitic and *si, mu,* and *gi* are proclitics).

(76) a. Dal   *li si mu   (gi)*   parite?   (Bulgarian)
        given Q are him.dat. them the-money
        'Have you given him the money?'
     b. [[~~*Si mu gi*~~ dal] *li* [*si mu gi* ~~dal~~] parite]

(77) a. *Si   mu   gi*   dal   *li* parite?   (Macedonian)
        are him.dat. them given Q the-money
        'Have you given him the money?'

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b. [[*Si mu gi* dal] *li* [~~*si mu gi* dal~~] parite]

The combination of a convergence requirement in terms of linearization and economy considerations on the number of applications of deletion therefore provides an account for why a chain does not surface with all of its links phonetically realized (the structure containing such a chain cannot be linearized)[27] and why scattered deletion constructions are uncommon (they are disfavored on economy grounds and must be triggered by additional convergence requirements in order to be licensed). What is now missing is an explanation for why the actual reduction of the DP chain in (73) must involve the deletion of the lower copy, rather than the head of the chain (cf. (74b) vs. (74c)), despite the fact that both reductions in (75a) and (75b) may employ a single operation of deletion targeting the whole DP node. Obviously, we can't simply say that lower copies must delete. Conceptually, that would amount to reintroducing traces and, empirically, it would be just wrong, as we have argued extensively in section 2 with many instances of traces being phonetically realized.

The most plausible answer should again be formulated in economy terms. There should be some factor that makes the pronunciation of the highest copy more economical in the general case. But like in any economy approach, if the most economical option does not lead to convergence, a less economical option is chosen instead. One possibility is that such independent factor is feature checking (see Nunes 1995, 1999, 2004). Assuming that every movement operation must be licensed by feature checking (see Chomsky 1995), the higher the position a given element moves to, the greater the number of checking relations it will have participated in; hence, higher copies will always have more features checked than lower copies. In the derivation of (73), for instance, *[the book]* only checks its Case-feature after it moves to [Spec, TP], as illustrated in (78), where subscript annotates checking.

(78) a. [was [found [the book]-**CASE**]]
    b. Copying: [the book]^i-**CASE**
    c. Merger + Feature Checking: [[the book]^i-**CASE** [was [found [the book]^i-**CASE**]]]

Nunes (1995, 1999, 2004) uses this independent asymmetry between different copies to formulate a specific economy metric that favors deletion of lower copies. Assuming that all formal features are uninterpretable at PF, Nunes first extends Chomsky's (1995) proposal that feature checking renders uninterpretable features invisible at LF to invisibility at PF, as well. This means that after the Case-feature of the upper copy of *[the book]* in (78c) is checked, it becomes invisible at both LF and PF. That being so, the preference for deleting lower copies may be derived from general economy computations with respect to elimination of formal features in the phonological component. Consider, for instance, the optimal outputs of Chain Reduction in (74a) and (74b), repeated below in (79) with the checking information indicated.

(79) a. [[~~the book~~]^i-~~**CASE**~~ [was [found [the book]^i-**CASE**]]]
    b. [[the book]^i-**CASE** [was [found ~~the book~~]^i-~~**CASE**~~]]]

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[27]   See section 4 below for further discussion and refinements.

Although formal features feed the phonological component and are computed by morphology, they are not interpretable at the PF level itself. Thus, as Chomsky (1995:230-231) notes, there must be an operation in the phonological component applying after morphology that deletes formal features. Such required feature deletion in later computations of the phonological component now renders the derivations of (79a) and (79b) different in terms of derivational cost, despite the fact that both reductions in (79) are equally costly as they can be implemented with a single application of deletion, as mentioned earlier. The Case-feature of the higher copy of *the book* in (79b) has already been rendered invisible for PF (and LF) purposes upon checking and therefore need not be deleted by later computations of the phonological component; in other words, (79b) can converge at PF as is, so to speak. By contrast, (79a) can only converge at PF after the unchecked Case-feature of the lower copy of *the book* gets deleted. Hence, the derivation of (79b) is more economical in that it employs fewer applications of deletion in later computations of the phonological component. To put it in general terms, unless it is motivated by additional convergence constraints of the phonological component such as the ones discussed in section 2, the pronunciation of a higher copy will always be favored over the pronunciation of a lower copy.[28]

Interestingly, certain MWF data discussed by Bošković (2002) provide evidence that Chain Reduction proceeds in a top-down fashion, targeting first the highest chain (that is, the chain whose head asymmetrically c-commands the other chains in its domain), then targeting the second highest, and so on.[29] Consider the following data from Bulgarian, another MWF language that is also subject to the ban on homophonous sequences of *wh*-phrases discussed in section 2.1, as seen in (80).[30]

(80) a. *Koj na kogo kogo   e pokazal?   (Bulgarian)
         who to whom whom is pointed-out
     b. Koj kogo na kogo e pokazal?
          who whom to whom is pointed-out
         'Who pointed out whom to whom?'

In principle, (80a) could be rescued by pronouncing either of the homophonous *wh*-phrases in a lower position. However, Bošković (2002) observes that it is the accusative rather than the dative *wh*-phrase that has to be pronounced lower, as shown in (81).

(81) a. Koj na kogo e pokazal   kogo?   (Bulgarian)

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[28]   This proposal is also compatible with Chomsky's (2000, 2001) Agree-based system, where feature checking/valuation may take place in the absence of movement, if we assume that the EPP involves PF-feature checking on the element that undergoes movement, along the lines discussed above. For further discussion on multiple EPP-checking, see Nunes 1999, 2004.

[29]   Here we are reinterpreting in structural (LCA) terms Bošković's (2002) original proposal that chains are scanned in a left-to-right fashion when the system is determining which copy to pronounce.

[30]   It is worth noting that although Superiority affects the order of *wh*-phrases in Bulgarian (see Rudin 1988, Bošković 1999, 2002, Richards 1997, 1998, and Pesetsky 2000, among others), only the first fronted *wh*-phrase is subject to this condition, as observed by Bošković (1997b) (see Richards 1997 and Bošković 1999 for alternative explanations of the selectivity of Superiority effects in Bulgarian). Hence, the unacceptability of (80a) is not due to a Superiority violation.

who to whom is pointed-out whom
b. ??Koj kogo e pokazal   na kogo?
    who whom is pointed-out to whom
'Who pointed out whom to whom?'

The structures underlying the sentences in (80) are given in (82) below (irrelevant details omitted). As standardly assumed, the order of *wh*-phrases reflects the order of their movement to [Spec, CP]. Given the selectivity of Superiority effects in Bulgarian (see fn. 30), *koj*, the highest *wh*-phrase prior to *wh*-movement must move first, the order of movement of the objects being free (the order of the objects in the base position is irrelevant for our current concerns).

(82) a. [$_{CP}$ koj^i [na kogo]^j kogo^k e [$_{IP}$ koj^i pokazal [na kogo]^j kogo^k]]
      b. [$_{CP}$ koj^i kogo^k [na kogo]^j e [$_{IP}$ koj^i pokazal [na kogo]^j kogo^k]]

Let us now examine how the *wh*-chains in (82a) are to be reduced. The highest chain is the one headed by *koj*. Since nothing goes wrong if the chain is pronounced in the head position, economy considerations regarding deletion of formal features discussed above then trigger deletion of the lower copy, as shown in (83a) below. Next, the system moves to the second highest chain, the chain involving *na kogo*. Again, no PF violation occurs if we pronounce its head (nothing rules out the *koj na kogo* sequence) and the lower copy is deleted, as shown in (83b) (Recall that the deletion of the higher copy of *na kogo* is excluded by economy considerations regulating deletion of unchecked features of the lower copy). At this point, then, we have the sequence *koj na kogo* sentence initially and may proceed to the reduction of the chain involving *kogo*. If we pronounce *kogo* in the head position, we violate the PF constraint against homophonous sequences of *wh*-words. In order not to do that, we pronounce the tail of the chain, as shown in (83c), deriving (81a).

(83) a. [$_{CP}$ koj^i [na kogo]^j kogo^k e [$_{IP}$ ~~koj^i~~ pokazal [na kogo]^j kogo^k]]
      b. [$_{CP}$ koj^i [na kogo]^j kogo^k e [$_{IP}$ ~~koj^i~~ pokazal ~~[na kogo]^j~~ kogo^k]]
      c. [$_{CP}$ koj^i [na kogo]^j ~~kogo^k~~ e [$_{IP}$ ~~koj^i~~ pokazal ~~[na kogo]^j~~ kogo^k]]

Crucially, if the system could consider the linearization of all chains at once or if reduction of a given chain CH$_1$ were allowed to take into account later decisions regarding the reduction of another chain CH$_2$, reduction of the chain involving *na kogo* in (82a) should also allow the pronunciation of its lower copy in order to circumvent the adjacency problem with *kogo*. The fact that this is not the case (cf. (81b)) shows that the decision of whether to pronounce the head or the tail of a given chain is made based on the material already linearized, without look-ahead. Consider now (82b). It is easy to verify that under the assumption that Chain Reduction proceeds from the highest to the lowest chains, no PF violation occurs if we pronounce the heads of all three chains. We must then pronounce the initial *wh*-phrases, which gives us (80b).

To sum up, lack of phonetic realization is not an intrinsic property that characterizes traces as grammatical primitives. Traces or parts of traces may be phonetically realized if the pronunciation of the head of the chain causes the derivation to crash at PF. The fact that traces in the general case are not phonetically realized results from the interaction among convergence and economy factors. On the one hand, linearization requirements trigger deletion of "repeated"

material within a chain and legibility at PF triggers deletion of (visible) formal features in the phonological component. On the other hand, economy considerations ensure that deletion is employed in an optimal way, affecting as few elements as possible. If the phonological component imposes no additional convergence condition that can affect these optimality computations, the head of a chain will always be the optimal option for phonetic realization.

4. Pronunciation of Multiple Copies
Thus far, we have witnessed two kinds of situations: one link of a given chain is pronounced or different chain links are phonetically realized, but with different material (scattered deletion). In no case have we seen instances where a chain has more than one full link pronounced and this is exactly what we should expect, given that a structure containing more than one full chain link cannot be linearized. However, the facts appear to be a bit more complicated than this. There are actually several kinds of constructions that seem to involve phonetic realization of more than one copy. "*Wh*-copying" constructions such as (84) in German (from McDaniel 1986), where an intermediate *wh*-trace is pronounced in addition to the head of the chain, are the most familiar examples of this state of affairs (see du Plessis 1977, Hiemstra 1986, McDaniel 1986, Höhle 2000, and the collection of papers in Lutz, Muller, and von Stechow 2000, among others).

(84) *Wen*   glaubt Hans *wen*   Jakob gesehen   hat?   (German)
     whom   thinks Hans *whom* Jakob seen   has
   'Who does Hans think Jakob saw?'

Given the discussion so far, there are two logical paths one could take. The first one is to attempt to show that appearances are misleading and that the identical *wh*-elements in (84) are not copies resulting from movement (see Nunes 1995). However, the fact that *wh*-copying constructions are subject to island effects, as illustrated by the German sentence in (85) (from Fanselow and Mahajan 2000) with a factive island, indicates that this is not a promising line of investigation.

(85) **Wen*   bewies sie,   *wen*   Fritz liebt?   (German)
     Who   proved she   *who*   Fritz loves
     'Who did she prove that Fritzs loves/'

The other approach is to assume that *wh*-copying constructions do involve movement – and, therefore, copies – but that (some of) their copies are somehow invisible to the LCA. The obvious question then is how to give substance to this idea without undermining the whole approach discussed in section 3. One possible avenue to explore is to see whether there are other cases of syntactic objects that are invisible to the LCA.

One such possibility is explicitly discussed by Chomsky (1995) when dealing with the issue of how to linearize two heads in a mutual c-command relation within the bare phrase structure system. Take the structure in (86), for instance, where *r*, *m*, and *p* are lexical items and *r* and *m* determine the label of K and L, respectively.

(86)   K = {r, {r, {m, {m, p}}}}

```
 r          L = {m, {m, p}}
        ╱╲
      m      p
```
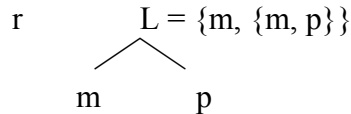
Since the bare phrase structure system does not allow for vacuous projections, neither *m* nor *p* in (86) asymmetrically c-commands the other, and no linear order between them can be established in consonance with the LCA. A derivation containing a structure such as L in (86) should therefore be canceled, unless, as Chomsky (1995:337) suggests,

> "the structure N = [$_L$ *m p*] has changed by the time the LCA applies so that its internal structure is irrelevant; perhaps N is converted by Morphology to a 'phonological word' not subject internally to the LCA, assuming that the LCA is an operation that applies after Morphology".

Nunes (2004) implements the morphological reanalysis suggested by Chomsky in terms of the operation *fusion* of Distributed Morphology (see Halle and Marantz 1993), which takes two terminal heads that are sisters under a single category node and fuses them into a single terminal node, reducing the number of independent morphemes in a structure. Applied to the two independent terminals *m* and *p* in (86), fusion (represented by '# #') yields an atomic blended terminal *mp*, as shown in (87), with no internal structure accessible to further morphological or syntactic computations. That is, the order internal to the output of fusion (whether #*mp*# or #*pm*#, for instance) is determined exclusively by morphology and is of no concern to the LCA. In fact, the output will involve a subset of the morphosyntactic features of the input terminal nodes.

(87)   K = {r, {r, {m, {#mp#}}}}
```
        ╱╲
      r       L = {m, {#mp#}}
               │
            #mp#
```
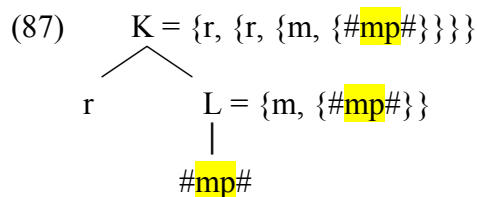
Thus, although the LCA will determine the linearization of the blended item #*mp*# with respect to *r* in (87) (*r* asymmetrically c-commands #*mp*# and should therefore precede it), the content of #*mp*# will only be indirectly linearized with respect to *r*, in virtue of being an integral part of #*mp*#. In this regard, it is linearized in the same way the phoneme /l/ is indirectly linearized in *John loves Mary* due to its being part of the lexical item *loves*.

Before we proceed, two points should be clear. We are not claiming that fusion is necessarily triggered by linearization considerations, neither are we claiming that fusion is the only rescuing strategy that allows linearization of heads in a mutual c-command relation (see Hornstein, Nunes and Grohmann 2005:sec. 7.3 for discussion of two other possibilities). All we are saying is that fusion, an independent operation of the morphological component, may allow the problem of linearizing two heads in a mutual c-command relation to be circumvented *if* such heads are specified to undergo fusion in the environment under consideration.

Now comes the punch line. Suppose that *m* in (86), for instance, moves and the copy left behind gets fused with *p* in the morphological component, as illustrated in (88) below. Given that #*mp*# is an atomic element not subject internally to the LCA, the only copy of *m* the LCA "sees" in (88) is the higher one and this creates no contradictory linearization requirements of the type discussed in section 3, for the lower copy blended within #*mp*# is simply not recognized by the LCA. Thus, the relevant asymmetric c-command relations are only established among *m*, *r*, and #*mp*#, yielding the linear order <m, r, #*mp*#>, which contains two copies of *m*.

(88) $[m^i \dots [_K r [_L \#m^i p\#]]]$

To make the point more generally, a chain may have more than one full link phonetically realized just in case some of these links have undergone fusion, falling outside the eyesight of the LCA. Furthermore, given that morphological fusion plays a key role in the licensing of multiple copies, we should in principle expect to find a close-knit relationship between phonetic realization of multiple copies and morphological restrictions. After all, it is simply not the case that any two random items can undergo fusion. Thus, we should expect all cases of multiple copies to be tied to morphological specifications such as sensitivity to specific lexical items, morphemes, or features; changes in the output (morpheme deletion, changes in the order of morphemes, tone changes, reduction, suppletion, etc.); and sensitivity to morphological complexity (especially syntactic complexity), given that these are hallmarks of fusion. In the following sections, we will see in some detail how this prediction is fulfilled by examining phonetic realization of multiple copies in A'-movement, A-movement, head movement, and remnant movement constructions.

4.1. Cases involving *wh*-movement
Let's start our discussion with *wh*-copying constructions in German such as (84) (from McDaniel 1986), repeated here in (89). [31]

(89) *Wen*   glaubt Hans *wen*   Jakob gesehen   hat?   (German)
     whom   thinks Hans *whom* Jakob seen   has
     'Who does Hans think Jakob saw?'

The *wh*-copying construction is subject to two intriguing constraints. First, although more than one trace may be phonetically realized (cf. (89)), only intermediate traces can be pronounced. Take the contrast between (90) (from Fanselow and Mahajan 2000) and (91) below, for example. In each sentence, three *wh*-copies are phonetically realized; however, only (90) is acceptable. The relevant difference between them is that in (90), only the intermediate *wh*-traces are realized, whereas in (91), the tail of the *wh*-chain is realized, as well. That being so, the question then is what is special about intermediate traces and how this can be accommodated under the copy theory.

(90) *Wen*   denkst Du   *wen*   sie   meint *wen* Harald liebt?   (German)

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[31]   *Wh*-copying is also found in Afrikaans (du Plessis 1977), Romani (McDaniel 1986), Frisian (Hiemstra 1986), and Child English (Thornton 1990), for example.

who   think   you   *who*   she   believes *who*   Harald loves
'Who do you think that she believes that Harald loves?'

(91) **Wen   glaubt Hans   *wen*   Jakob   *wen*   gesehen hat?   (German)
      whom   thinks Hans   *whom* Jakob   *whom*   seen   has
      'Who does Hans think Jakob saw?'

The second pervasive characteristic of *wh*-copying constructions is that, roughly speaking, they can only involve simplex, not complex *wh*-phrases, as illustrated by the contrast between (89) and the ones in (92) (see McDaniel 1986).

(92) a. *Wessen Buch glaubst du   *wessen Buch*   Hans   liest?   (German)
        whose book think   you   *whose book*   Hans   reads
        'Whose book do you think Hans is reading?'
    b. *Welche Bücher glaubst du   *welche Bücher* Hans   liest?
        which book   think   you *which book*   Hans   reads
        'Which book do you think Hans is reading?

Nunes (1999, 2004) argues that this paradigm can be accounted for, if long distance *wh*-movement in languages that allow for *wh*-copying constructions may proceed via head adjunction to C, as illustrated in (93a),[32] and if a [–wh] C fuses with the adjoined *wh*-element in the morphological component, as represented in (93b).

(93) a. [$_{CP}$ [$_{C0}$ WH^i [$_{C0}$ Q]] .... [$_{CP}$ [$_{C0}$ WH^i [$_{C0}$ C$_{[-wh]}$]] [$_{TP}$ ... WH^i ...]]]
     b. [$_{CP}$ [$_{C0}$ WH^i [$_{C0}$ Q]] .... [$_{CP}$ #[$_{C0}$ WH^i [$_{C0}$ C$_{[-wh]}$]#] [$_{TP}$ ... WH^i ...]]]

Consider now how the structure in (93b) is to be linearized. The *wh*-element undergoing movement adjoins to both the intermediate and the matrix Comp in overt syntax. In the morphological component, the intermediate [–wh] Comp triggers fusion with the adjoined copy of the moved *wh*-element. Hence, the *wh*-chain in (93b) has only two links visible to the LCA, as the intermediate *wh*-copy becomes invisible after it undergoes fusion. The two visible copies should then prevent the structure from being linearized unless Chain Reduction is employed. Thus, the derivation of (91), for instance, which has more than one chain link visible to the LCA, cannot converge because the relevant structure cannot be linearized.[33] Just to be clear, the claim

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[32]   For arguments that head adjunction should in general be preferred over movement to specifiers, all things being equal, see Nunes 1998 and Bošković 2001.

[33]   Incidentally, notice that if fusion could also affect the matrix complementizer of (91), for instance, repeated below in (i), this sentence would be incorrectly ruled in, for the two higher copies of *wen* would become invisible to the LCA and should create no problems for linearization with respect to the lowest copy. This indicates that fusion is restricted to [-wh] complementizers, as stated in the text. Alternatively, it could be the case that the relevant fusion is not so restricted, but the [+wh] specification of the interrogative complementizer renders it too complex in the relevant sense for fusion to apply (see Nunes 2004). Whether these are true alternatives or notational variants remains to be determined. Below, we discuss languages where the morphological restriction in question does not hold and we indeed find fusion with an interrogative complementizer.

here is not that every instance of head movement renders the adjoined element invisible to the LCA, but rather that *fused* elements are not computed by the LCA.[34] Under the assumption that the highest copy in (93b) has more features checked, it should be kept and the lowest copy should be deleted, as discussed in section 3, yielding (94).

(94) $[_{CP} [_{C0} WH^i [_{C0} Q]] .... [_{CP} \#[_{C0} WH^i [_{C0} C_{[-wh]}]\#] [_{TP} ... \overline{WH^i} ...]]]$

    We now have an answer for why the tail of the *wh*-chain contrasts with intermediate traces with respect to phonetic realization. There is nothing intrinsic to intermediate traces themselves that allows them to be phonetically realized. Rather, morphological requirements of the intermediate C^0 may trigger fusion with the adjoined *wh*-copy, making it invisible for the LCA and, consequently, for deletion. Once the system only "sees" the highest and the lowest *wh*-copies in (93b), its linearization as in (94) is no different from the linearization of a standard *wh*-movement construction such as (95) below, where economy considerations on the applications of deletion by later computations of the phonological component trigger the deletion of the lower *wh*-copy (see section 3).

(95) a. What did John see?
      b. $[_{CP}$ what^i did $[_{IP}$ John see $\overline{what}^i]]$

    Suggestive evidence that *wh*-movement in *wh*-copying does indeed involve head adjunction is provided by the fact the *wh*-copying is more restricted than regular *wh*-movement. In particular, it is subject to negative islands even when arguments are moved, as illustrated in (96).

(96) a. *Wen* glaubst du   nicht dass sie liebt?   (German)
         whom believe   you not   that she loves
      b. **Wen* glaubst du nicht, *wen*   sie liebt?
          whom believe you not   whom she loves
          'Who don't you think that she loves?'

The fact *wh*-copying is always subject to negative islands, as shown in (96b) (from Reis 2000), can be accounted for if it involves head-adjunction to Com^P, as claimed above, and if an intervening Neg head blocks such head movement (see Bošković 1998 and Rivero 1991, for

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(i) **Wen* glaubt Hans   *wen*   Jakob   *wen*   gesehen hat?   (German)
     whom thinks Hans   whom   Jakob   whom   seen   has
     'Who does Hans think Jakob saw?'

[34] Contrary to what may seem at first glance, movement of the *wh*-element from the head-adjoined position to adjoin to the matrix interrogative complementizer Q in (93a) is not incompatible with Baker's (1988) account of the general ban on excorporation (if the ban indeed holds). According to Baker, given the head adjunction structure $[_{Y0} X^0 Y^0]$, if X^0 moves, the morphological component will receive a head with an adjoined trace, which was taken to be an illicit morphological object. Under the copy theory, Baker's proposal can be interpreted as saying that deletion of copies cannot take place under an X^0 element. Notice that it is a crucial feature of the analysis reviewed above that the *wh*-copy adjoined to the intermediate C^0 does *not* delete.

relevant discussion). By contrast, once standard *wh*-movement such as the one in (96a) involves movement to [Spec, CP], the intervening Neg head does not count as a blocker.

Finally, by having *wh*-copying be dependent on morphological fusion, we reach a natural explanation for why complex *wh*-phrases do not license *wh*-copying (cf. (92)). The more morphologically complex a given element is, the harder it is for it to be fused and be reanalyzed as part of a word. Thus, the unacceptability of sentences such as the ones in (92) is arguably due to the fact that the *wh*-phrases cannot undergo fusion with the intermediate C^0 due to their morphological complexity. This in turn entails that all the copies of the moved *wh*-phrase are visible to the LCA and failure to delete all but one link prevents their structures from being linearized.

It should be noted that one finds considerable dialectal and idiolectal variation among speakers who accept *wh*-copying constructions. According to Fanselow and Mahajan 2000, for instance, the dialect of German spoken in the Berlin-Brandenburg area distinguishes multiple copies of regular PPs, as in (97a), from multiple copies of PPs that involve incorporation and independently function as simple morphological words, as in (97b); however, other dialects do not make such a distinction and allow both of these constructions.[35]

(97) a. *An wen   glaubst Du,   *an wen*   sie   denkt?   (German)
         of whom   believe you   *of whom* she   thinks
         'Who do you believe that she thinks of?'
      b. *Wovon*   glaubst Du,   *wovon*   sie   träumt?
         what-of   believe you   *what-of* she   dreams
         'What do you believe that she dreams of?'

From the perspective reviewed here, variation in this regard is not due to syntactic computations proper, but to the degree of morphological complexity a given dialect or idiolect tolerates under fusion. As a rule, the more complex a constituent, the less likely it is for it to undergo fusion and become invisible to the LCA. And this holds not only for *wh*-copying constructions, but for all constructions that display multiple copies, as we will see below.

Nunes's (2004) account of *wh*-copying reviewed above can provide an alternative analysis for constructions in North Eastern Italian dialects like the ones illustrated in (98) and (99), which Poletto and Pollock (2004) have analyzed in terms of "*wh*-clitic doubling".[36]

(98) a. *S'a-lo*   fat   *che*?   (Illasi)
         what-has-he done *what*
         'What has he done?'
      b. *Ndo*   e-lo ndat *endoe*?
         where is-he gone *where*
         'Where has he gone?'
      c. *Ci*   halo   visto *ci*?

---

[35]   The dialects that allow (97a) must then allow for fusion between the preposition and the *wh*-word, followed by fusion with the intermediate C^0.

[36]   We are thankful to Mary Kato (p.c.), who suggested that Nunes's (1999, 2004) analysis of *wh*-copying could be extended to *wh*-doubling.

whom has-he seen *whom*
'Who has he seen?'

(99) a. *Ch'*et   fat   *què*?   (Monno)
      what-have-you done *what*
      'What have you done?'
    b. *Ngo*   fet   majà *ngont*?
      where do-you eat   *where*
      'Where do you eat?'

According to Poletto and Pollock's analysis, the higher *wh*-element in (98) and (99) is a *wh*-clitic that is doubled by the lower *wh*-element, in much the same way pronominal clitics may double arguments in some languages.

     Among the interesting properties constructions such as (98) and (99) display, Poletto and Pollock mention that doubling is only licit with a subset of *wh*-words; complex *wh*-phrases, PPs containing *wh*-elements and *parché* 'why' cannot appear in doubling constructions, as illustrated in (100).

(100) a. **parché* e-lo   partio *parché*?   (Illasi)
      why   is-he left   *why*
      'Why has he left?'
    b. **S'*   alo   magnà *che torta*?
      what has-he eaten   *what cake*
      'What cake has he eaten?'

     Another interesting property pointed out by the authors is that in case the *wh*-elements are not identical, the short form must be the one on the left, as shown by the contrast between (98a) and (98b), on the one hand, and (101a) and (101b), on the other.

(101) a. **Che* a-lo   fato   *sa*?   (Illasi)
      what has-he done *what*
      'What has he done?'
    b. **Ngont* fet   andà *ngo*?   (Monno)
      where do-you go   *where*
      'Where do you go?'

     Poletto and Pollock interpret the reduced form of the left *wh*-element as a reflex of its clitic properties and the lack of doubling involving complex *wh*-phrases as an example of the restrictions generally found in standard clitic doubling constructions (such as the restriction that French clitics may double pronouns, but not DPs, for example). However, given that the complexity restrictions found in *wh*-doubling constructions to a certain extent mimic the ones found in *wh*-copying constructions discussed above, it would be desirable to subject them to the same analysis. It should be noted that, besides exhibiting sensitivity with respect to morphological complexity, *wh*-doubling also patterns with *wh*-copying (cf. (96b)) in being blocked by negation, as shown in (102) (see Poletto and Pollock 2004:fn. 27), and it even mirrors

wh-copying in exhibiting variation among speakers with respect to the specific *wh*-elements that allow doubling (see Poletto and Pollock 2004:fn. 14).

(102) *Ci no te   ha   visto *ci*   (Illasi)
       who not you have seen *who*
       'Who haven't you seen?'

Based on these similarities, we thus propose that *wh*-doubling and *wh*-copying are indeed derived in a similar way. More specifically, we propose that in the relevant dialects, a moved *wh*-element may adjoin to the interrogative complementizer Q and then be fused in the morphological component, as sketched in (103).

(103) a. $[_{CP}$ Q $[_{IP}$ … wh …]]
      b. $[_{CP}$ $[_{C0}$ wh^i $[_{C0}$ Q]] $[_{IP}$ … wh^i …]]
      c. $[_{CP}$ #$[_{C0}$ wh^i $[_{C0}$ Q]]# $[_{IP}$ … wh^i …]]

Once the moved *wh*-element fuses with Q, as seen in (103c), it is no longer visible for purposes of linearization and economy considerations prevent its deletion, yielding a structure with two copies of the *wh*-element (cf. (98) and (99)).

We can now provide a straightforward account for why complex *wh*-phrases, PPs containing *wh*-elements or the bimorphemic *wh*-element *parchè* 'why', which arguably involves a preposition and a *wh*-word, cannot be doubled. The morphological complexity of these elements prevents them from fusing with the interrogative complementizer; hence all of their copies are visible to the LCA and only one can surface.[37] In turn, the intervention of negation is attributed to the proposed head adjunction sketched in (103b), as discussed above (cf. (96b)).[38] Finally, since fusion is a morphological operation that conflates features of multiple terminals into a single one, it shouldn't surprise us to find cases of suppletion or, more transparently, shortened forms. That is, once it is the leftmost copy that undergoes fusion, it should thus be the one to display signs of this morphological reanalysis; hence the contrast between (98a) and (99b), on the one hand, and (101a) and (101b), on the other.

The proposal that multiple copies are a by-product of morphological fusion can therefore provide a uniform account of both *wh*-copying and *wh*-doubling constructions.

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[37] Morphological complexity may also provide an account for Poletto and Pollock's (2004) observation that *wh*-doubling in embedded clauses is possible only when the complementizer is null, as illustrated in (i) below. If in these dialects, the overt interrogative complementizer (that is, the complex *wh*+overt C) is morphologically heavy in the relevant sense, it should prevent fusion and, consequently, multiple copies of the moved *wh*-element.

(i) a. So   mia 'ngo   (*che) l'é   ndà (ngont)   (Monno)
        (I) know not where (*that) he is gone (where)
      'I don't know where he has gone.'
     b. Dime ci   (*che) l'a tolto   (ci), el quadro   (Illasi)
        tell me who (*that) he has taken (who) the picture
      'The picture, tell me who has taken it.'

[38] The fact that *wh*-doubling triggers subject clitic inversion (see Poletto and Pollock 2004) should perhaps be interpreted along the same lines, that is, as due to the head adjunction involved.

4.2. Cases involving head movement

The analysis of the constructions involving multiple copies of *wh*-elements discussed above crucially relied on (somewhat uncommon) instances of head adjunction. Recall however that it is not the case that every instance of head adjunction leads to pronunciation of multiple copies. It just happens that syntactic head adjunction provides a configuration in which morphological fusion – the relevant operation in cases of pronunciation of more than one copy – may apply. Actual application of fusion to a head adjunction structure will depend on the morphological properties of the language and the lexical items in question. That said, we should in principle expect to also find multiple copies in more standard cases of head movement. This is what we show below, with clitic placement, postposition incorporation, and verb movement.

Take, for instance, clitic duplication in (some dialects of) Argentinean Spanish, illustrated in (104a), which contrasts with the duplication of the clitic cluster in (104b) (see Nunes 2004).[39]

(104) a. Yo *lo* iba a hacer*lo*.   (Argentinean Spanish)
   I *it$_{CL}$* went to do-*it$_{CL}$*
   'I was going to do it'
   b. *Yo *se* *lo* iba a decir*selo.*
   I *him$_{CL}$* *it$_{CL}$* was-going to say- *him$_{CL}$* -*it$_{CL}$*
   'I was going to say it to him'

The duplication exemplified in (104a) can be accounted for if, after adjoining to a given functional head F, the moved clitic gets fused with F in the morphological component, as sketched in (105).

(105)
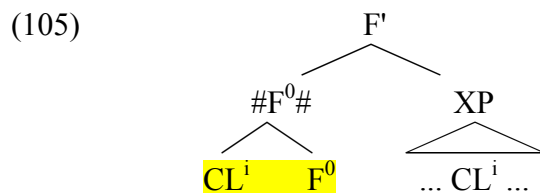
After fusion, the highest copy of the clitic in (105) becomes invisible to the LCA and should therefore be ignored by Chain Reduction, which should then keep the second highest copy and delete the remaining ones (if the clitic has already moved before adjoining to F), yielding a sentence with two copies of the clitic, as in (104a). Under this analysis, the unacceptability of (104b) is to be attributed to the morphological complexity induced by the cluster. If it is morphologically heavy enough to prevent fusion, all the copies of the clitic cluster are visible to the LCA and all but one copy of the clitic cluster chain must be deleted; in other words, the structure underlying (104b) cannot surface as is, because it cannot be linearized.

Interesting evidence for the proposed morphological reanalysis in this case of clitic duplication is found in other dialects of Argentinean Spanish, where duplication necessarily

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[39]   Despite being stigmatized as nonstandard, clitic duplication such as (104a) is not uncommon in South American Spanish. See Oroz 1966 and Silva-Corvalán 1989 for documentation of clitic duplication in Chilean Spanish, for instance.

correlates with an enclisis pattern that is otherwise not allowed in the language. Take (106), for example (see Nunes 2004).

(106) a. *Nos*   vamos acostumbrando   a este pais   poco   a   poco.   (Argentinean
   us$_{CL}$ go-1PL getting-accustomed to this country little   by   little   Spanish)
  b. Vamos   acostumbrándo*nos*   a este pais   poco a   poco
   go-1PL getting-accustomed/*us*$_{CL}$ to this country little by little
  c. *Vámo*nos*   acostumbrándo   a este pais   poco a poco.
   go-1PL /*us*$_{CL}$ getting-accustomed to this country little by little
  d. Vámo*nos* acostumbrándo*nos*   a este pais   poco a poco.
   go-1PL /*us*$_{CL}$ getting-accustomed/*us*$_{CL}$ to this country little by little
  e. *Nos* vamos acostumbrándo*nos*   a este pais   poco a   poco.
   us$_{CL}$ go-1PL getting-accustomed/*us*$_{CL}$ to this country little   by   little
   'We are getting accustomed to this country little by little.'

(106a) and (106b) exhibit the standard pattern of clitic placement in Spanish when finite auxiliaries are involved: clitic climbing and proclisis to the finite auxiliary or enclisis to the nonfinite main verb, respectively. Crucially, enclisis to the finite auxiliary is not permitted, as shown in (106c). The contrast between (106d) and (106e) in turn shows that clitic duplication is also possible in these other dialects, but only if the highest copy is enclitic to the finite auxiliary, which, as we have just seen, is not a pattern that is independently found in the language. The exceptional enclisis in (106d) can therefore be analyzed as the overt manifestation of the morphological fusion affecting the higher copy of the clitic chain and the finite auxiliary. In other words, the exceptional pattern seen in (106d) is not to be treated as an additional option for syntactic clitic placement. Otherwise, we would incorrectly rule (106c) in and fail to capture the correlation between exceptional enclisis and clitic duplication. The exceptional enclisis in (106d) should rather be analyzed as a by-product of the morphological reanalysis that renders the highest copy of the clitic invisible to the LCA (see Nunes 1999, 2004 for further data and discussion). Accordingly, (106e) is ungrammatical because the higher copy of the clitic has not undergone fusion with the finite auxiliary and once both copies are visible to the LCA, the structure cannot be linearized (see section 3).

 Morphological exceptionality when duplication is involved is also found in postposition incorporation constructions in Panara, a Brazilian indigenous language. As shown in Dourado 2002, postpositions in Panara may be duplicated just in case they can also undergo standard incorporation. Assuming Nunes's (1999, 2004) analysis of multiple copies, Dourado argues that this restriction follows if the moved postposition may optionally be fused with the head it has adjoined to, as sketched in (107), becoming invisible to the LCA.

(107)
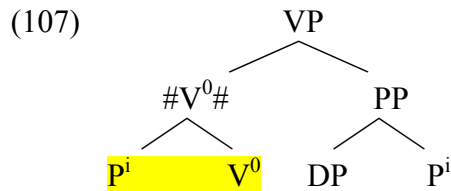
Supporting evidence for this proposal is provided by the fact that when duplication takes place, an additional morphological process is activated, as illustrated in (108) (from Dourado 2002).

(108) a. kamɛra   yɨ=**ra**=**ria**-tẽ   ĩkyẽ *hɔw* kri   tã   (Panara)

     you.PL.ABS   REAL.TR=**1SG.ABS**=**2PL.ABS**=go   I   *with* tribe   to

    b. kamɛra   yɨ=**ra**=*hɔw*=**ria**-tẽ   ĩkyẽ kri   tã

     you.PL.ABS   REAL.TR=**1SG.ABS**=*with*=**2PL.ABS**=go I   tribe to

    c. kamɛra   yɨ=**ra**=*hɔw*=tẽ   ĩkyẽ *hɔw* kri   tã

     you.PL.ABS   REAL.TR=**1SG.ABS**=*with*=go I   *with* tribe to

    'You will go with me to the tribe.'

The structure without incorporation in (108a) shows that the verb exhibits overt agreement with both the absolutive subject and the argument of the postposition. (108b), in turn, shows that when the postposition is incorporated, verbal agreement with both arguments remains the same; the only relevant difference is that the incorporated postposition intervenes between the two agreement morphemes. By contrast, the corresponding construction with postposition duplication in (108c) requires deletion of the agreement morpheme adjacent to the verbal root. Dourado interprets such deletion as a reflex of the morphological reanalysis that renders the incorporated postposition invisible to the LCA.

    Another illustration that morphology is indeed involved in indirectly allowing multiple copies is presented by verb movement to Foc and Top heads. Take, for instance, verb clefting in Vata (from Koopman 1984) and verb topicalization in Brazilian Portuguese (from Bastos 2001), as shown in (109) and (110).

(109) *li*   à   *li*-da   zué   saká   (Vata)
     eat   we   *eat*-PAST   yesterday   rice
     'We ATE rice yesterday.'

(110) Lavar,   o João   lavou   o carro.   (Brazilian Portuguese)
     wash-INF the João   washed the car.
     'As for washing (something), João washed the car'.

Koopman (1984) and Bastos (2001) respectively show that the two verbal occurrences in (109) and (110) cannot be separated by islands, which indicates that they should be related by movement.

    Nunes (2004) analyzes verb clefting in Vata as involving verb movement to a Focus head, followed by morphological fusion between the moved verb and the Foc head, as illustrated in (111) below. Based on this analysis, Bastos (2001) treats sentences such as (110) in a similar fashion, with verb adjunction to a Top head followed by morphological fusion, as sketched in (112).

(111) [$_{FocP}$ #[$_{Foc0}$ V^i [$_{Foc0}$ Foc^0]]# [$_{TP}$ … [$_{T0}$ V^i [$_{T0}$ T^0]] [$_{VP}$ … V^i …]]]

(112) $[_{TopP}$ #$[_{Top0}$ V^i $[_{Top0}$ Top^0]]# $[_{TP}$ … $[_{T0}$ V^i $[_{T0}$ T^0]] $[_{VP}$ … V^i …]]]

Once the highest copies of the verb in (111) and (112) are fused, becoming invisible to the LCA, Chain Reduction will only consider the two lower copies and delete the lowest one, yielding sentences with a verbal copy in the left periphery and another one in T.[40] It should be observed that the copies in the left periphery in (109) and (110) are not exactly identical to the lower copies. In Vata, "the focused verb merely consists of the segmental specification of the verb, without its tonal specification. Since the elements with no associated tone surface carrying mid tone (…), the focused verb invariably surfaces with mid tone" (Koopman 1984:155). As for Brazilian Portuguese, the topicalized verb surfaces with default infinitival morphology (see Bastos 2001 for discussion). From the current perspective, these changes can be seen as resulting from the morphological fusion between the moved verb and the left periphery head.

Confirming evidence for such morphological reanalysis in Vata comes from certain morphological complexity restrictions. According to Koopman (1984:156), none of the particles that occur in Infl may appear with the fronted verb, as illustrated in (113) (from Koopman 1984), which suggests that these particles render the complex head too heavy, preventing fusion.[41]

(113) a. *(*na`) le*      wa      *ná`-le*-ka   (Vata)
        (*NEG) eat   they   *NEG-eat*-FT
        'They will not EAT.'
     b. *li (*wa)*   wà   *li-wa*   zué
        eat(*TP)   they   *eat(*TP)*   yesterday
        'They ATE yesterday.'

Even more telling is Koopman's (1984:158) observation that the restricted set of verbs that cannot undergo clefting (auxiliaries, the defective verb *na/la/lO* 'to say', and the verbs *lÈ* 'to be' and *kà* 'to have') have in common the property that they cannot serve as input for morphological processes that apply to other verbs. If these verbs cannot participate in any morphological process, they certainly should not be able to undergo the morphological fusion with Foc^0 depicted in (111) and therefore should not be allowed in predicate clefting constructions.

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[40]   If the verb moves directly to the left periphery, without stopping in T^0, the lower copy will, accordingly, surface within VP. That is arguably the case in the Vata cleft construction in (i) (from Koopman 1984). See Nunes 2004 for further discussion.

    (i) *li*   O   da   saka   *li*   (Vata)
        eat s/he   PERF-AUX   rice   *eat*
        'S/he has EATEN rice.'

[41]   Sentences such as (113a) and (113b) thus involve excorporation of the verbal head adjoined to Infl. Again, this is in fact in consonance with our reinterpretation of Baker's (1988) ban on excorporation under the copy theory mentioned in fn. 34. As in the cases of *wh*-excorporation involved in *wh*-copying constructions, the copy of the excorporated verb in (113a) and (113b) does not get deleted in the phonological component.

Verb topicalization in Brazilian Portuguese also displays morphological sensitivity. For instance, it cannot target verbs that involve suppletion such as *ir* 'go', as illustrated by the contrast in (114) (see Bastos 2001 for further discussion).

(114) a. Viajar,   o João viajou pro   Brasil.   (Brazilian Portuguese)
          travel-INF the João traveled to-the Brazil
          'As for traveling, João traveled to Brazil.'
      b. ??Ir,   o João foi pro   Brasil.
          go-INF the João went to-the Brazil
          'As for going (somewhere), João went to Brazil.'

To sum up, in section 4.1 we saw that *wh*-movement in some languages may exceptionally proceed via adjunction to a complementizer. The complex head in turn may undergo fusion in the morphological component, rendering the adjoined *wh*-copy invisible to the LCA. Once morphology was invoked in the analysis of *wh*-copying and *wh*-doubling, we should expect to detect some reflexes of the proposed morphological operation and we did, in fact, detect a general lack of tolerance for multiple copies of morphologically complex *wh*-elements. When we moved to the domain of head movement, the reflexes of the morphological reanalysis involving multiple copies got much more diversified, coming in all kinds of forms in addition to the ban on morphological complexity. This is exactly what we should expect to find. Given that standard head movement already yields outputs that can be directly manipulated by morphology, such outputs should be more amenable to undergo fusion.[42]

4.3. Cases involving A-movement
Let us now consider the sentences in (115) from San Lucas Quiaviní Zapotec (henceforth *SLQZ*; all SLQZ data are from Lee 2003) and (116) from Hmong (all Hmong data are from Mortensen 2003).

(115) a. R-yu'lààa'z Gye'eihlly$_i$ Gye'eihlly$_i$.   (SLQZ)
          HAB-like   Mike   Mike
          'Mike likes himself.'
      b. R-yu'lààa'z-ëng$_i$ la'anng.
          HAB-like-PRON.3SG.PROX PRON.3SG.PROX
          'S/he likes her/him-self.'

(116) a. Pov$_i$ yeej   qhuas Pov$_i$.   (Hmong)
          Pao always praise Pao
          'Pao always praises himself.'
      b. Nwg$_i$ yeej   qhuas nwg$_i$.
          PRON.3SG always praise PRON.3SG
          'He always praises himself.'

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[42]   For further data and discussion, see Nunes 2004, Cheng this volume, Corver this volume, Kandybowicz this volume, and Martins this volume.

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          'Mike likes himself.'
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          'S/he likes her/him-self.'

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          Pao always praise Pao
          'Pao always praises himself.'
      b. Nwg$_i$ yeej   qhuas nwg$_i$.
          PRON.3SG always praise PRON.3SG
          'He always praises himself.'

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[42]   For further data and discussion, see Nunes 2004, Cheng this volume, Corver this volume, Kandybowicz this volume, and Martins this volume.

Given that the object R-expression in (115a) and (116a) and the object pronoun in (115b) and (116b) are locally A-bound, one would in principle expect Principles C and B of binding theory to be violated here and these sentences to be unacceptable, contrary to fact. These data become even more puzzling if we also take into consideration the observation by Lee (2003) for SLQZ and Mortensen (2003) for Hmong that apparent violations of Principles B and C are only licensed if *they involve identical elements*. When this is not the case, we do find standard Principle C and Principle B effects, as illustrated in (117) and (118).

(117) a. R-yu'làaa'z Gye'eihlly me's.   (SLQZ)
         HAB-like   Mike   teacher
          'Mike$_i$ likes [the teacher]$_{k/*i}$'
      b. R-yu'làaa'z Gye'eihlly la'anng.
         HAB-like   Mike   PRON.3SG.PROX
          'Mike likes him/*himself'

(118) a. Pov yeej   qhuas   tug xibfwb.   (Hmong)
         Pao always praise   CLF teacher
          'Pao$_i$ always praised [the teacher]$_{k/*i}$'
      b. Pov yeej   qhuas   nwg.
         Pao always praise   PRON.3SG
          'Pao always praises him/*himself'

This seems to indicate that the sentences in (115) and (116) in fact involve some kind of reflexivization. Additional evidence to this effect is provided by the fact that the apparently bound expressions pattern like standard anaphors in ellipsis contexts such as (119) in yielding sloppy readings, as illustrated in (120) and (121).

(119) Mary loves herself and John does, too.
      ('… and John loves himself, too')

(120) a. B-gwi'ih   Gye'eihlly   lohoh Gye'eihlly zë'cy cahgza' Li'eb.   (SLQZ)
         PERF-look Mike   at   Mike   likewise   Felipe
          'Mike looked at himself and Felipe did too (look at himself/*Mike)'
      b. R-yu'làaa'z-ëng   la'anng   chiru' zë'cy cahgza' Gye'eihlly.
         HAB-like-PRON.3SG.PROX PRON.3SG.PROX also   likewise   Mike
          'S/he likes her/him-self, and Mike does too (like himself/*her/*him)'

(121) a. Pov yeej   qhuas Pov; Maiv los kuj ua le hab.   (Hmong)
         Pao always praise Pao May TOP also do as too
          'Pao always praises himself and so does May (praise herself).'
      b. Koj   yeej qhuas koj;   nwg   los kuj ua le hab.
         PRON.2SG always praise PRON.2SG PRON.3SG TOP also do as too
          'You always praise yourself and so does he (praise himself).'

Boeckx, Hornstein, and Nunes (2007; *BHN*) analyze this complex paradigm in terms of Hornstein's (2001) analysis of reflexivization and Nunes's (1999, 2004) proposal regarding the phonetic realization of multiple copies. For Hornstein (2001), the derivation of a sentence such as (122) below proceeds along the lines of (123), where *John* merges with *self* and then moves to [Spec, VP] (stranding *self)* to get the external θ-role, before reaching its final position in [Spec, TP]. In the phonological component, the intermediate copy of *John* is deleted for purposes of linearization, but deletion of the lower one would not license the morphological requirements of *-self*; the morphological component then converts *John* into *him*, allowing the structure to be linearized and the requirements of *-self* to be met.[43]

(122) John shaved himself

(123) a. [$_{TP}$ John [$_{VP}$ John [$_{V'}$ shaved John-self]
     b. [$_{TP}$ John [$_{VP}$ ~~John~~ [$_{V'}$ shaved him-self]

BHN propose that "reflexive copying" constructions in SLQZ and Hmong such as (115) and (116) are also derived along the lines of (123a), but their 'self' morpheme is a phonologically null element which must morphologically fuse with the element it has merged with. Once the object copy gets fused with the null 'self', it becomes invisible to the LCA and is not subject to deletion for purposes of linearization. (115) and (116) then surface with two copies phonetically realized. As evidence for this proposal, BHN present Lee's (2003) and Mortensen's (2003) documentation of impossible cases of reflexive copying constructions, all of which arguably involve an increase in morphological complexity, as illustrated in (124) and (125).

(124) *R-yu'làaa'z   Li'eb cuann Gye'eihlly Li'eb cuann Gye'eihlly.   (SLQZ)
     HAB-like   Felipe and   Mike   Felipe and   Mike
     'Felipe and Mike like themselves.'

(125) Txhua tug dlev pum txhua tug dlev.   (Hmong)
     every CLF dog   see   two   CLF dog
     'Every dog sees every (other) dog.'/*'All the dogs see themselves.'

Since complex material such as the NPs above cannot undergo fusion, all the copies are visible to the LCA. As a result, the structures underlying (124) and (125) under the reflexive reading cannot be linearized.

BHN also reanalyze Lee's (2003) SLQZ control data such as (126) as involving phonetic realization of multiple copies. Assuming Hornstein's (1999, 2001) theory of control, according to which obligatorily controlled PRO is in fact a copy left by A-movement to a θ-position, BHN propose that the data in (126) involve morphological fusion of the lower copy of the element undergoing A-movement with the null 'self' morpheme available in this language (see BHN for details and further discussion).[44]

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[43]   See Hornstein 2001 for alternative technical implementations and further discussion.

[44]   As observed by Lee (2003), like "copying reflexive" constructions, control structures involving multiple copies also give rise to sloppy readings under ellipsis, as shown in (i).

(126) a. R-càaa'z   Gye'eihlly g-auh   Gye'eihlly bxaady.   (SLQZ)
        HAB-want Mike   IRR-eat Mike   grasshopper
        'Mike wants to eat grasshopper.'
     b. B-quìi'lly   bxuuhahz Gye'eihlly ch-iia   Gye'eihlly scweel.
        PERF-persuade priest   Mike   IRR-go Mike   school
        'The priest persuaded Mike to go to school.'

As we should expect by now, if a control chain involves a complex element, all the links will be visible to the LCA so that all the links but the head of the chain will have to delete, as illustrated in (127) (see BHN for further discussion).

(127) a. *Yra'ta' zhyàa'p r-càaa'z   g-ahcnèe' yra'ta' zhyàa'p   Lia Paamm.   (SLQZ)
        every   girl   HAB-want IRR-help   every   girl   FEM Pam
        'Every girl wants to help Pam.'
     b. *R-e'ihpy Gye'eihlly behts-ni'   g-a'uh behts-ni'   bx:àady.
        HAB-tell Mike   brother-REFL.POSS IRR-eat brother-REFL.POS grasshopper
        'Mike told his brother to eat grasshoppers.'

To summarize, if movement into θ-positions is possible, we should in principle expect such movement to also yield constructions with multiple copies, provided that we have evidence that one of the copies is morphologically reanalyzed. BHN's analysis of "copying-reflexive" and "copying-control" constructions shows that this prediction is indeed fulfilled.

4.4. Cases involving remnant movement

We will finally examine remnant movement constructions involving multiple copies. Before doing so, let us consider how deletion of copies proceeds in standard remnant movement constructions. Take the derivation of (128), as sketched in (129), where *John* moves to [Spec, TP], leaving a copy behind, and VP then moves to a higher position.

(128) … and elected, John was.

(129) a. [$_{TP}$ was [$_{VP}$ elected John]]
     b. [$_{TP}$ John^i [$_{T'}$ was [$_{VP}$ elected John^i]]]
     c. [$_{XP}$ [$_{VP}$ elected John^i]^k [$_{X'}$ X [$_{TP}$ John^i [$_{T'}$ was [$_{VP}$ elected John^i]^k]]]]

Remnant constructions present a very interesting puzzle for the linearization approach to copy deletion reviewed in section 3 (see Gärtner 1998). In (129c), the leftmost copy of *John* arguably doesn't form a chain with either of the other copies (it neither c-commands nor is c-commanded by the other copies); thus, there are only two chains to be reduced: the DP chain

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(i) R-càaa'z   Gye'eihlly g-ahcnèe Gye'eihlly   Lia Paamm zë'cy cahgza' Li'eb.   (SLQZ)
    HAB-want Mike   IRR-help Mike   FEM Pam,   likewise   Felipe
    'Mike wants to help Pam, and so does Felipe (want to help Pam/*want Mike to help Pam)'

formed by movement of *John* to [Spec, TP] and the VP chain. However, if Chain Reduction just deletes the lower link of each of these chains, as shown in (130) below, the resulting structure cannot be linearized due to the presence of more than one copy of *John*. So, the question is how to delete the leftmost copy of *John* in (129c) in a principled fashion.

(130) a. $[_{XP}$ $[_{VP}$ elected John$^i]^k$ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was $[_{VP}$ elected ~~John$^i]^k$~~]]]]

    b. $[_{XP}$ $[_{VP}$ elected John$^i]^k$ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was ~~$[_{VP}$ elected John$^i]^k$~~]]]]

There are two possible answers to this question. A more representational answer is offered in Nunes (2003, 2004), building on Chomsky's (1995:300) observation that the representation of a chain such as CH = (α, α) should be seen as a notational abbreviation of CH = ((α, K), (α, L)), where K and L are each the sister of one occurrence of α. In other words, a chain can be conceived of as multiple occurrences of the same constituent occupying different structural positions; the individual links of a chain must then be identified not only in terms of their content, but also in terms of their local structural configuration. Hence, movement of *John* in (129b) forms the chain CH$_1$ = ((John^i, T'), (John^i, elected)) and movement of the remnant VP in (129c) forms the chain CH$_2$ = ((VP^k, X'), (VP^k, was)). Under the assumption that Spell-Out ships the whole structure in (129c) to the phonological component, Chain Reduction inspects CH$_1$ and instructs the phonological component to delete the occurrence of *John* that is the sister of *elected*. Interestingly, there are two elements in (129c) that satisfy this description, namely, the leftmost and the rightmost copies of *John*. In fact, these two copies are technically identical: they are nondistinct in terms of the initial numeration, they have participated in no checking relations, and their sisters are nondistinct. Assuming that the phonological component blindly scans the structure to carry out the deletion instructed by Chain Reduction, it ends up deleting the two copies that satisfy the instruction, as represented in (131a); Chain Reduction of CH$_2$ then deletes the lower copy of VP, as illustrated in (131b), and the sentence in (128) is derived.

(131) a. $[_{XP}$ $[_{VP}$ elected ~~John$^i]^k$~~ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was $[_{VP}$ elected ~~John$^i]^k$~~]]]]

    b. $[_{XP}$ $[_{VP}$ elected ~~John$^i]^k$~~ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was ~~$[_{VP}$ elected John$^i]^k$~~]]]]

Under a more derivational approach, we may assume multiple Spell-Out and take linearization/Chain Reduction to apply as the phonological component is fed with spell-out units. Under this view, the system spells out TP after the structure in (132a) below is built and Chain Reduction deletes the lower copy of *John*. From this point on, the copy of *John* in the object position will be unavailable to any operation of the phonological component. Hence, movement of VP later on in the derivation, as shown in (132b), will be oblivious of this copy. After the whole structure in (132c) is spelled out, deletion of the lower VP copy then yields the sentence in (128).

(132) a. $[_{XP}$ X $[_{TP}$ John^i $[_{T'}$ was $[_{VP}$ elected ~~John$^i]^k$~~]]]

    b. $[_{XP}$ $[_{VP}$ elected ~~John$^i]^k$~~ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was $[_{VP}$ elected ~~John$^i]^k$~~]]]]

    c. $[_{XP}$ $[_{VP}$ elected ~~John$^i]^k$~~ $[_{X'}$ X $[_{TP}$ John^i $[_{T'}$ was ~~$[_{VP}$ elected John$^i]^k$~~]]]]

We will not attempt to decide between these alternatives here. For our purposes, it suffices that both of them correctly enforce deletion of traces displaced by remnant movement and can

also handle the constructions involving multiple copies to be analyzed below. Due to space limitations, however, we will only entertain the multiple Spell-Out approach in the discussion that follows.[45]

Consider the focus duplication construction from Brazilian Sign Language (*LSB*), illustrated in (133) (see Quadros 1999, Nunes 2004), where the doubled element is focused.

(133) a. I *LOSE* BOOK *LOSE*   (LSB)
       'I LOST the book.'
   b. I *CAN* GO PARTY *CAN*
        'I CAN go to the party.'
   c. I HAVE *TWO* CAR *TWO*
       'I have TWO cars.'
   d. *YESTERDAY* I BUY CAR *YESTERDAY*
        'I bought a car YESTERDAY'
   e. *WHO* LIKE BANANA *WHO*
       'WHO likes bananas?'

Despite being optional, focus duplication at the right edge of a sentence is a very pervasive phenomenon in LSB, being able to affect several kinds of constituents, as seen in (133). However, there is a major restriction on this construction: the duplicated material cannot be morphologically complex, as shown in (134).[46]

(134) a. *NEXT MONTH I WILL-GO ESTRELA *NEXT MONTH*   (LSB)
     'I will go to Estrela NEXT MONTH.'
   b. *WHAT MAN OF-THEM YOU LIKE *WHAT MAN OF-THEM*
     'WHICH OF THOSE MEN did you like?'
   c. *JOHN *BUY CAR* YESTERDAY *BUY CAR*
     'Yesterday, John BOUGHT A CAR.'
   d. *JOHN BUY *BIG CAR* YESTERDAY *BIG CAR*
     'Yesterday, John bought A BIG CAR.'

By now, the morphological complexity restriction illustrated by the contrast between (133) and (134) should look very familiar. Nunes (2003, 2004) and Nunes and Quadros (2006, forthcoming) argue that this is the same restriction that prevents morphological fusion. More precisely, they argue that focus duplication in LSB results from an interaction of remnant movement and morphological fusion. A sentence such as (133a), for example, is to be derived schematically along the lines of (135).

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[45] For an analysis of remnant movement constructions with multiple copies under the "representational" approach alluded to above, see Nunes 2003, 2004.

[46] This contrast mimics the restriction originally noted by Petronio (1993) (see also Petronio and Lillo-Martin 1997) with respect to American Sign Language (ASL). Independent differences aside, the analysis of duplication of focus in LSB to be reviewed below can also be extended to the ASL data (see Nunes 2004, Nunes and Quadros 2006, forthcoming).

(135) a. $[_{FocP}$ Foc $[_{TP}$ I LOSE BOOK$]]$ (LSB)

     b. *head movement + merger of X*:
       $[_{XP}$ X $[_{FocP}$ $[_{Foc^0}$ LOSE^i $[_{Foc^0}$ Foc$^0]]$ $[_{TP}$ I LOSE^i BOOK$]]]$

     c. *Spell-Out of FocP + morphological fusion (Chain Reduction inapplicable)*:
       $[_{FocP}$ #$[_{Foc^0}$ LOSE^i $[_{Foc^0}$ Foc$^0]]$# $[_{TP}$ I LOSE^i BOOK$]]$

     d. *remnant movement of TP*:
       $[_{YP}$ $[_{TP}$ I LOSE^i BOOK$]^k$ $[_{XP}$ X $[_{FocP}$ #$[_{Foc^0}$ LOSE^i $[_{Foc^0}$ Foc$^0]]$# $[_{TP}$ I LOSE^i BOOK$]^k$ $]]]$

     e. *Spell-Out of the whole structure + reduction of the TP chain*:
       $[_{YP}$ $[_{TP}$ I LOSE^i BOOK$]^k$ $[_{XP}$ X $[_{FocP}$ #$[_{Foc^0}$ LOSE^i $[_{Foc^0}$ Foc$^0]]$# ~~$[_{TP}$ I LOSE^i BOOK$]^k$~~ $]]]$

After the verb adjoins to the Focus head in (135b), FocP is spelled out and sent to the phonological component where the complex head LOSE+Foc undergoes fusion (cf. (135c)). Once the adjoined copy of the verb becomes invisible to the LCA, Chain Reduction is inapplicable, as only the lower link of the verb chain is visible to the LCA; in other words, for purposes of linearization, the verb chain behaves as if it were a trivial single-link chain and no deletion is triggered. By contrast, further movement of TP does trigger deletion of the lower link, as shown in (135e), yielding a sentence with a double of the focalized verb at the right edge.

     Once the phonetic realization of multiple copies is dependent on morphological fusion and fusion is sensitive to morphological complexity, the ungrammaticality of the sentences in (134) can be attributed to the impossibility of fusion involving the moved elements. The presence of multiple copies that are visible to the LCA then prevents the structures underlying these constructions from being linearized. In this regard, the contrast between (133a) and (136) below is very illustrative. Quadros (1999) has shown that inflected verbs such as $_aLOOK_b$ in LSB have very different syntactic properties from bare verbs such as *LOSE* and attributes these differences to the morphological agreement represented in (136) by the indices. The unacceptability of (136) indicates that agreement morphology in LSB renders the verb too complex, preventing morphological reanalysis and, consequently, phonetic realization of more than one copy of an inflected verb (see Nunes 2003, 2004, Nunes and Quadros 2006, forthcoming for additional data and further discussion).[47]

(136) *JOHN $_aLOOK_b$ MARY $_aLOOK_b$ (LSB)
     'John LOOKED at Mary'

     To conclude, remnant movement constructions provide further empirical support for the copy theory in that they can also allow more than one chain link to be phonetically realized, provided that linearization and morphological requirements are satisfied.

5. Conclusion

The original evidence Chomsky (1993) provided in favor of the copy theory of movement involved interpretation of lower copies, i.e., it came from the LF interface. Now we also have

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[47]   For additional examples and further discussion of remnant movement constructions with multiple copies under the approach reviewed here, see Bastos's (2001) analysis of vP topicalization in Brazilian Portuguese, Nunes's (2003, 2004) analysis of verb clefting in Korean and Japanese, and Boeckx, Hornstein, and Nunes's (2007) analysis of adjunct control in SLQZ.

evidence for the copy theory of movement concerning the pronunciation of lower members of chains, i.e. the PF interface. It seems to us that the pronunciation evidence for the copy theory of movement is even stronger than the interpretation evidence. Alternative accounts can be readily devised for the interpretation evidence. It is much more difficult to devise a principled comprehensive alternative to the copy theory account of the pronunciation evidence. We have also shown that rethinking movement operations in terms of the copy theory, which was driven by the minimalist search for conceptual elegance, has led to a considerable enlargement of the empirical coverage previously handled.

It is also worth noting that the approach reviewed here can shed light on the internal structure of PF. More precisely, examining what kind of PF processes can cause lower copy pronunciation or render a copy invisible to the LCA can help us determine exactly when copy deletion takes place. We have seen that morphological restrictions on identical elements, the second position requirement providing support for a prosodically weak element, intonational requirements, and even clitic weakening and stress assignment processes can all trigger lower copy pronunciation, which indicates that copies survive for quite some time into the PF derivation.

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