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## Cyclic Spell-Out and the Domain of Post-Syntactic Operations: Evidence from Complementizer Agreement

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### 1. Introduction

In current investigations into the nature of the mapping between syntax and the interpretative components of grammar, it is widely assumed that the structure(s) generated by the syntactic computation are spelled out not as a single representation, but rather in a piecemeal fashion (cf. e.g., Epstein et al. [25], Uriagereka [77], Chomsky [16, 17, 18, 19]). That is, in contrast to previous grammar models, there is no single designated point at which the output of the syntactic derivation is handed over to the phonological and the semantic components. Instead, Spell-Out applies repeatedly during the syntactic derivation, each time transferring a subpart of the phrase-marker constructed so far to the post-syntactic components of grammar. The latter are assumed to operate in a strictly cyclic fashion as well, in the sense that a syntactic object transferred to the interpretative components is directly mapped to the interfaces to the (language-external) sensorimotor (SM) and conceptual-intentional (C-I) systems (cf. Chomsky [18, 19]). Thus, the language-external systems do not interpret complete representations derived from the output of narrow syntax, but rather structural chunks which correspond to the individual derivational cycles of narrow syntax. According to this model, then, post-syntactic operations cannot access pieces of information which are part of different Spell-Out domains.

Focusing on the phonological/morphological module of grammar, I argue in this article that this restriction on the workings of the post-syntactic components is too strong. More specifically, it is shown

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that post-syntactic operations may cut across the Spell-Out domains defined in Chomsky ([16, 17, 18, 19]), paying special attention to the phenomenon of complementizer agreement in Germanic. Based on the observation that this form of multiple agreement is subject to restrictions that exhibit an unmistakable phonological character (adjacency effects, sensitivity to PF processes such as sluicing or elision of the finite verb), it is claimed that complementizer agreement is established by a post-syntactic operation that copies the verb's  $\phi$ -features from T to C. Under the assumption that Spell-Out affects the complement of a (strong) phase head, handing TP and VP to the interfaces, this morphological copy operation requires access to pieces of information that are distributed over different Spell-Out domains. We must therefore allow for a (slight) extension of the scope of PF processes, either via a redefinition of Spell-Out domains (with considerable consequences for the syntactic computation), or by assuming that phonological domains in fact differ slightly from Spell-Out domains, keeping to the theory of phases devised by Chomsky. This article makes a concrete proposal in the latter direction, arguing that the phonological component constructs from the cyclic output of narrow syntax larger units which consist of a Spell-Out domain  $\Sigma_n$  and the right edge of a subsequent Spell-Out domain  $\Sigma_{n+1}$ .

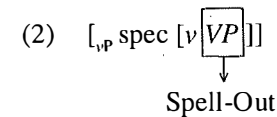
## 2. Phases, Spell-Out Domains, and the Scope of PF Operations

According to recent work by Chomsky, Spell-Out domains are associated with derivational cycles (of narrow syntax) which are referred to as *phases*. Chomsky identifies these phases as CP and (transitive/agentive) vP, and assumes that the domain (i.e., the complement) of a phase head is transferred to the phonological component when the phase is completed (cf. e.g., [17:13, 18:108]).<sup>1</sup> This yields a strong version of cyclicity, since after Spell-Out, only the specifier(s) of a lower phase head and the phase head itself remain accessible to further syntactic operations (the so-called *Phase Impenetrability Condition*, PIC):

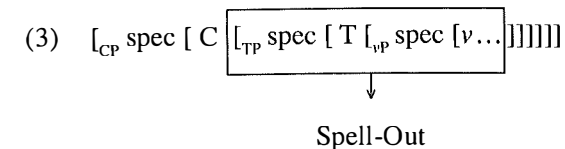
<sup>1</sup> Still, Chomsky assumes that T can access a quirky nominative object in the domain of vP (cf. [17:13, 18:108]). At first sight, this seems to imply that in this case, Spell-Out of the domain of a lower phase head (here: VP) is actually delayed until a higher phase head (C, in the case at hand) is merged. However, Chomsky seems to stick to the notion that "the sister of H can be spelled out at HP" (cf. 18:125, n. 19)),

- (1) At the phase ZP containing phase HP, the domain of H is not accessible to operations, but only the edge of HP. (Chomsky [18:108])

For example, the VP complement of a phase head  $v$  is sent to the post-syntactic components when vP has been completed. As a result, VP and everything contained in VP are no longer accessible to the ongoing syntactic computation:



Likewise, the TP complement of the phase head C is spelled out once CP is created (note that it must be possible to spell out root CP in full, presumably together with its TP complement, cf. Chomsky [18:108]):



This set of assumptions introduces an asymmetry between the notions of *phase* and *Spell-Out domain*: while Spell-Out is associated with the phase level, the actual phrasal units sent to the interpretative components (i.e., the Spell-Out domains) correspond to VP and TP (with the edge of vP spelled out together with TP and the edge of embedded CP spelled out together with matrix VP). The asymmetry between phases and Spell-Out domains raises an issue with respect to the original characterization of phases in terms of interface properties, cf. Chomsky [18:124]:

assuming that T may probe into VP (which has already been subject to Spell-Out at vP) if this operation does not have any visible effects on the (already spelled out) nominative object (i.e., it may neither raise nor undergo any phonetic change, *ibid.*). Furthermore, the assumption that the complement of the head of phase HP is spelled out when HP is completed is required for independent reasons in the model outlined in Chomsky [18, 19], where it is assumed that T inherits its feature content from C. As a result, operations triggered by C and T take place simultaneously (so-called "parallel probing"). Under these assumptions, "late" spell out of VP (i.e., when C is merged) would presumably facilitate violations of the PIC, since besides T, C should also be able to probe into VP.

“Ideally, phases should have a natural characterization in terms of IC [interface conditions]: they should be semantically and phonologically coherent and independent. At SEM,  $\nu$ P and CP (but not TP) are propositional constructions:  $\nu$ P has full argument structure, and CP is the minimal construction that includes Tense and event structure and (at the matrix, at least) force.”

However, if it is not the phase itself that is transferred to the SM and C-I interfaces, but merely the complement of the phase head, then the object that reaches the interfaces is actually *not* a “semantically and phonologically coherent and independent” unit. In other words, we may ask how interface conditions can identify CP and  $\nu$ P as phases if the units that are actually interpreted at the interfaces are significantly smaller, corresponding to TP and VP. See section 4 below for more discussion and an answer based on the assumption that phasal units are restored in the phonological component.

A general question raised by the assumption of cyclic Spell-Out concerns the way the post-syntactic components deal with the parts and pieces handed to them in the course of the derivation in order to create interface representations usable by the language external sensorimotor (SM) and conceptual-intentional (C-I) systems “that enter into thought and action” (Chomsky [18:106]). More specifically, we may ask whether the idea of cyclic Spell-Out entails that the interfaces are accessed in a cyclic fashion as well.<sup>2</sup> According to Chomsky [18, 19], this is indeed the case. More precisely, he assumes that the output of each derivational cycle is separately transferred to the interfaces. It follows that the post-syntactic components do not construct a single unified interface representation from the individual Spell-Out domains created by narrow syntax, cf. the following quote taken from Chomsky [19:8f.]:

“[...] the final internal level LF is eliminated [...] at various stages of computation there are Transfer operations: one hands the SO already constructed to the phonological component, which maps it to the SM interface (“Spell-Out”); the other hands SO [syntactic object] to the semantic component, which maps it to the C-I interface.”

<sup>2</sup> Put differently, we may ask whether it is possible for the language external systems to interpret the output of the syntactic computation in a piecemeal, phase-by-phase fashion. See von Stechow [73] for some discussion of this question with respect to the C-I interface.

The assumption of cyclic Spell-Out implies that the operations carried out in the post-syntactic components of grammar are equally constrained by the cyclic nature of the syntactic derivation. Accordingly, processes such as prosodic phrasing, stress assignment, or the creation of linear order proceed in parallel with the syntactic computation and are thus assumed to be subject to the same kind of strict cyclicity as narrow syntax (i.e., the PIC):

“ $\Phi$  [the phonological component] proceeds in parallel with the NS [Narrow Syntax] derivation.  $\Phi$  is greatly simplified if it can “forget about” what has been transferred to it at earlier phases; otherwise, the advantages of cyclic computation are lost.” [18:107]

In other words, it is assumed that post-syntactic operations may not cut across phase boundaries, e.g., accessing information which is contained in two different phases/Spell-Out domains. Thus, at first sight, the assumption that the interfaces to SM and C-I are accessed at each phase level seems to establish strict isomorphism between the cycles of the syntactic and the post-syntactic computation, in the sense that both may use only information which is part of a single phase. Note, however, that the locality conditions imposed by this phase-driven model of Spell-Out are in fact slightly more restrictive for the post-syntactic components than they are for narrow syntax. For example, while a T head may enter into an Agree relation with material which is contained in the domain of  $\nu$  (e.g., with a quirky nominative object in Icelandic, see fn. 1 above), no such dependency can be created during the post-syntactic computation between elements that are part of different Spell-Out domains; once a subpart of a phrase-marker (say, VP) is spelled out, it is directly mapped to the interfaces and thus no longer accessible to operations involving material from other Spell-Out domains. In this sense, then, there is no strict parallelism between narrow syntax and the post-syntactic computation: syntactic operations may (minimally) cut across Spell-Out domains, while post-syntactic operations may not.

This should lead us to expect that there are empirical phenomena which reflect this kind of asymmetry, in the sense that there are instances in which the scope of post-syntactic processes is confined to the relevant Spell-Out domains, that is, VP or TP. However, glossing over a small set of relevant empirical phenomena, it seems that it is rather the other way around. In other words, there are clear cases

of “non-local” post-syntactic operations that cut across Spell-Out domains. For example, it is a well-known fact that the size of phonological phrases is dependent on, but not identical to the size of syntactic phrases (cf. e.g., Selkirk [70]; Truckenbrodt [75, 76]). Yet, in contrast to what is expected under the above assumptions, prosodic phrases may include material from different Spell-Out domains. Consider the example from Italian in (4) and the corresponding prosodic structure in (5), in which phonological phrases are marked by  $\varphi$  (examples taken from Nespor et al. [59:9]):

(4) [<sub>IP</sub> Gianni avrà [<sub>VP</sub> già mangiato [le belle mele]]].  
 ‘Gianni will have already eaten the good apples.’

(5) [Gianni]  $\varphi$  [avrà già mangiato]  $\varphi$  [le belle mele]  $\varphi$

In (5), the object *le belle mele* constitutes the rightmost phonological phrase. The next  $\varphi$  starts at the main verb and includes further material on its left, extending to the left edge of the relevant syntactic phrase (here: VP or  $\nu$ P). Furthermore, the finite auxiliary *avrà* is integrated into the same  $\varphi$  as the main verb, since auxiliaries do not count as separate heads for purposes of prosodic phonology (cf. Nespor and Vogel [60]). It is immediately clear that the kind of prosodic phrasing exhibited by examples such as (5) raises a problem for the assumptions (i) that cyclic Spell-Out affects VP and TP, and (ii) that the phonological component “forgets about” what has been transferred to it at earlier stages of the derivation. Under this set of assumptions, we would not expect that the auxiliary (presumably located in T) forms a prosodic phrase together with material contained in the VP, which has been spelled out separately at the  $\nu$ P phase.<sup>3</sup> These facts can be taken to indicate that the post-syntactic components must have access to pieces of information which are distributed over more than one Spell-Out domain, cf. section 4 for some discussion (see Selkirk and Kratzer [71] for related problems raised by properties of stress assignment and a solution based on a redefinition of phases).

<sup>3</sup> Possibly, Chomsky [18:108] has similar cases in mind when he speculates “that global properties of phonology (e.g., intonation contour) are superimposed on the outcome of the cyclic operation of  $\Phi$  [the phonological component].” However, it is not clear to me at which point of the post-syntactic computation the relevant operations should apply. Certainly, it is not very attractive to assume the existence of a phonological component that is associated with “global properties of phonology” and operates on the output of the “normal” phonological component, since this would void the advantages of cyclic computation (reduction of memory load etc.).

The often non-local character of Binding phenomena constitutes another potential challenge for the assumption of cyclic Spell-Out.<sup>4</sup> In a comprehensive new approach, Fischer [26] provides convincing arguments that the licensing and (phonetic) realization of bound pronouns represents another case where the domains of syntactic and post-syntactic operations differ. More precisely, she shows that the feature content of bound elements can be determined by operations of narrow syntax in a cyclic fashion, while the phonetic realization of these elements requires access to the complete syntactic chain created during the syntactic derivation.<sup>5</sup> As noted by Fischer [26:204],

“[t]his constitutes a minimal violation of the Phrase Impenetrability Condition and the Strict Cycle Condition, but apparently this is what we have to accept if we want to integrate such a non-local phenomenon as binding into a local derivational approach.”

<sup>4</sup> This is particularly clear for the unbounded character of Principle C of traditional Binding Theory (see Bouchard [12:351f.] for discussion and some considerations concerning the extension of local domains for the purposes of binding theory). Note that the points raised here carry over to a non-syntactic approach in which Binding is analyzed as an interface phenomenon and attributed to properties of the C-I system (cf. e.g. Jackendoff and Culicover [47]; see Chomsky [16:146, n. 65] for a related suggestion). That is, if Binding is treated, in particular, as a post-syntactic phenomenon, its non-local character raises a problem for the assumption that the interpretative components are accessed in a phase-by-phase fashion. However, see Chomsky [19] for some speculations on ways in which a syntactic analysis of Binding in terms of feature checking (along the lines proposed in Reuland [64]) can be integrated into a phase model.

<sup>5</sup> Fischer [26] develops a strictly derivational account of anaphoric relations in which the phonetic form and semantic interpretation of bound elements (including pronouns and anaphors) are determined as a result of syntactic operations. More precisely, she assumes that a bound pronoun  $\beta$  starts out in the syntax as a list of features {SE, PRON, SELF} which contains all possible realizations of  $\beta$ . During the syntactic derivation, the bound pronoun moves up in the structure, looking for its antecedent. When the bound element  $\beta$  reaches the edge of a cyclic domain (which corresponds to a phrase in Fischer’s approach) and remains unbound, the feature matrix of  $\beta$  may be subject to an optimization process which reduces the number of features in the matrix. More specifically, the features corresponding to the most anaphoric realization of  $\beta$  may be deleted. In this way, the distance between the antecedent and the bound element is tracked, which captures the effects of the (representational) principles of traditional Binding Theory in a purely derivational approach. When the bound element eventually locates an antecedent with matching features, it does not move any further and enters into a checking relation with its antecedent. At this point, the concrete realization of  $\beta$  is determined (corresponding to the most anaphoric feature specification that remains in the matrix) and spelled out in the appropriate position (i.e., mapped to the interfaces). Crucially for our present purposes, this position may be located in a different Spell-Out domain than the antecedent where the form and interpretation of the bound element is ultimately determined.

Note that this violation of cyclicity/locality is confined to the interpretative components of grammar, while in narrow syntax, the relevant derivation is strictly cyclic.<sup>6</sup> Again, this suggests that post-syntactic operations may cut across Spell-Out domains. In the next section I add further evidence from complementizer agreement in Germanic that such violations of strict cyclicity are characteristic of the post-syntactic components of grammar, that is, the mapping to the SM interface.

### 3. Complementizer Agreement in Germanic

Before we can turn to the issues raised by complementizer agreement for the theory of cyclic Spell-Out, a closer look at the phenomenon in question is in order. It is a well-known fact that in many non-standard varieties of Germanic, the subject's  $\phi$ -features are reflected not only on the verb, but also on the complementizer:<sup>7</sup>

- (6) a. da-n=k                      ik werk-en                      *West Flemish*  
       that-1SG=CLIT.1SG    I    work-1SG  
       'that I work'
- b. da-t=ze                      zie    werk-t  
       that-3SG=CLIT.3SG.FEM    she    work-3SG  
       'that she works'

<sup>6</sup> In a similar vein, von Stechow [73] argues that the LF (i.e., the interface to C-I) of an expression can be constructed cyclically from the output of narrow syntax (via the post-syntactic re-combination of individual phases/Spell-Out domains), but cannot be interpreted cyclically. That is, the proper interpretation of e.g. operator-variable chains in a syntactic structure X requires access to a single complete LF representation which contains all variables (plus indices) used during the syntactic derivation of X.

<sup>7</sup> Cf. Bayer [5], Altmann [4], Weiß [80, 81], on Bavarian; Bennis and Haegeman [7], Haegeman [38, 39], Shlonsky [72], de Vogelaer et al. [78] on (West) Flemish; de Haan and Weerman [36], Hoekstra and Marácz [45] on Frisian; Zwart [82, 83, 84], van Koppen [51] on various Dutch dialects; Hoekstra and Smits [46] for an overview. Note that only West Flemish exhibits a full paradigm; in other varieties complementizer agreement is usually restricted to certain person/number combinations (Bavarian: 2nd person (and 1pl in some varieties), eastern dialects of Dutch: 1pl, southern dialects: 1pl and 3pl, Frisian: 2sg (plus 2pl in some varieties)). See Fuß [29, 30] for a diachronic explanation of the person/number restrictions found in Bavarian.

- (7) dat-st      do      jûn      kom-st                      *Frisian*  
       that-2SG    you      tonight    come-2SG  
       'that you come tonight'
- (8) a. ob-st                      du    noch Minga    kumm-st    *Bavarian*  
       whether-2SG    you    to    Munich    come-2SG  
       '...whether you come to Munich'
- b. ob-ts                      ihr    noch Minga    kumm-ts  
       whether-2PL    you.PL    to    Munich    come-2PL  
       '...whether you (pl) come to Munich'

In the literature, we find predominantly syntactic accounts of the data in (6)-(8) (e.g., Hoekstra and Marácz [45], Zwart [82, 83, 84; INFL-to-C movement]; Roberts [67], Shlonsky [72: spec-head relation between the subject and a separate Agr-head in the C-domain; Carstens [15], van Koppen [51: separate  $\phi$ -set in C<sup>0</sup> initiates an AGREE operation accessing the subject). Most of these approaches to complementizer agreement translate quite easily into a phase-driven model of narrow syntax and thus do not raise any issues for the assumption of cyclic Spell-Out; C, and the "source" of its inflection (either the subject in SpecTP or T/Infl), are by standard assumptions part of the same phase and can therefore enter into a syntactic dependency. In this section, however, it is shown that certain properties of complementizer agreement (adjacency effects, sensitivity to late/PF deletion processes such as sluicing and comparative deletion) strongly suggest that this form of multiple agreement is actually accomplished by operations which are part of the post-syntactic components of grammar, that is, the mapping to PF (cf. Fuß [30, 31]; see Ackema and Neeleman [2] for related proposals). Under the assumption that Spell-Out domains are to be defined as TP and VP (see above), this requires that the relevant post-syntactic operations may cut across Spell-Out domains, due to the fact that the source of the agreement features in C (either the subject or T) is spelled out prior to the Spell-Out domain (matrix VP) that contains C.

### 3.1. The Post-Syntactic Nature of Complementizer Agreement

The first set of problematic data comes from dialects in which the shape of complementizer agreement differs from the shape of verbal agreement (called "double agreement" dialects in Zwart [82]). In the Dutch dialect Hellendoorn, for example, the 1pl inflection found on the complementizer is /-ə/, while the verb carries the ending /-t/ (cf. Ackema and Neeleman [2, 3]).<sup>8</sup> This is shown in (9). In inversion contexts, the regular verbal agreement ending is replaced by the inflectional formative associated with complementizer agreement, cf. (10b):

(9) datt-e wiej noar't park loop-t  
 that-1PL we to-the park walk-1PL  
 'that we are walking to the park'

(10) a. Wiej loop-t noar't park.  
 we walk-1PL to-the park  
 'We are walking to the park.'

b. Volgens mij lop-e wiej noar't park.  
 according-to me walk-1PL we to-the park  
 'According to me we are walking to the park.'

However, the realization of complementizer agreement is subject to an adjacency requirement (cf. van Craenenbroeck and van Koppen [22], Carstens [15], Ackema and Neeleman [3]): the presence of a (scrambled) adjunct which intervenes between C and the subject blocks the availability of complementizer agreement. This restriction holds for both main and embedded clauses:

(11) a. dat/\*datt-e [op den wärmsten dag van't joar]  
 that/that-1PL on the warmest day of-the year  
 wiej tegen oonze wil ewärkt hebt  
 we against our will worked have  
 'that on the warmest day of the year we have worked  
 against our will'

<sup>8</sup> Similar "double agreement" phenomena can be observed in Dutch dialects spoken in the Eastern Netherlands and Brabants, and in some Lower Bavarian dialects (on the latter see Bayer [5], Kollmer [50], Weiß [80, 81], and Fuß [30]).

b. Volgens mij loop-t/\*lop-e [op den  
 according-to me walk-1PL/walk-1PL on the  
 wärmsten dag van't joar] ook wiej noar't park.  
 warmest day of-the year also we to-the park  
 'According to me we are also walking to the park on the  
 warmest day of the year.'

(11a) shows that the complementizer must appear without an inflectional ending if a (scrambled) PP intervenes between C and the subject. As illustrated by (11b), a similar adjacency effect can be observed in main clauses where the presence of an intervening XP blocks replacement of the regular verbal agreement ending /-t/ with /-ə/, the inflectional formative associated with complementizer agreement. Similar adjacency effects can be observed in other Germanic varieties which exhibit complementizer agreement, cf. the following examples from Bavarian:<sup>9</sup>

(12) a. obwoi-st du ins Kino ganga bist  
 although-2SG you to-the movies gone are  
 'although you went to the movies'

b. \*obwoi-st [woartscheints] du ins Kino ganga bist  
 although-2SG probably you to-the movies gone are  
 'although you probably went to the movies'

c. obwoi [woartscheints] du ins Kino ganga bist  
 although probably you to-the movies gone are  
 'although you probably went to the movies'

(Günther Grewendorf, p. c.)

Again, the presence of an XP (here a sentential adverb) that intervenes between C and the subject prevents the realization of inflection on the complementizer, as illustrated by the contrast between (12b) and (12c). As will become clear immediately, this adjacency effect raises a problem for purely syntactic approaches to complementizer agreement.

<sup>9</sup> West Flemish and Frisian always require strict adjacency between the (inflected) complementizer and the subject. That is, violations of the adjacency requirement lead to ungrammaticality and not to non-inflected complementizers (Liliane Haegeman, *Germen de Haan*, p.c.). See Haerberli [37] for detailed discussion and a syntactic analysis of the strict adjacency requirement.

First, the adjacency requirement in question is completely unexpected under approaches which attribute complementizer agreement to INFL-to-C movement (Hoëkstra and Marácz [45], Zwart [82, 83, 84]): in general, the presence of an intervening XP should not block  $X^0$ -movement. Even worse, complementizer agreement is not available in examples such as (11b) where exactly this operation has taken place.<sup>10</sup>

Alternatively, it has been proposed that the inflection found in the C-domain is licensed in a specifier-head relation between a separate AgrC-head and the subject which moves to SpecAgrCP (Shlonsky [72] assumes that the subject clitics of West Flemish are base generated in this position). Subsequently, AgrC<sup>0</sup> moves to C<sup>0</sup>, leading to inflected complementizers (cf. Shlonsky [72]; see Roberts [67] for a related proposal):

- (13) [<sub>C</sub> Comp+AgrC [<sub>AgrCP</sub> subject [<sub>AgrC</sub> t<sub>AgrC</sub> [<sub>IP</sub> PP [<sub>IP</sub> t<sub>subject</sub> ... ]]]]]]

Under this analysis, strict adjacency between the inflected complementizer and the subject (in SpecAgrCP) can be ensured by a stipulation ruling out adjunction to AgrCP (cf. Shlonsky [72:360] who takes “adverbial adjunction to be IP-bound”). However, while this assumption captures the relevant facts, it fails to offer a deeper explanation of the adjacency requirement (see Fuß [30:101ff.] for a discussion of further shortcomings of Shlonsky’s analysis).

Carstens [15] proposes another syntactic account of complementizer agreement and the adjacency effect which is based on the probe/goal mechanism devised in Chomsky [16]. Carstens assumes that C hosts its own set of uninterpretable  $\phi$ -features which initiates an AGREE operation accessing the interpretable  $\phi$ -set of the subject in SpecTP under closest c-command (cf. van Koppen [51] for a related proposal). As a result, C’s  $\phi$ -set is identified with the relevant values of the subject’s  $\phi$ -features. The adjacency requirement is then analyzed in terms of an intervention effect created by the adverbial adjoined to TP. By assumption, the intervening (scrambled) PP in examples like (11) bears a Case feature that identifies P as a possible

<sup>10</sup>This adjacency effect is also unexpected under the analysis proposed by Watanabe [79] who assumes that complementizer agreement results from a two-step operation in which the subject’s  $\phi$ -features are first copied onto T (as a result of Agree) and then carried along with head movement of the T<sup>0</sup>-complex to C. Again, this analysis should lead us to expect that the verb always carries complementizer agreement in V2 clauses, contrary to the facts.

goal for the  $\phi$ -set in C<sup>0</sup>. As a consequence, the adverbial “disrupts closest c-command of the subject by C<sup>0</sup>” (p. 398), thereby blocking the evaluation and realization of complementizer agreement:

- (14) [<sub>C</sub> C [<sub>TP</sub> PP [<sub>TP</sub> subject ... ]]]



AGREE

However, this account raises a number of conceptual and empirical issues. First, the claim that PP adverbials carry a Case feature is clearly ad hoc and by no means a standard assumption.<sup>11</sup> Second, the analysis makes false predictions concerning the behavior of adverbials that intervene between T<sup>0</sup> and the base position of the subject. Recall that Carstens assumes that the  $\phi$ -set of T initiates an AGREE relation with the subject in SpecvP. Now we should expect that adverbials that intervene between T and the base position of the subject (SpecvP) should give rise to the same kind of intervention effects that are taken to block AGREE between C and the subject in SpecTP, as illustrated in (15). Of course, this is not the case.<sup>12</sup>

<sup>11</sup> However, an anonymous reviewer highlighted the fact that there are various proposals in the literature according to which the placement of adjuncts and scrambled material involves the checking of formal features (cf. e.g., Kitahara [58], Grewendorf and Sabel [33] for feature-driven analyses of scrambling, Rizzi [66] for the idea that first Merge of *wh*-adjuncts in the left periphery of the clause is triggered by a formal *wh*-feature associated with a functional category Int(errogative)).

<sup>12</sup> Van Koppen [51] notes that in Tegelen Dutch, there is another asymmetry between C-related and T-related agreement phenomena: while complementizers agree only with the first conjunct of a complex subject consisting of two conjoined DPs (so-called *first conjunct agreement*, FCA), verbs obligatorily agree with the whole complex subject (similar phenomena are found in other Dutch and German dialects, cf. van Koppen [51] for details). Consider the following examples (van Koppen [51:40, 80]):

- (i) a. Ich dink de-s doow morgē kum-s.  
I think that-2SG you tomorrow come-2SG  
'I think that you will come tomorrow.'  
b. Ich dink de-s [doow en ich] ôs treff-e-.  
I think that-2SG you and I each.other.1PL meet-PL  
'I think that you and I will meet.'
- (ii) Doow en Marie \*ontmoet-s/ ontmoet-e uch.  
you and Marie meet-2SG meet-PL each.other.2PL  
'You and Marie will meet each other.'

As pointed out by an anonymous reviewer, this suggests that complementizer agreement and verbal agreement are established by different mechanisms (see section 3.2 below and van Koppen [51] for concrete proposals). Note that this can be taken to weaken our conclusion concerning the absence of intervention effects in the case of verbal agreement if it is assumed that C-related agreement and verbal agreement are the result of different syntactic operations which obey different locality conditions.

(15) [<sub>T</sub> T [<sub>vp</sub> adv [<sub>vp</sub> subject ... ]]]



To conclude, it appears that the adjacency effects observed in (11) and (12) represent a serious challenge for purely syntactic accounts of complementizer agreement. Moreover, under the assumption that adjacency effects are in fact more naturally accounted for in terms of post-syntactic operations/the mapping to PF (cf. e.g., Halle and Marantz [41]; Bobaljik [8, 9, 10]; Lasnik [52, 53] on affix hopping/Morphological Merger in English), these data can be seen as a first indication that complementizer agreement should be taken to operate in the post-syntactic components of grammar. Next, it is shown that there is actually some more evidence that this hunch is on the right track. Consider the following examples from Bavarian (Günther Grewendorf, p.c.):

(16) a. I woass dass-ts ihr a Madl gsehg hoabts,  
I know that-2PL you a girl seen have-2PL  
owa I woass net wo-ts ihr a Madl gsehg hoabts.  
but I know not where-2PL you a girl seen have-2pl)

b. I woass dass-ts ihr a Madl gsehg hoabts,  
I know that-2PL you a girl seen has-2PL  
owa I woass net wo (\*-ts) ihr a Madl gsehg hoabts.  
but I know not where-2PL (you a girl seen have-2pl)  
'I know that you've seen a girl, but I don't know where  
(you've seen a girl).'

(16b) shows that complementizer agreement is blocked in sluicing constructions; that is, cases where an IP within a *wh*-CP is elided (cf. Lobeck [56:59]). Similar facts can be observed in Dutch dialects, cf. e.g., van Craenenbroeck [21].<sup>13</sup> Under the common assumption that

<sup>13</sup> Note that in (16a), the inflection associated with C<sup>0</sup> does not attach to the complementizer (which has to be absent in (16b); cf. the so-called *Sluicing-Comp Generalization*, Merchant [58:62]), but rather to the clause-initial *wh*-phrase. In Bavarian, similar facts can be observed in all cases lacking an overt complementizer, cf. the example in (i) (Bayer [5:235]):

(i) Du soll-st song [<sub>cp</sub>[ an wäichan Schuah]-st [<sub>ip</sub> du wui-st]].  
you should-2sg say which shoe-2sg you want-2sg  
'You should say which shoe you want.'

It is often assumed that in these examples, there is actually an empty comple-

mentizer is to be analyzed in terms of PF-deletion (Ross [68], Lasnik [54], Merchant [58]), the data in (16) indicate that the realization of complementizer agreement is sensitive to post-syntactic operations. This fact cannot be accounted for if it is assumed that complementizer agreement is established by purely syntactic mechanisms.<sup>14</sup> Furthermore, it suggests that the inflection carried by the complementizer is presumably the result of a post-syntactic mechanism as well. Importantly, the fact that the potential sources of C's agreement features (the subject or T<sup>0</sup>) are located in a Spell-Out domain separate from C (i.e., TP) seems to indicate that the relevant post-syntactic process ranges over more than a single Spell-Out domain. This conjecture is further corroborated if we take a closer look at the specifics of an adequate post-syntactic account of complementizer agreement.

### 3.2. Toward a Post-Syntactic Account of Complementizer Agreement

Focusing on the adjacency effects observed above, Ackema and Neeleman [2] propose an analysis of complementizer agreement in terms of a PF feature checking rule which applies if C and the subject are part of the same prosodic phrase (marked by braces in (17)):<sup>15</sup>

(17) *Germanic complementizer agreement*  
 {[C (Prt) (Add) (Plr)] [D (Prt) (Add) (Plr)]} →  
 {[C (Prt<sub>i</sub>) (Add<sub>j</sub>) (Plr<sub>k</sub>)] [D (Prt<sub>i</sub>) (Add<sub>j</sub>) (Plr<sub>k</sub>)]}  
 (Ackema and Neeleman [2:241])

mentizer present to which the inflectional ending attaches (cf. e.g. Harnisch [44], Nübling [62]). This analysis is supported by the fact that the complementizer can also be overtly present:

(ii) Du soll-st song [<sub>cp</sub>[ an wäichan Schuah]-st [<sub>ip</sub> du wui-st]].  
you should-2sg say the which-one shoe that-2sg you want-2sg  
'You should say which one of the shoes you want.'

If C<sup>0</sup> is overtly realized, the inflection must show up on the complementizer and cannot attach to the *wh*-phrase:

(iii) \*Du soll-st song [<sub>cp</sub>[ an wäichan Schuah]-st dass [<sub>ip</sub> du wui-st]].  
you should-2sg say the which-one shoe-2sg that you want-2sg  
'You should say which one of the shoes you want.'

<sup>14</sup> Of course, data like (16) cannot be used as an argument against syntactic accounts of complementizer agreement if sluicing is analyzed in terms of a covert syntactic process which replaces a null category representing the "elided" IP with a phrase marker copied from the relevant matrix antecedent (cf. Lobeck [56], Chung, Ladusaw, and McCloskey [20]).

<sup>15</sup> Note that this is another instance in which prosodic phrasing cuts across the Spell-Out domains defined in Chomsky [16] and subsequent work.



The rule in (17) serves to identify the set of  $\phi$ -features associated with C (Prt = Participant, Add = Addressee, Plr = Plural) with the relevant (interpretable)  $\phi$ -features of the subject. The adjacency effect is then attributed to a difference in prosodic phrasing caused by material adjoined to IP/TP: due to the presence of an XP that intervenes between C and the subject, rule (17) cannot apply since the complementizer and the subject are in two different prosodic domains (marked by braces):

- (18) a. [<sub>CP</sub> C [<sub>IP</sub> XP [<sub>IP</sub> subject ... [<sub>VP</sub> ... V ... ]]]]  
 b. {C XP} {subject} {...} {...V...}

Under this analysis, the absence of complementizer agreement in sluicing constructions can be attributed to the fact that the subject has been deleted at/prior to PF and cannot participate in further PF (feature checking) processes. Thus, a post-syntactic analysis in terms of PF feature checking seems to be able to capture the major empirical facts and is therefore superior to the syntactic approaches discussed above. Crucially, an account in terms of (17) requires that at PF, elements which are part of different Spell-Out domains (but part of the same prosodic domain) are visible to the mechanisms establishing complementizer agreement.

However, there is a set of data from Bavarian which challenges the assumption that complementizer agreement involves a checking relation between C and the subject (cf. Fuß [30, 31]). Note that this analysis predicts that the establishment of complementizer agreement is independent of the realization of verbal agreement. At least in Bavarian, however, this expectation is not borne out by the facts. Consider the comparative clauses in (19):

- (19) a. D'Resl is gresser [ als wia-st du bist].  
 the-Resl is taller than as-2sg you are  
 'Resl is taller than you are.'  
 b. \*D'Resl is gresser [ als wia-st du].  
 the-Resl is taller than as-2sg you  
 c. D'Resl is gresser [ als wia du].  
 the-Resl is taller than as you

(Bayer [5:269])

(19b) shows that in comparatives, overt agreement on C leads to ungrammaticality if the finite verb is absent from the structure. The sentence becomes acceptable when the complementizer bears no inflection, as illustrated in (19c). This contrast shows that agreement between the complementizer and the subject cannot be implemented in terms of a checking relation between the set of  $\phi$ -features in C and the subject in SpecTP. Otherwise one would expect examples such as (19b) to be grammatical (the  $\phi$ -set of C should be able to enter into a checking relation with the subject's  $\phi$ -set). This conclusion holds for a syntactic analysis in terms of AGREE (e.g., Carstens [15]) as well as for an account involving PF checking rules as proposed by Ackema and Neeleman [2]. Moreover, the data in (19) show that it is the presence/absence of the inflected verb which is crucial for the availability of complementizer agreement. This suggests that the inflection found in the C-domain is mediated by the finite verb.<sup>16</sup> In other words, it seems that complementizer agreement is parasitic on the presence of a set of agreement features that has been evaluated during the syntactic derivation.<sup>17</sup> This basic idea can be rendered in more formal terms if it is assumed that the agreement features giving rise to complementizer agreement are introduced by a post-syntactic operation which creates a copy of the relevant  $\phi$ -set on T and inserts it to C at the level of Morphological Structure (for details of this analysis and further discussion, see Fuß [30, 31]). Following common practice in Distributed Morphology (DM), I assume that the relevant set of agreement features in T (and C) corresponds to a separate agreement head or *morpheme* that is adjoined to a functional head with

<sup>16</sup> In addition, the data set in (19) provides further evidence that complementizer agreement results from a post-syntactic operation if we follow the standard assumption that comparatives of this type are the result of a post-syntactic operation that deletes the inflected verb in the second clause, as shown in (i) (cf. e.g. Bresnan [14], Lechner [55]).

(i) D'Resl is gresser [ als wia (\*-st) du bist].  
 the-Resl is taller than as-2sg you (are)  
 'Resl is taller than you are.'

If the licensing of complementizer agreement were to take place in the syntax, we would not expect any interaction with comparative deletion; the finite verb would be present throughout the whole syntactic derivation, being subject to deletion only after the structure has been transmitted to the post-syntactic components of grammar.

<sup>17</sup> Chomsky [19:9, fn. 23] considers the overt expression of inflectional features on C as further support for his proposal that T inherits its feature content from C, which is assumed to be the genuine host of  $\phi$ -features. However, the fact that complementizer agreement is parasitic on verbal agreement seems to indicate that it is rather the other way around: the expression of inflectional features on C appears to depend on properties of T (i.e., its overt realization).

independent content (cf. e.g., Halle and Marantz [41]).<sup>18</sup> In the case at hand, then, the agreement morpheme on C (i.e., Agr-on-C) is a *copy* of the agreement morpheme located in T (Agr-on-T, which has been valued by a syntactic AGREE relation), giving rise to an instance of multiple agreement where the subject's  $\phi$ -set is reflected on both the verb and the complementizer.<sup>19</sup> That is, I assume that the constituent structure derived in the syntactic component may be modified by the post-syntactic insertion of inflectional heads/features. In realizational models of grammar such as DM, this mechanism is widely used to account for phenomena which involve features that do not receive an interpretation at the C-I interface (i.e., agreement and structural case, but not Tense or Aspect, cf. e.g., Marantz [57], Halle and Marantz [41], Embick [23], Halle [40], Noyer [61], Harbour [43]).

Accordingly, the restrictions on complementizer agreement observed above (adjacency effects, absence in sluicing and comparatives) should be accounted for in terms of constraints on the application of post-syntactic operations. While the absence of complementizer

<sup>18</sup> See Sternefeld [74] for a syntactic implementation of the idea that complementizer agreement involves a (checking) relation between C and the  $\phi$ -features of the finite verb. The assumption that complementizer agreement is parasitic on verbal agreement is further supported by the observation that across Germanic, there appear to be no languages with complementizer agreement but without verbal agreement, while there are many languages that exhibit verbal agreement in the absence of complementizer agreement (Hoekstra and Smits [46]). Thus, it seems that cross-linguistically, the availability of complementizer agreement is dependent on the overt realization of verbal agreement morphology.

<sup>19</sup> This analysis implies a hybrid model of agreement in which feature matching between two elements may result from two different underlying mechanisms (cf. Fuß [30] for discussion and further details). First, the surface realization of "canonical" subject-verb agreement is attributed to an agreement morpheme that is added to T *before* the resulting complex head enters the syntactic derivation. The feature content of these *syntactic* agreement morphemes is then identified via an AGREE operation, which leads to feature matching with an appropriate set of interpretable  $\phi$ -features under closest c-command. In addition, agreement morphemes may be added *after* the syntax as copies of syntactically evaluated Agr-morphemes. The insertion of these *morphological* Agr-morphemes typically leads to instances of multiple agreement where agreement with a certain argument is realized in several places in a sentence. This approach to the phenomenon of multiple agreement preserves the idea that *syntactic* agreement is a unique dependency between two elements (cf. e.g., the Agreement Criterion, Uriagereka [77:270]). However, note that a post-syntactic analysis of complementizer agreement raises the question of how to account for alleged syntactic effects of complementizer agreement such as pro-drop, doubly-filled COMP phenomena, or the absence of *that*-trace effects (cf. e.g., Bayer [5] on Bavarian). Another problem concerns the phenomenon of first conjunct agreement (FCA) in dialects such as Tegelen Dutch (cf. fn. 12 above). For reasons of time and space, I have to leave these issues for future research (however, see Fuß [30] for the (historical) connection between complementizer agreement and pro-drop and Fuß [31] for some remarks on the phenomenon of FCA).

agreement in comparatives and sluicing constructions can presumably be attributed to the sequence of PF processes,<sup>20</sup> the adjacency effects observed above in (11) and (12) suggest an explanation in terms of locality conditions on post-syntactic operations. More precisely, I assume that the copying/insertion procedure giving rise to Agr-on-C operates in a strictly local fashion, requiring structural adjacency between C<sup>0</sup> and T<sup>0</sup> (as is typical of morphological rules in DM, cf. e.g., Halle and Marantz [41]). The condition in (20) and the definition of *Structural adjacency* in (21) warrant strict locality between the syntactic Agr-morpheme on T<sup>0</sup> and its post-syntactically inserted copy on C<sup>0</sup> (cf. Fuß [30, 31] for further discussion):

(20) *Insertion of morphological Agr-morphemes*

A post-syntactically inserted Agr-morpheme can attach to a functional head X only if X is *structurally adjacent* to another functional head Y hosting an Agr-morpheme that has been valued in the syntax.

(21) *Structural adjacency*

A head X is structurally adjacent to a head Y iff

- (i) X c-commands Y
- (ii) There is no projecting head Z that
  - (a) is c-commanded by X and
  - (b) c-commands Y.

In other words, the copy operation which creates a morphological Agr-morpheme may target only a syntactically valued Agr-morpheme which is locally c-commanded by the insertion site. According to (21), then, a head X is structurally adjacent to the head Y of its complement. Hence, Agr-on-C can only be inserted as a copy of Agr-on-T if C<sup>0</sup> is structurally adjacent to a T-head that hosts a valued Agr-morpheme. The analysis of the adjacency effect is based on the idea that this kind of locality is violated by a scrambled element that intervenes between C and the subject. How? Let's assume that scrambled XPs do not adjoin to IP/TP but occupy the specifier of a functional projection (TopP/FocP above TP; cf. Frey [28], Grewen-

<sup>20</sup> For example, we may assume that at MS, the insertion of morphological Agr-morphemes applies after the deletion of the syntactic terminal node which corresponds to the inflected verb (cf. Fuß [30, 31] for discussion; see e.g., Embick and Noyer [24] and Ackema and Neeleman [2] for the ordering relations between different types of MS/PF operations).

dorf [32]; see Jayaseelan [48], Belletti [6], and Haeberli [37] for related ideas) that is only projected if it serves to implement certain information-structural distinctions (cf. Rizzi [65], Branigan [13] for similar proposals concerning the presence of TopP/FocP in the left periphery). Now consider (11b), repeated here as (22).

- (22) \*<sub>[CP datt-e</sub> <sub>[FP [PP op den wärmsten dag van't joar]</sub>  
 that-1<sub>PL</sub> on the warmest day-of-the year  
<sub>[F' F°</sub> <sub>[TP wiej tegen oonze wil ewärkt hebt]]</sub>  
 we against our will worked have  
 'that on the warmest day of the year we have worked  
 against our will'

In (22), the PP *op den wärmsten dag van't joar* is located in the specifier of a TopP/FocP (simply labeled FP here), the head of which disrupts structural adjacency between C<sup>0</sup> and T<sup>0</sup>. As a result, the insertion of Agr-on-C is blocked.<sup>21</sup> Note that the kind of locality based on adjacency is reminiscent of affix hopping in English where the inflectional features located in T may undergo Morphological Merger with a lower main verb (presumably located in *v*) if no other projecting head such as Neg intervenes (cf. e.g., Halle and Marantz [41]; Bobaljik [8, 9, 10]; Lasnik [52, 53]). In the next section, I discuss some consequences of the present analysis of complementizer agreement for the theory of cyclic Spell-Out.

<sup>21</sup> In Fuß [30, 31], it is shown that not all elements that intervene between C and the subject block complementizer agreement. In Bavarian, modal particles such as *aber*, *halt*, *ja* and clitic object pronouns may intervene between inflected C<sup>0</sup> and TP/the subject (cf. Altmann [4]):

(i) dass-st oaba du ibaroi dabei bist  
 that-2<sub>SG</sub> <sub>PRT</sub> you everywhere with-it are  
 'that you really are involved everywhere' (Altmann [4:205])

(ii) wia-sd=n du gseng hoast  
 when-2<sub>SG</sub>=<sub>CLIT</sub>.3<sub>SG</sub> you seen have  
 'when you saw him' (Pfalz [63:231])

Similarly, object clitics may intervene between the subject and the inflected complementizer in West Flemish, which otherwise requires strict adjacency between C and the subject (Liliane Haegeman, p.c.):

(iii) da-n ze Valère en Marie nie gezien een  
 that-3<sub>PL</sub> her Valère and Marie niet seen have-3<sub>PL</sub>  
 'that Valerie and Marie have not seen her'

These facts can be accounted for if it is assumed that the structural positions of clitics and modal particles differ from the position of scrambled XPs. That is, only the latter move into a specifier position of an FP intervening between C<sup>0</sup> and TP, in contrast to clitics (the placement of which is determined by post-syntactic processes,

#### 4. Cyclic Spell-Out and Phonological Domains

If we accept the notion that complementizer agreement is accomplished in the post-syntactic components of grammar, we face another instance where morphological/phonological operations cut across the Spell-Out domains defined in Chomsky [16] and subsequent work. Note that this conclusion holds not only for the above analysis in terms of a copy operation that transfers agreement features from T to C, but also for the model developed in Ackema and Neeleman [2], which posits a PF checking relation between C and the subject. In both cases, there is a dependency between C (which is spelled out together with matrix VP), and an element contained in a different Spell-Out domain (TP) which has already been sent to the interfaces. This raises the question of how the implementation of agreement on C can access information which is already gone from the computation.

In what follows, I discuss a selection of potential solutions to this problem. Three possible accounts come to mind. First, we may assume that in the course of the derivation, a single unified interface representation (PF or Morphological Structure) is cyclically constructed from the successive output of narrow syntax (cf. e.g., Bouchard [12:343]; see von Stechow [73] for a related proposal concerning the C-I interface). As a result, post-syntactic operations would have access to the whole structure of an expression generated by narrow syntax. In the case at hand, then, a dependency between C and T (or C and the subject) could easily be created, leading to complementizer agreement. Similarly, no problems would arise in connection with prosodic phrasing or the realization of bound pronouns (see above). However, note that this "global" solution entails that PF is capable of storing the output of the individual cycles of narrow syntax until the final representation is assembled. Accordingly, we would completely lose the advantages of cyclic computation (i.e., reduction of memory load) for the phonological component. Furthermore, the observation that post-syntactic operations such as Morphological Merger, Fusion, Fission, Impoverishment, or the insertion of inflectional features appear to show quite strict locality restrictions (which may differ from syntactic locality conditions; cf. e.g., Halle and Marantz [41], Bobaljik [8, 9]; Noyer [61] among others) would be left unaccounted for.

cf. e.g. Bonet [11], Halpern [42], Schütze [69]) and modal particles (which can be analyzed as genuine adjuncts, cf. e.g. Abraham [11]).

Second, the problematic facts may be taken to indicate that the domain of Transfer operations should be redefined, in a way which warrants that C and T (or C and the subject) are part of the same Spell-Out domain (for concrete proposals to this effect, cf. e.g. Uriagereka [77], Fox and Pesetsky [27]; see Grohmann and Putnam [35], for an alternative definition of Spell-Out domains based on the notion of 'Prolific domains' (Grohmann [34])). In this way, we could ensure that the (post-syntactic) operations giving rise to complementizer agreement do not cross Spell-Out domains. For the sake of concreteness, we may assume that it is not the domain/complement of a phase head that is subject to Transfer, but rather the whole phase, including its edge (cf. e.g., Fox and Pesetsky [27]). Given Chomsky's motivation of phases in terms of interface conditions, this seems to be a natural move (cf. section 2 above). Furthermore, this assumption would eliminate the asymmetry between phases and Spell-Out domains and in this way warrant strict isomorphism between the syntactic and post-syntactic cycles. However, note that a redefinition of Spell-Out domains along these lines is again a very far-reaching proposal, which has serious consequences not only for the post-syntactic computation, but also for narrow syntax, in particular with respect to locality conditions (i.e., the PIC). For example, Spell-Out of a complete  $vP/CP$  phase including its edge should perhaps render successive-cyclic movement of elements contained in this phase impossible.<sup>22</sup> Moreover, it is questionable whether a redefinition of the Spell-Out domain alone suffices to capture other instances where post-syntactic operations cut across Spell-Out domains. For example, in the case of prosodic phrasing, discussed in (4) and (5) above (repeated here as (23) and (24)), it is doubtful that there can exist a derivational cycle in narrow syntax that contains the auxiliary plus a participle but excludes the subject and object:

<sup>22</sup> A possible solution to this problem would be to assume that the relevant phase is not really gone from the syntax after Spell-Out has applied (see also fn. 1 above). For example, Chomsky [19:9] hints at the possibility that the syntactic effects of the PIC actually follow from intervention effects:

"Note that for narrow syntax, probe into an earlier phase will almost always be blocked by intervention effects. [...] It may be, then, that PIC holds only for the mappings to the interface, with the effects for narrow syntax automatic."

In other words, we might assume that after Spell-Out of phase HP, HP is still present in the syntax, with locality/cyclicity effects attributed to intervention phenomena. Movement to the edge of a phase would then have to be motivated as a necessary step to avoid intervention effects. In this sense, then, the point of Transfer would define only the size of the structural units that are dealt with in the post-syntactic components and are eventually interpreted at the interfaces.

- (23) [<sub>IP</sub> Gianni avrà [<sub>VP</sub> già mangiato [le belle mele]]].  
'Gianni will have already eaten the good apples.'
- (24) [Gianni]  $\varphi$  [avrà già mangiato]  $\varphi$  [le belle mele]  $\varphi$

Thus, while it seems feasible to handle the problems raised by complementizer agreement with "large-scale" solutions such as a redefinition of Spell-Out domains or the assumption that post-syntactic processes operate on a single, cyclically constructed PF representation, the conceptual and empirical issues raised by the relevant proposals cast into doubt whether this is actually the way we should proceed.

Alternatively, we may pursue a more conservative approach and assume that the relevant modification should concern not the definition of Spell-Out domains, but rather the domain of post-syntactic operations. More precisely, I propose the following definition of the scope of post-syntactic operations in the PF/MS component:<sup>23</sup>

- (25) *The domain of phonological operations*  
Operations of the phonological component may access a single Spell-Out domain  $\Sigma_n$  and the right edge of the following Spell-Out domain  $\Sigma_{n+1}$ .

According to this definition of phonological domains, phonological/morphological operations may minimally cut across Spell-Out domains, accessing material which is part of two adjacent Spell-Out domains. Crucially, however, the range of this extension is quite limited, depending on the proper understanding of "right edge" in (25): perhaps only a single element (the rightmost terminal element of  $\Sigma_2$ , i.e., C in the case of  $\Sigma_1 = TP$  and  $v$  in the case of  $\Sigma_1 = VP$ ), or a little bit more (possibly specifier(s) of CP and  $vP$ , see below for some discussion). In this way, the advantages of cyclic computation in terms of a reduction of memory load are largely preserved in the post-syntactic components.

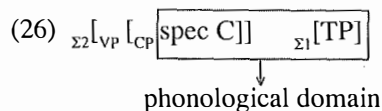
In the case of complementizer agreement, then, the phonological/morphological component may create a dependency between

<sup>23</sup> In what follows, I will use the notion "phonological operations" in a broad sense, as a cover term for both phonological and morphological operations that apply post-syntactically. The same goes for the notions "phonological/PF component" or "phonological/PF domain".

material which is part of the TP Spell-Out domain ( $= \Sigma_1$ ) and  $C^0$ , which is located at the right edge of the next Spell-Out domain that is transferred to the phonological component (matrix VP =  $\Sigma_2$ ). As a result, post-syntactic operations may copy agreement features from T to C, giving rise to an inflected complementizer (see above).<sup>24</sup>

Thus, it appears that only a minimal extension of the domain of post-syntactic operations is required, affecting only the rightmost head of the next Spell-Out domain. This outcome is certainly desirable, since it constitutes the smallest possible deviation from strict cyclicity in the PF component. However, as already briefly hinted at above, there are some reasons that might lead us to assume that the “right edge” actually includes more material than just a single terminal element.

Recall that the above noted asymmetry between the notions of phases (CP, vP) and Spell-Out domains (TP, VP) has been deemed conceptually problematic, since it eliminates the parallelism between syntactic and phonological cycles and undermines the original motivation for phases in terms of interface conditions (due to the fact that the chunks reaching e.g., the SM interface do not correspond to CP and vP, but rather to VP and TP, cf. section 2 above). However, if we assume that the phonological domain created by addition of the right edge of  $\Sigma_2$  includes not only the rightmost (phase) head, but also its specifiers, the present proposal can be taken to repair the asymmetry created by the operation Transfer (which separates the domain of a phase head from the other parts of the phase). In this way, the proposal that phonological operations are not confined to a single Spell-Out domain  $\Sigma_1$  but may extend to the right edge of the next Spell-Out domain  $\Sigma_2$  restores the isomorphism between the cycles of the syntactic and phonological computation by reassociating those parts of a phase spelled out at  $\Sigma_1$  (the complement of a phase head, e.g., TP in (26)) with the elements spelled out later (the phase head itself and its specifier(s)):



<sup>24</sup> Note that this definition of PF-domains works not only for the account proposed in this article, but also for the analysis by Ackema and Neeleman [2], in which C enters into a checking relation with the subject in SpecTP (if C and the subject are part of the same prosodic phrase).

Positive evidence in favor of this characterization of phonological domains again comes from complementizer agreement. As already noted in fn. 13 above, the relevant agreement formatives may also attach to elements occupying SpecCP, giving rise to an inflected *wh*-phrase, for example (Bayer [5:235]):

- (27) Du soll-st    song [<sub>CP</sub>[an wäichan Schuah]-st [<sub>IP</sub>du wui-st]].  
 you should-2sg say    which    shoe-2sg    you want-2sg  
 ‘You should say which shoe you want.’

Thus, if  $C^0$  does not contain any overt material to which the agreement formative can attach, material in the specifier of CP is available as a host for the relevant inflectional ending (realizing an Agr-morpheme adjoined to  $C^0$  at Morphological Structure).

While this set of assumptions removes the asymmetry between phases and Spell-Out domains for the purposes of the phonological computation, we may still wonder whether it also helps to overcome the very same asymmetry with respect to the mapping to the SM interface. Tentatively, I assume that this in fact the case. Thus, I propose that the phonological component recompletes the phasal units previously disrupted by the application of Transfer in narrow syntax. As a result, what surfaces at the SM interface is actually a unit which again corresponds to a syntactic phase.<sup>25</sup> In this way, Chomsky’s original characterization of phases in terms of interface conditions (a phase is a coherent/independent phonological unit) can be maintained. Of course, this rather speculative proposal raises a number of further issues which I cannot address in full in this article. In the following, I will focus on only two rather general difficulties which both have to do with the exact size of the phonological domains defined so far: (i) Are there contexts which allow an extension of phonological domains? (ii) Does the right edge of a Spell-Out domain  $\Sigma_{n+1}$  exclusively form a phonological domain with  $\Sigma_n$  or is it also part of the phonological domain based on  $\Sigma_{n+1}$ ? In other words, are phonological domains discrete units or do they overlap? In the following, I first deal with the question of whether phonological domains may be extended under certain circumstances.

<sup>25</sup> Conceivably, a similar mechanism is required in the semantic component, e.g., to create a complete predication structure that can be interpreted by the C-I-system – including the VP, (the copy of) the subject, and eventually temporal information (this was pointed out to me by Patrick Brandt).

Given the above definition of phonological domains, we would perhaps expect that phase boundaries closely match phonological boundaries. While this seems to be largely true of CP, which is commonly assumed to constitute an independent intonational unit, the effects of the supposed close isomorphism between syntactic and phonological cycles are much less clear clause-internally (see e.g., Selkirk and Kratzer [71] for a critical review of these matters with respect to focus placement). Again, this can be illustrated with the kind of prosodic phrasing exhibited by examples such as (24), repeated here as (28). How can we ensure that the participle may form a prosodic phrase together with the adverb and the finite auxiliary?<sup>26</sup>

(28) [Gianni ]  $\varphi$  [avrà già mangiato ]  $\varphi$  [le belle mele]  $\varphi$

First, consider a more fine-grained syntactic representation of (28):

(29) [<sub>TP</sub> Gianni<sub>i</sub> avr<sub>a</sub> [<sub>vP</sub> t<sub>i</sub> v [<sub>vP</sub> già mangiato [<sub>DP</sub> le belle mele]]]].

According to our definition of phonological domains, the VP (=  $\Sigma_1$ ) should form a phonological domain with the right edge of the TP (=  $\Sigma_2$ ), that is, spec and head of vP. However, note that the latter positions do not contain any phonologically relevant material in (29), due to raising of the subject and the finite verb. In other words, the right edge of  $\Sigma_2$  is actually empty. Now, let us assume that exactly this configuration makes available another extension of phonological domains which is based on the notion of adjacency. More precisely, I suggest that phonological operations may extend over two complete Spell-Out domains  $\Sigma_1$  and  $\Sigma_2$  iff no overt material intervenes between the left edge of  $\Sigma_1$  and the left edge of  $\Sigma_2$ . This is illustrated in (30) for the case at hand (after deletion of non-spelled out copies/traces in vP):

<sup>26</sup> The fact that the subject and the object correspond to separate phonological phrases is not a problem if we assume that phonological rules may divide a phonological domain into a number of separate phonological phrases. That is, the only problematic cases are those in which phonological operations seem to not respect the phonological domains defined here (i.e., a Spell-Out domain plus the right edge of the next Spell-Out domain).

(30)  $\Sigma_2$ [<sub>TP</sub> Gianni avr<sub>a</sub> [<sub>vP</sub>  $\emptyset$  ] ]  $\Sigma_1$ [<sub>vP</sub> già mangiato [<sub>DP</sub> le belle mele]]  
 ↓  
 phonological domain

Under a phonological characterization of “right edge”, then, phonological operations may access the finite auxiliary in T to construct a prosodic phrase including elements contained in the VP (the participle and the adverb) under linear adjacency.

The second issue I want to discuss here has to do with the question of how subsequent Spell-Out domains are successively mapped to phonological domains, focusing on the affiliation of right edges with respect to phonological domains. More specifically, it is unclear whether phonological operations may only affect the domain resulting from the union of a Spell-Out domain  $\Sigma_n$  and the right edge of  $\Sigma_{n+1}$ , cf. (31), or whether the phonological domains created by this process may overlap (i.e., whether the right edge of  $\Sigma_{n+1}$  is also accessible for operations at  $\Sigma_{n+1}$ ), as illustrated in (32):

(31)  $\Sigma_4$ [<sub>TP</sub> spec T [<sub>vP</sub> spec v]]  $\Sigma_3$ [<sub>vP</sub> spec V [<sub>CP</sub> spec C]]  $\Sigma_2$ [<sub>TP</sub> spec T [<sub>vP</sub> spec v]]  $\Sigma_1$ [<sub>VP</sub>]  
 ↓ ↓ ↓  
 PF-Domain<sub>3</sub> PF-Domain<sub>2</sub> PF-Domain<sub>1</sub>

(32)  $\Sigma_4$ [<sub>TP</sub> spec T [<sub>vP</sub> spec v]]  $\Sigma_3$ [<sub>vP</sub> spec V [<sub>CP</sub> spec C]]  $\Sigma_2$ [<sub>TP</sub> spec T [<sub>vP</sub> spec v]]  $\Sigma_1$ [<sub>VP</sub>]  
 ↓ ↓ ↓  
 PF-Domain<sub>3</sub> PF-Domain<sub>2</sub> PF-Domain<sub>1</sub>

There are some indications that the more restrictive variant (31) is more adequate. First, we have already noted that CP generally constitutes a separate intonational domain, which is properly captured by the proposal in (31), but somewhat at odds with the alternative in (32). Second, the assumption that there is no overlapping between PF-domains makes an interesting prediction with respect to complementizer agreement: if there are multiple complementizers present in the C-system (as e.g., in many variants of Dutch), agreement should always be confined to the rightmost complementizer. This follows from the analysis of complementizer agreement proposed above: if the post-syntactic operation which copies agreement features from T to C is confined to a single phonological domain, it may target only

the complementizer which constitutes the right edge of the subsequent Spell-Out domain (= matrix VP). As a result, it should not be possible that a higher complementizer inflects for agreement, while a lower one does not. Second, multiple realization of complementizer agreement on more than one complementizer is ruled out:

- (33) a. \*<sub>[CP]</sub> Comp+Agr ... Comp] ...  
 b. \*<sub>[CP]</sub> Comp+Agr ... Comp+Agr] ...

As far as I know, these predictions are borne out by the relevant data. This is not expected under the assumption of overlapping phonological domains; as indicated by (32), the complete (split-) CP would be part of the same phonological domain. Accordingly, agreement features (first copied from T to the C-domain) should be able to spread across the complete CP, contrary to facts.<sup>27</sup>

The restrictive variant of the mapping process also explains a curious restriction on complementizer agreement observed by de Haan and Weerman [36]. In Frisian, there is a set of verbs that optionally select a V2 complement embedded under a complementizer. Interestingly, complementizer agreement is obligatory when the verb stays behind in final position, but excluded when the V2 option is chosen:

- (34) a. Hy leaude datsto moarn komme soest.  
 he believed that-2sg=you tomorrow come should-2sg
- b. Hy leaude dat do soest moarn komme.  
 he believed that you should-2sg tomorrow come
- c. \*Hy leaude datsto soest moarn komme.  
 he believed that-2sg=you should-2sg tomorrow come  
 'He believed that you should come tomorrow.'  
 (Germen de Haan, p.c.)

<sup>27</sup> The possibility of a split CP structure (Rizzi [65]) gives rise to further complications which are not discussed here. See fn. 28 for some remarks on the Spell-Out of a recursive CP structure.

If the above examples of embedded V2 are analyzed as an instance of CP recursion (de Haan and Weerman [36]; see Carstens [15] for an analysis in terms of a split CP structure), the impossibility of complementizer agreement in (34c) can be attributed to the characterization of PF domains in (31); recall that the domain for establishing complementizer agreement consists of TP and the right edge of the subsequent Spell-Out domain (matrix VP). In (34c), the relevant right edge is occupied by the finite verb, excluding the complementizer *dat*. As a consequence, *dat* is part of a separate PF domain. It follows that it is not possible to copy features from T to *dat*. Similarly, there can be no feature transfer between the lower C-head hosting the finite verb and the higher C-head hosting *dat*.<sup>28</sup> Thus, we derive the result that the presence of the finite verb in the lower C head blocks complementizer agreement.

<sup>28</sup> Joost Kremers pointed out to me that in a recursive CP structure, the upper CP presumably constitutes a phase as well. This possibility gives rise to a special case of the Spell-Out procedure illustrated in (31): if a strong phase CP1 is the complement of another strong phase head C2, the piece of structure transferred to the phonological component (upon completion of CP2) consists of the left edge of CP1 (including C1) and nothing else. As a result, the phonological domain consisting of the previously spelled out TP is extended by adding the lower CP1 hosting the finite verb in (34c). However, under the assumption that phonological domains may not overlap (cf. (31)), this implies that CP1 may not be associated/extended with the right edge of the next Spell-Out domain (containing the complementizer *dat*), ruling out any feature transfer between C1 and C2 at PF.

## 5. Concluding Summary

In this article, it was shown that operations of the phonological component may cut across the Spell-Out domains as defined in Chomsky [16, 17, 18, 19]. In particular, I argued that certain properties of complementizer agreement (adjacency effects, sensitivity to PF deletion processes) suggest that this form of multiple agreement is established by a post-syntactic operation that copies agreement features (valued in the syntax) from T to C under structural adjacency. This was taken to indicate that T and C, which are part of different Spell-Out domains, must be part of a single domain in the phonological component of grammar.

It was then proposed that the phonological component maps the cyclic output of narrow syntax to phonological domains which are slightly larger than a single Spell-Out domain. More precisely, I suggested that a phonological domain consists of a Spell-Out domain  $\Sigma_n$  and the right edge of a subsequent Spell-Out domain  $\Sigma_{n+1}$ . In this way, then, the phonological component can be taken to restore phasal units which have been disrupted by the application of the operation Transfer (affecting TP and VP, but not the phase head and its edge), thereby warranting a strict isomorphism/parallelism between the cycles of syntactic and post-syntactic computation. It was then shown that this proposal makes not only correct empirical predictions concerning the realization of complementizer agreement in Germanic, it also serves to maintain the original characterization of phases in terms of interface conditions if it is assumed that it is not Spell-Out domains, but rather the domains created by the workings of the phonological component which are sent to the SM interface.

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## Linearization and Local Dislocation: Derivational Mechanics and Interactions\*

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### 1. Introduction

On the assumption that the syntax generates hierarchical representations that are accessed by both sound and meaning systems, it is an empirical question how the syntactic representation and the representation(s) referred to in different morphophonological processes relate to one another. In Chomsky and Halle [7:9], for example, this question is posed in terms of how two conceptions of *surface structure*, “output of the syntactic component” and “input to the phonological component,” relate to one another, with identity being a possibility that is excluded because of the existence of cases in which these two notions appear to differ. What is then required is a theory of the possible relationships between syntactic and phonological structures, on the assumption that in spite of some differences, the overall patterns are systematic. In terms of current models of syntax and its interfaces, this amounts to giving a theory of PF.

Since this set of questions was initially formulated, research in this area has identified a range of cases in which syntactic structure and phonological structure do not line up with one another, in a number of domains (prosodic phonology, cliticization, bracketing paradoxes, etc.). To the extent that phenomena of this type require syntactic and phonological representations that are distinct from one another, the further question is how great the differences are. I take it that the possible deviations are highly restricted in their scope, something that amounts to assuming a “restrained” view of PF. Within the context of a derivational framework, the program is to specify the different

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