

Investigations of downward movement

Tobin R. Skinner

Department of Linguistics
McGill University, Montréal

B.A., University of Virginia, 2000

M.A., Boston University, 2004

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ABSTRACT

Under a non-lexicalist view of word formation, such as Distributed Morphology (Halle and Marantz 1993), morphemes combine to form complex words during or after—but not before—narrow syntactic derivation. Such a model inevitably requires the availability of downward transformations, e.g. affix-hopping. This thesis provides a detailed investigation into such downward movements. Whereas previous analyses have relegated downward movements to a position outside of core derivational processes (e.g. Chomsky 1981 and, to a lesser extent, Embick and Noyer 2001), I argue that certain downward movements, namely head-to-head Lowering, form part of the central architecture of syntactic derivation and are motivated by fundamental properties of that architecture, such as phase impenetrability (Chomsky 2001).

Though this thesis addresses certain properties of other types of apparent downward movement (e.g. morpho-phonological merger; i.e. Local Dislocation), it focuses primarily on the defining characteristics of head-to-head Lowering. Central to this investigation is the observation that Lowering is a highly syntactic operation. In Chapter 2, I argue that a Lowering head may freely target any intermediate syntactic position of the complex head of its complement, thus deriving several cases of morphological optionality; e.g. reduplicative variability in Tagalog and Ndebele and the variable positions of agreement markers in Turkish.

Chapter 3 addresses tense-hopping, a canonical case of downward movement. I argue that certain asymmetries between English and Swedish provide evidence that these two languages derive their respective tense-hopping patterns via different means. Namely, Swedish tense-hopping is a case of Lowering, whereas English tense-hopping results from Local Dislocation (following Ochi 1999). Additionally, I propose a detailed theory of the Lowering vs. Raising distinction. Based in the observation that Lowering only ever takes place across a phase boundary, I posit a *Phase Head Impenetrability Condition* (PHIC), under which features embedded in a complex phase head become inaccessible as a result of Spell-out. Lowering occurs as a last resort feature-checking operation when the next highest head targets one of these embedded features; Raising occurs otherwise. I address several repercussions of this analysis, and in Chapter 4 I show that the PHIC allows for a straightforward account of the aux-raising vs. tense-hopping asymmetry in English. More precisely, I claim that auxiliary verbs are merged in the same phase as finite tense, and so the PHIC does not apply between these two elements, unlike with main verbs.

The analyses presented in this thesis all share a common goal: to show that downward movements can and should be incorporated into core linguistic theory.

RÉSUMÉ

Selon une conception non-lexicaliste de la formation du mot, telle que la Morphologie Distribuée (Halle et Marantz 1993), les morphèmes se combinent pour former des mots complexes pendant ou après—mais pas avant—la dérivation syntaxique étroite. Un tel modèle requiert inévitablement la disponibilité de transformations descendantes, par exemple la transformation affixale. La présente thèse procure une investigation détaillée de tels mouvements descendants. Tandis que les analyses précédentes ont relégué les mouvements descendants hors du cœur des processus dérivationnels (p. ex., Chomsky 1981 et, dans une moindre mesure, Embick et Noyer 2001), je soutiens que certains mouvements descendants, soit l'abaissement tête-à-tête, forment une partie de l'architecture centrale de la dérivation syntaxique et sont motivés par des propriétés fondamentales de cette architecture, tel que l'impénétrabilité phasique (Chomsky 2001).

Bien que la présente thèse examine certaines propriétés d'autres types de mouvements descendants apparents (p. ex., fusionnement morpho-phonologique, c'est-à-dire, la Dislocation Locale), elle se concentre principalement sur les caractéristiques définitionnelles de l'abaissement tête-à-tête. L'observation que l'abaissement est une opération proprement syntaxique est centrale à cette investigation. Au chapitre 2, je soutiens qu'une tête abaissante peut librement cibler toute position syntaxique de la tête complexe de son complément, dérivant ainsi plusieurs cas d'optionalité morphologique, par exemple, la variabilité reduplicative en tagalog et ndebele et les positions variables des marqueurs d'accord en turc.

Le chapitre 3 examine la transformation du temps. Je soutiens que certaines asymétries entre l'anglais et le suédois fournissent la preuve que ces deux langues dérivent leurs patrons de transformation du temps respectifs par des moyens différents. Plus précisément, la transformation de temps en suédois est un cas d'abaissement, tandis que la transformation du temps en anglais résulte d'une Dislocation Locale (selon Ochi 1999). De plus, je propose une théorie détaillée de la distinction entre l'abaissement et la montée. Sur la base de l'observation que seul l'abaissement ne prend place qu'à travers une frontière phasique, je stipule une condition d'impénétrabilité de la tête phasique (PHIC), sous laquelle les traits enchassés dans une tête de phase complexe deviennent inaccessibles à la suite de l'épel. L'abaissement prend place comme opération de vérification de trait en dernier recours lorsque l'avant-dernière tête cible un de ces traits enchassés; autrement, la montée se produit. J'explore plusieurs répercussions de cette analyse, et au chapitre 4 je montre que la PHIC permet une explication directe de la montée des auxiliaires par opposition à la transformation du temps en anglais. Plus précisément, je soutiens que les verbes auxiliaires et le temps fini sont fusionnés dans la même phase, et ainsi la PHIC ne s'applique pas entre eux, contrairement aux verbes principaux. Les analyses présentées dans cette thèse partagent toutes un but commun : montrer que les mouvements descendants peuvent et doivent être incorporés dans la théorie linguistique fondamentale.

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1 Introduction

1 Downward movement

The goal of much research in generative grammar is to uncover the mechanisms underlying apparent mismatches between the purported base-generated positions of syntactic constituents and their ultimate locations in the phonological and/or semantic representations. Determining what motivates—and what limits—these transformations of linguistic structure is thus one of the primary concerns of such investigation. In this thesis, I focus on one type of transformation, namely those cases in which a morpheme is pronounced in a position that is arguably lower than its base-generated position. In all of these cases, a morpheme has adjoined to or within a word that overtly occupies a lower syntactic position than the first merger site of that morpheme in the derivation, indicating that the morpheme has undergone a downward movement.

The sort of transformation that we will be addressing has posed a perennial challenge for most generative models of syntactic derivation, which limit transformational operations to upward movement, disallowing movement to positions lower in the syntactic structure. Given the undeniably apparent cross-linguistic scarcity of structural transformations that appear to be downward, it has been posited that such movements are precluded by fundamental properties of syntactic computation. For example, it was proposed under Government

and Binding Theory (GB) (Chomsky 1981) that any trace of a syntactic object must be antecedent-governed (i.e. locally c-commanded) by that syntactic object. Under this view, traces, like anaphors, are variables that must be properly bound.¹ Thus, a syntactic structure that exhibits downward movement, effectively creating an unbound trace, would be deemed illicit. Any apparent downward transformation was instead argued to take place on the PF branch, surfacing as the result of some filter on phonological representations (e.g. Chomsky's (1981) Rule R), thus allowing for the total absence of downward movement in syntactic computation. The Minimalist Program (MP) (Chomsky 1995) continues this tradition of upward-only movement in the syntax. Indeed, under MP, most, if not all, cases of apparent downward movement, such as affix-hopping, are argued to be illusory, and instead arise from the combination of a lexicalist morphology and upward covert movement.^{2,3} We thus observe that, within the most widely accepted paradigms of generative grammar, downward movements have either been relegated to a position outside of the core transformational theory, or have been claimed to be non-existent.

In this thesis, following Embick and Noyer (2001), I argue not only that downward movements exist, but also that they can be incorporated into the fundamental, overarching architecture of derivational processes, including both narrow syntactic and post-syntactic operations. I propose that downward movements are not theoretically exceptional, but are rather the result of inherent

¹We will investigate this claim further in Chapter 3, where I suggest that, in cases of head movement, this condition is obviated as a result of total syntactic reconstruction at LF.

²Under this view, all morphologically complex words are formed before they enter the syntactic derivation, and so they may be pronounced in a low position in their full morpho-phonological forms before undergoing covert movement to higher heads. We will discuss this model further in later sections.

³Note also that, within MP, movement operations have been argued to be constrained by the Extension Condition, which requires that all structure-building operations occur cyclically, targeting only the topmost node of the syntactic derivation (i.e. the root node) as the site of merger and re-merger of syntactic elements (Chomsky 1993, Epstein et al. 1998, Zhang 2004, among others). However, head movement in general is problematic under the Extension Condition, since head-adjunction does not target the root node (but see Matushansky (2006) for an attempt to reconcile head movement with the Extension Condition). Furthermore, even phrasal movement is argued to often violate (a strict version of) the Extension Condition (e.g. Richards's (2001) "tucking in"). Given these independent objections to the Extension Condition, I will not consider such a condition to be an inviolable principle of syntactic derivation. For example, I will not assume that a violation of the Extension Condition in cases of head-to-head Lowering provides sufficient reason to preclude the existence of such a structural transformation. However, we will return to this issue briefly throughout this thesis (see, for example, Chapter 5, §3).

properties of linguistic computation, including, above all, the interface of syntax and phonology. In particular, I claim that head-to-head Lowering is driven by properties of cyclic Spell-out to the PF branch (Chomsky 2001, Svenonius 2001, Uriagereka 1999, and many others), and that even Local Dislocation (i.e. morphological merger in the post-Spell-out morpho-phonological representation) can play a role in certain processes previously argued to be purely syntactic, namely feature-checking. In this way, I argue that a principled account of downward movements gives us insight into certain aspects of the derivational architecture, including, but not limited to, the timing and domain of cyclic Spell-out to the interfaces. Therefore, the central goal of this thesis is to show how all types of transformational processes can be analyzed in an inclusive manner as core parts of a single derivational process, thus allowing us to develop a more complete, organic model of linguistic computation from start to finish.

2 Architecture of the PF branch

Note that even recent treatments of downward movements (e.g. Embick and Noyer 2001) relegate all downward movement to the PF branch, maintaining the restriction against narrow syntactic downward transformations. We will also adopt this model of downward movement for much of this thesis, but will ultimately come to question whether it is accurate (see Chapter 3, §2.2.3).⁴ We thus begin with an overview of the architecture of the PF branch that will be assumed throughout most of this work, using representative examples to illustrate the two types of downward transformations available to linguistic computation, namely Lowering and Local Dislocation. In the following sections, I will show that it is often difficult to pinpoint the exact transformation that is operative in a downward movement, but that it is possible to develop a set of analytical criteria that will help us to decipher which type of transformation is responsible for individual cases of apparent downward movement. However, before we begin to investigate the details of these post-Spell-out operations, we must first situate the scope of this

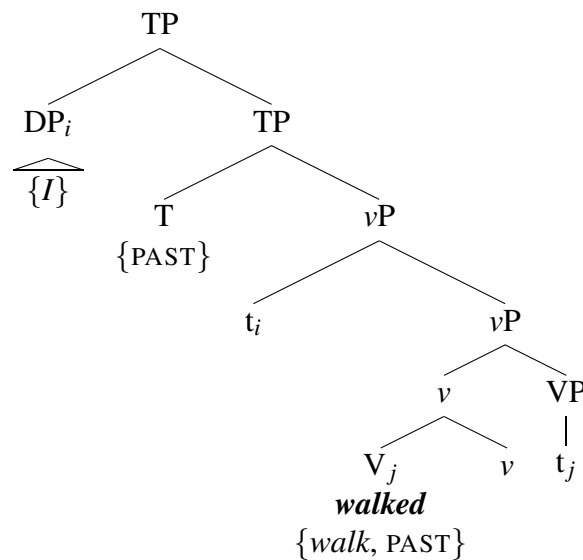
⁴In particular, I will address whether head-to-head Lowering occurs in the narrow syntactic structure itself or the post-Spell-out morpho-syntactic structure found on the PF branch. Note, however, that this distinction in the locus of Lowering will not affect any analysis preceding this discussion in Chapter 3, and that I will maintain throughout this thesis that Lowering is, at least in a sense, a post-Spell-out operation; i.e. Lowering is driven by the interface of narrow syntax with PF.

investigation within a particular theory of morphology, as our main concern will be downward transformations that affect the structure of individual words.

2.1 Lexicalist vs. Distributed Morphology

Under lexicalist theories of morphology (e.g. Bresnan 2001b, Chomsky 1995, Di Sciullo and Williams 1987, Jensen 1990, Lieber 1992, Pollard and Sag 1994), complex words (i.e. words that are formed from the combination of two or more morphemes) are constructed in a pre-syntactic generative lexicon. That is, both mono- and poly-morphemic words enter into the syntax as readymade structures. In the case of verbal inflection in English, this requires that verbs enter into the syntax pre-specified for agreement and/or tense features. For example (where each element contained within the curly brackets ‘{ }’ represents an individual lexical item created before syntactic derivation):⁵

(1) *I walked.*



I follow Chomsky’s (1957) fairly uncontroversial claim that inflected verbs are divisible into discrete underlying syntactic objects, namely tense T (i.e. INFL) and the bare verb V. Note that certain narrow syntactic transformations target tense as a separate constituent from the verb; for example, T-to-C movement in English

⁵Throughout this thesis I will adopt a vP-shell model of verb phrases in which the main or root verb V invariably moves to the light verb projection v (Larson 1988, Kratzer 1996). See Chapter 2 for further discussion on the fine structure of vP.

interrogatives (e.g. *Did John leave?*). This then suggests that T at least forms a discrete syntactic node; i.e. T is merged as its own syntactic head, as in (1).⁶ Moreover, since tense in English may undergo head movement to a higher position without also raising the V head, it must necessarily be merged in a position from which it c-commands the verb, as the verb clearly does not intervene between the base-generated positions of T and the higher C to which T is attracted. Otherwise, the verb would necessarily also undergo raising during T-to-C movement, due to the *Head Movement Constraint* (HMC) (Travis 1984); if the verb intervened between T and C, then the HMC would require that the verb head also be “picked up” and carried along during T-to-C movement, contrary to fact. Given this, it cannot be the case that tense and the verb are merged solely as a complex constituent, but that tense is at least also merged as a completely separate higher element.

Accordingly, under the view of lexical morphology, tense features must be represented twice in the derivation of (1); once on the pre-syntactically constructed verb and once on the head of TP. If the tense features in these two positions match, then the derivation converges, as the inflected verb may be spelled out in the position represented in (1), but may raise covertly to T to check its inflectional features against those in T.⁷ Notably, since (1) is the structure that is sent to PF, this model does not require that T undergo a downward transformation to adjoin to the verb (see §2.2), as the verb here already contains the inflectional morpheme, which can be checked against T later via covert movement. Indeed, it is this obviation of downward movement that led, in part, to the incorporation of lexicalist verbal morphology into the Minimalist Program.

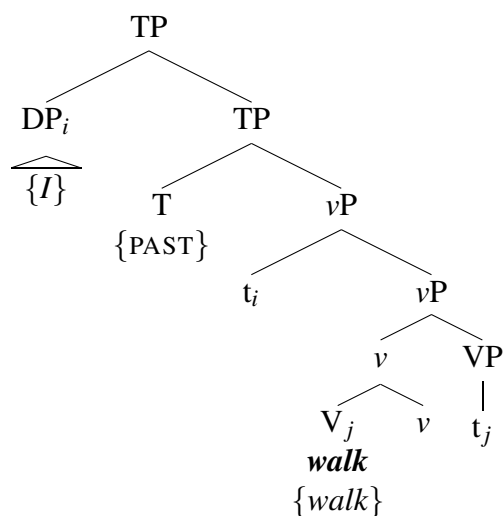
In their theory of Distributed Morphology (DM), Halle and Marantz (1993) reject the existence of a pre-syntactic generative lexicon, arguing instead that all morphologically complex words are derived in the syntactic and post-syntactic

⁶Under a lexicalist morphology, this also suggests that the pre-syntactic generative lexicon can foresee whether T-to-C movement will eventually occur, as the morphological form of the verb that is created in an interrogative does not contain a T morpheme. Such a system requires that the lexicon create an inflected verb when the numeration contains a declarative C, but create an uninflected verb when the numeration contains an interrogative C. Given the absolute absence of double-tensed forms like **Did John left*, it is unclear how the lexicon makes this determination, unless a look-ahead is possible, or, alternatively, several crashing structures may possibly be derived before a converging one is created.

⁷This is admittedly an oversimplification of lexicalist morphology. However, what should be noted is simply that, under this view, features relating to tense must be dispersed throughout multiple positions in the tree.

modules of the grammar, just as in the case of larger elements of linguistic structure (i.e. phrases and sentences).⁸ Under this view, syntactic derivation is the first step in the creation of any and all complex structures, with the possibility of certain further transformations occurring after the syntax interfaces with PF via the operation of Spell-out, to be discussed below. This model has two clear advantages over a lexicalist morphology. First, by reducing the number of generative modules, it creates a more economical system of linguistic derivation in which all elements are subject to a single set of syntactic and post-syntactic restrictions. Second, it allows us to dispense with feature redundancies like that seen in (1). For example, under DM, the verb in (1) enters the derivation with no pre-specified tense features, as in (2).

(2) *I walked.*



Here, DM offers two (general) theoretical possibilities to derive the complex morphological form *walked*; either the verb may raise syntactically to the tense morpheme, or the tense morpheme may move downward to the verb post-syntactically. We will see in §2.2 that it must be the latter case in English. What it is crucial to be aware of here, however, is that DM, by simplifying the representation of lexical items within the syntax, in turn also allows us to simplify syntactic procedures. Note that in (2), since the verb lacks any tense features, there is no longer a need to covertly check any pre-syntactic inflectional features on the

⁸See also Harley and Noyer (1998) for an analysis that provides additional support to this model.

verb with those in T, as is necessary under a lexicalist model of morphology.⁹ In the remainder of this thesis, I will adopt this model of DM and therefore assume that only individual morphemes may be merged into the syntactic derivation, and that, subsequently, all complex morphological forms are derived via syntactic and/or post-syntactic operations.

2.2 A brief introduction to Lowering

As mentioned above, the morphemes {*walk*} and {PAST} in (2) may theoretically be combined in two different ways under DM; either via a narrow syntactic raising operation or a post-syntactic downward transformation. However, as is well known, English verbs do not raise overtly out of vP, unlike verbs in languages such as French (Emonds 1976, Pollock 1989). This is illustrated by the asymmetric patterns of French (3) and English (4), in which the verb varies in its surface position relative to the vP-adjunct '*completely*'.¹⁰

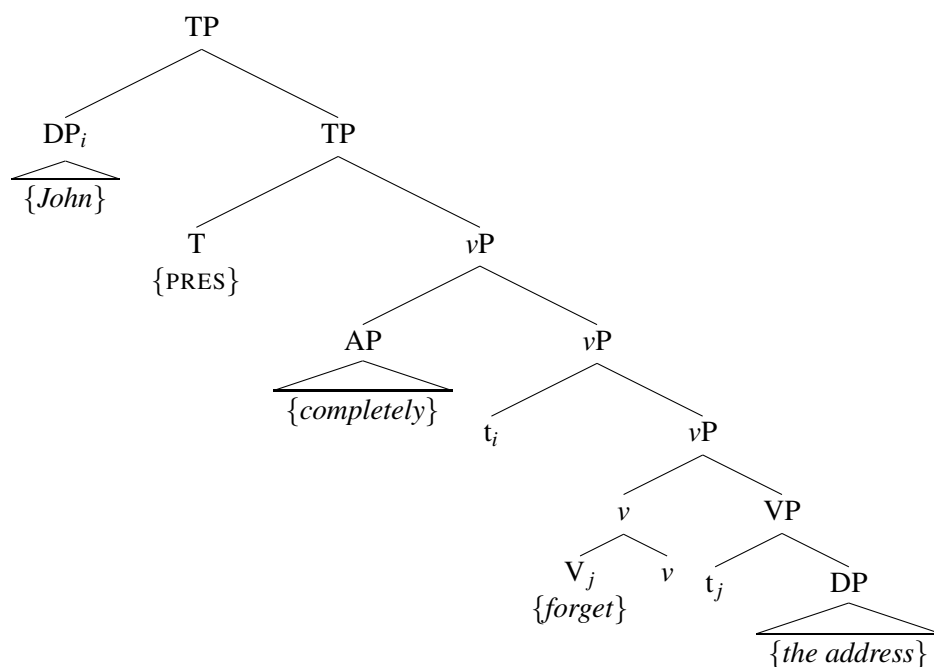
- (3) a. Jean oublie **complètement** l'adresse.
 Jean forget.3S.PRES completely DET.address
 'Jean completely forgets the address.'
- b. *Jean **complètement** oublie l'adresse.
 Jean completely forget.3S.PRES DET.address
- (4) a. *John forgets **completely** the address.
 b. John **completely** forgets the address.

Due to the ordering in (4b), a syntactic structure like that in (1) is assumed, in which the verb remains within vP.

⁹This does not rule out the possibility of covert verb movement, but rather allows for a theoretical model under which such movement may not be obligatory.

¹⁰Though I am purposefully not adopting a cartographic approach to syntactic structure with respect to adverb placement (Cinque 1999), the majority of adverbs used in this thesis to illustrate the relative positions of tense and the verb are all argued to occupy positions between the base-generated positions of T and v within such cartographies. This, then, still suggests a downward transformation in tense-hopping languages. See Chapter 2, §1.1.3 for a closer examination of Cinque's functional hierarchy from the perspective of tense-hopping.

(5) *John completely forgets the address.*



The question, of course, is how the tense morpheme gets realized on the verb if the verb does not move higher in the syntax than its position in (5). Following the standard assumption that downward movements are prohibited in the narrow syntactic derivation, Embick and Noyer (2001) argue that T is realized on the verb in English (and presumably other tense-hopping languages) as the result of post-Spell-out T-to-*v* Lowering. We must here note that, under DM, syntactic terminals consist solely of bundles of morpho-syntactic features, and are devoid of phonological features—the non-generative pre-syntactic “lexicon” contains no phonological features, but only morpho-syntactic feature bundles. Phonological features are mapped to syntactic terminals during the post-Spell-out process of Vocabulary Insertion (VI) (i.e. late insertion). This VI process takes as its input a syntactic hierarchy of morpho-syntactic terminals and gives as its output a linearized string of morpho-phonological elements that carry phonological segments. Importantly, VI erases syntactic hierarchy during this conversion process. Taking into consideration that adjuncts and specifiers are transparent for syntactic head raising, Embick and Noyer argue that the transparency of the adjunct for the tense-to-verb tense-hopping transformation resulting from (5) implies that this is a type of head movement operation. As such, since Lowering is a head-to-head operation, it is necessarily sensitive to syntactic hierarchy, and must

therefore occur before VI. However, since Lowering may not occur in the narrow syntax, by hypothesis, it must occur on the PF branch.¹¹ Lowering is accordingly defined as follows:¹²

(6) *Lowering (to be revised)*

A head X^0 may be lowered to the head of its complement Y^0 after Spell-out, but before Vocabulary Insertion.

$$[_{XP} X^0 \dots [_{YP} \dots Y^0 \dots]] \rightarrow [_{XP} \dots [_{YP} \dots [Y^0 Y^0 + X^0] \dots]]$$

Under this analysis, tense-hopping is blocked when T does not take νP as a complement at Spell-out (e.g. in cases of an intervening NegP projection, T-to-C movement, etc.). In Chapter 3, we will see evidence that gives us reason to reject the Lowering analysis of English tense-hopping, such as comparative data from νP -movement in English and Swedish, another tense-hopping language; rather, English tense-hopping is argued to result from morpho-phonological merger on the PF branch, i.e. Local Dislocation. However, in Chapter 2, we will also see evidence of Lowering in other languages that allows us to maintain the definition in (6), with one or two important modifications.

We must note that, while the definition in (6) might adequately explain the structural properties of Lowering, it gives no indication as to why Lowering occurs. Indeed, previous studies of Lowering have not addressed the issue of the motivations underlying these operations. Though much attention has been paid to the reasons behind upward head and phrasal movement in linguistic theory, there has been no explanatory theory developed to account for why head-lowering occurs, and therefore how it might fit into an overall model of structural transformations. One of the primary goals of this thesis is to develop such a theoretical model, under which the different patterns of Lowering and Raising are accounted for via principled means. In particular, I argue that Lowering, like all other transformations of syntactic structure, is feature-driven, and that, contra previous theories of the relationship between feature-checking and Spell-out, which limit feature-checking to the pre-Spell-out, narrow syntactic derivation, Lowering checks uninterpretable features after (or rather during) Spell-out of the narrow syntax. This suggests that the pre-Spell-out narrow syntactic derivation is not the only domain in which

¹¹Note, again, that we will be refining the exact timing of Lowering with respect to Spell-out in Chapter 3.

¹²See §3.2 below and Chapter 2 for the definition and importance of the ' X^0 ' notation.

morpho-syntactic feature-checking may occur. As I will argue, Lowering simply occurs when narrow syntactic feature-checking via raising is impossible, due to the effects of cyclic Spell-out.

To explain a bit further, note that Lowering, as it necessarily occurs before VI, cannot be sensitive to phonological concerns (e.g. word minimality, prosody, segmental information, etc.), but must rather be driven by concerns of the morpho-syntax. Assuming that all structural transformations of morpho-syntactic elements are driven by the checking requirements of uninterpretable features, head-to-head Lowering should be no exception. Thus, Lowering must be feature-driven. However, transformations to satisfy the requirements of uninterpretable morpho-syntactic features are not generally considered to fall within the domain of post-Spell-out operations, but are rather thought to occur in the narrow syntactic derivation before Spell-out, or, in the case of weak features, LF syntax. In fact, it has been argued (e.g. Svenonius 2004) that all strong uninterpretable formal features must be checked before Spell-out to PF. However, Lowering is a post-Spell-out operation that must necessarily occur as the result of a feature-checking requirement. Taking this into consideration, it must be the case that feature-checking can occur after Spell-out.¹³ I return to this issue in subsequent chapters and argue that, in fact, feature-checking after Spell-out is not only possible, but is also a conceptual necessity under the Minimalist Program (Chomsky 1995). In particular, I postulate a Strong Minimalist Feature-checking Hypothesis (SMFH), under which feature-checking may take place very late in the overall derivation. I claim that, given that post-Spell-out operations (e.g. Lowering and Local Dislocation) take place before the representation is evaluated at the actual articulatory-perceptual (i.e. pronunciation) interface, and that strong uninterpretable features must simply be checked before this interface is reached, this necessarily allows for features to be checked after Spell-out, but before the representation interfaces with the A-P system; that is, within the domain of post-Spell-out transformations on the PF branch. In Chapters 3 and 4, I develop of a model of Spell-out that allows for this conceptually desirable scenario.

For now, we have seen that Lowering is argued (e.g. by Embick and Noyer) to be a post-Spell-out downward head-to-head movement occurring on the PF branch before VI. Let us now turn to transformations after VI.

¹³Or, as I argue in Chapter 3, after a phase has been triggered for Spell-out.

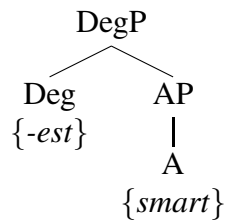
2.3 A brief introduction to Local Dislocation

There are certain downward transformations that cannot be derived via Lowering, as defined in (6). Consider the following canonical example of the superlative transformation in English (note that this general pattern also holds for the comparative construction in English with *-er/more*):

- (7) a. She is the smart-est student.
 b. *She is the intelligent-est student.
 c. She is the mo-st intelligent student.

Abney (1987) argues that it is the structure in (7c) that most closely mirrors the underlying syntactic/semantic structure of the superlative construction, giving us a pre-Spell-out syntactic structure like the following for the example in (7a), where the superlative degree operator takes syntactic and semantic scope over the AP:

- (8) *smartest*



The example in (8) could easily be accounted for under a Lowering analysis by moving the degree head to the adjective head after Spell-out. Indeed, given just the structure in (8), we might also account for this transformation by simply arguing that the adjective undergoes head raising in the narrow syntax to the degree head. However, in either case, we would then be unable to rule out the ungrammatical example in (7b). Note that the superlative transformation in English is sensitive to the phonological size of the targeted adjective. As shown in (9), the superlative morpheme may only undergo affixation to an adjective that is parsed into a maximum of two syllables.

(9) *Superlative constructions*

- | | |
|--------------|---------------------|
| a. prettiest | e. *beautifulest |
| b. poorest | f. *impoverishedest |
| c. manliest | g. *masculinest |
| d. drunkest | h. *intoxicatedest |

The ungrammatical examples in (9e-h) and (7b) are ruled out due to the fact that the adjectives in these examples are all parsed into more than two syllables. As syllabic structure is determined based on the phonological segments of a word, phonological features must therefore be visible to the computational component when the superlative transformation is evaluated. Recall that phonological features are unavailable to the narrow syntactic derivation under DM, effectively ruling out a narrow syntactic head raising analysis of this transformation. Additionally, as Lowering necessarily occurs before phonological features have been mapped to syntactic terminals via VI, a Lowering analysis is likewise untenable.¹⁴ Embick and Noyer (2001) propose that this is rather a case of the post-VI transformation Local Dislocation, in which two string-adjacent morpho-phonological elements in a linearized string are fused into a single, complex structure. Local Dislocation is defined as follows:¹⁵

(10) *Local Dislocation*

After Vocabulary Insertion, an element may adjoin to a string-adjacent element, and only to a string-adjacent element. (‘^’ indicates a relationship of linear precedence and adjacency in the phonological string).

$$\begin{array}{l}
 [X \wedge Y \wedge Z] \rightarrow [Y+X \wedge Z] \\
 [X \wedge Y \wedge Z] \not\rightarrow [Y \wedge Z+X]
 \end{array}$$

Local Dislocation is therefore characterized as affixation under PF-adjacency, similar to previous theories of post-syntactic morphological merger (e.g. Bobaljik

¹⁴Note that this could also be explained as optional syntactic movement. That is, either a raising or lowering operation combines the two morphemes and then, at a later stage of morpho-phonological evaluation, the structure converges only if the adjective that has participated in the head movement is mapped to two or fewer syllables, and crashes otherwise. However, unless there is first rigorous effort exerted to find an alternative, principled solution, I will reject any such analysis of purely optional transformations throughout this thesis.

¹⁵The notation “Y+X” indicates that the element X has adjoined to the element Y. For more on the nature of this morpho-phonological adjunction under Local Dislocation, see Chapter 4.

1995).¹⁶ In this way, if the superlative morpheme is string-adjacent to an adjective with two or fewer syllables after VI, it will undergo Local Dislocation with that adjective and will be realized as a suffix in the resulting phonological surface representation. If this condition is not satisfied, it will be realized as the phonological form *most* and not undergo a merger operation (see below).

Furthermore, as Local Dislocation occurs after VI has stripped away syntactic hierarchy, intervening adjuncts are predicted to be opaque for Local Dislocation operations. This prediction is borne out.¹⁷

- (11) a. *She is the incredibly smart-est student.
b. She is the mo-st incredibly smart student.

In (11), though the adjective *smart* is an appropriate target for Local Dislocation of the superlative morpheme, in terms of its size, its position in the phonological string after VI does not satisfy the criterion of string-adjacency. In (12), we see that the superlative morpheme is string-adjacent to the adjunct *incredibly* rather than the adjective *smart*.

- (12) $[-st \wedge \text{incredibly} \wedge \text{smart}] \not\rightarrow [\text{incredibly} \wedge \text{smart}+-st]$

Since Local Dislocation is blocked in this case, as the superlative morpheme may not skip over the intervening adjunct, I assume that the phonological component inserts the segments *mo-* in order to obviate a violation of the stray-affix filter.¹⁸

¹⁶While Local Dislocation is technically a rightward transformation in the phonological string under this definition, I will continue to refer to it as a downward transformation, given that the displacement most often involves movement of an element to another element that it c-commanded in the narrow syntactic structure (though not always; e.g. in right-headed languages, a morpheme X may undergo Local Dislocation with a morpheme Y that is to its right, where Y c-commanded X in the narrow syntax; see Chapter 2 §2.3). However, it should be noted that Local Dislocation is not limited in terms of directionality, but is rather dependent solely on string-adjacency. For example, given a simple string $[X \wedge Y]$, X could undergo Local Dislocation to adjoin to Y, or Y could do so to X, irrespective of c-command relations. These are both *prima facie* theoretical possibilities.

¹⁷The current argumentation follows that of Embick and Noyer (2001), who claim that Local Dislocation is prevented in (11b) due to the intervening adjunct, as in (12). While this is essentially correct, note that in Chapter 4 we will investigate the more intricate structure of such phrases, showing, for example, that a structure like $[\text{incredibly} \wedge -st \wedge \text{smart}]$ is underivable due to semantic restrictions.

¹⁸This might instead be a case of simple allomorphy in which the morpho-syntactic feature bundle corresponding to the superlative is mapped the phonological features /st/ when affixation under Local Dislocation is possible and the phonological features /most/ when it is not. The result would be the same. See Chapter 4 for a more detailed analysis of the superlative/comparative transformation, including satisfaction of the stray affix filter after VI, as well as a discussion of the possible category-sensitivity of Local Dislocation operations.

We are now left with the following order of operations after syntactic computation:¹⁹

(13) *Order of operations on the PF branch*

| | |
|---------------------------|--|
| Spell-out ↓ | = Narrow syntax interfaces with the phonological component. |
| Lowering ↓ | = Downward head-to-head movement. |
| Vocabulary Insertion ↓ | = Mapping of phonological features to morpho-syntactic feature bundles. Syntactic information is erased and converted into a string of morpho-phonological elements. |
| Local Dislocation ↓ | = Merger of two string-adjacent morpho-phonological elements (i.e. affixation under phonological adjacency). |
| Phonological Form | = Phonological representation that is interpreted by the phonetic interface. |

What is crucial to note here is that there are two classes of downward transformations available on the PF branch, the characteristics of which result from the timing of each in relation to the mapping of syntactic structure to phonological form. Namely, Lowering, as it occurs before VI, is sensitive only to syntactic (i.e. not phonological) concerns, while, conversely, Local Dislocation may be sensitive to phonological properties, as it occurs after VI, and thus cannot be directly sensitive to syntactic hierarchy. It is these two classes of PF transformations

¹⁹Halle and Marantz (1993) use the term “Morphological Structure” to refer to the ‘space’ between Spell-out and PF. For all intents and purposes, we will take “Morphological Structure” to be synonymous with “the syntax-phonology interface.” That is to say, the morphological operations of Lowering, Vocabulary Insertion, and Local Dislocation all occur during the point at which syntax interfaces with phonology via the operation of Spell-out. Note, however, that this is not a true “interface” operation—i.e. it does not directly interface with either of the interpretive components of linguistic computation (the articulatory-perceptual and conceptual-intentional interfaces)—, but rather transfers syntactic structure to the PF branch for further computation.

that will be the main topic of discussion for the remainder of this thesis. In the next section, we will see that, given certain developments in the theory of structure-building operations, it is not always easy to distinguish between these two operations.

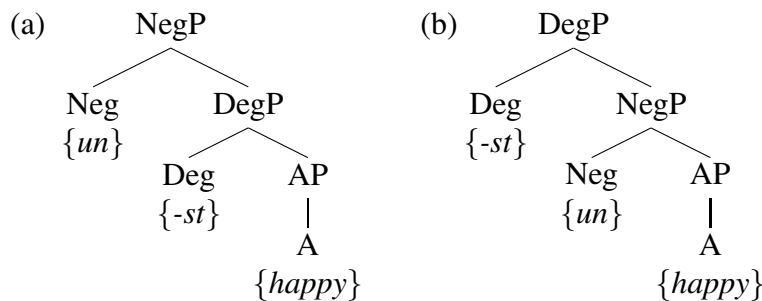
3 The Lowering vs. Local Dislocation distinction

Embick and Noyer (2001) argue that the primary overtly distinguishable characteristic between Lowering and Local Dislocation is sensitivity to adjuncts (and presumably overt specifiers, though this is not as apparent in the data presented thus far, but see Chapters 3 and 4). Lowering, as it is essentially a head movement operation on the PF branch, is not sensitive to adjuncts, whereas Local Dislocation, which is sensitive only to string-adjacency, is necessarily sensitive to intervening adjuncts in the phonological representation. However, in this section we will see that this distinction is not so cut and dry.

3.1 Late adjunction

Certain examples of comparative and superlative transformations have proven problematic for the Local Dislocation analysis proposed above. Consider, for example, the so-called ‘bracketing paradox’ in (14). The superlative morpheme undergoes Local Dislocation with the adjective *unhappy*, even though this adjective contains more than two syllables. Two theoretically possible structures are represented in (14a-b).

(14) *unhappiest*



If the underlying syntactic structure were that shown in (14a), then this transformation would be unproblematic, as the superlative morpheme would be string-adjacent to the bisyllabic adjective *happy* after VI. However, this structure does not represent the semantic interpretation of *unhappiest*. The correct interpretation *most not happy*, rather than *not most happy*, implies a syntactic structure like that in (14b).²⁰ Assuming a tight correlation between syntactic structure and semantic interpretation, we must accept the structure in (14b) as the correct syntactic hierarchy of these morphemes. Thus, we are left with the paradox of how the superlative morpheme can seemingly undergo Local Dislocation with an adjective like *unhappy* that does not satisfy the affix's subcategorization requirement on maximal phonological size. Newell (2005), following Nissenbaum (2000), proposes a late adjunction analysis to account for this paradox. However, before we discuss this solution, let us first look briefly at the principle argument for the late merger of adjuncts into syntactic derivations.

Lebeaux (1988) proposes that relative restrictors, which are taken to be adjuncts, may be merged to the phrasal projection of the head of the relative clause counter-cyclically, whereas clausal complements to nouns may not be. Consider the following:

- (15) a. [Which argument that Bill_j made]_k does he_{i/j} believe *t_k*?
 b. [Which argument that Bill_j is a genius]_k does he_{i/*j}
 believe *t_k*?

While co-reference of the pronoun *he* and the R-expression *Bill* does not cause a violation of Condition C of the Binding Theory in (15a), it does so in (15b). Lebeaux argues that this 'anti-reconstruction' effect emerges from the requirement that complements to a head must be merged to that head in the head's base-generated position, represented by the trace in (15b). This creates a Condition C violation under trace reconstruction, as the R-expression will be bound by the

²⁰Note that the following infelicitous discourse shows that the meaning represented by (14a) is not available:

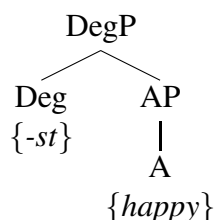
- (i) #Everyone is happy. However, Mary is happier than Sue, but Bill is even happier than Mary. So, Mary and Sue are the unhappiest.

pronoun in this base position.²¹ However, Lebeaux proposes that the relative clause adjunct in (15a) [*that Bill_j made*] may be merged to the phrase it restricts after that phrase has undergone movement to a position higher than the pronoun. Thus, the R-expression contained within this adjunct is never within the c-command domain of the co-indexed pronoun, and so a Condition C violation is avoided. Therefore, it is argued that adjuncts (i.e. modifiers) may be added to the syntactic derivation later than the constituents that they modify, i.e. counter-cyclically.

Returning to the issue of the bracketing paradox in (14b), Newell (2005), following Nissenbaum (2000), posits that the negative morpheme *un-* is a late-adjoining modifier. Under this analysis, the structure in (16a) undergoes Spell-out and is evaluated for Local Dislocation before merger and Spell-out of the adjunct in the structure in (16b) (**bold** in (16b) indicates the phonological form derived after Spell-out of (16a) and Local Dislocation).²²

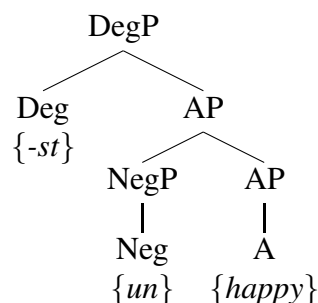
(16) *unhappiest*

a. Spell-out Cycle 1



$[-st \wedge \text{happy}] \rightarrow [\text{happiest}]$

b. Spell-out Cycle 2



$[\text{un} \wedge [\text{happiest}]]$

Crucially, Local Dislocation operations that take place on an earlier Spell-out cycle may not be undone by a late-merger operation. Therefore, when the negative morpheme *un-* is merged late into the syntax, as in (16b), on the subsequent Spell-out cycle it is realized on the left phonological edge of the previously created

²¹This exact scenario obtains under a copy theory of movement (e.g. as in Chomsky 1993). However, the distinction between a copy theory of movement and trace reconstruction is not crucial to the analysis illustrated here.

²²This analysis implies that the syntax interfaces with phonology at several points in the derivation, which is a topic that will be addressed extensively in the upcoming chapters.

phonological structure *[happiest]*.²³ Thus, the phonological form *[happiest]* will not be altered by the later Spell-out of the negation adjunct, since the phonological position of the superlative morpheme with respect to *[happy]* has already been determined on the first Spell-out cycle.

This possibility of pre-late-merger Local Dislocation raises a problem for analyses of other adjunct-insensitive downward movements that have previously been analyzed as Lowering, such as tense-hopping in English. Recall that the primary distinguishing characteristic of Lowering operations, according to Embick and Noyer, is insensitivity to adjuncts. However, if adjuncts may also be transparent for Local Dislocation operations, due to late merger, then this particular distinction is lost. Indeed, Ochi (1999) argues that the potential late merger of adjuncts allows us to analyze tense-hopping in English as a case of pre-late-merger affixation under PF-adjacency, aka Local Dislocation.²⁴ Under this analysis, PF-adjacency of the finite tense morpheme and the verb is evaluated before any intervening adjunct is merged into the derivation, producing the following scenario:

- (17) *John completely forgets the address.*
- a. Spell-out of CP:
[John ^ -s ^ forget ^ the ^ address]
 - b. Local Dislocation of tense and the verb:
[John ^ forget+s ^ the ^ address]
 - c. Late-merger of adjunct and Spell-out:
[John ^ completely ^ forget+s ^ the ^ address]

²³This is essentially the *Linear Edge Condition* (LEC) of Nissenbaum 2000; see Chapter 4 of this thesis. Additionally, note that this analysis also raises problems for the adjunct-sensitivity of the superlative morpheme that we saw in example (11). We might conjecture at this point that the phrasal adjuncts that are opaque for this Local Dislocation operation are merged before Spell-out of the superlative morpheme, unlike the late-merged *un-*, and are thus interveners at PF. We return to this issue in Chapter 4, where I argue on semantic grounds that the apparent intervening adjuncts are indeed merged at the same time as the superlative (and comparative) morpheme, and so cannot be merged and spelled out after the Local Dislocation operation is evaluated, thus making them necessarily present at PF when Local Dislocation of the superlative affix and the adjective is evaluated.

²⁴Bobaljik (1995) also proposes a morpho-phonological merger analysis of tense-hopping, but stipulates that adjuncts are simply transparent for such operations in the morpho-phonological representation.

Here, Local Dislocation of tense and the verb occurs on a Spell-out cycle that precedes late merger of the adjunct. As the late-merged adjunct cannot undo Local Dislocation of tense and the verb, it is realized at the phonological edge of this unified verb plus tense structure.

As the two analyses of tense-hopping illustrate, it is often difficult to tease apart the differences between Lowering and Local Dislocation operations, given that both are constrained by strict locality requirements and may, in theory, be immune to the effects of any intervening adjuncts. We will discuss this issue in relation to tense-hopping at length in Chapters 3 and 4.

In the following section, we will begin to construct a set of criteria that will allow us to categorize a downward transformation as either Lowering or Local Dislocation. This will serve as the backbone for the remainder of our investigation into downward movements, the ultimate goal being to devise a set of tests that allows us to unequivocally determine which class of transformation a particular downward movement belongs to. The results of these tests will additionally provide us with clearer insights into many aspects of the syntax-phonology interface.

3.2 Distinguishing characteristics of Lowering and Local Dislocation

While it may at first seem an impossible task to differentiate between Lowering and Local Dislocation operations, given that both are downward transformations restricted by tight conditions on locality and are both possibly insensitive to adjuncts, the basic architecture of the morphological component of the PF branch allows us to identify quite a few determinative restrictions and characteristics of each type of post-syntactic transformation, all of which we will see are borne out in the data. By taking into account what is theoretically both permissible and impermissible either before or after the phonology-mapping operation of Vocabulary Insertion, and analyzing the patterns of a downward PF transformation accordingly, we arrive at a much clearer picture of whether that transformation is taking place before or after VI; i.e. whether it is a case of Lowering or Local Dislocation. What follows is simply a brief overview of some of the issues to be addressed in later chapters.

Recall that Lowering occurs before VI, and is thus necessarily insensitive

to phonological properties, but is necessarily sensitive to syntactic hierarchy. Conversely, Local Dislocation is only sensitive to string-adjacency in the phonological representation, and cannot be directly sensitive to syntactic hierarchy. Therefore, any downward movement in which a higher element X displays a direct sensitivity to the internal syntactic structure of the targeted landing site Y must be a case of Lowering. As we will explore in more detail in Chapter 2, evidence from reduplication in Tagalog shows that this process displays such a sensitivity to syntactic structure. Consider the following data, which show that Tagalog allows multiple possibilities with respect to which morphemes are copied during reduplication, with no semantic differences among the variable exponents of reduplication (TRANS = transitive; CAUS = causative):

(18) Tagalog (Austronesian)

Base form

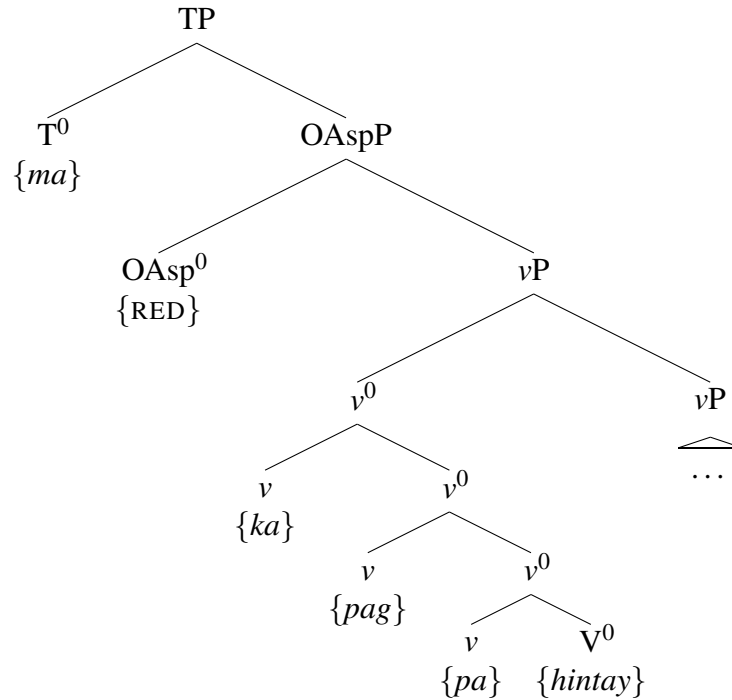
ma- ka- pag- pa- hintay
 ABILITY- COMPLETE- TRANS- CAUS- wait
 ‘be able to cause someone to wait’

Possible and impossible reduplicative outputs

- a. *[**maa**]-ma-ka-pag-pa-hintay
- b. ma-[**kaa**]-ka-pag-pa-hintay
- c. ma-ka-[**paa**]-pag-pa-hintay
- d. ma-ka-pag-[**paa**]-pa-hintay
- e. ma-ka-pag-pa-[**hii**]-hintay
- f. *ma-ka-pag-pa-hin-[**taa**]-tay

‘will be able to cause someone to wait’ (*unrealized aspect*)

In Skinner (2007, 2008) I proposed the following narrow syntactic structure for all grammatical examples in (18a-f) (OAsp = Outer Aspect, Travis 2000, in prep):

(19) *Pre-Spell-out structure for Tagalog reduplication*²⁵

According to this analysis, the OAsp reduplicative head in (19) lowers after Spell-out to adjoin to any X^0 -level projection of the head of its complement. Upon VI, OAsp copies the phonological features of its sister, deriving all of the grammatical forms in (18a-f), depending on which X^0 of the complex v head OAsp has lowered to, and correctly disallowing the ungrammatical forms. Under this analysis, the Lowering OAsp head in Tagalog reduplication may target a position internal to the complex v head. It is this sensitivity to the internal syntactic composition of the targeted landing site that requires this reduplication-deriving transformation to be a case of Lowering. Under Local Dislocation, the internal syntactic structure of the complex v head would not be visible to the affixation operation, and, indeed, the embedded morphemes of the complex verb would not be string-adjacent to the reduplicative morpheme in OAsp.

²⁵Note that the morpheme represented as *ma* in this tree may not be monomorphemic, but might rather be analyzed as a phonologically coalesced form of the Actor Topic morpheme *m-/um-* and a vP -internal morpheme, such as *pa* (Lisa Travis p.c.). As will be shown in Chapter 2 §2.1.4, any morpheme that undergoes phonological coalescence with the Actor Topic morpheme resists reduplication. Though I provide an analysis of this pattern, in order to maintain a clearer exposition I will continue to treat *ma* as a single morpheme that is generated above OAspP.

(e.g. in [RED ^ *ka* ^ *pag* ^ *pa* ^ *hintay*], the reduplicative morpheme cannot undergo Local Dislocation with *pag*, *pa*, or *hintay*, as these are not string-adjacent to RED).²⁶ Therefore, Lowering is the only post-syntactic transformation that can allow this type of optionality in which a downwardly-moving head may target different embedded positions of the complex head of its sister.²⁷

Another distinguishing characteristic, based again in the syntactic nature of Lowering, is that Lowering is the only post-syntactic transformation capable of creating a trace. I will leave the discussion of this for later chapters, but note that in the following example from Swedish, tense is realized twice in the surface structure—once on the fronted verb and once on the dummy ‘do’ verb in V2 position—, which I will argue in Chapter 3 is due to pronunciation of two copies of a single T head:

- (20) [_{VP} Läser boken] gör han nu.
 read.PRES book.DEF do.PRES he now
 ‘Reading the book he is now.’

As Lowering is simply the structural inverse of head raising (i.e. re-merger of a syntactic head in a lower, rather than a higher, position), it may leave behind a trace, just like we assume occurs in other head movement operations. As Local Dislocation is the non-syntactic unification or coalescence of two linearly adjacent morpho-phonological elements, it is incapable of creating a syntactic trace. This is due to the fact that syntactic structure has already been eliminated from the representation before this transformation takes place. I will argue that in (20) T lowers to *v* before *v*P-fronting occurs, leaving behind a trace of tense in the original position of the head of TP. This trace copy subsequently undergoes T-to-C movement and is realized overtly at PF via ‘do’-support due to the fact that it no longer forms a chain with the overt copy of T in the fronted *v*P.

²⁶It is even unlikely that Local Dislocation of [RED] may target the adjacent [*ka*] morpheme, given that Local Dislocation is argued to not be able to target embedded elements of a complex head (the M-word vs. Subword distinction; see Chapter 2, §2.1.3).

²⁷Note that it is not necessarily the case that all Lowering operations into a complex head display the type of free variation exhibited in Tagalog reduplication (although I have no evidence to the contrary, due to the paucity of overtly morphologically complex heads that are the target of Lowering operations). Extenuating factors may limit the positions available as possible landing sites for a Lowering head. For now, it is important to note simply that a downward movement operation that targets an embedded syntactic position may only be a case of Lowering.

As we will see, data like these allow us to create a refined typology of both tense-hopping and verb-raising languages,²⁸ including the underpinnings of V2 phenomena cross-linguistically.²⁹

We saw from the superlative examples in (9) (e.g. *prettiest*/**beautifullest*) that Local Dislocation may be sensitive to phonological form. However, there are even more distinctive and defining characteristics of this post-Vocabulary Insertion process. As we have seen, both Lowering and Local Dislocation have the potential to be insensitive to adjuncts. However, while Lowering is necessarily insensitive to any intervening adjunct, as it is strictly head-to-head movement, Local Dislocation may indeed target, or be blocked by, adjoined elements. In this way, if an adjunct is merged “early”, then it will be present in the phonological string when Local Dislocation is evaluated, and will therefore be visible to concerns of linear string adjacency.³⁰ Our current analysis of phrasal adjuncts in comparative and superlative constructions in English (§2.3 above, exs. (11-12)) provides an example of the morpho-phonological sensitivity of Local Dislocation to intervening adjuncts. Therefore, while insensitivity to adjuncts is not itself a sufficient criterion by which to define Lowering vs. Local Dislocation, due to the possibility of late-merger, sensitivity to adjuncts necessarily entails that a PF transformation is a case of Local Dislocation.

Recall, as well, that Lowering is constrained by syntactic structure. Therefore, any post-syntactic transformation that does not obey syntactic strictures, such as head-to-head locality, necessarily cannot be a case of Lowering. As argued above, Lowering is limited to downward movement of a head to the head of its complement; it may not skip heads or, as we will see, move through multiple heads. However, in certain instances of Local Dislocation, as syntactic structure is no longer present, downward movement may target seemingly “large” structures (i.e. phonological elements containing more than one maximal—that is, non-embedded—syntactic head), as argued by Embick and Noyer (2001) and

²⁸For example, under this model, any language that displays an inflected verb in a fronted vP must necessarily derive its tense-hopping pattern via Lowering.

²⁹Note also that, as Lowering must occur on a Spell-out cycle and must precede narrow syntactic vP-fronting here, we have evidence for a cyclic model of Spell-out; i.e. a Spell-out operation must occur before all narrow syntactic derivation is complete, contra Embick and Noyer (2001). The implications of this pattern will be addressed in Chapter 3.

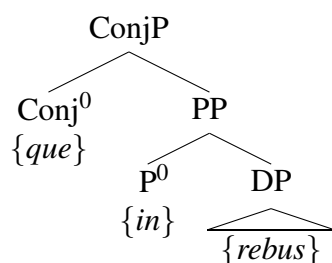
³⁰See Chapter 4 for a detailed discussion of the timing of adjunction, including some conditions that give rise to adjunct-sensitive Local Dislocation.

Embick (2006).³¹ Consider the Latin enclitic *-que*, which we will discuss further in subsequent chapters:

- (21) a. *contra-que legem*
 against-and law.ACC
 ‘and against the law’
- b. **contra legem-que*
 against law.ACC-and

Here, the enclitic *-que* attaches to the morpho-phonological element to its right, and does not skip the preposition *contra*. However, the following data exhibit a contrary pattern:

- (22) a. *in rebus-que*
 in things-and
 ‘and in things’
- b. **in-que rebus*
- c. *Narrow syntactic structure*



Downward movement here could not possibly be a case of Lowering, as post-Spell-out head-to-head movement would predict the ungrammatical (22b). Rather, as Latin *in* is a phonologically weak pronoun, and thus may not form a phonological constituent on its own, it must be parasitic on the prosodic structure of *rebus*. So, [*in rebus*] forms a complex phonological constituent to which *-que*

³¹Though the morpho-phonological representation is directly derived from syntactic structure, morpho-phonological transformations are not necessarily constrained by this structure, given its prior “erasure”.

adjoins via Local Dislocation.³² Therefore, any downward movement that “skips” a syntactic head (i.e. shows an insensitivity to syntactic structure) must be Local Dislocation.

As I will argue in Chapters 2 and 3, Lowering must necessarily be a feature-driven operation, just like head raising. In brief, as mentioned earlier, since Lowering occurs before phonological form is mapped to the morpho-syntactic feature bundles found in the syntactic terminals, it must be the formal features of those morpho-syntactic bundles that motivate post-syntactic Lowering, rather than concerns of the morpho-phonology. Because of this, we would expect to find a high, if not absolute, degree of category-sensitivity in Lowering operations. In other words, a head lowers because it needs to check an uninterpretable feature against a syntactic feature found on the head of its complement, or perhaps vice versa. As only certain syntactic heads carry certain features, we would predict that a Lowering head would consistently target the same category of syntactic head as its landing site, in order for the feature-checking operation to be successful (e.g. if a Lowering head X carries an uninterpretable feature γ , X will always lower to a head Y that carries interpretable γ ; furthermore, interpretable γ is only found on a limited class of syntactic heads).³³ Local Dislocation, on the other hand, may not necessarily be driven by concerns of syntactic features, but rather may occur merely due to considerations of phonological form, with no restrictions based in the category or individual formal features of the targets of this operation. Consider the additional data from Latin *-que* that follow:

³²In other words, *in* undergoes a string-vacuous Local Dislocation operation with *rebus* before Local Dislocation of *-que* is evaluated.

³³See Chapters 2 and 3 for an investigation into the featural make-up of the heads involved in Lowering operations.

- (23) a. diu noctu-que
day.ABL night.ABL-and
'by day and by night'
- b. maius-que commodum
more-and profit.ACC
'and more profit'
- c. vivimus vigemus-que
live.1PL.PRES flourish.1PL.PRES-and
'we live and flourish'

Note that in (21a) and (23) the enclitic *-que* undergoes Local Dislocation with four morpho-phonological elements that all have different syntactic categories (e.g. a preposition, a noun, an adjective/degree modifier, and a verb). As Embick (2006) argues, this pattern illustrates that *-que* encliticization is sensitive only to concerns of phonological linearity, and not syntactic categorical features. Therefore, as Lowering operations are inherently sensitive to concerns of syntactic features, including morpho-syntactic category, such a high level of category-insensitivity is a strong indication that the PF transformation in question is a case of Local Dislocation.³⁴

We have thus far developed the following criteria that differentiate between post-syntactic transformations:

(24) *Lowering vs. Local Dislocation Criteria*

| | | |
|--|---|-------------------|
| Targets internal syntactic structure of a complex head | ⇒ | Lowering |
| Leaves behind a trace | ⇒ | Lowering |
| Sensitive to phonological form | ⇒ | Local Dislocation |
| Sensitive to adjuncts | ⇒ | Local Dislocation |
| Skips syntactic heads | ⇒ | Local Dislocation |
| Category-insensitive | ⇒ | Local Dislocation |

In the remainder of this thesis, we will use these criteria to analyze several instances

³⁴Note, however, that though Local Dislocation operations may be insensitive to syntactic category, some cases are undeniably restricted by the categorical specification of the target; e.g. *He ran the quick-est/*quickly-est*, in which the superlative morpheme may only undergo Local Dislocation with an adjective, but not an adverb, irrespective of the phonological size of the target. This issue will be addressed further in Chapter 4, where I argue that Local Dislocation operations may play a limited role in the checking of formal features.

of apparent post-syntactic transformations, and will explore the implications of each for a general model of linguistic computation.

4 Goals

The overall goal of this thesis is to provide a detailed analysis of the mechanisms underlying downward movements, including the differences between Lowering and Local Dislocation, as illustrated in the table in (24), and the motivations behind each type of transformation. Throughout this work, I will incorporate the findings of these investigations into a general theory of derivations, thus obtaining a more comprehensive model of the architecture of the PF branch and its interface with the syntactic component. We will come to see that there is a close link between operations that take place at the PF interface and narrow syntactic derivational processes—especially cyclic derivation and Spell-out. In sum, by looking at both narrow syntactic operations and those at the PF interface as individual but related parts of a single, overarching process of linguistic computation, we attain a clearer picture of both. The following subsections provide a brief overview of how each of the upcoming chapters moves us closer to reaching this goal.

4.1 Chapter 2: The syntax of Lowering

In this chapter, I present a detailed investigation of head-to-head Lowering, addressing both the possibilities and limitations of Lowering operations, and their implications for syntactic derivational processes. I begin with an overview of the phenomenon, including several purported cases of Lowering, such as tense-hopping in Swedish verbal inflection and determiner-hopping in Bulgarian (Embick and Noyer 2001). I will focus here solely on the structure of Lowering operations, analyzing the syntactic head-to-head nature of Lowering, in addition to investigating the more intricate structural sensitivity of Lowering operations that result in cases of morphological optionality (i.e. multiple possible surface positions of morphemes); e.g. reduplication in Tagalog and Ndebele, and optionality in the placement of agreement markers in Turkish.

Further sections provide a preliminary analysis of the motivations underlying

Lowering transformations in terms of cyclic Spell-out. I show that Lowering heads are only ever generated in positions in which they take phases as their complements. Taking this into consideration, I propose an expansion of the *Phase Impenetrability Condition* (PIC, Chomsky 2001) to include levels of structure that are embedded within a complex head; i.e. head projections that are embedded within a complex phase head become unavailable for subsequent narrow syntactic feature-checking operations after Spell-out of that phase. I will claim that Lowering occurs only as a feature-checking rescue mechanism due to the effects of this phase head impenetrability. I argue, namely, that heads only lower when they have an uninterpretable feature that cannot be checked after Spell-out of their phase complement (i.e. when the corresponding interpretable feature becomes unavailable due to phase head impenetrability).

4.2 Chapter 3: Tense-hopping and Spell-out

This chapter explores in greater detail the broader implications and repercussions of the Lowering analysis presented in Chapter 2, and incorporates this theory into a general model of verbal morphology and verb placement cross-linguistically. I begin by illustrating that not all tense-hopping languages are created equal; namely, Swedish derives its tense-hopping pattern via Lowering, whereas English does so via Local Dislocation. The fact that Swedish is both a tense-lowering and a V2 language will lead us to make an important claim about syntactic derivation; namely, I will argue that when a head probes its c-command domain in a feature-checking operation, it does not necessarily target the structurally highest copy of the element that would satisfy its feature requirements, but rather targets the derivationally most recent copy.

Furthermore, the ν P-fronting facts from Swedish will lead us to posit a new type of syntactic movement, which I call “stowaway” movement (Lisa Travis, p.c.). Under stowaway movement, an element X moves (downward) into an element Y before Y is targeted for movement to a higher position, thus carrying along the “stowed away” X (e.g., in Swedish, T lowers into ν P before ν P is fronted to SpecCP). This discussion will also show that Lowering phenomena support a triggering model of Spell-out (Svenonius 2004) in which a phase is spelled out only once it merges with a head from another phase. I will additionally argue that

the empirical facts, in conjunction with theoretical concerns, support an analysis of Lowering under which this head-to-head movement takes place in the narrow syntactic structure, rather than on the PF branch.

Finally, I will address the additional issues of a possible T-to-C movement asymmetry in English *wh*-questions and the further implications of this overall model for verb-raising languages.

4.3 Chapter 4: Aux-raising and Spell-out

In this chapter, I expand the previous analysis to include an account of auxiliary-raising in English. I argue here that auxiliaries raise in English because they are merged in the same phase as finite T, which carries an uninterpretable V-feature. Similar raising of main verbs is argued to be unavailable, as these are merged in a lower phase. Additionally, I claim that T-to-*v* Lowering is impossible in English due to an ever-present Σ P projection that intervenes between these two heads (extending the analysis of Laka 1990).

This investigation, combined with the related claim that tense-hopping in English arises as a pre-adjunct merger Local Dislocation operation, will lead us to make an additional, somewhat surprising claim about Spell-out operations and feature-checking, namely that strong uninterpretable features may be checked on the PF branch. I claim that a phase may undergo Spell-out to PF while it still contains strong uninterpretable features, contra Svenonius (2004) and others. I will argue that not only does this theory allow for a highly parsimonious analysis of tense-hopping and auxiliary-raising in English, but that, as mentioned earlier, it is also a conceptual necessity.

Further issues that will be addressed include the apparently optional raising of infinitivals in French (Pollock 1989), clitic vs. free morpheme negation in English, patterns of progressive and perfective morphology in English, stem-allomorphy (e.g. *give* instead of the regularized **gaved*), and the status of adjuncts in downward transformations.

4.4 Chapter 5: Additional issues in the derivation and Spell-out of syntactic structure

In this final chapter, I briefly address a few remaining issues of the previous analysis. For example, I will argue in Chapters 2-4 that the Spell-out domain of a phase includes at least the head and complement of that phase. In Chapter 5, I will suggest a ternary model of Spell-out that includes the specifier of the phase, as well, thus allowing for a more straightforwardly constituent-based model of cyclic Spell-out. I will additionally discuss issues that arise for covert movements and the Extension Condition under the proposed triggering model of Spell-out; namely, if νP does not undergo Spell-out to PF until after T merges, but subsequent covert movements target Spec νP , how can we salvage any semblance of an Extension Condition for syntactic derivation? Following Nunes (2001), I propose that a phase-based workspaces model of derivation might provide a solution, under which every (upward) movement within a derivational workspace (i.e. phase) targets the root constituent of that workspace. The final section of this chapter provides a short summary and proposes some areas of further research that will continue the current project.

It is my hope that this study will not only serve to provide new insight into the inner workings of downward transformations, but also help to reconcile several seemingly disparate areas of linguistic theory. By looking at these transformations simultaneously from the perspectives of syntax, morphology, and phonology, we only stand to gain a deeper understanding of linguistic theory as a whole.

2

The syntax of Lowering

1 Overview

In this chapter, I investigate some of the structural properties of Lowering, focusing on the operation of Lowering as a head movement transformation that is inherently sensitive to hierarchical syntactic composition. Lowering, just like Raising of heads in the narrow syntax, is limited by strict locality conditions; just as narrow syntactic head movement is restricted to movement of a head to the next highest head, skipping specifiers and adjuncts (the *Head Movement Constraint* (HMC), Travis 1984), Lowering of a head X must target the head Y of its complement, thus also necessarily skipping any intervening specifiers and adjuncts. Therefore, in many respects, Lowering of heads at PF is simply the structural inverse of Raising of heads in the narrow syntax. The current chapter attempts to account for the similarities and differences between these two types of structural head movement in a principled manner.

Recall from Chapter 1 that all downward movements are prohibited in the narrow syntax, by assumption, and thus Lowering must occur on the PF branch after Spell-out.¹ Additionally, Lowering, as it must necessarily be operative on syntactic structures, since it specifically targets syntactic heads and is immune to

¹As noted in Chapter 1, I will initially follow Embick and Noyer's (2001) model of Lowering as a PF operation, though we will revise this view in later chapters.

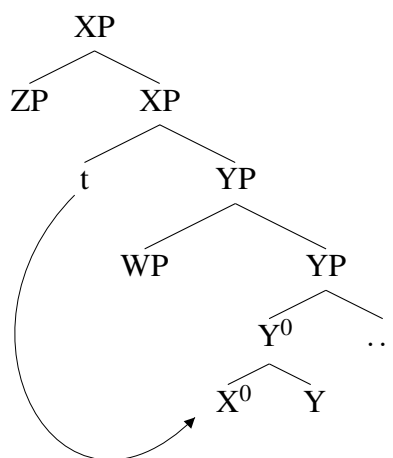
any blocking effects of intervening specifiers or adjuncts, occurs before Vocabulary Insertion (i.e. before the formation of a morpho-phonological string). Lowering is thus defined and represented schematically as follows (adapted from Embick and Noyer 2001:561):²

(1) *Lowering (to be revised)*

- a. A head X^0 may be lowered to the head of its complement Y^0 after Spell-out, but before Vocabulary Insertion.

$$[_{XP} X^0 \dots [_{YP} \dots Y^0 \dots]] \rightarrow [_{XP} \dots [_{YP} \dots [Y^0 Y^0 + X^0] \dots]]$$

b.



In the remainder of this section, we will see many purported examples of the above operation, and begin to develop certain analytical criteria that will allow us to identify Lowering transformations. While most of this and the next chapter will focus on Lowering (and Local Dislocation) operations within verbal paradigms cross-linguistically (e.g. tense-hopping, Lowering of Aspect to the verb), we will also address the possibility of such transformations within the nominal domain (e.g. Lowering of determiners within the DP, as in Bulgarian).

In Section 2 of this chapter, using examples of reduplication in Tagalog and Ndebele and subject agreement markers in Turkish, I argue that Lowering operations can be much more varied than narrow syntactic head movement, due simply to the opposite directionality of each respective movement and the correlating higher level of available complexity of the landing site for Lowering

²Note that the directionality of adjunction of X to Y is, for the most part, unimportant. We will address the resulting orderings of these morphemes in the morpho-phonological string in the upcoming sections.

heads than for Raising heads. In other words, unlike in narrow syntactic head movement, the head that is the targeted landing site for a Lowering operation may be structurally complex, as the result of previous narrow syntactic head movements, thus allowing for the possibility of multiple adjunction sites when Lowering into a complex head. I propose that this derives several cases of morphological optionality, in which the position of a particular morpheme within a word may vary considerably with respect to the positions of other morphemes in the overt representation of that word.

In Section 3, we investigate the motivations underlying Lowering operations, which have heretofore been elusive. Taking the relatively uncontroversial stance that 1) all transformations of syntactic structure (including head-to-head Lowering) should be feature-driven, and 2) structural transformations in the narrow syntax are preferred to—i.e. are more economical than—structural transformations after Spell-out (due, for example, to the Earliness Principle (Pesetsky 1989)), I propose an extension to the *Phase Impenetrability Condition* (PIC, Chomsky 2001) that accounts for these seemingly uneconomical downward head movements at PF. Namely, I argue for the *Phase Head Impenetrability Condition* (PHIC), under which embedded features of a complex phase head become unavailable for subsequent narrow syntactic feature-checking after phase Spell-out. Lowering is therefore evaluated when the PHIC disallows an uninterpretable feature on a higher head to be checked via narrow syntactic (i.e. upward) head movement; that is, the required interpretable feature embedded in the phase head is unable to be accessed by the corresponding uninterpretable feature on the higher head, due to the PHIC. This accounts for the general observation that Lowering only ever seems to occur between a head that takes a phase complement and the head of that phase (e.g. T-to-*v*, Asp-to-*v*, and D-to-*n* Lowering, among others). Section 4 summarizes the preceding arguments and presents a few remaining issues with the proposed model, many of which are to be addressed in later chapters.³

³The reader should keep in mind that I will be ignoring the motivations underlying the transformations in §1 and §2 until §3, and instead will be addressing these patterns from a purely structural perspective. However, note that I will later argue that each Lowering head that we observe carries an uninterpretable feature that it may not check via raising of the lower head, due to the PHIC, and so the higher head must therefore move downward to the lower head.

1.1 Tense-hopping

In this section, we will briefly examine one of the most well-known examples of Lowering: affix-hopping of finite tense in verbal paradigms (Chomsky 1957, Embick and Noyer 2001, and many others). As we saw in Chapter 1, some languages, such as French, raise the verb out of vP to the T head, whereas others, such as English and Swedish, leave the verb within vP (in embedded clauses in the case of Swedish), yet the morphology of the higher T head is realized overtly on the lower verb. As downward movements are assumed to be impossible in the narrow syntax, the overt morphological realizations of these inflected tense-hopping verb forms require explanation.

1.1.1 A brief note on competing theories of tense-hopping

Providing an account of the patterns of tense-hopping has been, to varying degrees, at least one of the goals of most models of (morpho-)syntactic theory ever since Chomsky (1957).⁴ Because of this, it would be impossible to provide a fair treatment of all of these various accounts, and so I will not attempt to do so here. I will simply note briefly that there are two general schools of thought on the subject, as mentioned in Chapter 1: the lexicalist view and the non-lexicalist view. Under the lexicalist view (e.g. Chomsky 1993), verbs come into the narrow syntactic derivation fully inflected, and all verbs raise to INFL to check their inflectional features. The difference between verb-raising languages and tense-hopping languages under this analysis is that the former raise these verbs before PF (i.e. INFL has strong features), whereas the latter raise these verbs at LF (i.e. INFL has weak features). Distributed Morphology (DM, Halle and Marantz 1993), on the other hand, takes a decidedly non-lexicalist approach to these patterns. Under DM, all verbs enter the syntax uninflected, as there is no pre-syntactic generative lexicon, and so all complex inflected verb forms must be created via syntactic and/or post-syntactic transformations of discrete morphemes.

Neither of these theories is without both its advantages and its drawbacks. For example, the lexicalist view renders downward transformations a completely unnecessary complication to syntactic derivation, but, unlike the non-lexicalist

⁴Or, at the very least, a theory of tense-hopping has been provided as a bit of “house-keeping” in most theories of syntactic derivation.

approach, this requires the existence of an additional pre-syntactic generative component of linguistic computation, the capabilities and limitations of which are difficult to pin down. Moreover, auxiliary-raising in English creates problems for the standard accounts of tense-hopping under both models; e.g., under the lexicalist view, auxiliaries may not wait until LF to raise, for uncertain reasons,⁵ and under the non-lexicalist view, tense-hopping is somehow made unnecessary in favor of verb-raising in the presence of an auxiliary.⁶ However, it is not a goal of this thesis to argue extensively for one theory over the other (but see the brief discussion in Chapter 1 §2.1), but rather to adopt one of these theories, namely Distributed Morphology, and account for the patterns of tense-hopping and other morphological phenomena using the mechanisms made available by that model of complex word formation. Therefore, I will leave the discussion of competing morphological theories here and move on to an analysis of tense-hopping under DM.

1.1.2 Tense-hopping under DM

We will begin with a brief overview tense-hopping from the perspective of Distributed Morphology, under which the pattern is derived via Lowering. Consider the following example from Swedish:⁷

- (2) a. Du vet att jag **helt** glömde adressen.
 you know.PAST that I completely forget.PAST address.DEF
 ‘You know that I completely forgot the address.’
- b. *Du vet att jag glömde **helt** adressen.
 you know.PRES that I forget.PAST completely address.DEF

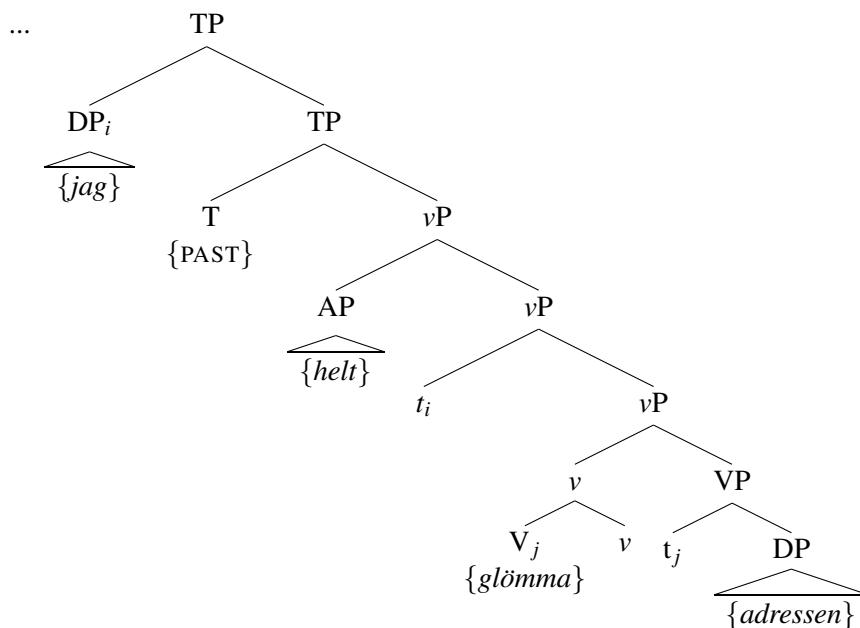
⁵Chomsky (1993) argues that this is because auxiliaries are semantically vacuous, and so therefore cannot be targeted by movement at LF. However, since overt movement is necessarily evaluated before covert movement, this scenario would seem to require an undesirable pre-PF-Spell-out look-ahead to the possibility or impossibility of later movement at LF, under a purely derivational model of syntax.

⁶Lasnik (1995) proposes a hybrid lexicalist/non-lexicalist approach for English verbs in which auxiliaries, but not main verbs, come into the derivation fully inflected. We will address this in Chapter 4 and present an alternative, purely non-lexicalist approach for both.

⁷Note that Swedish is V2 in matrix, but not embedded, clauses. We will address this issue in Chapter 3, in which I provide a cross-linguistic comparison of Swedish and English tense-hopping. Note that I will not address English tense-hopping in this chapter, as I ultimately claim that it is not a case of Lowering, following the general claims of Bobaljik (1995), Lasnik (1995), Ochi (1999), and Omaki (2008). However, we will maintain the Lowering analysis of Swedish tense-hopping throughout this thesis.

In the embedded clause in (2), the *vP*-adjunct *helt* ‘completely’ appears before the embedded verb *glömde* ‘forgot’, indicating that the verb has not raised out of the *vP*. This suggests a syntactic structure at Spell-out like the following (*glömma* is the infinitival, uninflected form of ‘forget’):

- (3) *Du vet att jag helt glömde adressen.*



Given that the verb has not moved out of *vP*, yet the higher inflectional past tense morpheme appears on the overt form of the verb, T in (3) must undergo a downward movement on the PF branch. According to Embick and Noyer (2001), tense-hopping, like that observed in the Swedish example above, is the result of T-to-*v* Lowering. Under this analysis, the morpheme in T in (3) undergoes Lowering to the head of its complement after Spell-out but before Vocabulary Insertion. Since this is a case of head-to-head movement, the phrase adjoined to *vP*, *helt*, is necessarily skipped in this structural transformation, whether it is merged early or late (see Chapter 1 §3.1, and Chapters 3 and 4).

1.1.3 Cinque’s (1999) Functional Cartography

Before we may accept such an analysis of supposed tense-hopping transformations like the one observed in the Swedish example above, we must ask whether it is

actually the case that the morpheme in T has lowered to the verb, or if the verb itself has rather raised to finite T, and the adverb is simply higher than T (with the subject in some even higher position). Cinque (1999) observed that there is a universal relative ordering of adverbs in the functional domain of clauses. For example, adverbs like *probably* must always appear structurally higher than adverbs like *completely*:⁸

- (4) a. John probably completely lost his mind.
 b. ?*John completely probably lost his mind.
- (5) *French*
- a. Il a probablement complètement perdu la tête.
 he has probably completely lost the head
 ‘He probably completely lost his mind’
- b. ?*Il a complètement probablement perdu la tête.

Taking this and many other universal, rigid ordering patterns into consideration, Cinque proposes that there is a strictly ordered cartography of functional heads (i.e. heads found above the lexical, verbal domain (see §2.1.1 below and Chapter 3)), which is a part of Universal Grammar. These heads project the adverbs in question in their specifiers, and thus these adverbs are universally ordered across languages. In this way, Cinque argues that all languages contain a great number of functional heads, and the order in which these are projected in the syntax is universally fixed. For example, here is one version of this hierarchy:

⁸In the absence of any focus or intonational pauses, (4b) can only be understood as *completely* directly modifying *probably*, showing that it may not take scope over the remainder of the clause. Consequently, [*completely probably*] itself must form its own, single syntactic constituent, with *completely* adjoined to *probably*.

(6) *Cinque's functional hierarchy*

MoodP_{speech act} >> MoodP_{evaluative} >> MoodP_{evidential} >>
 ModP_{epistemic} >> TP_(Past) >> TP_(Future) >> MoodP_{irrealis}
 >> ModP_{alethic} >> AspP_{habitual} >> AspP_{repetitive(I)} >>
 AspP_{frequentative(I)} >> ModP_{volitional} >> AspP_{celerative(I)}
 >> TP_(Anterior) >> AspP_{terminative} >> AspP_{continuative} >>
 AspP_{retrospective} >> AspP_{proximative} >> AspP_{durative} >>
 AspP_{generic/progressive} >> AspP_{prospective} >> ModP_{obligation}
 >> ModP_{permission/ability} >> AspP_{Completive} >> VoiceP >>
 AspP_{celerative(II)} >> AspP_{repetitive(II)} >> AspP_{frequentative(II)}

According to this hierarchy, the reason that *probably* is universally higher than *completely* is because *probably* is generated in SpecModP_{epistemic},⁹ whereas *completely* is generated in the structurally lower SpecAspP_{completive}. Assuming that this hierarchy of functional heads is correct, it gives us cause to question whether adverbs like the one in the Swedish example in (2) are simply generated in the specifier of one of the higher functional heads of this cartography, and the verb raises in the narrow syntax to a tense morpheme found in one of the lower functional heads (i.e. there is actually no tense-hopping involved in this pattern). Even a cursory examination of the above hierarchy suggests that this is not a possibility. Within this hierarchy, the adverb *helt* 'completely' should be generated relatively low (e.g. in SpecAspP_{completive}), but the past tense morpheme should be generated relatively high (e.g. in TP_(past)). Therefore, given that the inflected verb in (2) follows the adverb *helt*, the verb could not have possibly raised higher than the head of AspP_{completive}, which is still lower than the base-generated position of finite past tense. This requires that, even if we accept the consistent presence of these functional heads in the narrow syntactic structure, the tense morpheme must still undergo some type of downward transformation to adjoin to the verb before the ultimate PF representation is derived, given our rejection of a lexicalist model of verbal inflection (see Chapter 1 and §1.1.1 above).

⁹Cinque notes that adverbs like *probably* suggest the same lack of confidence on the part of the speaker as epistemic modals like *should* do when expressing doubt; e.g. *John should be home now (but I'm not sure if he is)*. Thus, *probably* is functionally related to these modals by virtue of being generated in the specifier position of the head that contains them, under his analysis.

Additionally, under a non-lexicalist morphology that allows for head-to-head Lowering, such an ever-present, expanded functional cartography can almost certainly not exist. Since Lowering is limited to a strict head-complement locality, this type of fine functional domain places overly restrictive conditions on what types of Lowering are possible. For example, it would limit Lowering to $\text{Mod}_{\text{epistemic-to-T}_{(\text{Past})}}$, $\text{Asp}_{\text{terminative-to-Asp}_{\text{continuative}}}$, etc., and would not allow for the putative cases of T-to-*v* Lowering, as these two morphemes would not be in a head-complement relation. We would instead have to re-think what locality conditions are operative in Lowering transformations, and undoubtedly allow for iterative head-lowering, for which I have found no empirical evidence.

Taking into account the fact that such a cartographic approach to adverb placement does not obviate the need for some type of tense-hopping transformation, and creates problems for the notion of locality in morpho-syntactic transformations, I will not adopt Cinque's hierarchy of functional heads for the remainder of this thesis, and will rather assume that the incontrovertible ordering patterns that he observed are the result of some as yet undetermined syntactic or semantic restrictions on the order and placement of adjuncts to pre-existing phrasal projections (see Ernst 2006, Nilsen 2003 for relevant proposals). The assumption here will therefore be that the strict ordering of adverbs is not due to the presence of a fixed cartography of functional heads, but it is rather due to a restriction on either the order in which these adjuncts may be merged into the narrow syntactic structure or, relatedly, some type of scope restrictions at LF. It is beyond the range of the current project to propose, or even conjecture about, what these restrictions might be. I will simply assume that (at least most) verbal modifiers are adjuncts to a *v*P projection, as schematized in (3), rather than specifiers of independent functional heads. Therefore, whether an inflected verb appears immediately before or after these *v*P-adjuncts will allow us to determine if a particular construction is the result

of verb-raising or tense-hopping, respectively.^{10,11} In this way, we allow for a much simpler syntactic derivation, with as few projections as possible, which will be an underlying goal of many of the proposals presented in this work.¹² I will close the discussion of tense-hopping here, but will take it up again in much more detail in Chapter 3.

1.2 Determiner-hopping

Lowering is argued to not be limited to tense-hopping constructions. For example, determiners in many languages undergo a downward transformation to adjoin to

¹⁰This of course does not hold in the case of right-adjoined modifiers like the following, which necessarily follow both the verb and its complement, just as in English, and thus do not allow us to make any strong claims about the relative positions of tense and the verb:

- (i) Du vet att jag läser tidningen ofta.
 you know.PRES that I read.PRES newspaper.DEF often
 ‘You know that I read the newspaper often.’

However, just as in English, this modifier may also be left-adjoined, which is the configuration that we are most concerned with here:

- (ii) Du vet att jag ofta läser tidningen.
 you know.PRES that I often read.PRES newspaper.DEF
 ‘You know that I often read the newspaper.’

I should take this opportunity to note that I am not adopting a syntactic linearization model like Kayne’s (1994) *Antisymmetry*. I instead entertain the possibility that there are both left- and right-adjunction, in addition to both left- and right-headedness (e.g. Turkish, §2.3).

¹¹I will also not entertain the non-standard assumption that all apparently intervening adjuncts are actually always adjoined to TP, rather than vP (see Bošković and Lasnik 2003). Among other things, this complicates an analysis of modals, which I assume to be located in T, with respect to adverbs, e.g. *Bill would often eat pie*, in which the modifier is necessarily adjoined to a position below T and above the verb, under the current analysis.

¹²This assumption is unproblematic for English and Swedish, which are our main concern here, as they are argued to have a ‘pre-Pollockian’ unsplit-INFL (Bobaljik 1995, Thráinsson 1996, Bobaljik and Thráinsson 1998). That is, unlike languages with multiple Agr projections in the domain of INFL, English and Swedish simply have the following structure:

- (i)
-
- ```

graph TD
 TP1[TP] --- Spec[Spec]
 TP1 --- TP2[TP]
 TP2 --- T[T]
 TP2 --- vP[vP]
 vP --- Triangle[△]
 Triangle --- Dots[...]

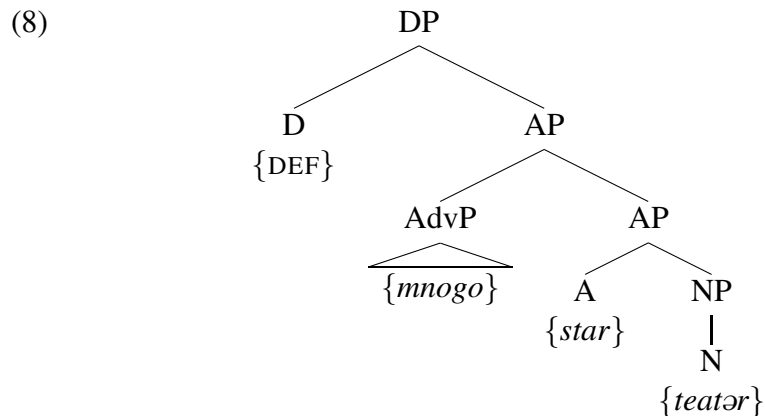
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In split-INFL languages, such as Italian and French, there are theoretically more possible adjunction sites. See Chapter 3, §2.3 for more.

the noun head, which is ostensibly the result of a Lowering operation. Consider the following Bulgarian data (from Embick and Noyer 2001) in which the definiteness marker appears adjoined to the noun head in (7a) and the adjective in (7b), but may not adjoin to the adverb in (7c):

- (7)
- a. kniga-ta  
book-DEF
  - b. xubaba-ta kniga  
nice-DEF book
  - c. \*mnog-ət star teatər  
very-DEF old theater
  - d. mnogo starij-ə teatər  
very old-DEF theater

Assuming, following Abney (1987), that the adjective AP is generated on the spine of the DP, and that the definiteness marker is the head of the DP, the pre-Spell-out structure for (7d) is the following, in which the adverb *mnogo* ‘very’ is an adjunct:<sup>13</sup>



<sup>13</sup>I assume that whether AP is generated on the spine or as an adjunct is parameterized cross-linguistically. In Chapter 4, I will show that the same type of parameterization occurs with negation.

Embick and Noyer argue that in (8) post-Spell-out Lowering moves the head D to the head of its complement, A, skipping the intervening adjunct.<sup>14</sup> In the absence of the AP projection (and, less importantly, the AdvP adjunct), D will take NP as its complement, and thus D lowers directly to N, as in (7a). However, in the presence of this AP, D may not lower all the way to N (7b,d), but must necessarily target just the head of its complement, A. Thus, movement of the determiner in Bulgarian is argued to be a post-Spell-out head-to-head transformation—i.e. Lowering—, and Lowering is limited to the simple, one time operation of moving a head to the head of its complement; that is, there is no evidence that Lowering may be iterative downward head movement (e.g. D may not move iteratively through A to N in Bulgarian). Note that this is unlike narrow syntactic head movement, which is argued to allow iteration in keeping with the HMC; we will address why this distinction exists in the following sections and in Chapter 3.

### 1.3 Section summary

In this section we have seen that Lowering is a strictly local, downward head-to-head movement operation occurring after Spell-out to the PF branch. It may not be iterative, nor may it skip intervening head projections, though adjoined phrases are transparent for this movement. However, the motivations behind these transformations remain unclear. We must ask the following questions: what drives Lowering, and why can't this requirement be met via narrow syntactic raising? We will address this issue in Section 3, but will first investigate the intricate structural sensitivity that is possible in Lowering operations.

## 2 Structural sensitivity of Lowering operations: Morphological optionality

In some languages, certain reduplicative operations may produce several distinct overt realizations, all of which are used in free variation by native speakers, and carry no semantically intelligible differences. One such example is Tagalog

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<sup>14</sup>In §4 below, I argue that an analysis of Bulgarian determiner-hopping as Lowering due to the PHIC is problematic. However, in Chapter 4 we will re-analyze this data as a possible case of Local Dislocation.

aspectual reduplication, where the position of the reduplicant may fluctuate within the verb. In the following cases, reduplication in Tagalog indicates that the entire event is unrealized—i.e., roughly, it is not yet complete (from Rackowski 1999; **boldface** and brackets ‘[]’ indicate the reduplicative aspectual morpheme):

- (9) a. *Base form*  
 ma- ?i- pa- bili  
 ABL- TM- CAUS- buy  
 ‘be able to have (s.o.) buy’
- b. *Reduplicated outputs*  
 ma-?i-pa-**[bii]**-bili  
 ma-?i-**[paa]**-pa-bili  
 ‘will be able to have (s.o.) buy’

In (9), either the verb root *bili* or the causative morpheme *pa-* may be targeted for reduplication.<sup>15</sup>

A similar example is the case of reduplication in the Bantu language Ndebele. Here, a phonologically small root allows for the optional copying of affixes into the reduplicant (data from Sibanda 2004):

- (10) a. *Base form*  
 zw -is -a  
 taste -CAUS -a  
 ‘cause to taste’
- b. *Reduplicated outputs*  
**[zwise]**-zw-is-a  
**[zwayi]**-zw-is-a  
 ‘cause to taste a bit’

In (10), the causative suffix *-is* may be optionally copied into the reduplicant; when it is not, the reduplicant instead meets a disyllabicity requirement via epenthesis of both *-a* and *-yi*. Both forms in (10b) are freely generated by Ndebele speakers.

In this section, I propose that the alternations in the patterns of reduplication in (9) and (10), and the similar alternations shown in the following sub-sections, may

<sup>15</sup>See §2.1 for the status of the ability marker *ma-* and the topic marker *?i-* in reduplication.

be attributed to post-Spell-out Lowering. However, the difference between these cases of Lowering and those illustrated in Section 1 above is that here, when the simplex head lowers, it targets a morpho-phonologically overtly complex head. As I argue below, when Lowering, a head may choose from among multiple hierarchical positions within a complex head as its landing site. Since the targeted structurally complex head is also overtly morpho-phonologically complex in Tagalog, the lowered morpheme may surface in the morpho-phonological string in different positions in relation to the other overt morphemes, depending on which of the multiple available syntactic landing sites of the complex head was targeted for adjunction of the Lowering head. In the cases above, the reduplicative morpheme is base-generated outside of  $vP$  in an aspectual projection, and lowers into the complex  $v$  head after the narrow syntax is spelled out, freely targeting a number of different positions within that head. In Sections 2.1 and 2.2, we examine the reduplication patterns of Tagalog and Ndebele, respectively. In Section 2.3, I show that this analysis of morphological optionality is not limited to reduplicative paradigms, but may also apply to other cases of overt, word-internal positional variance of morphemes, such as is the case with Turkish agreement markers.

## **2.1 Reduplication in Tagalog**

In this section, I argue that morphological optionality in Tagalog (Austronesian; Philippines) aspectual reduplication is the result of post-Spell-out Lowering of an Asp head into the complex  $v$  head of its complement. I will also demonstrate that, while this analysis sufficiently accounts for the positional variation of the reduplicative morpheme, it does not obviate the need for well-formedness constraints on phonological output representations in reduplication constructions. Instead, I show that narrow syntactic transformations, post-syntactic transformations, and phonological evaluation all form part of a single, overarching process of mapping a given numeration to the phonological/phonetic interface, each stage feeding the next.

### **2.1.1 Overview**

The data in (11) show that the imperfective/contemplated (i.e. unrealized) reduplicative morpheme in Tagalog may target a number of different positions



within a complex verb, with a few exceptions. It is important to note that these variations derive no semantic effects, and that native Tagalog speakers may freely generate any of the grammatical forms (data from Raph Mercado, p.c.).<sup>16,17</sup>

(11) Tagalog (Austronesian)

*Base form*

ma- ka- pag- pa- hintay  
 ABILITY- COMPLETE- TRANS- CAUS- wait  
 ‘be able to cause someone to wait’

*Possible and impossible reduplicative outputs*

- a. \*[**maa**]-ma-ka-pag-pa-hintay
- b. ma-[**kaa**]-ka-pag-pa-hintay
- c. ma-ka-[**paa**]-pag-pa-hintay
- d. ma-ka-pag-[**paa**]-pa-hintay
- e. ma-ka-pag-pa-[**hii**]-hintay
- f. \*ma-ka-pag-pa-hin-[**taa**]-tay

‘will be able to cause someone to wait’ (*unrealized aspect*)

The position of the reduplicative CVV morpheme is clearly constrained by morphosyntactic structural considerations; that is, it does not simply target syllables or other prosodic units irrespective of their morphological make-up (e.g. reduplication may not occur inside a morpheme (11f)). Crucially, the modal prefix *ma-* may not be a target of reduplication. The following example suggests that the *ma-* prefix is unable to be targeted for reduplication above due to categorical or structural reasons, rather than some sort of phonological linear edge prohibition on Tagalog reduplication (examples from Rackowski 1999):

<sup>16</sup>Note that the future tense is simply the closest approximation to an English translation available for this type of unrealized aspect. The aspect denotes simply that an event is not complete, or has not yet begun, and thus will, or may, take place in the future.

<sup>17</sup>See Chapter 1, fn. 25 for a note on the possible structural complexity of the *ma* morpheme.

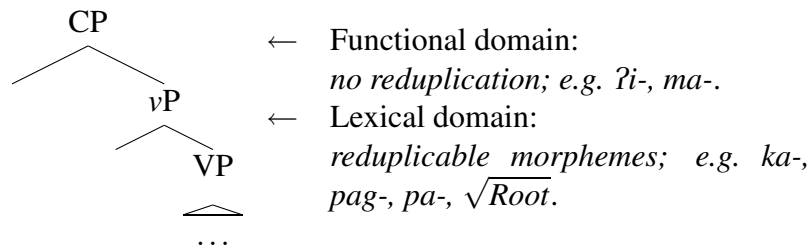
- (12) a. pag- lagy -an  
TRANS- place -LOC
- b. pag-[**laa**]-lagy-an  
[**paa**]-pag-lagy-an  
'will place'

Other prefixal morphemes in Tagalog are also unavailable for reduplication. For example, the topic marker *ʔi-* in the following example may not be reduplicated, similar to *ma-* in (11):

- (13) a. ʔi- ka- pa- niwala  
TM- COMPLETE- CAUS- believe
- b. \*[ʔii]-ʔi-ka-pa-niwala  
ʔi-[**kaa**]-ka-pa-niwala  
ʔi-ka-[**paa**]-pa-niwala  
ʔi-ka-pa-[**nii**]-niwala  
'will cause someone to believe'

Rackowski (1999) observes that Tagalog aspectual reduplication is limited to morpho-syntactic heads that are generated within the lexical domain (e.g. causative and transitivity markers, and verb roots, located in or below *vP*) and may not target heads in the functional domain (e.g. tense and modals, located above *vP*).<sup>18</sup> In short, anything that is generated above the topmost *vP* is outside the scope of reduplication in Tagalog. We illustrate this generalization as follows:

- (14) *Functional vs. Lexical domain*



<sup>18</sup>Note also that morphemes in the lexical domain may introduce arguments, whereas those in the functional domain may not. See Chapter 3 for more discussion on the distinction between lexical and functional (and discourse) domains.

Given that this reduplication pattern in Tagalog targets morphological elements, and that those elements that it may target form a syntactic natural class (i.e. morpho-syntactic heads generated within the lexical  $\nu$ P domain), we assume, following the aforementioned analyses, that the positional variation of the reduplicative morpheme is somehow syntactically constrained, rather than completely dependent on any sort of morpho-phonological output conditions.<sup>19</sup>

To be more precise, under an account of morphological optionality that relies solely on morpho-phonological output constraints at the late stage of PF evaluation (i.e. a global model in which both morphological and phonological alternations are simultaneously derived in a single component of output constraint evaluation given a morpho-phonological input), I believe it would be difficult, and at best stipulative, to posit constraints that are able to detect the differences between the types of morphemes that are possible or impossible targets of reduplication. That is to say, such a purely morpho-phonological account must rely on morpheme-specific prohibitive constraints that, when evaluated in relation to additional constraints on reduplication, prevent the reduplication of observably illicit morphemes in Tagalog. Indeed, under either a global model of morphology, such as certain versions of Optimality Theory (McCarthy and Prince 1995, Prince and Smolensky 2004), or a local account of morphology, such as Distributed Morphology, under which morphological structures are derived in a separate component before phonological evaluation, well-formedness constraint evaluation on a morpho-phonological output should not have access to the previously erased syntactic structure, as any sort of output evaluation necessarily deals with strings of morpho-phonological objects.<sup>20</sup> Therefore, an account of the unavailability of certain morphemes for reduplication within the verb word that relies merely on morpho-phonological output constraints cannot straightforwardly make reference to the syntactic distinction observed above, at least not without a modification to the view of phonological inputs such

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<sup>19</sup>Note that the lexical domain may contain more than one  $\nu$ P, as we will see. However, it is not necessarily the case that all  $\nu$ Ps are generated in the lexical domain. For example, in Chapter 4, I argue that auxiliary  $\nu$ Ps are generated in the functional domain in English. There, I also discuss in more detail the exact nature of the lexical-functional split and show how it directly influences the properties of cyclic Spell-out and, relatedly, patterns of movement (e.g. lowering vs. raising).

<sup>20</sup>An alternative, which we will not explore here, is the possibility of Optimality Theoretic syntax (Legendre et al. 2001, Pesetsky 1997), in which all aspects of a linguistic structure are determined via constraints on output representations. However, we will maintain a modular approach to derivation.

that these retain their internal syntactic structure during output evaluation. Rather, such an account would have to make use of individual constraints that specifically prohibit the reduplication of those morphemes (e.g. \*RED[*ma*-]: the morpheme *ma*- may not be reduplicated). While such a system is possible under Optimality Theoretic constraint ranking, since morpheme-specific constraints and rankings are permissible, it quickly becomes bloated, due to the fact that a prohibitive constraint on reduplication would be needed for every morpheme within a complex word that may not be reduplicated. Thus, an OT approach would have to allow for the positional variation in Tagalog reduplication via a mixture of constraints that both allow for a certain freedom in the placement of the reduplicant and conversely limit this freedom.

In addition to creating an overly powerful system of morpho-syntactic and morpho-phonological evaluation, this analysis also loses the generalization that the morphemes of the word that are possible candidates for reduplication form a structural, syntactic natural class. Therefore, since it holds that only morpho-syntactic heads that are contained within a specific narrow syntactic domain may be targeted for reduplication, we will maintain the assumption that this limitation is based in the structural properties of syntactic and post-syntactic transformations, rather than any conditions on morpho-phonological output representations. In the following sub-section, I present an analysis of how this limitation and the related positional variations are derived structurally.

## **2.1.2 Deriving the positional variation of Asp**

In this section, I argue that the narrow syntactic position of the reduplicant is fixed, and that the surface variations are due to operations occurring after Spell-out.

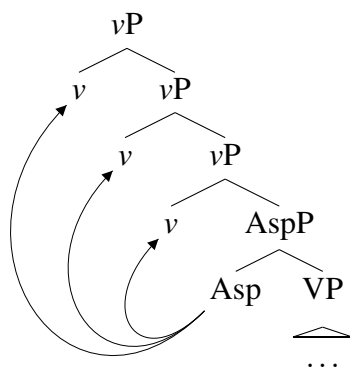
### **2.1.2.1 Non-variation of the narrow syntactic structure**

As we have shown above, the morphological limitations on reduplication in Tagalog are easily explained via the distinction between the syntactic lexical and functional clausal domains; only morphemes in the lexical domain may undergo reduplication. However, the observed variations in reduplication are not straightforwardly accounted for via purely narrow syntactic means, especially if we adopt a strict view of Baker's (1985) *Mirror Principle*, which requires that morphological derivations directly reflect syntactic derivations; that is, the morphological structure of

complex words mirrors the underlying syntactic structure of the heads involved.<sup>21</sup> For example, in order to account for the variations in Tagalog by way of the narrow syntax, we would need to posit multiple possible insertion points for the reduplicative morpheme; i.e. the reduplicative morpheme may be freely generated in any given position within the lexical domain. However, in this case, we might wrongly predict that variation in the narrow syntax will bring about variation in semantic interpretation, since the narrow syntactic scope of the reduplicant would differ in all of the various forms. In the absence of any semantic effects caused by these variations, we are led to conclude that the position of the reduplicant in the narrow syntax is fixed.<sup>22</sup>

Rackowski (1999) agrees that the base-generated position of the reduplicative aspectual morpheme in Tagalog is consistent throughout all reduplicative structures. Following Travis (1994, 1996) (see also Travis in prep), Rackowski argues that the reduplicative morpheme in Tagalog is generated in an aspectual projection that immediately dominates VP. After syntactic Spell-out, the head of this AspP may undergo a process of upward morphological scrambling to a higher *v* head to check a *v*-feature on Asp:

(15) *Morphological scrambling*



A welcomed consequence of this analysis is that, given that the reduplicative

<sup>21</sup>In this thesis, we tacitly adopt a weakened version of the *Mirror Principle*, in which syntactic derivations reflect morphological structures modulo the post-syntactic transformations of Lowering and Local Dislocation.

<sup>22</sup>Alternatively, we may posit a fixed syntactic merger position for the reduplicant, but a non-standard view of narrow syntactic head-movement, in which a head may freely skip intervening heads, contra the HMC. However, we will not explore this possibility here, but see the following discussion on post-Spell-out head-scrambling.

head is consistently base-generated in the same position, the variations in the surface realizations are correctly predicted to have no effect on semantic interpretation, since this scrambling occurs after Spell-out to the PF branch and so does not affect the structure sent to LF. However, as the landing sites of this scrambling operation are limited to  $\nu$  heads, this theory requires that all morphologically overt projections in the lexical domain be  $\nu$  heads in order to account for the range of reduplicative variations. While I believe that the assumption that all syntactic projections occurring between V and the topmost  $\nu$  are also of category  $\nu$  is a plausible one, this analysis does raise a few other concerns. For example, given that reduplication may target the V root (see data in §2.1.1), the upward scrambling operation in (15) must be optional, meaning that the  $[-\nu]$  on Asp either goes unchecked, or may be checked *in situ*. In either case, given that non-movement of the Asp head produces a convergent structure, there is little motivation for why movement might occur. Moreover, it is unclear why the uninterpretable  $\nu$ -feature on Asp must wait until after Spell-out to be checked.<sup>23</sup> An additional concern is that Tagalog is often considered to be a V-fronting language, in which the verb raises to  $T^0$  or higher (Aldridge 2002; cf. Chung 1990; see §3); however, in the structure in (15) the verb has not raised at all.

A further potential problem for this analysis is that post-syntactic head-movement generally appears to be limited to downward transformations such as Lowering and, somewhat relatedly, Local Dislocation, which are argued to be constrained by very strict locality conditions, unlike the morphological head-scrambling operation above, which freely skips intervening heads. In the following sections, I will present a Lowering analysis of morphological optionality that allows us to account for these data without having to posit a new structural transformation (e.g. morphological head-scrambling), but also permits us to maintain the benefits of Rackowski's theory.<sup>24</sup>

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<sup>23</sup>See Chapter 3 for an argument that uninterpretable features may indeed be checked after Spell-out, though not under a configuration like that in (15).

<sup>24</sup>Note that the goal of this section is not to re-create Rackowski's (1999) extensive work on Tagalog reduplication, but merely to offer an alternative morphological analysis within the confines of the post-syntactic architecture we have adopted. For that reason, I will not go into great detail regarding the areas in which our respective analyses make the same predictions, as is the case in most reduplicative forms in Tagalog, but will rather focus on those areas in which our theories make different predictions, in addition to the data that have implications for the current architecture. Simply put, the general pattern noted previously holds and, except where indicated, we assume that any apparent exceptions may be explained as in Rackowski (1999).

### 2.1.2.2 Tagalog reduplication as Lowering: the Head Adjunction Condition (HAC)

As we saw above, Rackowski (1999) claims that the reduplicative imperfective aspectual morpheme of Tagalog is base-generated as sister to VP. However, the placement of this morpheme is not uncontroversial, as not all aspectual morphemes are generated in the same syntactic position. Smith (1991) observed that there are two different classes of aspect: Viewpoint aspect and Situation aspect. Viewpoint aspect generally corresponds to grammatical notions such as perfective/imperfective and progressive (i.e., roughly speaking, whether an event is viewed as fixed or ongoing on a timeline; e.g. *I ate* vs. *I was eating*), whereas Situation aspect denotes the *Aktionsart* or eventuality classes of Vendler (1967): e.g. activity, accomplishment, achievement, and state. This distinction becomes quite robust when we observe that Viewpoint aspect is often realized via overt morphology cross-linguistically, while, on the other hand, Situation aspect is rarely encoded overtly; e.g. many languages encode progressive aspect via overt morphology (for example, English *eating*, Spanish *comiendo*, Turkish *yi-yor-uz*), but relatively few have overt morphemes to denote the different eventuality classes (cf. the Athabaskan languages of North America, Rice 2000). Considering that the functional domain normally houses overt verbal inflectional morphemes, such as tense and agreement, and that the lexical domain is argued to encode eventuality structures (Davidson 1967), it becomes clear that Viewpoint aspect is housed in the functional domain, and Situation aspect in the lexical domain.<sup>25</sup> Under this view, all verbal inflectional morphemes, including Viewpoint aspect, are merged in the functional domain, whereas morphemes affecting the argument structure (e.g. causative) or eventuality class (Situation aspect) are merged in the lexical domain. For this reason, Travis (in prep) labels Viewpoint and Situation aspect as Outer Aspect and Inner Aspect, respectively, projecting Inner Aspect within the  $\nu$ P-shell (Larson 1988), and Outer Aspect above the  $\nu$ P-shell.<sup>26</sup>

Looking at the Tagalog reduplicative morpheme, we plainly see that it has

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<sup>25</sup>Note that Situation aspect is often a property of individual lexical items. For example, *know* is a state, but *shop* is an activity. This further suggests that Situation aspect is closely linked with the lexical domain.

<sup>26</sup>Travis (2000, in prep) includes an Event Phrase (EP) between Outer Aspect and the VP-shell, but we will not address the role of this projection in any detail here and assume, instead, that the function of this event phrase is carried out by a  $\nu$ P projection.

more characteristics of Outer Aspect than Inner Aspect; not only is it encoded overtly in the morphology, like many other functional, inflectional morphemes cross-linguistically, but, more importantly, its semantic contribution is one of imperfectivity, or unboundedness/incompleteness, similar to the progressive aspect in English (e.g. *I was baking the pie when the oven stopped working.*). However, in the representation in (15), this morpheme is projected as Inner Aspect, presumably due to the fact that it is an aspectual morpheme whose overt distribution is limited to the lexical domain; i.e. it may target only those morphemes generated in or below  $vP$ , which might seem to indicate that it is also generated in the same domain as those morphemes.

I argue, however, that this reduplicative morpheme in Tagalog is base-generated more appropriately in the functional domain as Outer Aspect, given that it denotes imperfectivity, and that the observed surface patterns are derived via head-to-head Lowering into the lexical domain. Under this analysis, the initial structure at Spell-out for all of the grammatical outputs in (11), repeated below in (16), is that of (17), after narrow syntactic V-to- $v$  movement:<sup>27,28</sup>

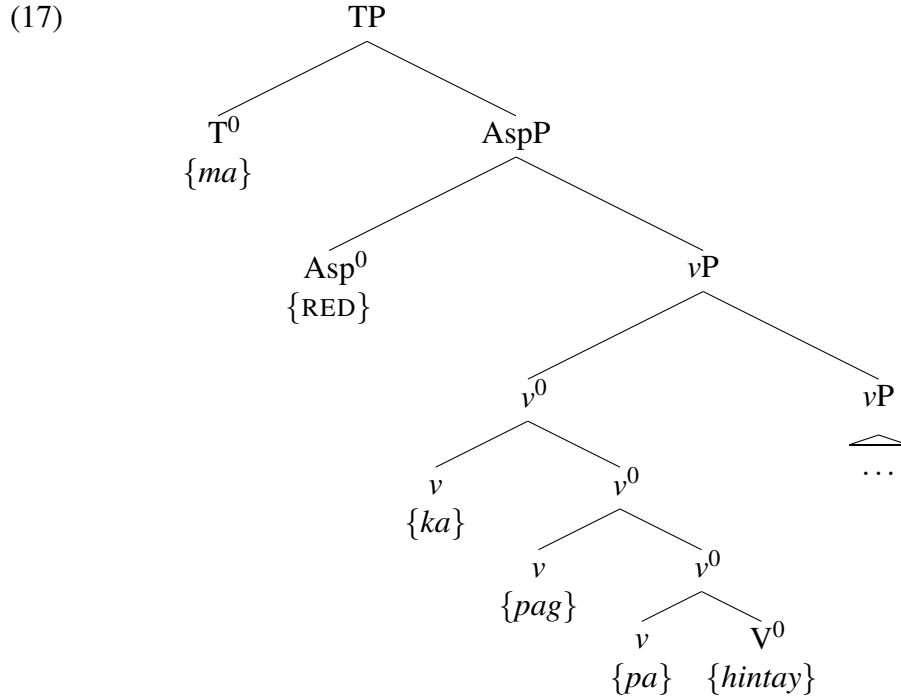
- (16) a.   ma-       ka-       pag-   pa-   hintay  
           ABILITY- COMPLETE- TRANS- CAUS- wait  
           ‘be able to cause someone to wait’
- b.   ma-[kaa]-ka-pag-pa-hintay  
       c.   ma-ka-[paa]-pag-pa-hintay  
       d.   ma-ka-pag-[paa]-pa-hintay  
       e.   ma-ka-pag-pa-[hii]-hintay  
           ‘will be able to cause someone to wait’ (*unrealized aspect*)

---

<sup>27</sup>Recall that it may not be the case that the (possibly bimorphemic) *ma-* morpheme is generated in T. It is only crucial to note that it (or at least part of it) is generated above the reduplicative aspectual head.

<sup>28</sup>See §3 for an analysis of verb-raising to T in Tagalog after this Lowering operation takes place.

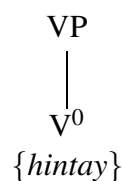




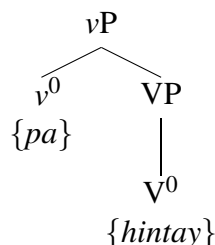
Note that in (17) the ‘<sup>0</sup>’ diacritic denotes the highest-level projection of an individual head. For example, the V<sup>0</sup> corresponding to the root *hintay* is adjoined to the head projection of the morpheme *pa* via narrow syntactic head movement, which are then both dominated by the v<sup>0</sup> of *pa*; in turn, that entire [*pa+hintay*] v<sup>0</sup> structure is adjoined to the head projection of the morpheme *pag*, thus extending the v<sup>0</sup> of *pag* to dominate these three morphemes, and so on (i.e. these are all derivationally M-words; see below).<sup>29</sup> This is briefly demonstrated below:

<sup>29</sup>Note that this definition of ‘X<sup>0</sup>’ differs greatly from the X<sup>0</sup> of Bare Phrase Structure (BPS, Chomsky 1994). Under BPS, anything dominating a branching node is not an X<sup>0</sup> (i.e. only terminal elements are X<sup>0</sup>s). However, as noted above, the X<sup>0</sup> notation used here denotes levels of projection that are or were M-words (see below for an argument to this effect), and are thus visible levels for morphological transformations with other X<sup>0</sup>s. I argue that it is these levels to which adjunction occurs under head movement (both upward and downward).

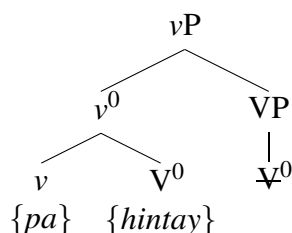
- (18) a. Merger of  $V^0$  *hintay*:



- b. Merger of  $v^0$  *pa*:



- c. Movement of  $V^0$  to  $v^0$ :



When  $V^0$  in (18) moves to  $v^0$ , it adjoins to the  $v^0$  level of  $\{pa\}$ . In the resulting structure,  $V^0$  is the topmost level of the head  $\{hintay\}$  and  $v^0$  is the topmost level of the head  $\{pa\}$ , which now dominates both  $\{pa\}$  and  $\{hintay\}$ . Consequently, the terminal  $\{pa\}$  is no longer an  $X^0$  by itself; the  $X^0$  of  $\{pa\}$  now contains another embedded  $X^0$ , namely  $V^0$ . Further head movements will similarly retain the  $X^0$ -level of the moved heads.

I argue that all head movements—both upward and downward—obey the following condition:

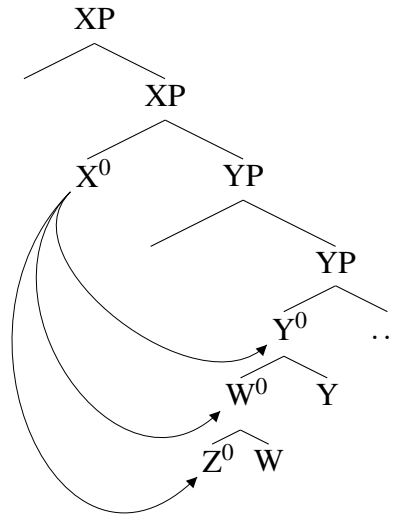
- (19) *Head Adjunction Condition* (HAC)  
Head movement adjoins a moving head  $\alpha$  to any  $X^0$ -level projection of its targeted landing site  $\beta$ .

As illustrated in (18), the landing site of upward head movements necessarily contains only one  $X^0$ -level projection, given the properties of cyclic derivation. There is, therefore, only ever one possible point of adjunction in upward head movements. However, following the HAC, a Lowering head may have multiple possible points of adjunction, if the head that is the targeted landing site is structurally complex. We thus modify our definition of Lowering as follows:

(20) *Lowering (revised)*

A head  $X^0$  may lower to any zero-level projection of the (potentially complex) head of its complement  $Y^0$  after Spell-out, but before Vocabulary Insertion.

$$\begin{aligned} [_{XP} X^0 \dots [_{YP} \dots [_{Y^0} Y^0 [W^0 \dots]]]] &\rightarrow [_{XP} \dots [_{YP} \dots [_{Y^0} [Y^0 + X^0 [W^0 \dots]]]]] \\ [_{XP} X^0 \dots [_{YP} \dots [_{Y^0} Y^0 [W^0 \dots]]]] &\rightarrow [_{XP} \dots [_{YP} \dots [_{Y^0} [Y^0 [W^0 + X^0 \dots]]]]] \end{aligned}$$

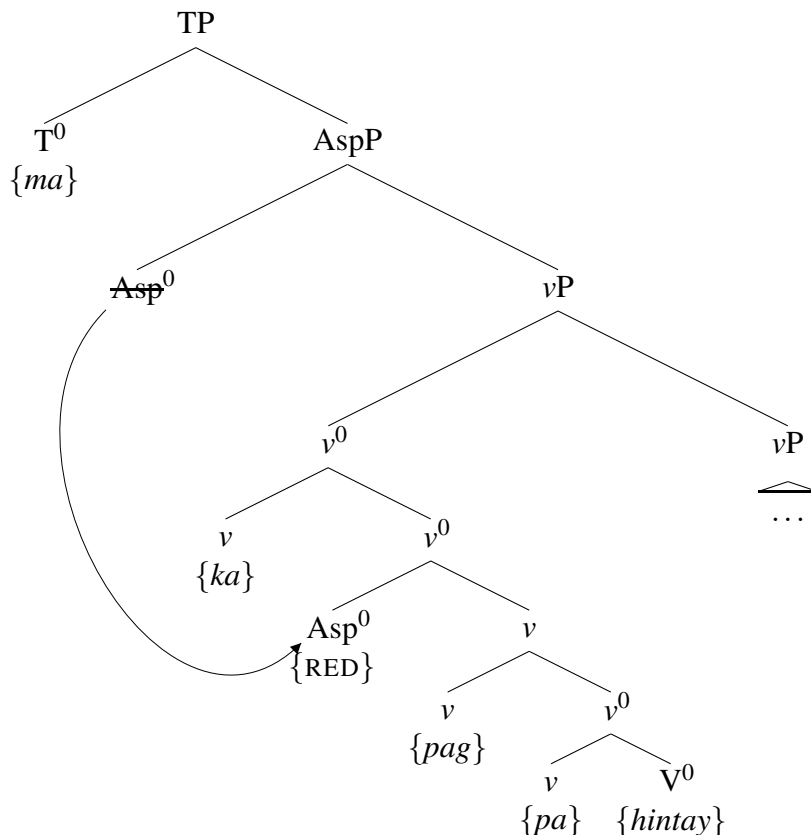


In the representation in (20), a Lowering head may take any one of the options illustrated. Under this definition of Lowering, interpolation of an  $X^0$  between terminals of a complex head complement is allowed. I argue that when the Asp head in (17) undergoes Lowering, it may target any of the zero-level projections of the complex head of its complement, as a result of the HAC, thus deriving the morphological optionality of Tagalog reduplication. Furthermore, since this is a Lowering operation, reduplication is correctly predicted to be unable to target higher morphemes (e.g. *ma-*).<sup>30</sup> To illustrate, we derive an output such as (16c) in the following manner, where Asp lowers to adjoin to the  $v^0$  immediately dominating the transitivity marker *pag*, i.e. the  $v^0$  containing the morphemes  $\{\{pag\}, \{pa\}, \{hintay\}\}$  (recall that at this point in the derivation, no terminal has yet received any phonological features, as Vocabulary Insertion occurs after

<sup>30</sup>I follow Rackowski (1999) in assuming that topic markers (e.g. *ʔi-*) are generated above Outer Aspect (i.e. above both Asp and  $vP$  in (17)); i.e., they are generated in the functional domain, as is *ma-*, and so they are not possible targets of reduplication. Note that we follow Rackowski in the syntactic placement of all morphemes in Tagalog, with the exception of the reduplicative aspectual morpheme.

Lowering on the PF branch; ~~strike through~~ denotes a trace (see Chapter 3 for discussion));<sup>31,32</sup>

(21) ma-ka-[**paa**]-pag-pa-hintay



When Vocabulary Insertion applies to this structure, phonological features are mapped to the terminal elements, and the terminals are linearized with respect to one another. We follow the standard DM assumption that this process applies to the complex head in a cyclical fashion from the most embedded element to

<sup>31</sup>Under the model presented here, the  $v^0$  dominating  $\{\{pag\}, \{pa\}, \{hintay\}\}$  is extended to include  $\{Asp\}$  (i.e.  $\{RED\}$ ) when  $\{Asp\}$  lowers and targets this  $v^0$  for adjunction. I assume that when this adjunction occurs, the original  $v^0$  that is the targeted landing site becomes a lower segment of the  $v^0$  that results from head-adjunction, as illustrated. However, since all of the terminals are contained within the same complex head—namely, the highest  $v^0$ —this segmentation will ultimately have no effect on the process of Vocabulary Insertion, which simply targets terminal nodes and, as argued below, erases the internal structure of complex heads.

<sup>32</sup>It is worth pointing out that the transformation in (21) is not a case of head-skipping, which has been argued to be impossible due to the HMC, but rather movement of a head to the next lowest head, where the targeted landing site is internally complex and thus contains multiple possible points of adjunction, following the HAC.



to the reduplicant contains only a prosodic “template”; e.g. the morpho-syntactic feature bundle of the aspectual reduplicant in Tagalog is initially mapped to the phonological form  $[\sigma]$  (where the syllable is pre-specified as containing an onset and a long vowel), which contains no segments of its own. In this way, reduplicants differ from other morphemes only in that they are mapped to a phonological item that contains no segments.<sup>36</sup> However, since VI is responsible for giving segmental information to all terminals, this prosodic template is filled by copying the phonological segments of its sister. Therefore, by the end of the VI process, all morphemes, including the reduplicant, will have segmental information. Thus, during the linearization Cycle 3 in (22), Asp must look to the phonological features of its sister, which has already been linearized and given phonological form, and copy that string of phonological segments into its prosodic template:<sup>37</sup>

- (22')      Cycle 3:       $[\sigma \wedge \text{pag} \wedge \text{pa} \wedge \text{hintay}]$       .  
                  Cycle 3':       $[\text{paa} \wedge \text{pag} \wedge \text{pa} \wedge \text{hintay}]$   
                  Cycle 4:       $[\text{ka} \wedge \text{paa} \wedge \text{pag} \wedge \text{pa} \wedge \text{hintay}]$

<sup>36</sup>Note that it may be the case that in examples of fixed segmentism (see Alderete et al. 1999), the Vocabulary item is only partially underspecified for phonological features.

<sup>37</sup>Note that I am not adopting a full copying theory of reduplication (McCarthy and Prince 1995), in which all phonological segments available are copied into the reduplicant and the reduplicant is augmented or truncated during later evaluation at PF. This analysis requires there to be an output constraint on the well-formedness of the reduplicative morpheme, e.g. RED=CVV. Though this analysis would make the same predictions as the underspecified prosodic Vocabulary item analysis, I believe the latter to be more theoretically sustainable, since it places the burden of the phonological form of the reduplicant on the standard syntax-phonology mapping process rather than on a stipulative constraint at PF evaluation. Nevertheless, there are no clear empirical advantages of one theory over the other, in the case of Tagalog.

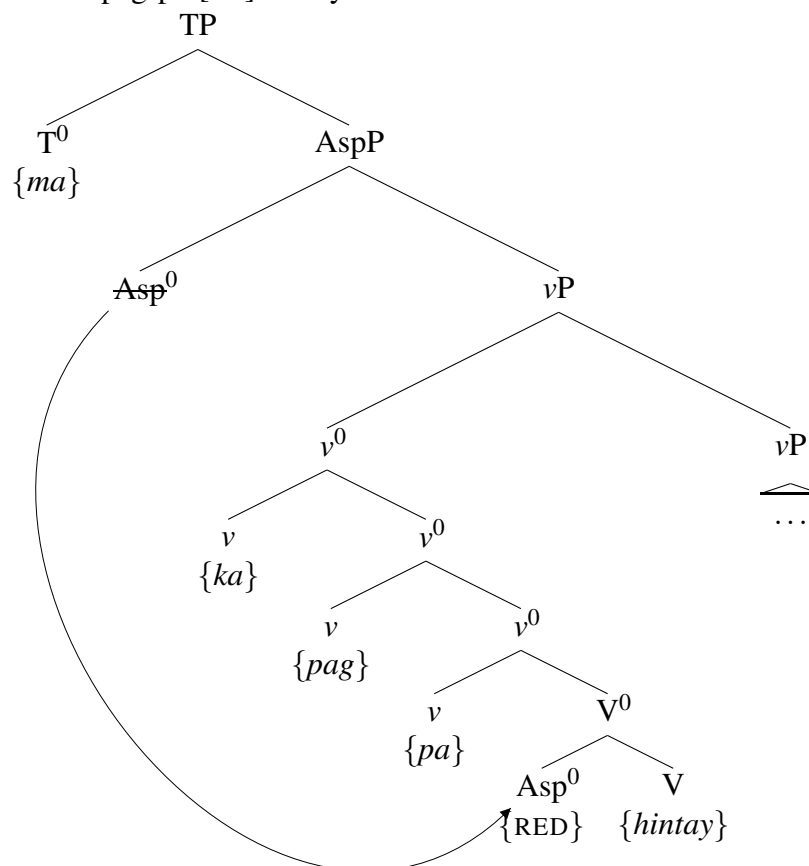
However, note that reduplication in Madurese, another Austronesian language, displays a similar case of morphological optionality, except that the segments copied into the reduplicant correspond to the segments at the right edge of the domain that is copied (Stevens 1971):

- (i)      a.      pul-    ma-    kumpul  
                  RED- CAUS- gather  
                  b.      ma-    pul-    kumpul  
                  CAUS- RED- gather  
                  ‘keep on gathering’

If reduplication here is simply full copying and then truncation at PF, a form like (ia) would derive a morpho-phonological string at VI like  $[\text{makumpul} \wedge \text{ma} \wedge \text{kumpul}]$ . Subsequent truncation at PF would simply retain the rightmost phonological elements of the reduplicant, rather than the leftmost, as in Tagalog. However, it may also be the case that the reduplicant here is an empty prosodic template, but that it picks up its segmental features in a way distinct from that of Tagalog (e.g. it copies them from the right edge of its sister rather than the left edge). Thus, these facts still do not provide decisive evidence for a full copying approach over a templatic approach to reduplication.

As noted above, and following the HAC, the Lowering Asp head may adjoin to any  $X^0$ -level of the complex  $v$  head, such as  $V^0$ :

- (23) a. ma-ka-pag-pa-**hii**-hintay



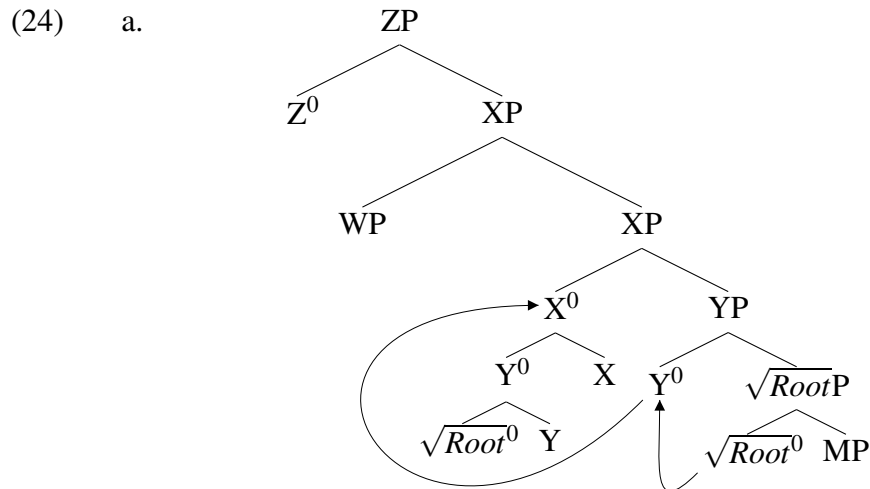
- b. Cycle 1:  $[\sigma \wedge \text{hintay}]$   
 Cycle 1':  $[\mathbf{hii} \wedge \text{hintay}]$   
 Cycle 2:  $[\text{pa} \wedge \mathbf{hii} \wedge \text{hintay}]$   
 Cycle 3:  $[\text{pag} \wedge \text{pa} \wedge \mathbf{hii} \wedge \text{hintay}]$   
 Etc.

Crucially, I argue that it is not the case that reduplicative copying targets morpho-syntactic material *per se*, but rather that it copies whatever phonological material is available to it during the cyclic process of Vocabulary Insertion. The morphological variations we witness in reduplicative patterns are only the result of syntactic and post-syntactic transformations that occur before phonological form is given to terminal nodes. The previous morpho-syntactic derivation is therefore the only driving force behind the licit variations of the surface position of the

reduplicative morpheme in Tagalog.

### 2.1.3 M-words, Subwords, and the loss of intermediate structure

According to Embick and Noyer (2001:574), there are only two ontological classes of objects present in a morphological structure that enter into the computation of transformations on the PF branch: M-Words and Subwords (note that phrases themselves are not important for these types of word-level morphological concerns):



- b. *M(orphological)-Word*:  
A (potentially complex) head not dominated by further head-projection (e.g.  $Z^0$  and  $X^0$  above).
- c. *Subword*:  
A terminal node within an M-Word (e.g.  $X$ ,  $Y$ ,  $\sqrt{Root}^0$ , and arguably  $Z^0$  above, as it is simultaneously maximal and minimal; see below).

Additionally, Embick and Noyer argue that M-Words may only undergo morphological transformations with other local M-Words, and Subwords may likewise only do so with other local Subwords (where locality is defined for Lowering of M-Words as the head-to-head-of-complement relation, and for Local



Dislocation of all items as string-adjacency).<sup>38</sup> For example, under this view, if the M-Word  $Z^0$  were to lower in (24a), its only available target for head-adjunction would be the M-Word  $X^0$  (i.e. not any intermediate zero-level projection of this head, contra what has been argued above, since these are not M-Words according to the definition in (24b)).<sup>39</sup> Similarly, if the Subword  $\sqrt{Root}^0$  is to undergo Local Dislocation, it may only do so with the terminal Y.

Leaving aside the problems these tight restrictions cause for the above analysis of Lowering in Tagalog, let us briefly see how these restrictions work under a case of Local Dislocation. Embick and Noyer (2001) and Embick (2006) provide irrefutable evidence that intermediate levels of structure such as  $Y^0$  above are transparent for Local Dislocation. For example, they show that the Latin enclitic *-que* ‘and’ may never interpolate within a complex head:

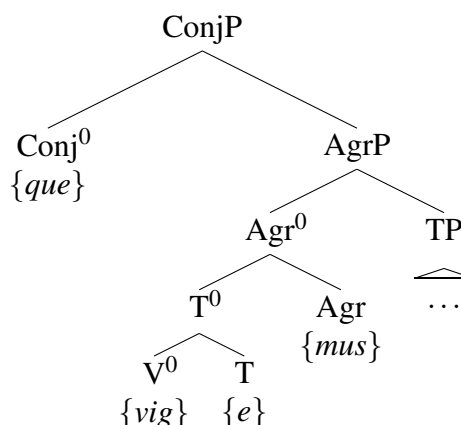
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<sup>38</sup>It is worth noting that if we simply limit all morphological transformations (i.e. Lowering and Local Dislocation) to local M-Word-to-M-Word and local Subword-to-Subword operations, there is no theory-internal reason to disallow Subword-to-Subword Lowering within the same M-Word, under Embick and Noyer’s model. I will later propose a model of Lowering that correctly precludes such a scenario. I argue that a head lowers due to the fact that it carries an uninterpretable feature; however, as all Subwords that are contained in the same M-Word are already in a local feature-checking relation with one another (by virtue of all being contained in the same complex syntactic head), there is never a motivation for Subword-to-Subword Lowering.

<sup>39</sup>Note that  $Z^0$ ’s possible dual classification as both M-Word and Subword is irrelevant, as it is not in a sufficiently local relation with another Subword to undergo a Subword-to-Subword transformation. Subwords may only undergo transformations with other Subwords that are contained in the same M-Word. However, the M-Word  $Z^0$  contains only one Subword, namely itself. Because of this, any transformation that involves  $Z^0$  must necessarily be one that targets another M-Word and, thus, given this constraint, such a transformation must target  $Z^0$  as an M-Word, not a Subword.

- (25) a. vivimus          vigemus-que  
          live.1PL.PRES flourish.1PL.PRES-and  
          ‘we live and flourish’

b. *Underlying structure of second conjunct (approximation)*



c. *Impossible interpolated forms*

\*vig-que-e-mus

\*vig-e-que-mus

It is clear from the examples in (25c) that *-que* may not target any intermediate  $X^0$  of the complex head of its sister. Rather, *-que* can only adjoin to the  $\text{Agr}^0$  projection. However, given Embick and Noyer's restriction above that an M-word may never target Subwords of another M-word under any PF operation (effectively ruling out interpolation), this adjunction could be the result of either Lowering (with head movement of the M-word  $\text{Conj}^0$  to the M-word  $\text{Agr}^0$ ) or Local Dislocation (with inversion of the same two M-words). Nevertheless, as we saw in Chapter 1, ex. (23), there is other evidence that suggests that this is a case of Local Dislocation rather than Lowering; namely, it is insensitive to category.<sup>40</sup> Additionally, it is sensitive to phonological concerns, adjoining to the string [*in rebus*] only after string-vacuous Local Dislocation of these two elements, due to the small phonological size of the

<sup>40</sup>This category-insensitivity also provides support against an upward head movement analysis, under which the conjunct *-que* checks an uninterpretable feature against any interpretable feature of the head of its complement.

preposition *in*:<sup>41</sup>

- (26) a. in rebus-que  
in things-and  
'and in things'  
b. \*in-que rebus

These data all seem to indicate that *-que* may undergo Local Dislocation only with the entire M-word that is its sister after (or perhaps during) Vocabulary Insertion. E.g.:

- (27) a.  $[[M\text{-}word\text{ } -que] \wedge [M\text{-}word\text{ } vig \wedge e \wedge mus]]$   
b.  $[[M\text{-}word\text{ } -que] \wedge [M\text{-}word\text{ } in+rebus]]$

The M-word *-que* cannot target any Subword of the M-words  $[vig \wedge e \wedge mus]$  or  $[in+rebus]$ , nor may it target the proposed intermediate  $X^0$ -levels, but must rather target these entire M-words under Local Dislocation.

Returning to the proposed revised model of Lowering, the question to ask is 'why are intermediate  $X^0$ s possible targets for Lowering, as suggested by the reduplication data above, but not for Local Dislocation, as shown in (25c)?' I believe the answer lies in the effects of the linearization process of Vocabulary Insertion on the syntactic typology of intermediate levels of complex heads. Note that before linearization/VI, a complex head is a hierarchical syntactic structure of two or more  $X^0$  projections. I claim that, at this point in the derivation, each of these zero-level projections qualifies as an M-word level, to use the terminology of Embick and Noyer. Thus, we re-define M-word as follows:

- (28) *M(morphological)-word (revised):*  
The topmost level of head projection of a single head.

Therefore, at the point of Lowering, all  $X^0$  levels of a complex head are potential landing sites if a Lowering head/M-word is limited to targeting an M-word of the head of its complement. To be precise, each zero-level projection within the XP in (24a) qualifies as an M-word within this syntactic structure, as each zero-level

<sup>41</sup>Note that if *-que* adjoined to *in* before Vocabulary Insertion (i.e. via Lowering), this operation might obviate the failure of *in* to meet some sort of minimality requirement, as it could then be dependent on *-que*. However, this is clearly not the case; Local Dislocation of *in* and *rebus* must occur before the "downward" transformation of *-que* is evaluated, indicating that this movement takes place at least after VI has applied to *in*.

projection corresponds to the highest level of head projection of each individual head contained within the complex structure. Therefore, as Lowering is evaluated on this structure, each M-word projection contained within the head of XP is a possible landing site for a Lowering  $Z^0$ .<sup>42</sup>

However, I argue that during Vocabulary Insertion (i.e. after Lowering is evaluated) a complex head is converted into a single head-projection with multiple terminal elements. Following the standard DM assumption that linearization deletes hierarchical syntactic information, I claim that intermediate  $X^0$ /M-word projections of a complex head are deleted, preserving only the most dominant  $X^0$ /M-word of the complex head, along with the terminal elements/Subwords. In a sense, the complex head is *atomized* during Vocabulary Insertion; it is converted from a unified collection of morphological words with individual terminals into a single atomic M-word head with multiple terminals. To illustrate, each  $X^0$  in the pre-VI structure on the left below qualifies as an M-word, but in the corresponding post-VI/linearization structure on right, only the entire, linearized complex head itself qualifies as an M-word:

$$\begin{array}{llll}
 (29) & \text{M-word} \rightarrow & & \\
 & & X^0 & \\
 & & \swarrow \quad \searrow & \\
 \text{M-word} \rightarrow & Y^0 & X & \quad VI \Rightarrow \quad [X \wedge Y \wedge Z] \leftarrow \text{M-word} \\
 & \swarrow \quad \searrow & & \\
 \text{M-word} \rightarrow & Z^0 & Y & 
 \end{array}$$

Thus, a complex syntactic head that contains many embedded M-Word levels will be transformed into a single M-Word upon linearization. As a result, the topmost level of head projection of all of the Subwords contained within the complex head will be the head projection of the topmost head, as this is the only remaining head projection that dominates these Subwords. In this way, only the topmost M-word level of a linearized structure like  $[vig \wedge e \wedge mus]$  will be visible for Local Dislocation operations with any adjacent elements. We illustrate this via VI cycles as follows:

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<sup>42</sup>We could thus re-define Lowering as movement of an M-word to an M-word in the head of its complement after Spell-out but before VI. However, as ‘M-word’ equates to ‘ $X^0$ ’ at this point of the post-syntactic derivation, we will maintain our earlier definition.

(30) *Linearization of vig-e-mus-que*[<sub>V</sub> vig]*Linearization of  $T^0$  creates a single M-word with category T:*Cycle 1: [<sub>T</sub> vig ^ e]*Linearization of  $Agr^0$  creates a single M-word with category Agr:*Cycle 2: [<sub>Agr</sub> vig ^ e ^ mus]*Linearization of  $Conj^0$  head with linearized complex head  $Agr^0$  (note that -que is a separate M-Word before Local Dislocation, as it is not contained within the complex head):*Cycle 3: [[<sub>Conj</sub> que] ^ [<sub>Agr</sub> vig ^ e ^ mus]]*Local Dislocation of enclitic M-Word -que with adjacent M-Word Agr:*LD: [<sub>Agr</sub> [vig ^ e ^ mus]+que]<sup>43</sup>

This model of linearization therefore predicts that the intermediate M-Word levels that are available landing sites for Lowering will no longer be present after VI, due to atomization of the complex head, and so, in keeping with previous analyses, these intermediate levels will never be available for Local Dislocation operations with other M-words.<sup>44</sup> While the strict string-adjacency requirement of Local Dislocation somewhat obviates the need for the erasure of intermediate M-word levels—that is, even if embedded M-words of a complex head were still visible as such when Local Dislocation is evaluated, they would not be string-adjacent to an M-word found just outside that complex head—, maintaining these M-word levels after VI goes against the notion of the absence of complex embedded syntactic structure in a morpho-phonological string, and makes it difficult to account for M-word-internal Subword-to-Subword Local Dislocation operations (i.e., as we will see below, all terminals of a complex head must share a unique status at PF such that they are all equally individual elements of a larger structure, namely an M-word). In any case, for now I note only that the revised definition of M-Word holds for the observed instances of both Lowering and Local Dislocation, due to

<sup>43</sup>Note that the M-word that undergoes Local Dislocation (in this case, -que) becomes a Subword of its target (Embick and Noyer 2001, Embick 2006).

<sup>44</sup>Note, however, that as the Subword terminals are still present, they may undergo Local Dislocation operations with other Subwords contained within the same M-word. See the discussion below on the passive in Ndebele for more on this.

the fact that what qualifies as an M-Word will differ before and after Vocabulary Insertion.

In sum, the derivational history of narrow syntactic head movement (i.e. the iterative creation of M-words/ $X^0$ s) is still visible when Lowering is evaluated, but Vocabulary Insertion erases this history by converting a hierarchical object into a linearized string. In this way, when Asp lowers to  $v$  in Tagalog, it may target any M-word/ $X^0$  of the complex  $v$  head. However, if this transformation were a case of Local Dislocation, the intermediate M-word levels of the complex Tagalog verb could not be targeted by the M-word Asp<sup>0</sup>, and so the rich morphological optionality in Tagalog reduplication would not be possible.

#### 2.1.4 Tagalog *mag-*

In this section I show that, while the above model of post-syntactic transformations adequately accounts for several aspects of the aforementioned case of morphological optionality in Tagalog reduplication, it does not obviate the need for subsequent evaluation of phonological well-formedness after Vocabulary Insertion is complete. Namely, I argue that the syntax may overgenerate certain structures that will be ruled out by later inspection in the phonological component.

The Actor Topic marker *m-/um-* in Tagalog, which appears in contexts in which the external argument is also the grammatical subject of the verb, undergoes a phonological process of coalescence when it precedes the morphemes *pag-/pa-/pang-*:<sup>45</sup>

- (31) a. [m + pag - linis]  
           mag-       linis  
           AT.TRANS- clean  
           ‘cleans’
- b. [m + pag - bili]  
           mag-       bili  
           AT.TRANS- buy  
           ‘buys’

As we saw earlier, the transitivity marker *pag-* is generated within the scope of reduplication, i.e. within the lexical domain. However, if this morpheme undergoes

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<sup>45</sup>For more on the voice/topic alternations in Tagalog, see Schachter (1976).

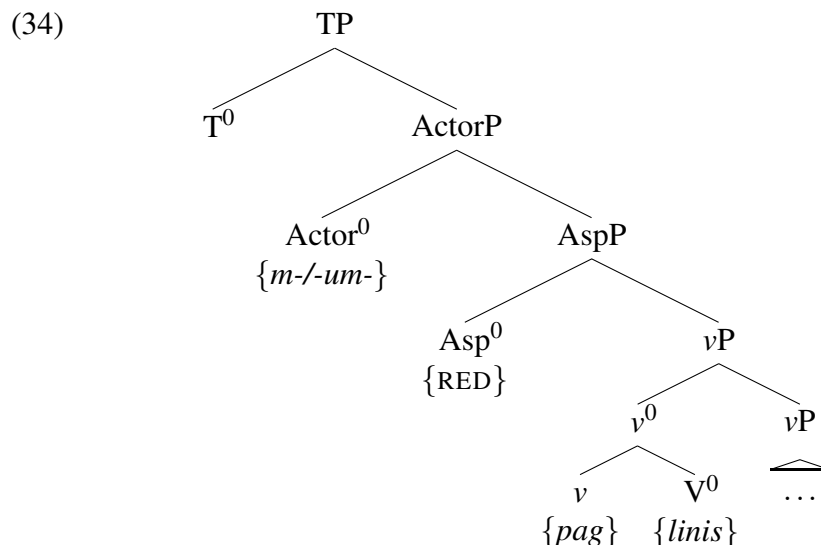
coalescence with the AT morpheme, it may no longer be reduplicated (Carrier 1979):

- (32) a. mag-[**lii**]-linis  
 b. \***[maa]**-mag-linis  
 c. \***[maa]**-pag-linis

I propose that the ungrammaticality of the forms in (32b-c) is due both to syntactic restrictions and phonological ineffability (i.e. crashing at PF evaluation). First, the Actor Topic morpheme is generated outside of the scope of reduplication, above Asp. This is evident from those cases that contain the *-um-* form of the affix, which also may not be reduplicated, and indeed appears to be infixated after reduplication occurs:

- (33) a. kain  
       ‘eat’  
 b. [**k**-[um]-**aa**-kain  
       -um- RED- kain  
       ‘is/are eating’  
 c. \***[kuu]**-kumain  
       RED- -um- kain

(33c) shows that the reduplicant may not attach to the verb after the AT morpheme. I thus propose the following general structure for a construction like (32a):



In the structure above, *m-* will never be within the scope of the reduplicant, thus ruling out the possibility of a form such as \*[*maa*]-*mag-linis* (from [*m-paa*]-*m-pag-linis*), due to syntactic restrictions; recall that linearization/VI will occur from the bottom up, and so Asp will receive its phonological features before the AT morpheme is coalesced with the transitivity marker *pag-*. As we saw in (32a), Asp may lower to V<sup>0</sup>, which is predicted under our model. However, as (32b) shows, lowering of Asp to v<sup>0</sup> creates the ungrammatical form \*[*maa*]-*pag-linis* (from *m-[paa]-pag-linis*). I claim that this is due to phonological ineffability. Under the analysis proposed here, though this structure may be derived via post-syntactic operations, it will be ruled out by constraint evaluation on the phonological form of reduplicative structures. Namely, the form [*maa*]-*pag-linis* is impossible as it violates the requirement that the phonological form of the reduplicant be faithful to the phonological features of the stem it has copied. While we could formulate this phonological restriction within many frameworks of evaluation and/or rules of phonological form, I use the well-known framework of Optimality Theory (McCarthy and Prince 1995, Prince and Smolensky 2004) to illustrate these generalizations. Note, however, that the version of Optimality Theory that I am implementing here only has the power to evaluate phonological form; it may not alter morpho-syntactic structure, which is determined solely via narrow syntactic and post-syntactic transformations. Therefore, for our purposes here, constraint evaluation at PF can merely determine whether a morpho-phonological structure fed to PF after the completion of Vocabulary Insertion is a viable phonological



output.

PF evaluation may determine that a given input is not viable, and will thus not allow the form to be pronounced. In order to capture this fact, we implement a CONTROL model of phonological evaluation (Orgun and Sprouse 2002), in which the optimal output candidate from EVAL undergoes a further evaluation of strictly inviolable constraints in CONTROL. If the most optimal candidate from EVAL violates any of the constraints in CONTROL, the form is ungrammatical, and a lexical gap is created (cf. Prince and Smolensky's 2004 MPARSE model). Thus, the CONTROL module is responsible for determining whether a given form created by pre-PF-evaluation operations is acceptable or not. In the case of reduplication in Tagalog, there is a necessarily inviolable IDENT constraint in CONTROL that requires that the leftmost segments of the reduplicant and the base correspond phonologically in the output. Additionally, I follow McCarthy and Prince's (1995) model of nasal coalescence; however, note that there are additional factors that contribute to nasal coalescence which have been omitted for clarity:

- (35) \*NC<sub>[-VOC]</sub>  
No nasal-voiceless consonant clusters.
- (36) UNIFORMITY  
No element in the output has multiple correspondents in the input.
- (37) IDENT<sub>LEFT</sub>(RED, BASE)  
Any element at the designated periphery [LEFT] of S1 [RED] in the output has a correspondent at the designated periphery of S2 [BASE] in the output.

We can thus effectively account for the unavailability of the surface form [*maa*]-*pag-linis* via the output constraint on phonological representations in (37), even though the morpho-syntactic derivation is possible:<sup>46</sup>

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<sup>46</sup>We must also disallow the possibility of backcopying of the form [*maa*]-*pag-linis* to [*maa*]-*mag-linis*, in which the *p* of *pag* is altered to satisfy IDENT<sub>L</sub>(RB). Recall, however, that we are implementing a very weak version of OT in which alteration of morpho-phonological form is strictly limited. In any case, if backcopying were possible during the process of constraint evaluation, I suggest that it would be disallowed here due to morpheme correspondence issues. That is, the resulting form would be indistinguishable from the surface form derived from [*m-paa*]-*m-pag-linis*, in which the *m*- prefix occurs within the scope of reduplication, and which is ruled out on syntactic grounds.

(38) *Phonological ineffability tableaux for [maa]-paglinis*

| Eval                                            |                       |            |
|-------------------------------------------------|-----------------------|------------|
| m <sub>1</sub> -[p <sub>2</sub> aa]-paglinis    | *NC <sub>[-VOC]</sub> | UNIFORMITY |
| a. m <sub>1</sub> -[p <sub>2</sub> aa]-paglinis | *!                    |            |
| ☞ b. [m <sub>1,2</sub> aa]-paglinis             |                       | *          |

| Control                          | IDENTL(RED, BASE) |
|----------------------------------|-------------------|
| ☞ [m <sub>1,2</sub> aa]-paglinis | *!                |

In (38), the EVAL form that satisfies the constraint on nasal-consonant clusters is sent to the CONTROL component, where it crashes due to its failure to meet the IDENT constraint. This captures the generalization that any reduplicative form in Tagalog in which the leftmost phonological segments of the reduplicant do not match those of the stem it has copied will be unpronounceable. The unavailability of reduplication of a coalesced AT marker is therefore accounted for straightforwardly, assuming that both syntactic and phonological factors play a role in disallowing the ungrammatical outputs. In the absence of such coalesced segments, as in the example [paa]-pag-lagy-an in (12b), neither syntactic nor phonological restrictions are violated, producing a grammatical structure, since the inviolable CONTROL constraint IDENTLEFT(RED, BASE) will be satisfied during the final stage of evaluation.

### 2.1.5 Section summary

I have argued above that the imperfective/unrealized aspectual morpheme of Tagalog is generated above vP in the position of Outer Aspect, and that this head lowers to the morphologically complex *v* head of its complement after Spell-out to the PF branch. When targeting this complex head, the Asp<sup>0</sup> head may adjoin to any X<sup>0</sup>-level projection of that complex head, thus deriving the positional free variation we observe in the surface representation of reduplicative constructions. I have also argued that, by readjusting the typology of what constitutes an M-word before and after Vocabulary Insertion, we may maintain Embick and Noyer's (2001) original claim that M-words may only interact with other local M-words in transformations on the PF branch, where the notion of

locality differs for head-to-head Lowering and merger/inversion of string-adjacent elements under Local Dislocation. Furthermore, I have shown that structures that are generated by narrow syntactic and post-syntactic transformations still must be subject to conditions on morpho-phonological well-formedness, and that not all possible structures are phonologically acceptable. We now turn to reduplication in Ndebele, which I argue is derived via the exact same process as Tagalog aspectual reduplication, and is susceptible to similar strictures.

## 2.2 Reduplication in Ndebele

We saw above that a Lowering analysis of reduplication in Tagalog can account for the positional optionality of the reduplicant.<sup>47</sup> We must now ask whether this model can be implemented to explain other cases of multiple exponence. In this section, I argue that, though the surface position of the reduplicant is fixed, the variable forms of the reduplicant in Ndebele (Bantu: Zimbabwe) are accounted for under the proposed system of Lowering. Thus, as we will see, the model of Lowering presented in this chapter has the explanatory power to capture two very different types of multiple exponence in reduplication.

Verbal reduplication in Ndebele expresses the idea that an event occurs only for a short while, or happens only from time to time (Sibanda 2004). The reduplicant in Ndebele must be disyllabic with no coda in the second syllable. When the verb root that is targeted contains two or more syllables, there is no variation in the form of reduplication; only information from the root may be copied into the reduplicant (data from Hyman et al. 1999):

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<sup>47</sup>Note that the analysis of Ndebele reduplication, as well as the analysis of Tagalog reduplication, presented here are based on Skinner (2008).

- (39) a.    **[nambi]-**    nambith    -a  
          \***[nambith]-**    nambith    -a  
          \***[namb-a]-**    nambith    -a  
          \***[nam]-**    nambith    -a  
          **[RED]-**    taste    -a  
          ‘taste a bit’
- b.    **[nambi]-**    nambith    -el    -a  
          \***[namb-a]-**    nambith    -el    -a  
          \***[namb-e]-**    nambith    -el    -a  
          **[RED]-**    taste    -APPL    -a  
          ‘taste a bit for’ (applicative -*el*)

However, when the root is monosyllabic in Ndebele, certain suffixes may be optionally copied into the reduplicant. This suggests that it is not the case that reduplication simply targets a string of phonological material in the PF representation, but is rather in some way sensitive to morpho-syntactic structure. Indeed, we see a pattern similar to Tagalog, in that only morphemes that are base-generated within the lexical domain are available for reduplication. In (40), we observe that the applicative and causative morphemes, normally believed to be generated in the lexical domain (Pylkkänen 2001),<sup>48</sup> may be optionally targeted for reduplication (recall that we analyze -*a* as epenthetic to satisfy the phonological conditions of reduplicant disyllabicity and/or NOCODA):

- (40) a.    **[lim-e]-**    lim    -el    -a  
          **[lim-a]-**    lim    -el    -a  
          **[RED]-**    cultivate    -APPL    -a  
          ‘cultivate a bit for’
- b.    **[lim-i]-**    lim    -is    -a  
          **[lim-a]-**    lim    -is    -a  
          **[RED]-**    cultivate    -CAUS    -a  
          ‘make cultivate a bit’ (causative -*is*)

The condition on reduplicant disyllabicity may be met in (40) by either copying the

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<sup>48</sup>Pylkkänen (2001) distinguishes between high and low applicatives, the former generated above  $\nu$ P and the latter below  $\nu$ P. See §2.2.3 for more on the location of these applicative heads.

first vowel of the applicative or causative morpheme, or via epenthesis of *-a*.<sup>49</sup> In this case, reduplication of the suffixes appears to be truly optional.

Also just as in Tagalog, affixes in Ndebele that are generally believed to be in the functional domain may not be targeted for reduplication:

- (41) a.    \***[lim-e]-**   lim        -e  
              **[lim-a]-**   lim        -e  
              **[RED]-**   cultivate   -SUBJV  
               ‘cultivate (subjunctive) a bit’
- b.    \***[lim-i]-**   lim        -i  
              **[lim-a]-**   lim        -i  
              **[RED]-**   cultivate   -NEG  
               ‘not cultivate a bit’

The subjunctive tense and negative suffixes may not be copied into the reduplicant here, and so only epenthetic *-a* may be used in (41) to meet reduplicant minimality (i.e. fill the [σσ] template of the reduplicant’s Vocabulary item).

Furthermore, if the root is consonantal, we see an even greater amount of overt variation in the reduplicant (similar to *-a*, *-yi* is an epenthetic syllable):

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<sup>49</sup>In previous analyses of Ndebele reduplication (e.g. Hyman et al. 1999, Inkelas and Zoll 2005), *-a* is treated as a semantically empty epenthetic morpheme, rather than simply an epenthetic phonological segment, as these theories rely on a purely templatic morphology for reduplication, in which morphological ‘slots’ must be filled. This distinction is not crucial to our analysis, as we are merely concerned with the fact that *-a* is not present in the underlying syntax. However, as we will see below, the analysis presented here will obviate the need for a templatic morphology and, consequently, epenthetic morphemes.

- (42) a.     [**dl-a-yi**]- dl   -a  
           [**RED**]-   eat  -a  
           ‘eat a bit/eat from time to time’
- b.     [**dl-a-yi**]- dl   -el   -a  
           [**dl-e-yi**]- dl   -el   -a  
           [**dl-el-a**]- dl   -el   -a  
           [**RED**]-   eat  -APPL -a  
           ‘eat a bit for’
- c.     [**dl-a-yi**]- dl   -is   -a  
           [**dl-i-yi**]- dl   -is   -a  
           [**dl-is-a**]- dl   -is   -a  
           [**RED**]-   eat  -CAUS -a  
           ‘make eat a bit’
- d.     [**dl-a-yi**]- dl   -el   -i  
           [**dl-e-yi**]- dl   -el   -i  
           [**dl-el-a**]- dl   -el   -i  
           \*[**dl-el-i**]- dl   -el   -i  
           [**RED**]-   eat  -APPL -NEG  
           ‘not eat a bit for’

Given this robust sensitivity to morpho-syntactic structure, we may assume that reduplication in Ndebele does not rely solely on phonological output conditions, but rather that, like Tagalog, its targets are restricted to those morphemes generated in the syntactic lexical domain. The problem, therefore, is how to account for the fact that the reduplicant in Ndebele does not simply copy all of the morpho-phonological material to its right, but instead may optionally target varying subsets of the phonological material of these morphemes. To explain this pattern, we must determine why reduplication in Ndebele is limited to the morpho-syntactic structure of the lexical domain, in addition to why there is such a great range of optionality in the morphemes that it targets within that domain.

### 2.2.1 Previous morphological accounts of Ndebele reduplication

Given the incontrovertible morphological sensitivity of Ndebele reduplication, it is not surprising that it has been previously analyzed as a result of morphological operations, just as is the case with Tagalog reduplication. However, the recent

treatments of this phenomenon in Ndebele have proposed new and somewhat language-specific post-syntactic operations to account for the observed variations. For example, Hyman et al. (1999) propose a Bantu-specific morphological template into which the morphemes above are inserted; morphemes that cannot be reduplicated are simply inserted into slots that are outside the scope of the insertion point of the reduplicative morpheme within this template. As illustrated previously, such morphological limitations can be derived simply via narrow syntactic derivation, and so I will not address the viability of such a language-specific template further here. Rather, I will briefly examine another theory of Ndebele reduplication that attempts to exploit the syntactic nature of morphological derivation. I will show that certain problems associated with the following theory may be obviated by adopting a localist view of morphological derivation, under which later phonological evaluation is strictly limited in its ability to affect the morphological structure, if not completely unable to do so.

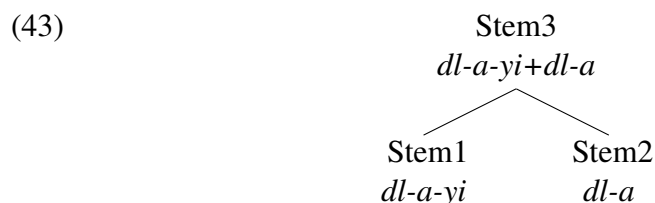
Inkelas and Zoll (2005) propose a *Morphological Doubling Theory* to account for the variations in Ndebele reduplication. Under this theory, the reduplicant is not an individual morpheme that attaches to a verb stem, but rather a separate syntactic derivation of another verb stem, thus accounting for the potential morphological complexity of the “reduplicant”. The stem normally considered to be the reduplicant, Stem1, must be morpho-semantically identical to the stem normally thought of as the base, Stem2, after the point of morpho-syntactic derivation.<sup>50</sup> Therefore, reduplication is simply concatenation of two individual verb stems under this analysis, rather than the affixation of a reduplicative morpheme to a verb stem, somewhat similar to serial verb constructions.<sup>51</sup> Given that there are striking differences between the shape of Stem1 and Stem2 (see the data above), it is proposed that each is evaluated by a different ranking of phonological output constraints (i.e. co-phonologies). A third co-phonology is used to evaluate the entire

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<sup>50</sup>In actual practice, it seems that this is more a subset relation of morphemes, rather than a strict parallel identity condition; Stem1 may only contain a subset of the semantically contentful morphemes of Stem2.

<sup>51</sup>Note, however, that in serial verb constructions, two separate stems are contained in the pre-syntactic numeration (Baker and Stewart 2002). However, under Morphological Doubling Theory, the additional stem (i.e. the reduplicant) is created via an idiosyncratic stem-doubling process. It must be pointed out that this process is not only peculiar to reduplication, but is also a novel derivational operation. I will later propose that we can account for these patterns without positing any new structure-building tools.

combined structure for basic word-level well-formedness. For example to derive (42a), we have a morphosyntactic derivation like the following:



In (43), the phonological size constraints for Stem1 and Stem2 are evaluated via different sets of constraint rankings on output forms, while the combined structure, Stem3, is subject to a third set of constraint rankings, one that determines word-level well-formedness. While the presence of multiple stems and co-phonologies might account for the variations in question, I believe the non-morphemic status of the reduplicant is a flaw in this theory. Reduplication cross-linguistically carries its own specific semantics—and Ndebele is not an exception—, suggesting that the reduplicant is stored in the pre-syntactic lexicon as its own morpho-semantic/morpho-syntactic feature bundle. In order to derive the aspectual semantics of a Stem1+Stem2 (i.e. verb+verb) construction, interpretation at LF in Ndebele would have to include a special rule of semantics to interpret the concatenated structure as such, whereas this is unnecessary if the reduplicant enters the derivation as a separate aspectual morpheme that carries its own semantic interpretation. As we will see below, I believe that we can account for these morphological variations via the theory of post-syntactic Lowering, without positing the derivation of two separate verbal stems or the presence of co-phonologies.

### 2.2.2 Ndebele reduplication as a Lowering Outer Aspect head

As reduplication in Ndebele encodes information about how an event is situated on a timeline, more or less (e.g. “from time to time” or “for a little bit”), I claim that this reduplicative morpheme is generated in the position of Outer Aspect, as in Tagalog, and lowers to the complex *v* head of its complement. Under this analysis, Lowering of the reduplicant in Ndebele works identically to Lowering in Tagalog, with the only difference being the directionality of affixation of certain morphemes, which, as mentioned previously, is determined by the individual Vocabulary item



upon Vocabulary Insertion. Consider the negated applicative construction of the consonantal verb root *dl* ‘eat’, repeated below:

- (44)
- |    |                      |                     |       |      |
|----|----------------------|---------------------|-------|------|
| a. | [ <b>dl-a-yi</b> ]-  | dl                  | -el   | -i   |
| b. | [ <b>dl-e-yi</b> ]-  | dl                  | -el   | -i   |
| c. | [ <b>dl-el-a</b> ]-  | dl                  | -el   | -i   |
| d. | *[ <b>dl-el-i</b> ]- | dl                  | -el   | -i   |
|    | [ <b>RED</b> ]-      | eat                 | -APPL | -NEG |
|    |                      | ‘not eat a bit for’ |       |      |

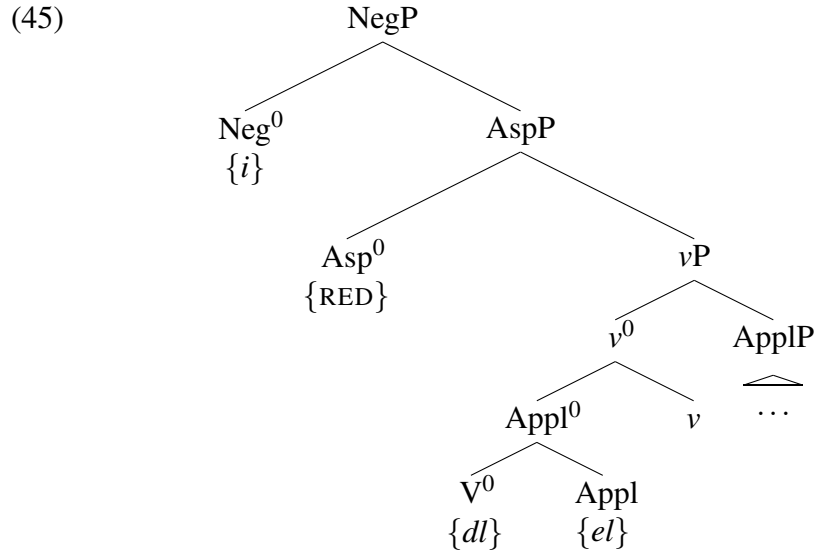
I assume that (44b-c) are merely phonological variants of the same morphological structure,<sup>52</sup> and that negative *-i* is unavailable for reduplication, since it is generated in the functional domain outside of the scope of the reduplicant. In (44a), the reduplicant contains only the root plus epenthetic segments, and in (44c), the reduplicant contains the root, the applicative morpheme, and epenthetic *-a*; the reduplicant in (44b) also contains the root and applicative morphemes, but uses epenthetic *-yi*. I propose the following syntactic structure as the input to morphology (i.e. the structure at Spell-out to PF) for all grammatical forms (44a-c):

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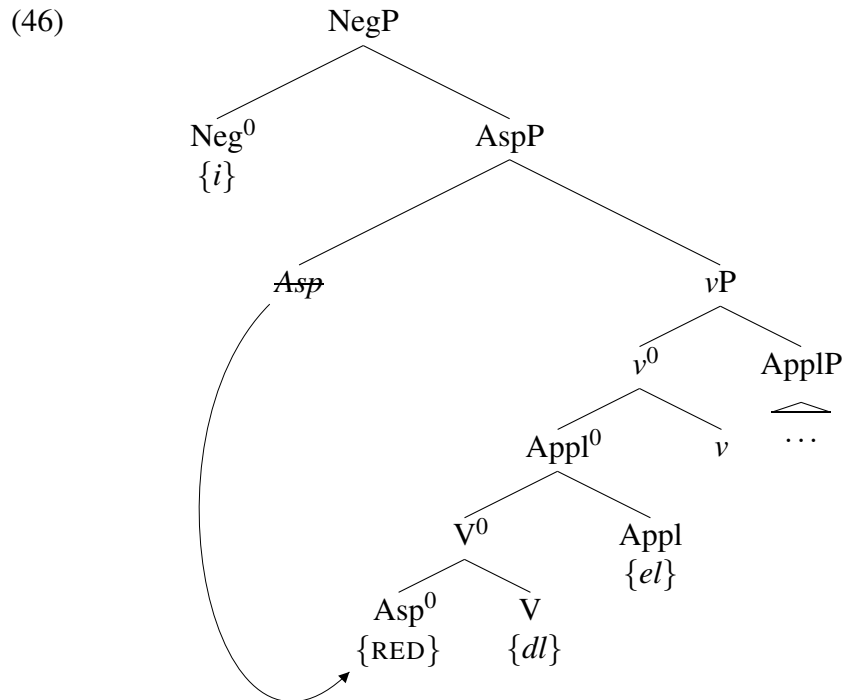
<sup>52</sup>As both *-a* and *-yi* are cases of epenthesis, I merely argue that they are in competition with each other at phonological form, perhaps as a result of the interaction of the following constraints:

- (i) MAX(RED)  
Do not delete any segment from the reduplicant.
- (ii) \*DORSAL  
Dorsal vowels (e.g. [a]) are prohibited.

If MAX(RED) and \*DORSAL are crucially unranked relative to one another, deletion of a segment from the reduplicant will be equally as costly as epenthesis of *-a*. This captures the generalization that coronal segments (e.g. [i]) are most often the least marked segments cross-linguistically. Nevertheless, since both structures in (44b-c) contain the same morphosyntactic make-up, we won’t be concerned with this phonological variation in the remainder of our discussion.



To derive the form in (44a),  $\text{Asp}^0$  lowers to  $\text{V}^0$  as follows:



At VI, the following linearizations and phonological mappings take place:<sup>53</sup>

<sup>53</sup>Here, we may simply assume that the verb raises to or above Neg after the Lowering operation takes place (see §3), though this is not strictly necessary, as  $\text{Neg}^0$  may simply undergo Local Dislocation with the  $[dl \wedge dl \wedge el]$  M-word after VI applies to this M-word, similar to Latin *-que*. Additionally, we assume a phonologically null  $v$ , but do not include it in our linearization rules, as it does not affect any process occurring during or after Vocabulary Insertion.

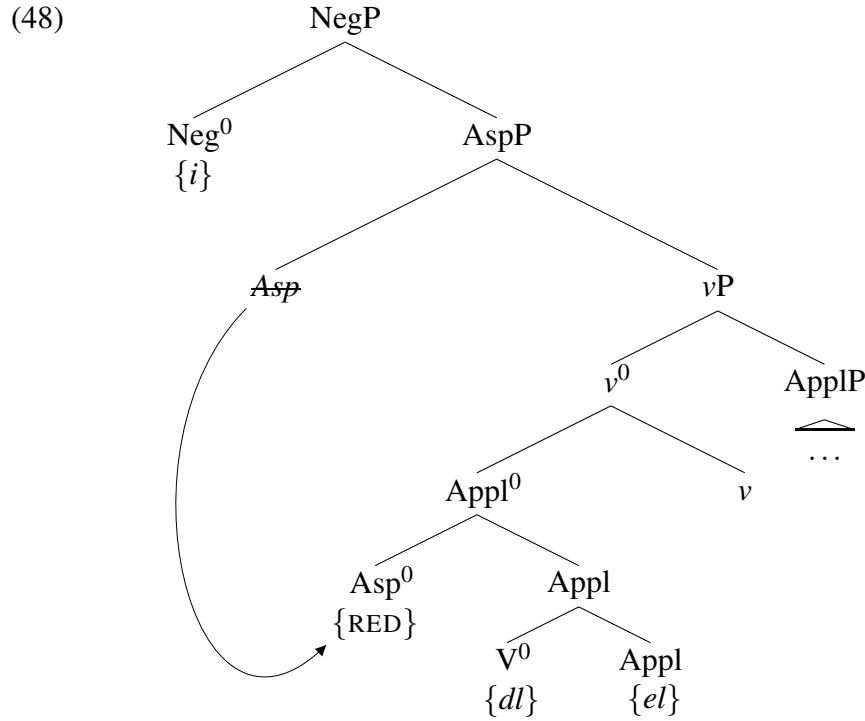
- (47) Cycle 1: [ $\sigma\sigma \wedge dl$ ]  
 Cycle 1': [ $dl \wedge dl$ ] *Phonological copying into reduplicant*  
 Cycle 2: [ $dl \wedge dl \wedge el$ ]  
 Cycle 3: [ $dl \wedge dl \wedge el \wedge i$ ]

Crucially, phonological copying into the reduplicant occurs on the reduplicant's VI cycle, and no later. Thus, the reduplicant will have access only to the phonological features that have been mapped to the structure before it itself is mapped to phonology. Consequently, the disyllabic template of Asp in (47) only has access to the phonological features previously mapped to  $[dl]$ , and so, in order to fill this template,  $[dl]$  in (47) is augmented to  $[dl-a-yi]$  via epenthesis.<sup>54</sup> Therefore, it is not always the case that the reduplicant will be able to fill its template by copying as many phonological features to its right as possible in the overt, completed phonological representation, but that the phonological features available to the reduplicant are limited to those that have already been mapped cyclically via VI before VI applies to the reduplicant.

Similarly, to derive (44c) [*dl-el-a*]-*dl-el-i*, Asp<sup>0</sup> lowers to Appl<sup>0</sup>, as follows:

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<sup>54</sup>It is unclear whether this augmentation via epenthesis takes place during the VI cycle itself to fill the templatic Vocabulary item or later at PF evaluation to satisfy some condition on full prosodic interpretation (i.e. the disyllabic template must be filled before pronunciation). I will assume the latter, for ease of exposition, but note that this is not crucial for the analysis presented here.



Deriving the following linearizations upon VI:

- (49) Cycle 1: [dl ^ el]  
 Cycle 2: [ $\sigma\sigma$  ^ dl ^ el]  
 Cycle 2': [**dlel** ^ dl ^ el] *Phonological copying into reduplicant*  
 Cycle 3: [**dlel** ^ dl ^ el ^ i]

Here, the reduplicative aspectual morpheme has access to the phonological features of both the root and the applicative morpheme during its VI cycle, given that it has lowered to a position from which it takes scope over these heads, and so is assigned phonological features after these two lower heads have undergone VI. Again, the reduplicant [**dlel**] must undergo epenthesis to fill the disyllabic template of the reduplicant.<sup>55</sup>

Note that when the root is polysyllabic, phonological copying into the aspectual reduplicant template will target as many features as possible, and, in this case, will be able to target enough features to fill the disyllabic template (e.g. [**nambi** ^ *nambith* ^ el ^ i]). Thus, no suffix or epenthetic segments will ever surface within the overt representation of the reduplicant when the root is polysyllabic.

<sup>55</sup>In the case of epenthesis of -yi, the [l] must be deleted due to phonotactic constraints. See fn. 52.

Crucially, the only optionality under this theory is that of the Lowering operation of  $\text{Asp}^0$ , which may target any  $X^0$ -level of the complex head of its complement, just as in Tagalog. Therefore, there is no need to posit morphological templates, extraneous derivational operations, or variably ranked morpho-phonological output constraints in order to account for these patterns.

### 2.2.3 Passives in Ndebele

We saw above that morphemes in the functional domain such as negative *-i* and subjunctive *-e* are unavailable for reduplication simply because they are generated in a higher syntactic position than the reduplicative aspectual morpheme. However, syntactic restrictions on reduplicative structures are not limited to the unavailability of morphemes in the functional domain. In the following discussion, we will see that certain instances of the lexical, passive morpheme are also sometimes unavailable for reduplication, but other times are surprisingly available for reduplication. I show that the theory of reduplication presented above correctly predicts both the availability and unavailability of passive reduplication in these patterns.

First, recall that the applicative morpheme *-el* in Ndebele introduces an additional argument. The semantic role attributed to this additional argument is not fixed, but rather depends on the semantic class of the verb to which it adjoins (e.g. it can be a benefactive, goal, locative, etc., Sibanda 2004). Furthermore, there are two possible argument structures for the applicative. This becomes evident in cases of passivization, like the example below. In (50a), the benefactive argument has moved to subject position, and in (50b) it is the theme argument that moves to subject position, suggesting a different structural ordering between the passive and applicative projections. We crucially note, however, that the surface order of morphemes within the verb is identical in both examples, e.g. *phek-el-w* (data from Hyman et al. 1999).<sup>56</sup>

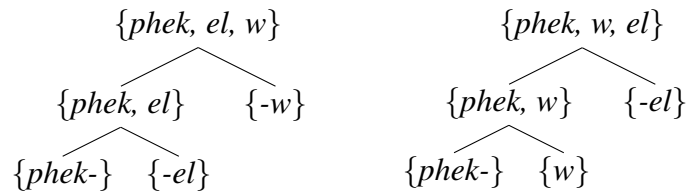
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<sup>56</sup>Note that I use passive examples here, since in active sentences the agent will invariably occupy the subject position.

- (50) a. abantwana b- a- phek -el -w -a ukudla.  
 children they- PAST- cook -APPL -PASS -a food  
 ‘the children were cooked food’
- b. ukudla kw- a- phek -el -w -a abantwana.  
 food it- PAST- cook -APPL -PASS -a children  
 ‘the food was cooked for the children’

Following Pytkänen (2001), we attribute this syntactic difference to the existence of both high and low applicative projections in the narrow syntax, the low position corresponding to (50a) and the high position to (50b);<sup>57</sup> (50a) is a passivized applicative, corresponding to the general structure in (51a) below,<sup>58</sup> and (50b) is an applicativized passive, corresponding to (51b) below (Hyman et al. 1999).

- (51) a. *passivized applicative* b. *applicativized passive*



First note that the applicativized passive structure in (51b) predicts the wrong surface order of morphemes (i.e. *\*phek-w-el* instead of *phek-el-w*). I will later argue that the correct order is derived via a Local Dislocation operation (e.g. the high applicative/applicativized passive undergoes Local Dislocation from  $[phek \wedge w \wedge el]$  to  $[phek \wedge el+w]$ ), but that it is the morpho-syntactic structures in (51) that are crucial for reduplication, rather than the resulting morpho-phonological string.

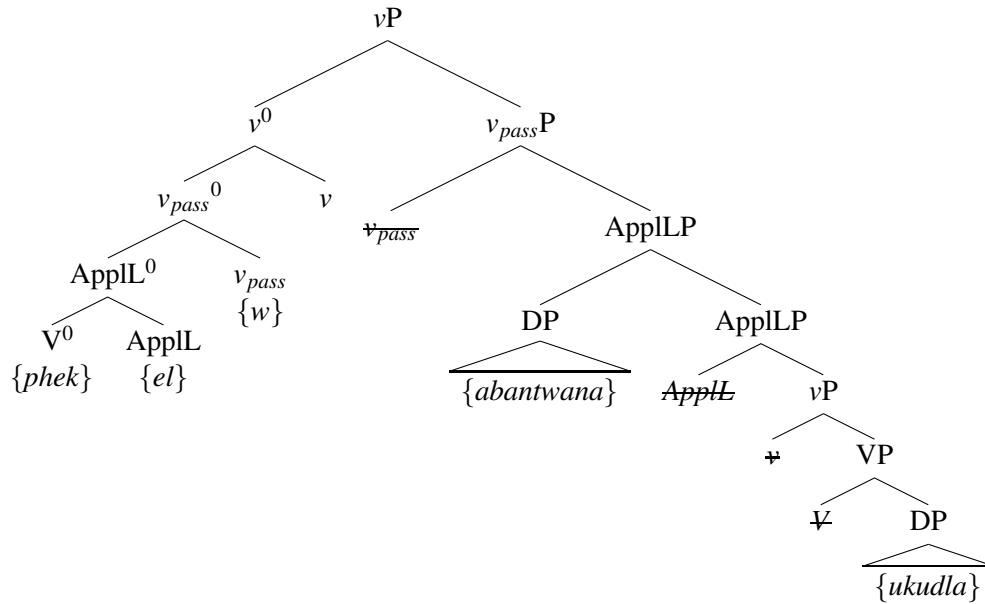
With regard to the passive forms above, I assume that it is the first DP argument located below the passive morpheme that is promoted to subject position. Thus, in a passivized applicative, the argument introduced by the applicative morpheme will

<sup>57</sup>Unlike Pytkänen, we will assume that both of these applicative projections are generated in the lexical domain, as I assume that all argument-introducing heads are lexical. Pytkänen generates ApplH above vP and ApplL below VP. However, taking into account the morpho-syntactic distribution of reduplicable verbal suffixes in Ndebele, I will generate all of these above VP in the lexical domain. I refer the reader to her work for more on the semantic distinction of these two projections. What is crucial to note here, however, is simply that two possible syntactic orderings are available between the passive and applicative morphemes. We are concerned primarily with the morpho-syntactic/phonological, rather than semantic, effects of these different structures.

<sup>58</sup>These trees will be further articulated syntactically in the upcoming discussion.

be promoted to subject position (e.g. the benefactive *abantwana* ‘the children’ in (50a)/(51a), whereas in an applicativized passive, the theme argument will move to subject position (e.g. *ukudla* ‘the food’ in (50b)/(51b)). For example, the structure of the passivized applicative *vP* in (50a) is represented as follows (ApplL = low applicative):<sup>59</sup>

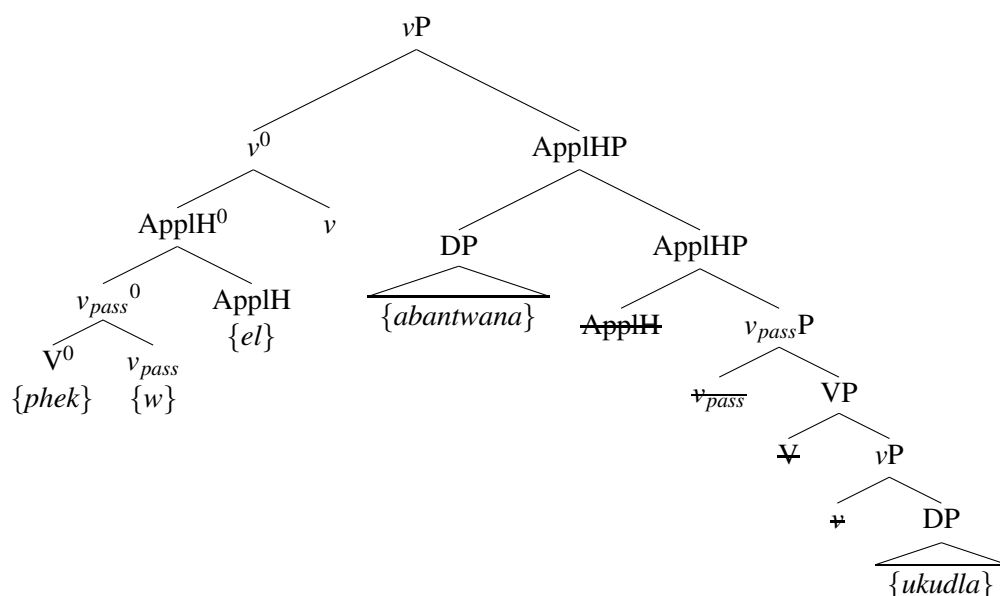
(52) *Passivized applicative*



In (52) the first DP argument in the c-command domain of the base position of  $v_{pass}$  is the argument of the low applicative, and so this DP is promoted to subject position.<sup>60</sup> However, as shown below, in the applicativized passive construction (50b), the high applicative morpheme is generated above  $v_{pass}P$ , and so the first argument c-commanded by the base position of the passive is the object DP, which is promoted to subject (ApplH = high applicative).

<sup>59</sup>Note that I include a dominating  $vP$  projection here in order to maintain uniformity in my trees, though this may not be necessary. If applicative and passive projections are also  $vPs$  that induce V-to- $v$  raising, then the presence of the highest  $vP$  in these representations is unnecessary. However, its inclusion does not affect the current analysis, as it is only important that the V head moves to the head of the complement of the aspectual reduplicant, whether that complement is  $vP$ ,  $v_{pass}P$ , or ApplP.

<sup>60</sup>I assume that the subject promotion occurs when  $v_{pass}$  is first merged (i.e. it is perhaps the case that the  $v_{pass}$  head moves the promoted subject to its specifier position when it is merged), though the details of this operation are not crucial for the current analysis.

(53) *Applicativized passive*

Recall again that, though the verbs in (50) have different underlying syntactic structures, they have identical surface forms, e.g. *phek-el-w* (again, due to Local Dislocation; see below). Curiously, when the verbs in these examples are reduplicated, we observe a clear asymmetry, despite the identical surface forms of the complex verbs in the base:

(54) *Low applicative/passivized applicative*

- a. b-a-[**phek-e**]-phek-el-w-a
- b. b-a-[**phek-a**]-phek-el-w-a
- c. \*b-a-[**phek-w-a**]-phek-el-w-a
- d. \*b-a-[**phek-w-e**]-phek-el-w-a

(55) *High applicative/applicativized passive*

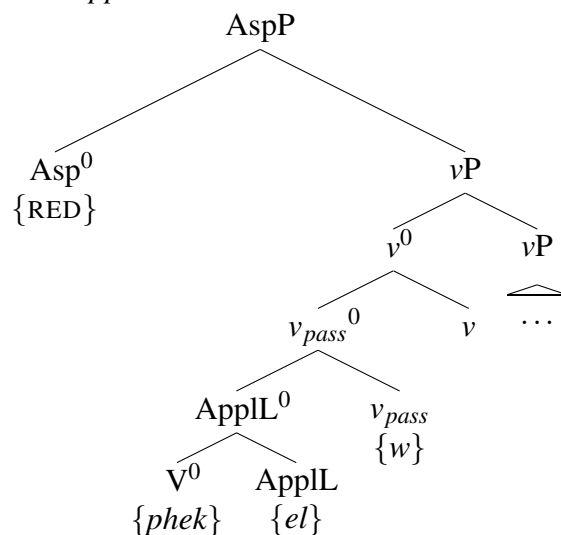
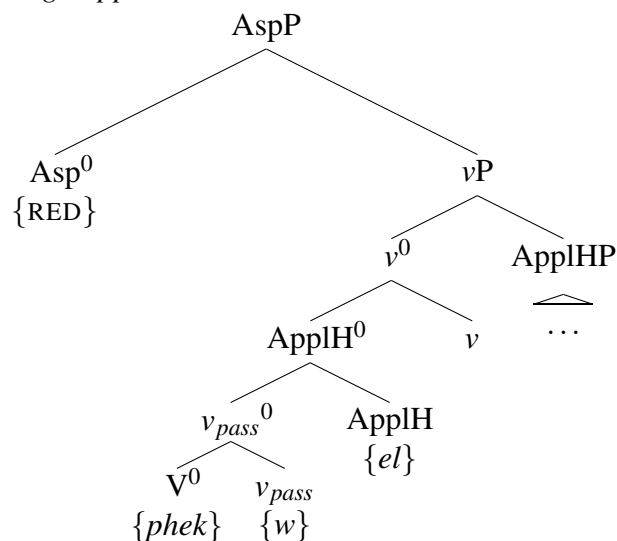
- a. kw-a-[**phek-e**]-phek-el-w-a
- b. kw-a-[**phek-a**]-phek-el-w-a
- c. kw-a-[**phek-w-a**]-phek-el-w-a
- d. \*kw-a-[**phek-w-e**]-phek-el-w-a

The forms in (54a,b) and (55a,b) are, at first glance, unproblematic under the current analysis of reduplication in Ndebele, given that each appears to be optionally targeting the applicative morpheme that is adjacent to the verb root, like the examples we saw in the previous section. Furthermore, note that in



the low applicative (54c), the verb root and the passive morpheme may not be targeted as a unit for reduplication, which is unsurprising considering that these are not contiguous (i.e. string-adjacent) morphemes. However, this is possible for the high applicative (55c); i.e., here, the non-contiguous root and passive morphemes are being copied into the reduplicant. Crucially, if reduplication were sensitive simply to linear strings of morphemes, then this asymmetry would not be predicted, as the linear strings of the base are identical in both (54) and (55). Furthermore, it would be impossible to account for the form in (55c) under such an analysis, as the morphemes *phək* and *-w* are not linearly adjacent in the morpho-phonological representation of the base, yet they are targeted as a unit for reduplication, to the exclusion of the linearly intervening applicative morpheme *-el*. If reduplication were simply phonological copying of a linear string from the final output representation of the base, it would be difficult to account for the transparency of the segments corresponding to the applicative morpheme in (55c).

The reasons for this asymmetry become clear if we look at the structure of the complex *v* head formed via V-to-*v* movement in the structures in (52) and (53), schematized as follows along with the aspectual reduplicative morpheme:

(56) *Applicative/passive structures*a. *Low applicative*b. *High applicative*

In the low applicative structure (56a), there is no  $X^0$  that dominates just the verb root and the passive morpheme; therefore, Asp may not lower to a position from which it will copy only that information to the exclusion of the applicative morpheme, which accounts for the ungrammaticality of (54c) *\*b-a-[phek-w-a]-phek-el-w-a*. However, in (56b), such a position exists, namely  $v_{pass}^0$ , and so the reduplicative morpheme may copy phonological information from just the root and passive morpheme during linearization, thus producing the grammatical (55c) *kw-a-[phek-w-a]-phek-el-w-a*; i.e., at some point during the

VI process, Asp may scope over just  $[phek \wedge w]$ , by adjoining to  $v_{pass}^0$ , and copy that phonological material. Therefore, it is crucially the morpho-syntactic structure, rather than the ultimate PF representation, that constrains reduplicative copying in Ndebele. In particular, as we will see, it is the process of mapping that morpho-syntactic structure to phonology that produces the patterns of Ndebele reduplication observed above.

As noted previously, the high applicative/applicativized passive structure in (56b) predicts an incorrect ordering of morphemes with respect to the passive and applicative. For example, we would expect from this structure the order  $*[phek-w-el]$ , which is never the case. Additionally, we would predict that the reduplicative form  $[phek-e]$  would be impossible under the high applicative structure, as there is no node that dominates just the verb root and the applicative morpheme to the exclusion of the structurally intervening passive. However, these problems are resolved if we posit a Local Dislocation rule for the passive morpheme with the applicative morpheme in the high applicative structure (e.g.  $[phek \wedge w \wedge el] \rightarrow [phek \wedge el+w]$ ), in addition to the following rule regarding the timing of Local Dislocation operations:

(57) *Timing of Local Dislocation*

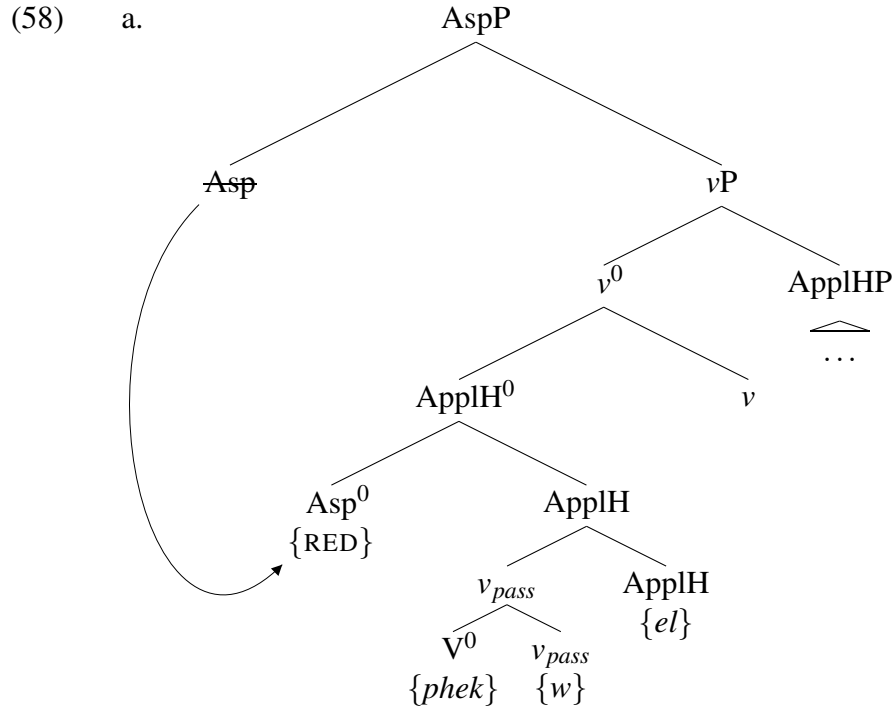
During the cyclic process of Vocabulary Insertion, a morpheme will undergo Local Dislocation as soon as possible.<sup>61</sup>

Under (57), Local Dislocation operations are not delayed until after all VI cycles are complete, but rather occur during the VI process itself.<sup>62</sup> With respect to Ndebele, (57) predicts that the passive morpheme will undergo Local Dislocation as soon as there is another morpho-phonological element to its right, within the same M-word. Note that both the passive and applicative morphemes are classified as Subwords of the same M-word—they are both terminals of the same complex head before VI—, and so may interact with each other in a transformational process. Furthermore, following (57), if Local Dislocation of the passive morpheme is possible at any point in the process of cyclic Vocabulary Insertion, it must occur before any other

<sup>61</sup>Recall that “cyclic” here does not refer to phase cycles, but rather to the subsequent bottom-up cycles of Vocabulary Insertion on the group of terminal morpho-syntactic elements sent to PF on a phase Spell-out cycle. We will address the issue of phases at length in §3 and the remaining chapters.

<sup>62</sup>Note that Embick and Noyer (2001) allow for this possibility, as well.

morpheme is evaluated for phonological features, including the reduplicant. In this way, I argue that Local Dislocation is evaluated on each individual linearization cycle. For example, to derive (55a) [*phək-e*]-*phək-el-w-a* from the high applicative structure in (56b),  $\text{Asp}^0$  first lowers to  $\text{ApplH}^0$ , deriving the following structure and linearization cycles:



- b. Cycle 1: [phək ^ w]  
 Cycle 2: [phək ^ w ^ el]

Local Dislocation of *w* and *el*:

Cycle 2': [phək ^ el+w]

Cycle 3: [σσ ^ phək ^ el+w]

Copying of phonological features into template:

Cycle 3': [**pheke** ^ phək ^ el+w]

Note, again, that in the morpho-syntactic structure of the applicativized passive above, the verb root and the applicative do not form an exclusive morpho-syntactic constituent, though they are targeted as adjacent morpho-phonological elements

in reduplication. However, in keeping with (57), Local Dislocation of *w* and *el* must occur before Cycle 3 takes place (i.e. before the reduplicant is assigned phonological segments), and therefore their positions within the morpho-phonological string will be inverted, thus forming the string  $[phek \wedge el + w]$  before reduplicative copying occurs. Note, again, that at the stage of Cycle 2 both  $[w]$  and  $[el]$  are Subwords of the larger M-word  $[phek \wedge w \wedge el]$ , and so Subword-to-Subword Local Dislocation is possible.

Furthermore, under the low applicative structure in (56a), no Local Dislocation is necessary, since the passive morpheme already follows the applicative morpheme.<sup>63</sup>

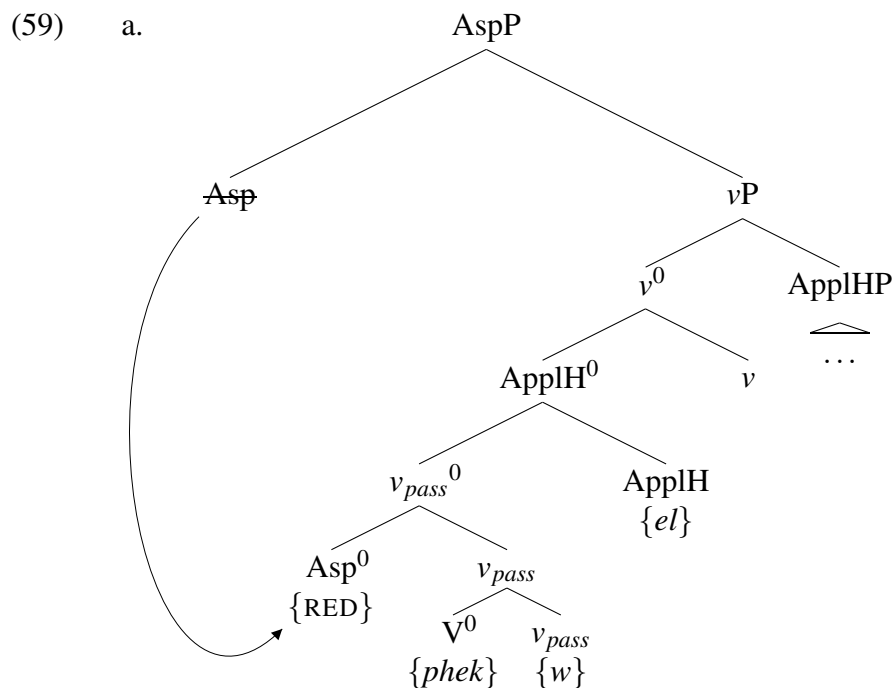
Not only does this account for the invariable surface position of the passive morpheme (i.e. the underlying high applicative sequence  $[w \wedge el]$  will always be converted to  $[el + w]$ , which is identical to the surface form produced by the structure of the low applicative), but it also explains why the high applicative form  $*[kw - a - [phek - w - e] - phek - el - w - a]$  is impossible, since reduplicative copying would have to occur before Local Dislocation in order to derive this form, contra (57). However, as noted above, when  $Asp^0$  scopes over  $ApplH^0$  after Lowering, it necessarily is not assigned phonological segments until after Local Dislocation of the lower  $[w]$  and  $[el]$  morphemes. Consequently, a string like  $[Asp \wedge phek \wedge w \wedge el]$  is never derived during VI/linearization since, before *Asp* undergoes VI, the string  $[phek \wedge w \wedge el]$  is converted to  $[phek \wedge el + w]$  via Local Dislocation of the passive. Therefore, we correctly predict that reduplication in Ndebele will never be able to target a string  $[phek \wedge w \wedge el]$ .

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<sup>63</sup>It may be the case that, in the low applicative construction,  $[el \wedge w]$  undergoes a string-vacuous Local Dislocation operation to  $[el + w]$ . The motivations for Local Dislocation of *-w* are not entirely clear, but the evidence indicates that this morpheme always appears at the end of the lexical stem, regardless of the underlying argument structure; alternatively, it must always appear as the last morpheme of the complex head/M-word in which it is contained (see the discussion on Turkish pre-stressing morphemes (e.g. the yes/no clitic  $[mI]$ ) in §2.3 for a similar example). Furthermore, we may conjecture that *-w* is parasitic due to the fact that it is too small to stand on its own phonologically; i.e. morphemes that are subsyllabic must adjoin to an adjacent morpheme in order to be licensed.

Alternatively, it is possible that the Vocabulary item corresponding to the passive morpho-syntactic bundle is simply a [LABIAL] feature, rather than a full phonological segment. In this way, it can be categorized as a “mobile morpheme” (Piggott 2000, Rose 1997). These featural affixes cannot stand on their own phonologically, and so must be licensed by other phonological segments. This may allow us to motivate more clearly the Local Dislocation operation observed above by assuming that, when possible, this [LABIAL] feature will look to an adjacent Subword as a potential licenser. More evidence is needed to verify this scenario, however.

However, reduplication may target the string  $[phek \wedge w]$  in the high applicative, as shown in the problematic (55c) *kw-a-[**phek-w-a**]-phek-el-w-a*. This pattern is easily accounted for under the current model, which allows different adjunction sites of the Lowering  $Asp^0$  head. The following represents this derivation, where  $Asp^0$  lowers to  $v_{pass}^0$  in the high applicative structure (56b):



- b. Cycle 1:  $[phek \wedge w]$   
 Cycle 2:  $[\sigma\sigma \wedge phek \wedge w]$

Copying of phonological segments:

Cycle 2':  $[\mathbf{phek}w \wedge phek \wedge w]$

Cycle 3:  $[\mathbf{phek}w \wedge phek \wedge w \wedge el]$

Local Dislocation of  $w$  and  $el$ :

Cycle 3':  $[\mathbf{phek}w \wedge phek \wedge el+w]$

In (59), since the high applicative structure contains an  $X^0$  position that includes just the root and passive morphemes,  $Asp^0$  may lower to this position and copy the phonological segments of just those morphemes before the applicative morpheme is evaluated by Vocabulary Insertion, and thus before Local Dislocation of  $[w]$  and

[*el*] occurs. Given the morpho-syntactic structure in (59), the reduplicative Asp morpheme, which does not scope over the applicative morpheme, will be evaluated for phonology before the passive morpheme may undergo Local Dislocation, as there is no Subword to the right of [*w*] until after reduplicative copying has taken place (i.e. not until Cycle 3).

It is important to note that, in order to account for the availability of the string [*phek* ^ *w*] for reduplication in the high applicative structure, reduplicative copying must occur before Local Dislocation of the passive and applicative morphemes in (59). However, in order to account for the availability of the string [*phek* ^ *el+w*] for reduplication in (58), which has the same underlying, narrow syntactic high applicative structure, reduplicative copying must occur after Local Dislocation of the passive and applicative morphemes. Not only do these data support the present claim that the morpho-syntactic scope of the reduplicant can vary, but they crucially also support a post-Spell-out morphological architecture in which Local Dislocation and reduplicative copying occur during VI cycles, rather than after the entire process of VI is complete. This derives a more parsimonious system in which no phonological mapping or transformational operations occur after all VI cycles are complete. In particular, by including Local Dislocation operations as a sub-part of the overall Vocabulary Insertion process, we have obviated the need for any post-VI transformational component. Therefore, the process of mapping syntactic structure to phonological form is the last stage in which the overt morpho-syntactic structure may be altered. Though further research is needed into the cross-linguistic viability of such an architecture of the PF branch,<sup>64</sup> note that this model also supports the general claim of this thesis that the overt morpho-syntactic position of morphemes with respect to one another is the result of only narrow syntactic and post-syntactic transformational processes; that is, no process occurring after Vocabulary Insertion (e.g. evaluation of phonological form) may manipulate the relative order of morphemes.

To conclude this section, I must note that I would be remiss if I did not at least briefly address the more complex alternative analysis of Ndebele reduplication as morpho-syntactic copying. Under this analysis, Asp<sup>0</sup> would lower exactly as

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<sup>64</sup>Note, however, that the model of the timing of Local Dislocation proposed here creates no problems for any other case of Local Dislocation addressed either in this thesis or, to the best of my knowledge, elsewhere.

argued above, but instead of copying phonological material from the linearized string during the Vocabulary Insertion process, the reduplicant would create an exact replica of the morpho-syntactic structure over which it takes syntactic scope before Vocabulary Insertion—reduplication would be purely syntactic, rather than phonological. This is similar, though not identical, to Inkelas and Zoll's (2005) Morphological Doubling Theory. Under such an analysis, a Local Dislocation operation between the passive and applicative morphemes would be needed in the applicativized passive structure both in the stem and in the reduplicant, rather than simply in the stem, as under the phonological copying analysis. While there is no empirical evidence that such a model is untenable, it raises several problematic theoretical questions. For example, under the phonological copying analysis, copying occurs simply because the aspectual morpheme is not associated with a fully specified phonological matrix in the Vocabulary; i.e. reduplication is, in a sense, an epiphenomenal process due to phonological underspecification (note that underspecification of features is argued to be present elsewhere in phonological theory; see e.g. Steriade 1995). However, if reduplicative copying occurs before the Vocabulary is accessed, what would motivate the copying of morpho-syntactic structure into the morpho-syntactic representation of the reduplicant? Given that the reduplicant is semantically meaningful, it is not therefore devoid of morpho-syntactic features. Such morpho-syntactic copying thus seems to require the introduction of a novel linguistic primitive, e.g. a morpheme that is lexically specified with instructions to copy the morpho-syntactic structure of its sister. Additionally, the copying instructions would have to specify that it is the morpho-syntactic structure after Lowering that should be targeted, rather than the morpho-syntactic structure that is sister to the reduplicant when it is first merged into the derivation. I believe these to be unnecessary stipulations. Furthermore, reduplicative copying cross-linguistically is often directly sensitive to phonological concerns (e.g. feet, prosody, etc.), suggesting that this copying operation occurs during or after the mapping of phonological form onto syntactic structure, but not before this process. As noted earlier, VI erases morpho-syntactic structure, and so morpho-syntactic reduplicative copying would necessarily occur before phonology is present in the structure, thus making it difficult to account for the phonological sensitivity of reduplication. Therefore, since I have argued above that a phonological copying model of Ndebele reduplication allows us to correctly



predict the overt patterns, and does not raise the difficult theoretical issues involved in a morpho-syntactic copying analysis, I will maintain the proposed phonological model of reduplication.

#### 2.2.4 A brief note on phonological well-formedness in Ndebele

Like in Tagalog, the phonological form of reduplication in Ndebele is subject to certain output constraints at PF, though these apply only to the representation of phonological segments, and not morpho-syntactic structure. For example, certain phonological processes on the verb stem of the base, such as palatalization, must be reflected in the corresponding phonological form of the reduplicant. In (60), the final nasal of the stem becomes palatalized with the addition of the passive morpheme:

- (60) a. thum -a  
           send -a  
           ‘send’
- b. thuny -w     -a  
           send -PASS -a  
           ‘was sent’

When the passivized form is reduplicated, the reduplicant must contain the palatalized nasal, even if the phonological segments of the passive are not copied into the reduplicant.

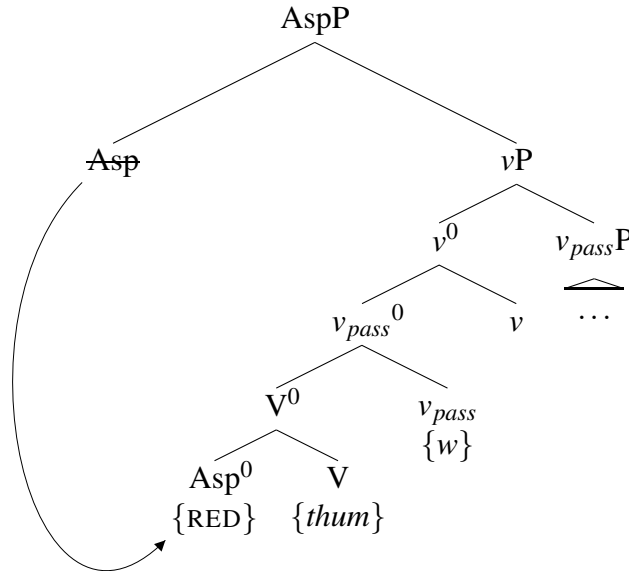
- (61) a. [**thuny-w-a**]-thuny-w-a  
       b. [**thuny-a**]-thuny-w-a  
       c. \*[**thum-a**]-thuny-w-a

In (61b), under the proposed model, Asp<sup>0</sup> has lowered to a position in which it copies the morpho-phonological string [*thum*] before phonology is mapped to the passive morpheme (i.e. it adjoins directly to the V<sup>0</sup> {*thum*}, below the passive), and thus before palatalization could have occurred, yet the phonological form of the reduplicant must still match the palatalized form of the base. I assume that, similar to phonological constraints in Tagalog, there is a faithfulness constraint on the reduplicant in Ndebele that requires that its overt phonological form match the overt phonological form of the base from which it was copied (e.g.

FAITH(RE<sub>D</sub>, BASE): the phonological features of the reduplicant must be identical to the corresponding phonological features of the base from which it was copied).<sup>65</sup> The following illustrates this order of operations, modulo epenthesis (phonological well-formedness evaluation is represented cyclically, for clarity):

(62) **[thuny-a]**-thuny-w-a

a.



b. Cycle 1:  $[\sigma\sigma \wedge \text{thum}]$

Copying of phonological segments:

Cycle 1':  $[\mathbf{thum} \wedge \text{thum}]$

Cycle 2:  $[\mathbf{thum} \wedge \text{thum} \wedge \text{w}]$

c. Evaluation of output well-formedness constraints:

Palatalization of root-final nasal

$[\mathbf{thum} \wedge \text{thum} \wedge \text{w}] \rightarrow [\mathbf{thum} \wedge \text{thuny} \wedge \text{w}]$

Faithfulness of reduplicant

$[\mathbf{thum} \wedge \text{thuny} \wedge \text{w}] \rightarrow [\mathbf{thuny} \wedge \text{thuny} \wedge \text{w}]$

<sup>65</sup>This constraint would require that any phonological changes that occur in the segments of the base that was copied into the reduplicant during VI be reflected in the phonological form of the reduplicant. With respect to Ndebele reduplication, this pattern holds.

Thus, the phonological form [*thum*] originally copied in (62) will be readjusted at the late stage of phonological evaluation to match the palatalized form [*thuny*]. The architecture of the PF branch proposed in this chapter in no way disallows such readjustment of phonological features based on output well-formedness constraints, but rather restricts manipulation of morpho-syntactic structure (i.e. the respective ordering of morphemes) to syntactic and post-syntactic transformational operations. Note that, crucially, satisfaction of the phonological faithfulness constraint above does not alter the morpho-syntactic structure of the reduplicant; i.e. the passive morpheme [*w*] is not added to the reduplicant, which would, in fact, make the palatalization of the final nasal in the reduplicant more uniform with other phonological palatalizations in the language. Notably, all transformations of morpho-syntactic structure that we have addressed can be accounted for straightforwardly without allowing for structural manipulation by the post-VI component of phonological well-formedness evaluation.

### 2.2.5 Section summary

In this section I have argued that morphological optionality in Ndebele reduplication closely parallels that of reduplication in Tagalog and that, indeed, the patterns are derived in almost identical ways via Lowering of an Outer Aspect head to the complex *v* head. Furthermore, I have claimed that Local Dislocation is evaluated during, rather than after, the process of Vocabulary Insertion, thus deriving a system in which the mapping of phonological form to syntactic terminals is the last stage of the overall derivation in which morphological structure may be manipulated. This supports an architecture in which output constraints on phonological form are not required to, and indeed cannot, alter morpho-syntactic structure, but may rather only alter phonological segments.

In the following section on agreement markers in Turkish, we will see that morphological optionality is not limited to reduplication, and that these patterns can also be accounted for under the theory of Lowering proposed above.

## 2.3 Turkish agreement markers

In this section I will show that the distinctive morpho-syntactic patterns of the *k*-paradigm (i.e. affixal) and *z*-paradigm (i.e. clitic) subject agreement markers in

Turkish, shown in (63), can be explained by the presence of Lowering in the *k*-paradigm markers and the absence of Lowering in the *z*-paradigm markers.

(63) *Turkish agreement markers* (from Good and Yu 2000)

|               | z-paradigm     |                | k-paradigm |              |
|---------------|----------------|----------------|------------|--------------|
|               | Singular       | Plural         | Singular   | Plural       |
| <b>First</b>  | -(y) <i>Im</i> | -(y) <i>Iz</i> | - <i>m</i> | - <i>k</i>   |
| <b>Second</b> | - <i>sIn</i>   | - <i>sInIz</i> | - <i>n</i> | - <i>nIz</i> |
| <b>Third</b>  | ∅              | ∅              | ∅          | ∅            |

Certain verbal suffixes take *k*-paradigm markers, while others take *z*-paradigm markers (adapted from Good and Yu 2000):

- (64) a. *Suffixes taking k-paradigm markers*  
           -*DI*      Past (PAST)  
           -(y)*sE*    Conditional (COND)
- b. *Suffixes taking z-paradigm markers*  
           -*Iyor*      Progressive (PROG)  
           -(y)*EcEk*    Future (FUT)  
           -*Er*        Aorist (AOR)  
           -*mIs*        Unwitnessed/Evidential (EVID)

Thus, the *k*- vs. *z*-paradigm distinction appears to be one of conditioned allomorphy. Each paradigm carries out the same morpho-semantic function, but surfaces in different morpho-syntactic (and morpho-phonological) environments. It is this allomorphic pattern that we will investigate in this section, and return to in Section 3.2.

Note that the position of the *k*-paradigm markers can vary in the verb word (notably without any semantic effects), but the *z*-paradigm markers must appear adjoined to the end of the word. Namely, the *k*-paradigm can appear immediately after the past tense morpheme or the conditional morpheme, but the *z*-paradigm markers must appear at the end of the verb after all other morphemes (data from

Öner Özçelik, p.c., and Good and Yu 2000):<sup>66</sup>

(65) *k-paradigm*

- a. git -ti -yse **-m**  
go -PAST -COND -1S<sub>K</sub>  
'If I went...'
- b. git -ti **-m** -se  
go -PAST -1S<sub>K</sub> -COND  
'If I went...'

(66) *z-paradigm*

- a. bul -uyor -muş **-sun**  
find -PROG -EVID -2S<sub>Z</sub>  
'You are apparently finding...'
- b. \*bul -uyor **-sun** -muş  
find -PROG -2S<sub>Z</sub> -EVID

Additionally, the *k*-paradigm markers may only appear immediately after the PAST or COND morphemes, and cannot appear immediately after any of the morphemes in (64b):

- (67) a. git -iyor -tu **-k**  
go -PROG -PAST -1PL<sub>K</sub>
- b. \*git -iyor **-k** -tu  
go -PROG -1PL<sub>K</sub> -PAST
- c. \*git **-k** -iyor -tu  
go -1PL<sub>K</sub> -PROG -PAST

---

<sup>66</sup>I follow Good and Yu (2000, 2005) in assuming that the forms in (65) are cases of mono-clausal verb constructions with multiple tense, aspect and/or mood (TAM) suffixes, and that the forms [yse]/[se] and [ydi]/[di] are cases of conditioned allomorphy. I thus assume that these verbs are not cases of the bi-clausal Turkish copular verb construction (i.e. periphrastic tense constructions), in which two clausal/inflectional domains are joined together via a copula producing a single, complex verb form (see Kornfilt 1997 and Sezer 2001 for more on copular verbs). Note that, as we will not be dealing with copular verb constructions here, all examples in this section are similarly mono-clausal with one or more TAM suffixes.

The structure in (67b) is unacceptable because the *k*-paradigm agreement marker immediately follows the progressive, and (67c) is ruled out because the marker immediately follows the verb root. Good and Yu (2000) provide an OT analysis of this pattern in which the constraint LICENSE evaluates this adjacency requirement, which makes forms that violate this constraint non-optimal (e.g. forms in which the *k*-paradigm agreement marker is adjacent to a root or some verbal suffix other than past or conditional are ruled out by LICENSE). However, I argue that the positional variation that we observe in Turkish *k*-paradigm agreement markers (and the non-variation of *z*-paradigm markers) is the result of post-syntactic processes, thus maintaining the assumption that all positional variation of morphemes within a verb is derived via pre-PF-evaluation transformational processes. While evaluation at PF may be able to rule out certain structures, as we saw in Sections §2.1.4 and §2.2.4, the order in which morphemes appear within a word is the direct result of narrow syntactic and/or post-syntactic transformational operations.

However, before I present my analysis, let's first consider the following examples with the *yes/no* morpheme *-mI* (i.e. Q). Note that the *z*-paradigm markers in (69) must appear after the *yes/no* morpheme (in **bold**), in keeping with the restriction that they follow all other morphemes of the verb, but that the *k*-paradigm markers in (68) must appear before the *yes/no* morpheme (adapted from Sezer 2001):<sup>67</sup>

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<sup>67</sup>Note that these are all single, mono-clausal, complex words, and that the hyphens merely indicate boundaries of the domain of stress assignment. That is, the leftmost hyphenated grouping of each word bears word-level stress (on the rightmost syllable). Though we will not be addressing issues of Turkish stress assignment in any detail here, note that the *k*-paradigm markers are included in the domain of stress assignment, whereas the *z*-paradigm markers are not (see also fn. 70).

(68) *k-paradigm*

a. Simple past  
e.g. ‘Did I go?’

go-PAST Q-PERS  
\*git-ti **mi**-m  
\*git-ti **mi**-n  
git-ti **mi**  
\*git-ti **mi**-k  
\*git-ti **mi**-niz

b. Simple past  
e.g. ‘Did I go?’

go-PAST-PERS Q  
git-ti-m **mi**  
git-ti-n **mi**  
git-ti **mi**  
git-ti-k **mi**  
git-ti-niz **mi**

(69) *z-paradigm*

a. Present progressive  
e.g. ‘Am I taking?’

take-PROG Q-PERS  
al-iyor **mu**-yum  
al-iyor **mu**-sun  
al-iyor **mu**  
al-iyor **mu**-yuz  
al-iyor **mu**-sunuz

b. Present progressive  
e.g. ‘Am I taking?’

take-PROG-PERS Q  
\*al-iyor-um **mu**  
\*al-iyor-sun **mu**  
al-iyor **mu**  
\*al-iyor-uz **mu**  
\*al-iyor-sunuz **mu**

These data suggest that either 1) the *z*-paradigm markers are generated higher in the structure than the *k*-paradigm markers (i.e. the *z*-paradigm above Q and the *k*-paradigm below Q), or 2) all agreement markers are generated in the same high narrow syntactic position, but only the *k*-paradigm markers undergo a downward transformation. I assume the latter, and make the following claims:

- The *yes/no* morpheme *-mI* is generated in C as an interrogative Q head.<sup>68</sup>
- The verb in Turkish does not raise to T. However, T raises to C. Note also that Turkish is head-final.
- All agreement markers are merged above CP (we assume that this is a Topic position, though its category is unimportant).
- *k*-paradigm agreement markers lower to the complex head formed via T-to-C movement.<sup>69</sup>
- *z*-paradigm agreement markers do not lower, but rather remain *in situ* during Spell-out of CP (see §3 for more on cyclic Spell-out).<sup>70</sup>

This gives us a complex structure at Spell-out (for a very complex verb) like the following (note that I label the conditional simply as CondP, though it is probably some type of higher modal projection in Turkish; note also that I remain agnostic about the syntactic structure below AspP (i.e. whether the verb raises to Asp)):<sup>71</sup>

<sup>68</sup>I believe this assumption is reasonable, given the function of the *yes/no* clitic as an interrogative morpheme.

<sup>69</sup>I argue later that the *z*-paradigm and *k*-paradigm morphemes are more closely related than indicated here, but the distinction argued for here holds for now.

<sup>70</sup>Good and Yu (2005) argue that the *k*-paradigm markers are lexical affixes, but that the *z*-paradigm markers are post-lexical clitics. Note that the *k*-paradigm markers can be stressed, like other affixes cross-linguistically, and the *z*-paradigm markers cannot be stressed, like other clitics cross-linguistically (Zwicky and Pullum 1983; note that stress is standardly word-final in Turkish):

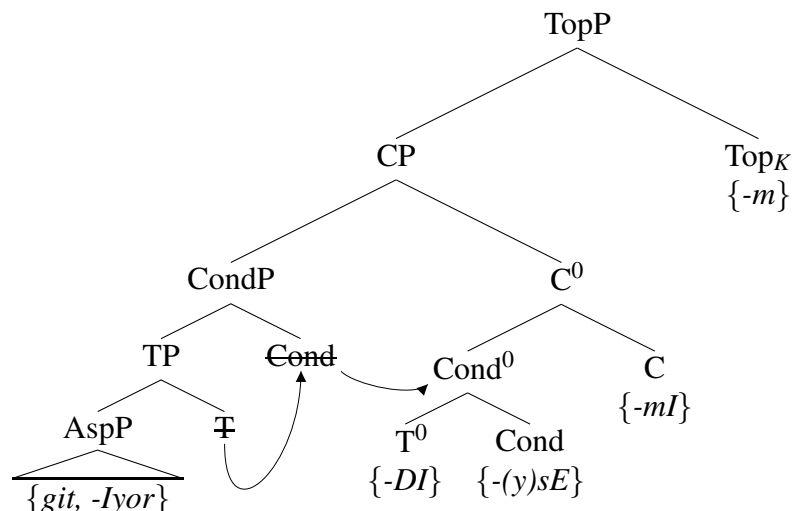
- (i)     unut -acák -siniz  
          forget -FUT -2PL<sub>Z</sub>  
          ‘you will forget’
- (ii)    unut -tu     -núz  
          forget -PAST -2PL<sub>K</sub>  
          ‘you forgot’

The model presented here is simply a way of deriving this distinction via narrow syntactic and post-syntactic means. Since I argue that the *k*-paradigm markers lower and the *z*-paradigm markers do not, it is simply the case that the *k*-paradigm markers lower into the domain of stress assignment (e.g. CP; see Newell 2008), whereas the *z*-paradigm markers remain outside of the domain of stress assignment. As the rules governing Turkish stress can be quite intricate, I will not address this issue further here, but will rather focus simply on the ordering of morphemes within a word (see Kornfilt 1997, Newell 2008, and Sezer 2001 for more on stress in Turkish verbs).

<sup>71</sup>The placement of the conditional hierarchically above finite past tense is in keeping with Sezer’s (2001) analysis of the syntactic structure of INFL in Turkish. Cinque (2001) also proposes a very complex hierarchy of functional heads in the Turkish INFL. While I will not be adopting his theory of ever-present multiple functional heads, I will also not be violating the order in which he argues that those heads appear in the INFL domain (see §1.1.3 above).



(70)



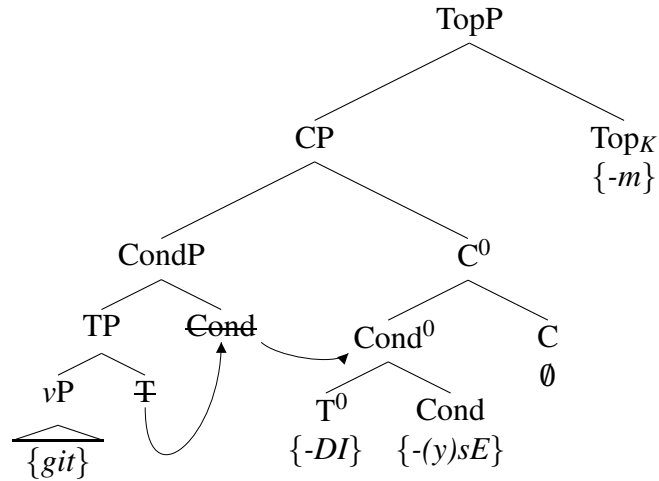
What is important to note is that here, since the verb does not raise to T, T-to-C movement does not move the verb to C. Therefore, when the *k*-paradigm agreement marker in Top lowers, it can only target the C<sup>0</sup>, Cond<sup>0</sup>, and T<sup>0</sup> levels. In this way, we never predict that the *k*-paradigm morpheme would ever adjoin to aspect or the verb (which are both attested impossibilities, e.g. (67b,c)), since these levels are not structurally available for Lowering of Top, and so we do not have to posit any sort of licensing constraints at PF. The *k*-paradigm markers will only ever be able to lower to those heads that “license” them, and so a morphological output in which the *k*-paradigm markers would be morpho-phonologically adjacent to any morpheme other than the past or conditional is ruled out by the limitations of post-syntactic transformations.<sup>72</sup>

Let’s illustrate this with the simpler examples in (65) and (66). Both of the *k*-paradigm examples in (65), repeated in (71a,b), have the structure in (71c) at Spell-out:<sup>73</sup>

<sup>72</sup>I show in §3.2 how a *k*-paradigm morpheme only ever surfaces in the presence of past and/or conditional within the complex C head.

<sup>73</sup>I assume that since there is no overt Asp morpheme in this example, there is no AspP projection here, and that the verb simply remains within vP. Note that the verb is still too low in the structure to be a target of Top-lowering.

- (71) a. git -ti -yse **-m**  
 go -PAST -COND -1S<sub>K</sub>  
 'If I went...'
- b. git -ti **-m** -se  
 go -PAST -1S<sub>K</sub> -COND  
 'If I went...'
- c.



In (71c), if Top lowers to either  $C^0$  or  $Cond^0$ , the following linearization structures will be derived upon Vocabulary Insertion, corresponding to (71a) (I simply include the vowel harmony/allomorphy in the representation of the VI cycles; note that since (complex) heads correspond to individual M-words (Embick and Noyer 2001 and §2.1.3), I put them in their own brackets):

- (72) Cycle 1:  $[[git] \wedge [ti]]$   
 Cycle 2:  $[[git] \wedge [ti \wedge yse]]$   
 Cycle 3:  $[[git] \wedge [ti \wedge yse \wedge m]]$

If, however, in (71c) Top lowers to  $T^0$ , as is possible under our revised theory of Lowering, then the following linearization cycles are produced:

- (73) Cycle 1:  $[[git] \wedge [ti]]$   
 Cycle 2:  $[[git] \wedge [ti \wedge m]]$   
 Cycle 3:  $[[git] \wedge [ti \wedge m \wedge se]]$

Note that there are no other possible scenarios for Lowering here, since there are no other  $X^0$  levels contained with the complex head of the complement of Top, and that all of these Lowering possibilities account for the observed patterns.

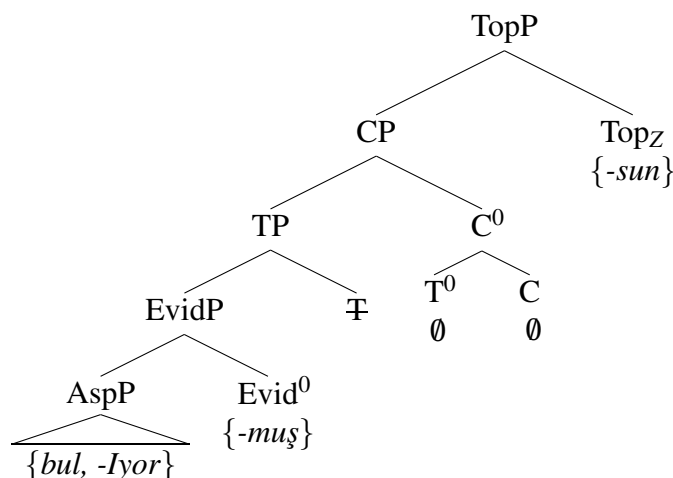
Let's now look at the  $z$ -paradigm in (66). Recall that I claim that the  $z$ -paradigm morphemes do not lower (note that I assume that EVID takes Asp as its complement; I will have more to say about this later; I also assume, along with Sezer 2001, that there is a null, featureless T morpheme here, though I still assume that it undergoes T-to-C movement):

(74)  $z$ -paradigm

- a. bul -uyor -muş **-sun**  
 find -PROG -EVID -2S<sub>Z</sub>  
 'You are apparently finding...'

- b. \*bul -uyor **-sun** -muş  
 find -PROG -2S<sub>Z</sub> -EVID

c.



In (74c), the  $z$ -paradigm marker does not lower,<sup>74</sup> and so it remains in Top, outside of the stress domain of the CP phase (see fn. 70). Therefore, the position of the  $z$ -paradigm markers will be consistently verb-final.

We now return to the pattern of the *yes/no* clitic [*mI*], which I assume is located in C. Note the following pattern, in which the  $k$ -paradigm marker must appear

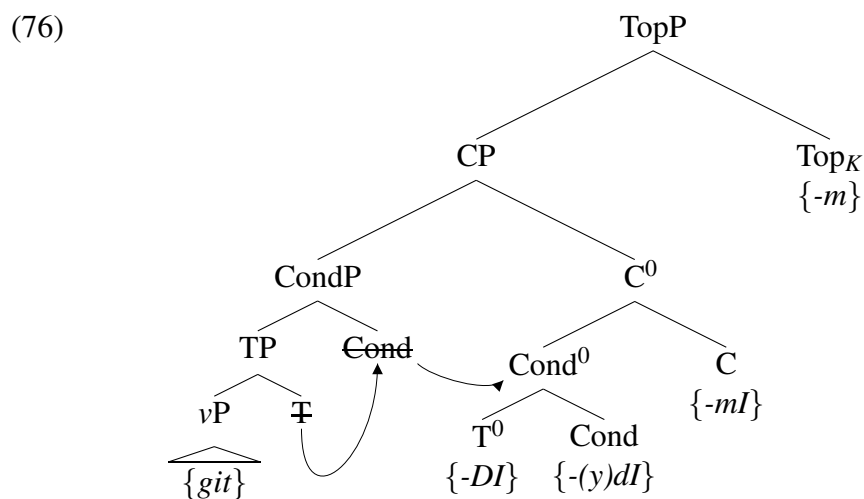
<sup>74</sup>Note, of course, that even if the  $z$ -paradigm agreement marker did lower to any  $X^0$  of C, it would be a string-vacuous movement, given that all elements contained within  $C^0$  are null. However, see the discussion of the *yes/no* [*mI*] clitic below for further evidence that the  $z$ -paradigm markers do not undergo Lowering.

adjoined to PAST or COND:<sup>75</sup>

(75) Yes/no *clitic*: *k*-paradigm markers

- a. \*git -ti -ydi -mi **-m**  
go -PAST -COND -Q -1<sub>SK</sub>
- b. git -ti -ydi **-m** -mi  
go -PAST -COND -1<sub>SK</sub> -Q  
'Had I gone?'
- c. git -ti **-m** -di -mi  
go -PAST -1<sub>SK</sub> -COND -Q  
'Had I gone?'

Similar to the examples in (71), (75b-c) both have the following structure at Spell-out:



As the *k*-paradigm marker in Top must lower, it may adjoin to  $T^0$ ,  $\text{Cond}^0$ , or  $C^0$ . Lowering to  $T^0$  produces the following linearization cycles, corresponding to (75c):

<sup>75</sup>The conditional here is the past perfect conditional, but I argue that it is also generated between T and C, given its position in the word (i.e. it occurs higher than/to the right of past tense).

- (77) Cycle 1:  $[[git] \wedge [ti]]$   
 Cycle 2:  $[[git] \wedge [ti \wedge m]]$   
 Cycle 3:  $[[git] \wedge [ti \wedge m \wedge di]]$   
 Cycle 4:  $[[git] \wedge [ti \wedge m \wedge di \wedge mi]]$

Lowering to  $Cond^0$  produces the following linearization cycles, corresponding to (75b):

- (78) Cycle 1:  $[[git] \wedge [ti]]$   
 Cycle 2:  $[[git] \wedge [ti \wedge ydi]]$   
 Cycle 3:  $[[git] \wedge [ti \wedge ydi \wedge m]]$   
 Cycle 4:  $[[git] \wedge [ti \wedge ydi \wedge m \wedge mi]]$

Note that the form in (75a), *\*git-ti-ydi-mi-m*, is ungrammatical, which is not straightforwardly predicted by the above scenario if Top can lower directly to  $C^0$ , which is possible under the proposed theory of Lowering. However, note that the Q-clitic *-mI*, just like the passive morpheme in Ndebele, must always appear at the right edge of the M-word corresponding to the complex head that it is contained within. In other words, when VI applies to the complex head headed by *-mI*, this C must always be to the right of all other morphemes within the complex head; i.e., it must be at the edge. A possible explanation for this is that if Top lowers to C, thus becoming part of the complex C head, C will undergo Local Dislocation to the right edge of its M-word during VI, deriving the following scenario:<sup>76</sup>

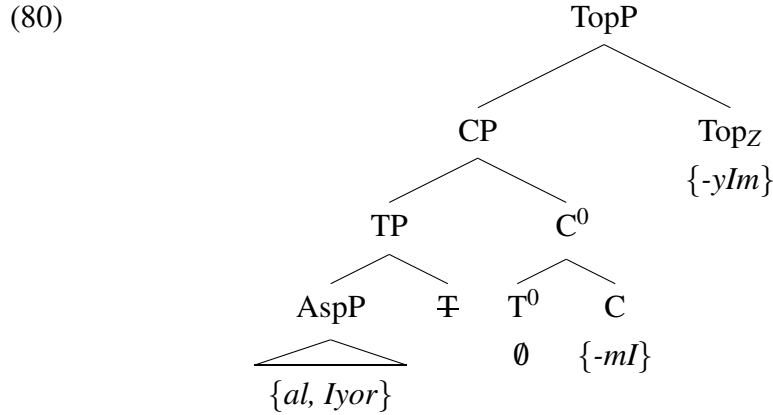
- (79) Cycle 1:  $[[git] \wedge [ti]]$   
 Cycle 2:  $[[git] \wedge [ti \wedge ydi]]$   
 Cycle 3:  $[[git] \wedge [ti \wedge ydi \wedge mi]]$   
 Cycle 4:  $[[git] \wedge [ti \wedge ydi \wedge mi \wedge m]]$   
 Local Dislocation of C and Top  
 Cycle 4':  $[[git] \wedge [ti \wedge ydi \wedge m+mi]]$

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<sup>76</sup>I leave exploration of what motivates this Local Dislocation operation for future research and assume, perhaps rightly so, that it is simply an idiosyncratic feature of the [mI] morpheme that it undergoes Local Dislocation with any element to its right within the phase. See Chapter 4.

Thus, the VI cycles of both (78) and (79) will produce identical outputs.

In the case of *z*-paradigm morphemes and the *yes/no* [*mI*] particle, since these agreement markers do not lower, they will always appear to the right of this particle. E.g.:<sup>77</sup>



- (81) Cycle 1: [[*al* ^ *iyor*]]  
 Cycle 2: [[*al* ^ *iyor*] ^ [*mu*]]  
 Cycle 3: [[*al* ^ *iyor*] ^ [*mu*] ^ [*yum*]]

Observe that the *yes/no* Q-clitic, which here surfaces as *mu* due to vowel harmony, is the only morpheme of its M-word in (81), and thus is also vacuously the rightmost morpheme of its M-word.<sup>78</sup> It does not therefore undergo a Local Dislocation operation like it must in (79).

Under the model proposed here, these patterns indicate that T must raise to C in Turkish. If all agreement markers are generated above C, as indicated by the pattern of the *z*-paradigm markers with respect to the *yes/no* morpheme, then it is necessarily the case that the *k*-paradigm markers undergo a downward transformation to adjoin to the past or conditional morphemes, as in (75). These patterns cannot possibly be derived via Local Dislocation (i.e. with the *k*-paradigm

<sup>77</sup>Recall that I am remaining agnostic as to whether the verb raises to Asp. If it does not, [[*al* ^ *iyor*]] in (81) should be represented as [[*al*] ^ [*iyor*]], i.e. as two separate M-words. This does not affect the current analysis.

<sup>78</sup>[*mI*] is also the rightmost morpheme of the Spell-out domain of the phase here, assuming, again, that the Spell-out domain consists of the phase head (e.g. C) and its complement, but not any projections above C, such as non-Lowering *z*-paradigm markers. I will argue in Chapter 3, §3.2.2 that the discourse domain above C is treated as a separate phase.

marker remaining above CP), as this would produce a morpho-phonological string like the following (simplified):

$$(82) \quad [\text{git} \wedge \text{ti} \wedge (\text{y})\text{di} \wedge \text{mi} \wedge \text{m}]$$

In order to create the morpheme order in (75c) [*git-ti-m-di-mi*], the agreement marker [*m*] would have to skip intervening morphemes, which is not possible in a Local Dislocation operation due to the limitation of string-adjacency. Therefore, the downward transformation responsible for this pattern must be Lowering. However, if T did not raise to C, then neither the past nor the conditional heads would be local to Top; as they would not be contained within the head of the complement of Top, they would not be available targets for a Lowering operation. Recall that Lowering may not be iterative, nor may it skip heads. Therefore, the only way for both past and conditional to satisfy the requisite locality condition for a downward transformation of the higher Top *k*-paradigm morpheme is if they both move to the head of the complement of Top, namely C, thus becoming available targets for Lowering.

Note that we have not had to resort to any licensing constraints on morpho-phonological outputs to account for the distribution of the *k*-paradigm and *z*-paradigm morphemes. All that is needed here is T-to-C movement and a Local Dislocation rule for [*mI*] to the edge of the M-word corresponding to the complex C head when the *k*-paradigm marker lowers directly to  $C^0$ , as posited above. Following this model, in the structure in (76),  $\text{Top}_K$  would only ever be able to lower to  $C^0$ ,  $\text{Cond}^0$ , or  $T^0$ . The latter two are attested possibilities, while the first may indeed be a structural possibility, but the surface form is altered via Local Dislocation. In the case of *z*-paradigm markers, these never lower, and so are correctly predicted to always appear to right of all material in C and below. Notably, since all specifiers and complements are to the left in Turkish, this also still derives the verb-final sentence structure. We return to this pattern of Turkish agreement markers in Section 3.

## 2.4 Section summary

In this section I have argued that a revised theory of Lowering can account for the variation in the surface position of the reduplicant in Tagalog, the variable

forms of the reduplicant in Ndebele, and the distinctive overt patterns of subject agreement markers in Turkish. As these Lowering operations occur after Spell-out to the PF branch, the lack of semantic effects of these multiple exponents of morpho-syntactic structure falls out naturally.<sup>79</sup> Furthermore, I have argued that a model in which all morphological structure is derived via narrow syntactic and post-syntactic transformational operations appropriately constrains the evaluation process of phonological form so that this process may judge or affect phonological segments only, and may not manipulate morphological structure.

In the following section we address the all-important question ‘why do heads lower?’ The model developed below for the motivations underlying Lowering operations will correctly predict the cross-linguistic scarcity of such operations, and also allows us to more fully integrate theories of post-syntactic operations with the theory of cyclic Spell-out to the interface.

### **3 The motivations and limitations of Lowering**

In this section, I briefly introduce the condition of phase head impenetrability, the details and repercussions of which will be addressed at length in Chapter 3. I argue that this condition is the driving force behind Lowering operations.

#### **3.1 Phase Head Impenetrability Condition (PHIC)**

In all of the above examples of Lowering,<sup>80</sup> the Lowering head has consistently targeted what are standardly assumed to be phase heads (e.g. T-to-*v*, Asp-to-*v*, Top-to-C). According to most current theories of cyclic syntactic Spell-out (Chomsky 2001, 2004, Fox and Pesetsky 2005, Svenonius 2001, and many others), syntactic derivations are created and sent to Spell-out piece-by-piece, rather than all at once at the end of the derivation. These pieces, or phases, are generally assumed to correspond to *v*P and CP at the clause-level (i.e. the lexical and functional domains, respectively; see Chapter 3). For example, when narrow syntactic derivation of *v*P is complete, it is spelled out to the PF and LF interfaces.

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<sup>79</sup>However, see Chapter 3, §3.4 for an argument that the absence of semantic effects in all head movement operations is due to compulsory total reconstruction of head movement chains at LF.

<sup>80</sup>With the possible exception of Bulgarian determiner-hopping, which we will return to in Ch.4 §4.3.



After this Spell-out operation, elements embedded within the phase may not be extracted during subsequent narrow syntactic derivation (the *Phase Impenetrability Condition* (PIC), Chomsky 2001). Arguably, the only elements that are still visible to higher narrow syntactic derivation are the phase head itself and its specifiers (i.e. elements at the phase “edge”).<sup>81</sup> I believe that the fact that Lowering consistently occurs between a head and its phase complement is not mere coincidence, but rather that Lowering is driven by the effects of phase Spell-out.

Recall that Lowering, as it occurs before Vocabulary Insertion, cannot be driven by phonological concerns, but must rather be motivated by the requirements of the morpho-syntactic feature bundle of the Lowering head. Furthermore, Lowering is an inherently structural/syntactic transformation. Under the basic assumptions of the Minimalist Program (Chomsky 1995), all such transformations of syntactic structure should be feature-driven. I propose, then, that just as narrow syntactic head-raising is driven by the need to check uninterpretable features, Lowering of heads likewise occurs to check uninterpretable features.

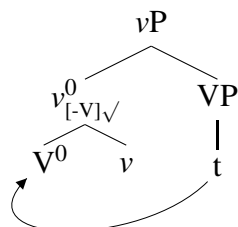
Thus assuming that Lowering occurs to check uninterpretable morpho-syntactic features, it must be the case that the feature-probing operation that results in Lowering is somehow structurally distinct from feature-probing operations that result in raising. Following standard syntactic assumptions, head-raising will occur in all instances in which a probing head X targets a simplex head Y in its c-command domain (modulo phase impenetrability, see below and Chapter 3). I argue that the difference is that Lowering occurs when a head probes a feature that is *embedded* in the head of its complement. However, it is not the case that this simple structural configuration always results in Lowering. Recall that in the languages we address here, V raises to *v*. This is necessary to derive subsequent verb-raising to the functional domain in e.g. Tagalog (see below), as *in situ* V could not be extracted if it did not move to the phase edge, given the PIC. This entails that *v* carries a [-V] feature which is checked via V-to-*v* movement. However, as we have seen, languages allow for the possibility of “stacked” *v*P projections; i.e. *v*Ps embedded in *v*Ps. In these cases, V raises iteratively through each *v*. Furthermore, many of these *v*P projections are not obligatory (e.g. causative, transitive), yet they all target

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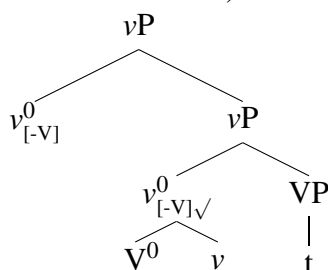
<sup>81</sup>See Fox and Pesetsky (2005) and Nissenbaum (2000) for theories of phase Spell-out in which only the complement of the phase head undergoes Spell-out. Again, we return to these issues in Chapter 3.

V for movement, regardless of the presence or absence of other  $vP$  projections (i.e. it is not the case that these  $v$  heads are targeting other  $v$  heads directly). Therefore, it is reasonable to assume that each  $v$  carries a  $[-V]$  feature. Now, consider the following schematic derivation in which there are two stacked  $vPs$ :

- (83) a. Step 1: first  $v$  merges and probes V; V moves to  $v$



- b. Step 2: second  $v$  merges and targets V (structure prior to  $v$ -to- $v$  movement)



I argue that it is not the case that, in structural configurations like (83b), the probing head targets the checked feature of the head of its complement, but must rather directly target the embedded  $X^0$  that satisfies its feature. In terms of the above example, the higher  $v^0$  does not target the lower  $v^0$  (which has had its  $[-V]$  checked), but rather must target  $V^0$ . In this way, head adjunction does not involve any sort of feature percolation. Instead, the higher  $v^0$  in (83b) may target  $V^0$  for movement, and this head movement will pied-pipe the lower  $v^0$  to which  $V^0$  is adjoined. Thus, all things being equal, a probing head may directly target features embedded in a lower head for a raising operation.<sup>82</sup> Anticipating the following discussion a bit, I formalize this as follows:

- (84) *Feature Accessibility Hypothesis*

A probing head  $\alpha$  may target any feature in its c-command domain, modulo the impenetrability effects of cyclic Spell-out operations.

<sup>82</sup>See Chapter 3 for more examples of this.

It is therefore not the case that Lowering occurs simply when a probing head targets an embedded feature, as embedded features may be accessible to a higher head for narrow syntactic operations.

Again, we have observed that head-to-head Lowering only ever occurs across a phase boundary; that is, Lowering only occurs to a phase head. This suggests that Lowering happens as a consequence of the effects of the Spell-out operation on features contained within the head of the phase complement of the Lowering head. Note that the possibility of verb-raising (e.g. *v*-to-T movement) indicates that not all operations that target a phase head necessarily result in Lowering. Taking these facts into consideration, I claim that Lowering occurs when a probing head targets a feature embedded in a phase head,<sup>83</sup> and that, consequently, raising of a phase head occurs when a higher head probes a non-embedded feature of that phase head (see below and Chapter 3 for more). In particular, I argue that it is the effect of phase Spell-out on the subsequent availability of syntactic features contained within a phase head that drives Lowering. Lowering is thus argued to be motivated by the following extension to the Phase Impenetrability Condition:

(85) *Phase Head Impenetrability Condition (PHIC)*

Features embedded within a complex phase head  $\alpha$  become unavailable for further narrow syntactic feature-checking transformations as a result of Spell-out of  $\alpha$ P. Only the features of  $\alpha$  itself and its specifier(s) will be visible after Spell-out.<sup>84</sup>

Under (85), if a head that c-commands the phase head carries an uninterpretable feature that must be checked against a corresponding interpretable feature embedded within the phase head, this feature-checking operation will be impossible after Spell-out of the phase.<sup>85</sup> I claim that if, however, the head carrying the uninterpretable feature takes the phase as its complement, that head may lower to the phase head during the Spell-out cycle of the phase in order to check its

<sup>83</sup>Note that I argue that all *v*Ps in (84) are contained in the same phase; see Chapter 3, §2.2.

<sup>84</sup>Recall that I argued in §2.1.3 that a complex head becomes “atomized” during VI, and so its embedded M-word levels are no longer visible to outside elements for Local Dislocation operations. However, although it makes for a tempting claim, it cannot be the case that phase head impenetrability is simply a direct result of this atomization at PF. This is primarily due to the assumption required by our derivational architecture that operations on the PF branch cannot affect the narrow syntactic structure. As we will see, the PHIC applies to the narrow syntactic structure of complex heads, thus negating any causal link between the PF atomization process and phase impenetrability.

<sup>85</sup>Note that this assumes that phase heads are spelled out along with their complements, which is an assumption I maintain for the remainder of this thesis (see Chapter 3).

uninterpretable feature.<sup>86</sup> In this way, Lowering is a feature-checking rescue mechanism that is only available when the following conditions hold:

1. a head  $\beta$  carrying an uninterpretable feature takes a phase complement, and
2. the corresponding interpretable feature that can check  $\beta$ 's uninterpretable feature is embedded within the phase head  $\alpha$  of the complement of  $\beta$  due to previous narrow syntactic head movement (e.g. V-to-*v* movement).

This scenario accounts for several of the observed limitations of Lowering. Namely:

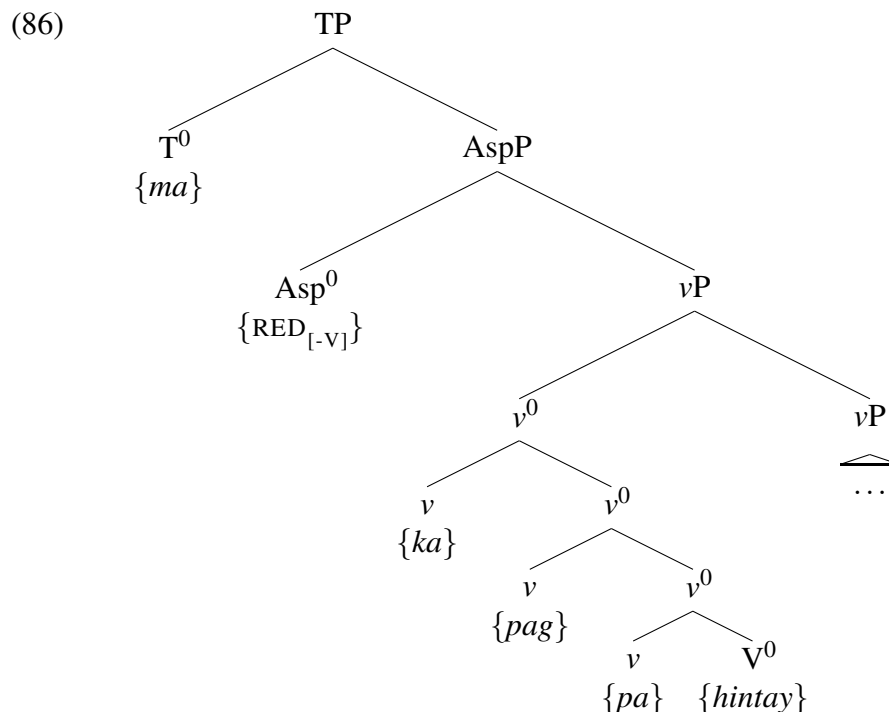
1. Lowering only ever occurs between a head that takes a phase complement and the complex phase head of that complement;
2. Lowering may not be iterative, as it is limited to moving a single head to the immediately lower phase head; and
3. Lowering does not occur when raising is possible.

Although my investigation into cross-linguistic patterns of Lowering has not been exhaustive, research thus far suggests that Lowering is much less common across languages than raising. Assuming that future research will continue to support this observation, the fact that the proposed model requires several conditions to hold in order to derive a Lowering transformation would help to account for the relative paucity of Lowering cross-linguistically. Furthermore, in order for such a Lowering operation to derive the types of morphological optionality observed in Section 2, in addition to meeting the aforementioned structural conditions on Lowering, the phase head must also contain more than one phonologically overt head. Therefore, the fact that several factors have to converge all at once to derive such morphological optionality under this system may help to explain why these patterns are so rare.

In the Lowering patterns of Tagalog and Ndebele, I argue that it is simply the case that Asp carries an uninterpretable V-feature. To illustrate (adapted from (17)):

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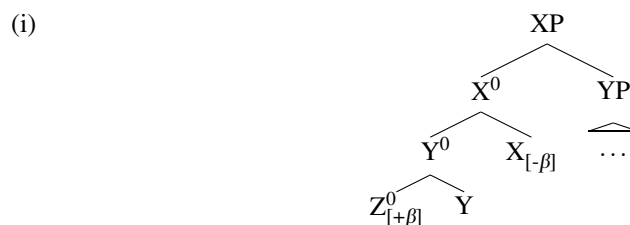
<sup>86</sup>This requires that the Lowering head be visible to the derivation when the phase is spelled out. Given this, I will argue in Chapter 3 for a triggering model of Spell-out, in which a phase is only spelled out immediately after derivation of a higher phase begins (i.e. after the Lowering head has been merged into the narrow syntactic derivation).



In (86), the  $[-V]$  feature on Asp will not be able to be checked after Spell-out of  $vP$ , as the interpretable V-feature of  $\{hintay\}$  will be unavailable for a feature-checking transformation due to the PHIC. Therefore, Asp lowers to the complex head of its complement during Spell-out of  $vP$  in order to check this feature. In a sense, Asp “piggybacks” on the Spell-out cycle of  $vP$  in order to check its uninterpretable feature. Note that I assume that Lowering to any  $X^0$ -level projection of the complex head creates a local enough relationship for feature-checking of the  $[-V]$  on Asp, as all relevant features will then be located in the same complex head.<sup>87</sup>

Crucially, the PHIC states that only the features embedded within a phase head become unavailable for further narrow syntactic feature-checking operations; the

<sup>87</sup>Feature-checking under such a structural configuration is also necessary for standard narrow syntactic head movement. E.g., the  $[-\beta]$  feature on X below may be checked by the  $[\beta]$  feature on Z even though Y intervenes:



feature of the phase head itself, however, is still visible. In Chapter 3 I argue that this derives the distinction between verb-raising and tense-hopping languages. Namely, the uninterpretable feature on T in verb-raising languages targets the feature of the  $v$  phase head itself (i.e. a non-embedded feature), whereas T in tense-hopping languages, such as Swedish, targets the feature of the V root (i.e. an embedded feature). To illustrate, recall that Tagalog is often considered to be a V-fronting language, in which the verb raises to  $T^0$  or higher (Aldridge 2002; cf. Chung 1990). For example:

- (87) Bumili siya ng aklat.  
 AT.buy he DET book  
 'He bought a book.'

Here, the verb precedes the subject, showing that the verb has at least raised out of  $vP$ . Note that in (86) if T carries a  $[-v]$  feature, then it may still target the verb for raising after Spell-out of  $vP$  (and thus after Lowering of Asp), since the interpretable  $v$ -feature of the phase head remains visible after Spell-out of  $vP$ . While this movement would require that the verb move through the trace position of Asp, I can think of no *a priori* reason to disallow such an operation. Note that the phonological form and position of the reduplicant within the verb have been determined during the Spell-out cycle of  $vP$ , and that this may not be changed by later narrow syntactic operations. Again, we will return to these issues later, but note for now simply that the PHIC does not preclude subsequent movement of the  $v$  phase head itself. We now return to the pattern of Turkish agreement markers, which I argue is also the result of the PHIC.

### 3.2 Turkish agreement markers revisited

While I believe the account in Section 2.3 explains the overt patterns of agreement markers in Turkish, we have not yet motivated the Lowering operation for the  $k$ -paradigm morphemes. As argued above, this movement should be feature-driven. This might seem to indicate that the  $k$ -paradigm markers have an uninterpretable feature they must check, while the  $z$ -paradigm markers do not. However, this scenario would predict that a  $z$ -paradigm marker is licensed in all environments, contrary to fact. Since  $z$ -paradigm markers carry out the same function as  $k$ -paradigm

markers—i.e. these are allomorphs—, if *z*-paradigm markers carry no uninterpretable features that must be checked, and there are no licensing constraints for *z*- vs. *k*-paradigm markers, then it should be possible to simply use a *z*-paradigm marker under all circumstances. This, however, is not the case. For example, if the past tense morpheme is present, a *k*-paradigm marker is compulsory:

- (88) a. \*git -ti      -yim  
           go -PAST -PERS<sub>Z</sub>
- b. git -ti      -m  
           go -PAST -PERS<sub>K</sub>  
           ‘I went.’
- c. \*git -ti      -mi -yim  
           go -PAST -Q -PERS<sub>Z</sub>
- d. git -ti      -m      -mi  
           go -PAST -PERS<sub>K</sub> -Q  
           ‘Did I go?’

Here, if a *k*-paradigm marker is possible, it must be used. The same holds for the conditional:

- (89) a. \*git -se      -yim  
           go -COND -PERS<sub>Z</sub>
- b. git -se      -m  
           go -COND -PERS<sub>K</sub>  
           ‘Would I go...’
- c. \*git -ti      -yse      -yim  
           go -PAST -COND -PERS<sub>Z</sub>
- d. git -ti      -yse      -m  
           go -PAST -COND -PERS<sub>K</sub>  
           ‘If I went...’

While we might wish to say that there is simply a strong preference for *k*-paradigm markers in Turkish, and that they are therefore used whenever possible, this

explanation is rather unsatisfactory, as it either requires a look-ahead to determine whether the uninterpretable feature on the *k*-paradigm morpheme will be able to be checked after Spell-out (i.e. a *k*-paradigm morpheme is inserted into the narrow syntax only and always when it can lower, and otherwise a *z*-paradigm morpheme is inserted), or predicts that several crashing derivations can be produced.

I propose instead that both *k*-paradigm and *z*-paradigm agreement markers are identical in the pre-syntactic lexicon. That is, there is only ever one morpho-syntactic feature bundle that corresponds to both classes of agreement markers. The allomorphic pattern of these two surface forms will be determined at Vocabulary Insertion. I claim that the uniform agreement marker feature bundle carries an uninterpretable feature that it will check as soon as possible in the overall derivation. I'll call this feature [-nominal] (see Sezer 2001).<sup>88</sup> The only syntactic heads that can check this [-nominal] feature are {PAST} and {COND}, and so I propose that both of these heads carry a [+nominal] feature. Therefore, as only {PAST} and {COND}, but not C itself, carry a corresponding feature, the agreement morpheme will lower to a complex C head containing {PAST} and/or {COND} during Spell-out of CP to check its uninterpretable feature; i.e. the PHIC will make the necessary feature of the {PAST} and/or {COND} heads embedded within the complex C phase head unavailable for feature-checking after Spell-out of CP, and so the agreement morpheme will lower to the complex C head in order to establish a locality relation with this embedded feature, thus checking its uninterpretable feature during the Spell-out cycle of CP.

However, in the absence of a {PAST} or {COND} head within the complex C head, Lowering cannot occur to check this [-nominal] feature. I propose, instead, that Vocabulary Insertion checks this feature in this scenario. To be precise, if Lowering may occur to check this feature, and it is therefore checked before VI,

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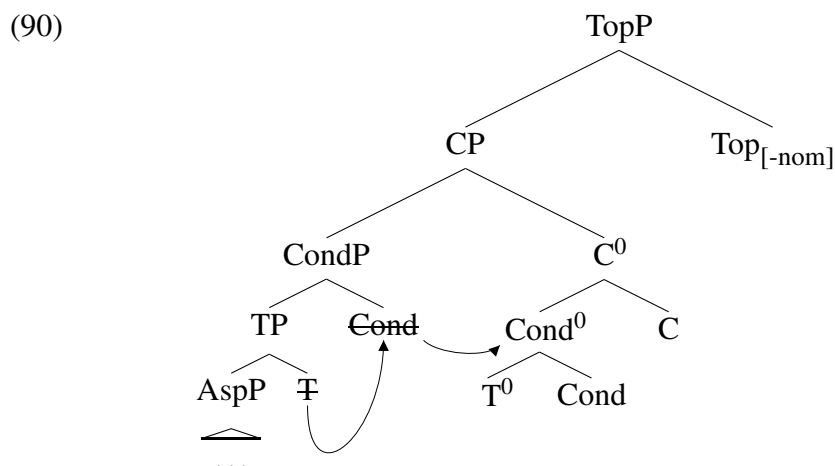
<sup>88</sup>Sezer (2001) proposes a featural complex for all inflectional morphemes and agreement markers in which the featural specification of an individual agreement marker must match identically the featural specification of the morpheme it is attached to. However, he provides no syntactic analysis of these morphemes, and thus this feature-matching is essentially a re-interpretation of Good and Yu's LICENSE constraint (i.e. some agreement markers are licensed by certain morphemes, while others are not). Here, I attempt to explain these patterns from a more straightforward Minimalist perspective of syntactic (and post-syntactic) feature-checking. I must concede, however, that it is primarily the overt morpho-syntactic pattern of these morphemes—rather than any considerations of semantics—that motivates their distinction from other morphemes under all analyses mentioned here, including the one currently being proposed. It is my hope that further research into the intricate semantic nature of these morphemes will serve to support this distinction on different grounds.



a *k*-paradigm allomorph is mapped to the feature bundle. If, however, this feature goes unchecked (e.g. in the absence of a {PAST} or {COND} morpheme on the complex C head), VI maps a *z*-paradigm allomorph to the feature bundle, thus checking its [-nominal] feature during the VI process. Note that this requires that uninterpretable features can be checked after Spell-out on the PF branch. While the theory of Lowering presented above essentially made this assumption implicitly, we will develop an explicit model of post-Spell-out feature-checking in Chapters 3 and 4, where I argue that feature-checking under VI is theoretically possible, and, indeed, oftentimes necessary.

Therefore, under the model proposed here, there is no pre-syntactic distinction between *k*-paradigm and *z*-paradigm agreement markers, and thus no need to posit a preference for one over the other. If Lowering is possible to check the [-nominal] feature on Top, the *k*-paradigm allomorph surfaces, and if it is not, the *z*-paradigm allomorph surfaces. This implies a new type of allomorphy. In particular, this allomorphy is conditioned by the checked vs. unchecked status of a morpho-syntactic feature when VI applies. I thus argue that allomorphy can arise as the result of syntactic feature-checking operations. We will explore this model further in Chapter 4.

To illustrate, consider the following proposed skeletal structure of Turkish verbs:



When  $T^0$  or  $\text{Cond}^0$  are filled with {PAST} or {COND}, respectively, which carry a corresponding [+nominal] feature, Lowering will occur to check the [-nominal]

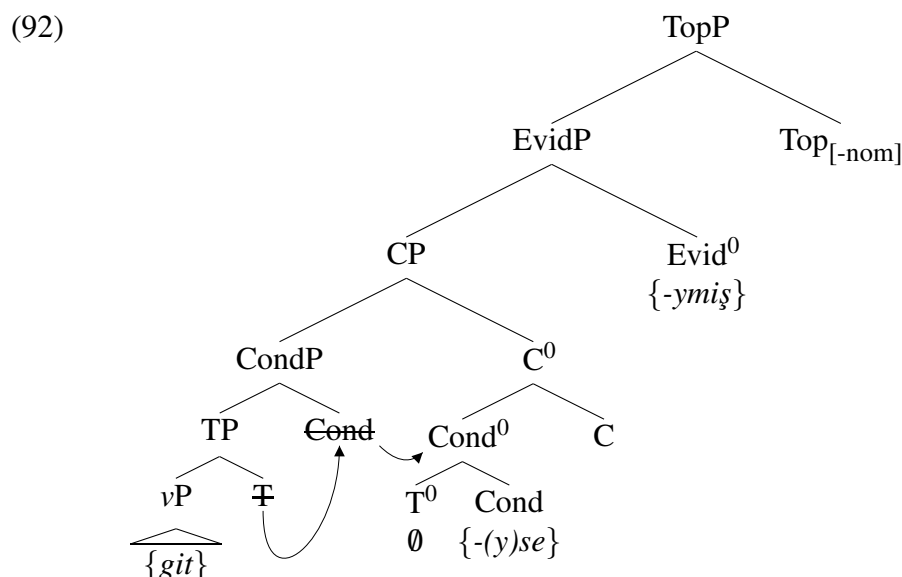
feature on Top, due to the PHIC. Thus, VI will later see that this feature has been checked, and a *k*-paradigm allomorph will be mapped to the person agreement feature bundle. However, if neither of these heads is present in C, then Lowering does not occur, since it would not check the [-nominal] feature on Top (i.e. Lowering is unmotivated in this case), and so this feature on Top goes unchecked and Top remains *in situ*. VI then maps a *z*-paradigm allomorph to this feature bundle, which checks the remaining [-nominal] feature. Therefore, I argue that it is not actually the case that *k*-paradigm markers lower and *z*-paradigm markers do not, but rather that *k*-paradigm markers surface as the result of Lowering of Top, and *z*-paradigm markers surface whenever Lowering is impossible or unmotivated—i.e., *z*-paradigm markers are, in a sense, the elsewhere case. This analysis assumes that features must be checked as early as possible (i.e. the Earliness Principle, Pesetsky 1989), and so if narrow syntactic Raising cannot check the feature, but Lowering is possible to check this feature, Lowering will invariably occur. Under this analysis, there is no need to posit preference rules or licensing constraints. The patterns we observe are simply the result of the availability of different post-syntactic feature-checking mechanisms, and the fact attested elsewhere that Lowering is evaluated before Vocabulary Insertion. Crucially, this model correctly predicts a pattern in which a *k*-paradigm allomorph will surface in every case in which Lowering can check the feature on Top (e.g. (88b,d) and (89b,d)) and a *z*-paradigm allomorph will surface in all other cases.

Now consider the following pattern, which I argue is straightforwardly predicted by the proposed model:

- (91) a.   git -se       -ymiş -sin  
           go -COND -EVID -PERS<sub>Z</sub>  
           ‘You really should have gone...’
- b.   git -miş -se       -n  
           go -EVID -COND -PERS<sub>K</sub>  
           ‘If you indeed went...’

Öner Özçelik (p.c.) reports that both examples in (91) are fine, though are felicitous in different contexts. I take this to be an indication that the {EVID} morpheme has two possible insertion points in the narrow syntax: one between TopP and CP (91a)

and another lower in the structure, perhaps as sister to AspP or *v*P (91b).<sup>89</sup> What is crucial to note here is that the conditional morpheme appears in (91a) without the *k*-paradigm agreement marker. This is straightforwardly predicted by the above theory, since EvidP here blocks Lowering of Top to C<sup>0</sup> containing Cond<sup>0</sup>. E.g.:



In (92), since Top cannot lower to C<sup>0</sup> due to the intervening EvidP (i.e. the complex phase head is not the head of the complement of Top), its [-nominal] feature goes unchecked, and so a *z*-paradigm allomorph surfaces (91a).<sup>90</sup> If EvidP is merged in its lower position (e.g. below T), then it is not an intervener for Lowering of Top, and so a *k*-paradigm allomorph surfaces (91b). In this way, not only have we developed a system in which feature-driven Lowering accounts for the variation in the position of the lowered agreement marker, but also the features that drive this movement are responsible for the morpho-phonological realization

<sup>89</sup>Another indication that the evidential has two different insertion points is that it can be doubled (adapted from Sezer 2001):

- (i) yap -miş -miş -yim  
do -EVID -EVID -1SZ  
'It turns out that I had done it.' or 'They say that others say that I did it.'

<sup>90</sup>Note that C does not raise to Evid. However, even if this movement did occur, Lowering to check the [-nom] feature on Top would be impossible, since the complex C phase head would necessarily have already undergone Spell-out before movement to Evid, and so the PHIC would apply.

of the *k*-paradigm markers vs. the *z*-paradigm markers, assuming, as I will argue in Chapter 4, that the structure fed to Vocabulary Insertion may contain uninterpretable morpho-syntactic features, to which VI may be sensitive.

Note that there are many other inflectional morphemes in Turkish that we have not addressed, but I believe that they can all be analyzed under the patterns above. The proposals presented here should not be taken as a complete, exhaustive analysis of Turkish morphology, but simply as a step forward in deriving the overt positions of Turkish agreement markers via narrow syntactic and post-syntactic transformations.

## 4 Summary

In this chapter I have argued that Lowering is strictly limited to the movement of a head to any  $X^0$ -level projection of the complex head of its phase complement. When the head of the targeted phase is overtly morpho-phonologically complex, the lowered head may therefore surface in different overt positions in relation to the other morphemes of the complex head, resulting in the observed cases of morphological optionality. Furthermore, I have argued that this movement is feature-driven, and occurs as a rescue mechanism due to the *Phase Head Impenetrability Condition*, which makes embedded features on a complex head unavailable to check higher uninterpretable features. In sum, I have proposed a model that provides a theoretical motivation for Lowering operations. Additionally, in presenting this model, I have made certain claims that give us further insight into structure-building operations (e.g. the *Head Adjunction Condition*) and the effects of cyclic Spell-out (e.g. the PHIC). Therefore, the incorporation of Lowering into our extant notions of derivation and Spell-out in this way has produced a more robust overall theory of linguistic computation.

These claims give us cause to question certain previous analyses of downward transformations as Lowering. For example, recall the pattern of Bulgarian determiner-hopping in Section 1, repeated here:

- (93) a. kniga-ta  
book-DEF
- b. xubaba-ta kniga  
nice-DEF book
- c. \*mnog-ət star teatər  
very-DEF old theater
- d. mnogo starij-ə teatər  
very old-DEF theater

Here, the alleged Lowering D head may target either a noun (93a) or an adjective (93b,d). However, if Lowering is consistently feature-driven, this would require a scenario in which either N or A could check the uninterpretable feature on D. Note that in all of the examples above, the uninterpretable feature on the Lowering head remained consistent. It is unclear, then, what the uninterpretable feature on Bulgarian D would be. Furthermore, this requires that both NP and AP constitute phase domains within the DP. While this is not a completely unreasonable assumption, the relative freedom with which the D head targets other elements (crucially, all non-adjunct elements) raises questions as to whether this is truly a head-to-head Lowering operation, given the model presented above. In the next chapter, we return to this issue and show that not all cases that may look like Lowering on the surface are actually Lowering. In particular, we will address the issue of tense-hopping cross-linguistically, and argue that some languages, such as Swedish, do indeed derive their tense-hopping patterns via Lowering, whereas other languages, such as English, derive their tense-hopping patterns via Local Dislocation under morpho-phonological string-adjacency. We will return to the determiner-hopping pattern above in Chapter 4, where I will argue that, similar to English tense-hopping, the downward transformation involved here is not, in fact, a case of Lowering, but rather Local Dislocation of string-adjacent elements before the late-merger of adjuncts.

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## 3

# Tense-hopping and Spell-out

## 1 Introduction

In Chapter 2 I argued that Lowering, like all other syntactic transformations, is necessarily feature-driven, and, furthermore, that Lowering occurs only as a result of the *Phase Head Impenetrability Condition* (PHIC). Consequently, Lowering only ever occurs to a phase head. In this chapter, we will look at another cross-linguistic phenomenon that has previously been analyzed as a case of head-to-head Lowering, namely affix-hopping of tense morphemes (Embick and Noyer 2001, cf. Chomsky 1957, Lasnik 1995, and Ochi 1999). On the surface, it would appear that all cross-linguistic paradigms of tense-hopping meet the requirements laid out previously for Lowering transformations; e.g. the T head takes the  $\nu$ P phase as its complement and T may carry an uninterpretable feature that is checked via a structural transformation.<sup>1</sup> Furthermore, in all tense-hopping languages, when tense-hopping occurs, T appears adjoined to the next structurally lower overt head on the spine of the syntactic structure (i.e. the verb, which is contained in the complex phase head), and so has undergone a downward transformation. The null hypothesis addressed in this chapter is that all tense-hopping languages derive this pattern via the same transformational mechanism, e.g. head-to-head Lowering, following Embick and Noyer. In this regard, I argue in Section 2 below that not all tense-hopping patterns arise as the result of a head-to-head Lowering operation.

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<sup>1</sup>Further evidence that T may carry an uninterpretable feature comes from verb-raising languages, in which T targets the verb for upward movement. See §5 for more on verb-raising languages.

In particular, I present evidence that, while the tense-hopping pattern of Swedish is derived via T-to-*v* Lowering, tense-hopping in English occurs as a post-Vocabulary Insertion morpho-phonological merger operation under string-adjacency, i.e. Local Dislocation. The model presented in this section has some important implications for narrow syntactic derivation, including the nature of syntactic chains. I will argue that, when targeting an element for movement, it is not always the highest copy in a chain that is moved but rather the copy that has most recently been merged. Crucially, under a theory that allows Lowering, these two characterizations do not always apply to the same member of a chain. In Section 3, I argue that the different patterns we observe in Swedish and English carry important consequences for a model of cyclic Spell-out—most crucially that, in the absence of Lowering, the verb and tense morphemes are spelled out on separate phases. Additionally, I discuss the exact timing of the Lowering operation, and argue for a model in which head-to-head Lowering occurs in the narrow syntactic structure rather than in the structure on the PF branch. Section 4 briefly addresses the putative T-to-C movement asymmetry in *wh*-questions, and Section 5 illustrates how verb-raising functions under the proposed theory. In Section 6, I summarize the chapter.<sup>2</sup>

The goal of this chapter is not simply to provide an analysis of the basic patterns of tense-hopping cross-linguistically, but rather to further develop a parsimonious model of the syntax-phonology interface that comprises the simplest architecture possible, while still making the correct predictions with a minimum of stipulations. I hope to show that so-called post-syntactic transformations should not be viewed as operations that are completely isolable from other syntactic processes, but that all stages of a derivation may be unified under a single, overarching system of linguistic computation, based primarily in the interactions of feature-checking and cyclic Spell-out operations.

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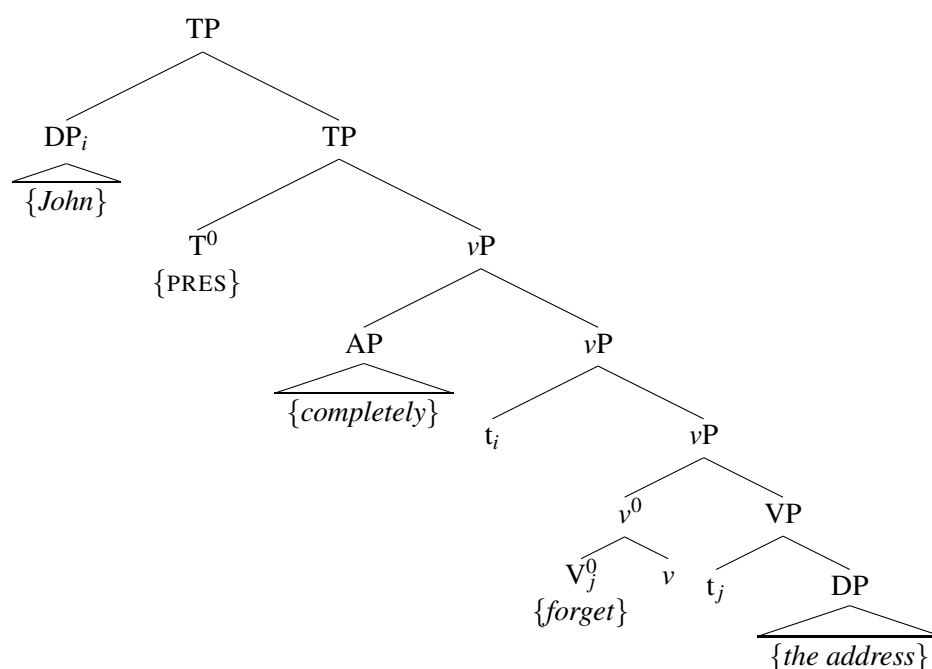
<sup>2</sup>Note that the current chapter deals almost exclusively with patterns of tense-hopping. Other aspects of finite tense constructions, such as auxiliary-raising and the interaction of negation, will be dealt with in Chapter 4.



## 2 Tense-hopping: Lowering or Local Dislocation?

As mentioned in the previous chapters, there are two theoretical possibilities for deriving the downward/rightward tense-hopping transformation under Distributed Morphology; it may either be a case of head-to-head Lowering, as in Embick and Noyer (2001), or a case of pre-adjunct merger Local Dislocation (i.e. morphological merger under PF-adjacency), as in Ochi (1999). Consider again the following, which illustrates the pre-Spell-out structure of an English sentence in which tense-hopping occurs:

- (1) *John completely forgets the address.*



Under the Lowering analysis presented in Chapter 2, T in (1) would lower to  $v$  during the Spell-out cycle of  $vP$  as a last resort to check an uninterpretable V-feature. Under the Local Dislocation analysis, the syntactic position of T remains consistent, but the adjunct *completely* in (1) would not be merged until after Spell-out of the other elements. That is, the morpho-phonological string  $[John \wedge -s \wedge forget \wedge the \wedge address]$  would be formed and Local Dislocation of tense and the verb would occur before late-merger and Spell-out of the adjunct.

In the vast majority of constructions, especially in English, these two theories make the same empirical predictions. For example, an intervening negation (e.g.

*John does not completely forget the address*) disrupts the head-complement locality requirement for T-to-v Lowering, assuming negation in English to be an intervening non-adjunct projection. Likewise, the negation disrupts the string-adjacency requirement necessary for Local Dislocation, assuming it is not a late-merged adjunct like the *un-* morpheme in *unhappiest* (see Chapter 4, §4.2). Similarly, T-to-C movement in standard *yes/no* questions (e.g. *Does John completely forget the address?*) blocks tense-hopping under both theories; under the Lowering analysis T is displaced from a position in which it takes *vP* as a complement, and under Local Dislocation the phonologically overt subject, which is present even before the late merger of adjuncts, disrupts adjacency of tense and the verb; e.g. [*-s* ^ *John* ^ *forget* ^ *the* ^ *address*].

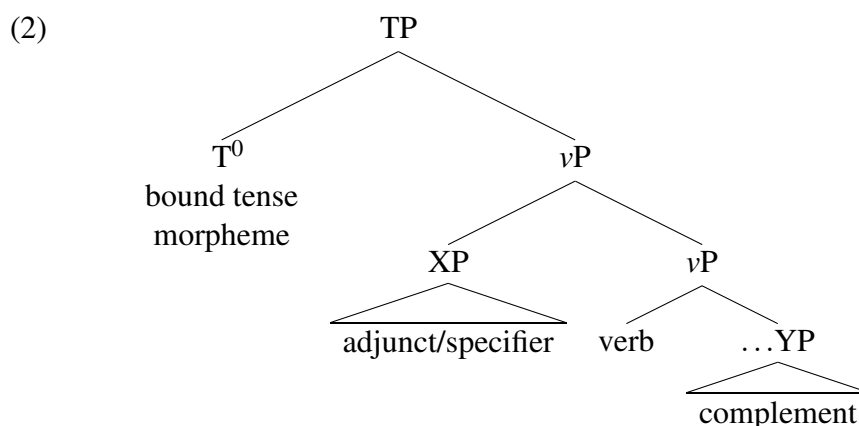
However, these two theories do make at least one different prediction with respect to syntactic structure. In subject *wh*-questions in English, tense-hopping occurs (e.g. *Who completely forgets the address?*). Under the Lowering analysis, this indicates that T-to-C movement has not occurred, making subject *wh*-questions exceptional in terms of interrogatives (compare the following object *wh*-question, in which tense-hopping does not occur, indicating that T-to-C movement has taken place: *What does John completely forget?*). Pesetsky and Torrego (2001) argue that T-to-C movement indeed does not take place in subject *wh*-questions. Rather, the *wh*-subject, which moves to SpecCP, checks all the relevant uninterpretable features on interrogative C (see §4). Conversely, no such T-to-C asymmetry is necessary under the Local Dislocation analysis. Movement of the *wh*-subject from SpecTP to SpecCP and movement of T to C will create the initial string at Spell-out [*who* ^ *-s* ^ *forget* ^ *the* ^ *address*], in which Local Dislocation of the morpho-phonologically adjacent tense and verb morphemes is licensed.

In the remainder of this section, I analyze each of these empirically adequate and theoretically possible theories of tense-hopping in more detail. I will show that a cross-linguistic analysis of tense-hopping reveals that these two theories in fact do not always make the same empirical predictions. The findings will strongly support the Local Dislocation analysis of English tense-hopping, which calls into question the necessity of positing a T-to-C movement asymmetry between subject *wh*-questions and other interrogatives (to be addressed in §4). Moreover, the model of cyclic Spell-out supported by the Lowering facts in Swedish will render a Lowering analysis of English tense-hopping untenable. As a result of these

investigations, we will be able to further refine our model of the syntax-phonology interface.

## 2.1 Tense-hopping cross-linguistically

In the previous chapters, following Emonds (1976) and Pollock (1989), I argued that a diagnostic for differentiating between tense-hopping and verb-raising languages is the general pattern of the relative positions of an inflected verb, verbal modifiers/adjuncts, and complements.<sup>3</sup> Generally speaking, standard declarative clauses in a verb-raising language exhibit the surface order [inflected verb ^ adjunct ^ complement] (e.g. French) and tense-hopping languages show the order [adjunct ^ inflected verb ^ complement] (e.g. English (1) above). This is assuming a standard syntactic structure in which a discrete tense node scopes over the verb phrase, including any adjuncts to that verb phrase; e.g.



Thus, in a verb-raising language the verb moves up to this tense node, past the  $vP$ -adjunct and away from its complement, whereas in a tense-hopping language the tense morpheme itself adjoins to the verb within the  $vP$ , also moving past the  $vP$ -adjunct, though in the opposite direction. As just mentioned, this tense-hopping transformation may be accounted for via either morpho-syntactic or morpho-phonological means. Differentiating between these two theories is the primary goal of this section.

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<sup>3</sup>This chapter treats the verb-raising vs. tense-hopping distinction as a linguistic dichotomy, since we are only concerned with languages that exhibit inflected verb paradigms, as opposed to languages that encode all tense with free morphemes.

We will be comparing and contrasting two tense-hopping languages, namely English and Swedish. Note that, though it is V2 in matrix clauses, the order of constituents in embedded clauses in Swedish is identical to that of English (compare the translation in (3)), where the inflected main verb follows any *vP*-adjunct, showing that Swedish is also a tense-hopping language.

- (3) Du vet            att jag **ofta** läser            tidningen.  
       you know.PRES that I    often read.PRES newspaper.DEF  
       ‘You know that I often read the newspaper.’

In the absence of V2 head movement, which only occurs in matrix clauses in Swedish, tense morphology (e.g. the present tense [-*r*] morphology of Swedish) undergoes a downward transformation to the Swedish verb, moving past the syntactic position of the *vP*-adjunct. In the following section, we will see that tense-hopping also occurs in matrix clauses in Swedish, though it is often obfuscated by subsequent V2 head movement; that is, though the tense morpheme moves downward to the verb, the verb may later move higher to C, unlike in English. Taking this and other facts into consideration, I will show that Swedish and English do not derive their tense-hopping patterns via identical means, contra the null hypothesis of tense-hopping.

## 2.2 *vP*-fronting

Fronting of a *vP* that contains a matrix verb is only possible in tense-hopping languages. In verb-raising languages, the matrix verb will have moved out of *vP* before *vP* is targeted for movement. However, in tense-hopping languages, the verb remains within *vP*, and so will be carried along under *vP*-fronting. In this section, we will see that both English and Swedish allow fronting of a *vP* containing the matrix verb, but that a seemingly small difference in their respective patterns has crucial consequences for theories of tense-hopping, especially with respect to the Lowering vs. Local Dislocation debate. In particular, I argue that an asymmetry in *vP*-fronting strongly suggests a Lowering analysis of Swedish tense-hopping, but a Local Dislocation analysis of English tense-hopping. Additionally, the existence of this asymmetry calls into question the viability of the *Late Lowering Hypothesis* (Embick and Noyer 2001), since it is argued that Lowering must be evaluated

cyclically. We will also see in §2.3 and Chapter 4 that this micro-variation in tense-hopping allows us to account for several other contrasting characteristics of these languages.

### 2.2.1 *vP-fronting in English*

In English *vP*-fronting, tense clearly does not adjoin to the verb before the *vP* is moved from its original position as complement to T:

- (4) a. He said he would play the piano, and [<sub>vP</sub> play the piano]<sub>i</sub> he did *t*<sub>1</sub>.  
 b. \*He said he would play the piano, and [<sub>vP</sub> played the piano]<sub>i</sub> he (did) *t*<sub>1</sub>.

In (4a), the verb *play* appears in its uninflected form in the fronted *vP*. Embick and Noyer (2001) use these facts to argue for their *Late Lowering Hypothesis* (LLH), under which Lowering does not occur until all narrow syntactic derivation has been completed. Following the LLH, tense-hopping in English, which Embick and Noyer analyze as Lowering, is not evaluated cyclically (i.e. on iterative Spell-out cycles to PF), but rather only after the entire narrow syntactic structure has been determined (i.e. on the final Spell-out cycle).<sup>4</sup> As narrow syntactic *vP*-fronting takes place before T-to-*v* Lowering is evaluated under this analysis, and *vP*-fronting displaces the verb from the complement of T, Lowering is precluded.<sup>5</sup> We will return to this issue shortly.

Under the Local Dislocation analysis of tense-hopping, the pattern in (4) suggests that tense and the verb are never phonologically adjacent during the course of the derivation of (4a). In other words, tense is not given phonological features until after *vP* has been fronted in the syntax. This scenario obtains under most theories of both cyclic and non-cyclic Spell-out. For example, if T does not lower to *vP*, but is rather spelled out on the CP cycle (or, alternatively, the final

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<sup>4</sup>Embick and Noyer's definition of the LLH, given the tense-hopping and *vP*-fronting data, may be a bit too strong. The LLH, with respect to tense-hopping, might simply be re-stated as "T does not lower until the Spell-out of CP." This would at first appear to be a reasonable assumption, given that T is first merged within the CP phase. However, we will soon see evidence that contradicts both the original LLH and this reformulation.

<sup>5</sup>As noted earlier, the same holds true of T-to-C movement under a Lowering analysis, as well, since this moves T to a position in which its complement is no longer *vP*.

or only Spell-out cycle), it will not be given phonological features (i.e. undergo Vocabulary Insertion) until after all narrow syntactic transformations have taken place. Under a theory of cyclic Spell-out, this is due to the requirement that all narrow syntactic transformations occur before Spell-out of the matrix CP, given the *Phase Impenetrability Condition* (PIC) (Chomsky 2001). For our purposes here, I roughly define the PIC as follows:

- (5) *Phase Impenetrability Condition*  
 Elements embedded in the Spell-out domain of a phase  $\alpha$ P are not accessible to operations in a higher phase  $\beta$ P.

Note that this definition is intentionally imprecise; it does not define “Spell-out domain” nor does it specify what constitutes an “embedded element”, though we may assume that at least the complement of the phase head qualifies as “embedded” under this definition. These are issues that we will address shortly. What is important to note for now is that a consequence of the PIC is that any element that is not located at the edge of a phase  $\alpha$ P before Spell-out of  $\alpha$ P will not be able to move higher in the structure after Spell-out of  $\alpha$ P. At the very least, no element contained within the complement of the phase head  $\alpha$  may be extracted after Spell-out of the  $\alpha$ P phase. In the case under consideration here, since  $v$ P is contained within the complement of C, the PIC precludes movement of  $v$ P after Spell-out of CP. Consequently,  $v$ P will move to SpecCP before phonological features are mapped to *in situ* T during the Spell-out cycle of CP; thus,  $v$ P is displaced before Local Dislocation of the bound tense morpheme to the verb is evaluated. Since string-adjacency of the fronted verb and *in situ* T does not obtain in this case, the impossibility of tense-hopping in English under the Local Dislocation analysis is likewise predicted under a theory of cyclic Spell-out.

Thus, these data in and of themselves do not support one analysis of English tense-hopping over the other, since each makes the same empirical predictions regarding the absence of tense-hopping in  $v$ P-fronting constructions. However, the Lowering analysis, with respect to the LLH, has the unfortunate drawback that it requires that transformations on the PF branch be delayed until after the narrow syntactic derivation is complete. This creates a scenario in which operations on the PF branch (e.g. Lowering, Vocabulary Insertion, Local Dislocation) do not occur in step with the independently motivated cyclic Spell-out operations (Chomsky

2001, Fox and Pesetsky 2005, Legate 2003, Svenonius 2001, and many others). Under the most parsimonious system of cyclic Spell-out and the syntax-phonology interface, post-syntactic operations and transformations would be evaluated on each individual Spell-out cycle. This would thus derive an architecture in which morpho-syntactic structure, linearization, and phonological features of syntactic elements are all established on the same Spell-out cycles that constrain narrow syntactic derivation. Consequently, phases would be both morpho-syntactic and morpho-phonological (Piggott and Newell 2006). In what follows, I present evidence that will lead us to conclude that such a unified system of phases is, in fact, necessary to account for certain cross-linguistic differences in tense-hopping patterns.

### 2.2.2 *vP-fronting in Swedish*

We have just seen that the *vP*-fronting data from English do not straightforwardly allow us to choose one theory of tense-hopping over the other. However, the following data show that movement of *vP* does not display an identical pattern across tense-hopping languages, which helps to shed light on the current debate. (6a) below illustrates a normal V2 word order in Swedish, in which the verb has moved to C and the DP *boken* has moved to the preverbal position. As we see in (6b), Swedish also moves *vP* to the ‘preverbal’ position (i.e. SpecCP) under *vP*-topicalization. However, the verb in the fronted *vP* is finite, unlike in English (examples from Källgren and Prince 1989).

- (6) a. [DP Boken] läser han nu.  
           book.DEF read.PRES he now  
           ‘He is reading the book now.’
- b. [<sub>vP</sub> Läser boken] gör han nu.  
           read.PRES book.DEF do.PRES he now  
           ‘Reading the book he is now.’

The fact that overt tense morphology appears on the verb in the fronted *vP* is a strong indication that T adjoins to the verb in Swedish before *vP*-movement occurs. Furthermore, I argue below that *gör* is a ‘dummy’ verb, similar to *do*-support in English, and that it is here a resumptive realization of a trace copy of T. This

indicates that there are at least two copies of a single T head in (6b), which can only arise as the result of a morpho-syntactic transformation (e.g. Lowering) rather than a morpho-phonological one (e.g. Local Dislocation). As mentioned in Chapter 1, Local Dislocation is an adjustment to the constituency and linear order of morpho-phonological objects rather than morpho-syntactic objects. Given that Local Dislocation occurs after the point at which hierarchical syntactic structure is erased, it is unable to create traces that would be visible to subsequent structural operations, by hypothesis. Assuming that traces represent a record of the structural positions in which a syntactic element has been merged (or re-merged), Local Dislocation does not leave a trace, since this operation does not affect the syntactic, structural position of an element, but rather minimally alters the linearization scheme of the morpho-phonological representation. Lowering, on the other hand, since it operates on morpho-syntactic structure and re-merges a syntactic element in a new structural position, should indeed leave a trace, just like other head movements. Thus, the evidence strongly suggests that tense-hopping in Swedish is the result of Lowering.

It might be tempting to analyze this asymmetry as a difference in the size of the fronted constituents; e.g. English fronts *v*Ps but Swedish fronts TPs. Note, however, that the following example shows that the fronting transformation in question is not targeting a constituent larger than *v*P, given that no material in TP (neither the subject nor the modal) is fronted along with the verb phrase:

- (7) [<sub>vP</sub> Läs**a** boken] ska han.  
       read.INF book.DEF will he  
       ‘Read the book, he will.’

Thus, the XP-fronting operation must be targeting a constituent smaller than TP, namely *v*P.<sup>6</sup> Therefore, in example (6b), it must be the case that tense moves

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<sup>6</sup>Recall that I am assuming that V obligatorily moves to *v* in the languages under consideration (See Chapter 1, §2.1). This is primarily for theoretical reasons, as the head-complement locality required for tense-to-verb Lowering does not obtain if the lexical verb remains in VP. Moreover, V2 head movement of the matrix verb requires that V move to *v*, as V would be subject to the PIC if it remained *in situ* during Spell-out of *v*P, thus preventing movement of the verb to C. Therefore, (7) cannot be a case of VP-fronting under this analysis, since the verb has moved out of VP.

I should also point out that a Local Dislocation analysis of tense-hopping makes no empirical or theoretical predictions regarding V-to-*v* movement. Since *v* is phonologically null in e.g. English, the same morpho-phonological string will be produced regardless of whether V raises to *v*. As this will not affect my analysis, I continue to assume that V raises to *v* in all tense-hopping and verb-raising languages.



structurally downward into the  $\nu$ P before  $\nu$ P movement, which is only possible as a head-to-head Lowering operation. Given that it is a  $\nu$ P constituent that is being targeted in this transformation, tense-hopping in Swedish cannot possibly be a case of Local Dislocation under any theory of Spell-out. If tense-hopping in Swedish were derived via morpho-phonological merger of the tense and verb morphemes, then both T and  $\nu$  would have to be simultaneously visible and string-adjacent at PF before the  $\nu$ P-fronting operation occurred. If we assume non-cyclic Spell-out (i.e. there is only one Spell-out operation that occurs at the end of the derivation), then morpho-phonological adjacency of tense and the verb could not be obtained in cases of  $\nu$ P-fronting, as the  $\nu$ P would have to be fronted to SpecCP in the narrow syntax before the one-time Spell-out operation, thus disrupting the PF-adjacency of the verb and *in situ* T. The same restrictions hold under a model of cyclic Spell-out. If T does not lower to  $\nu$ , but rather remains *in situ* in the narrow syntax, it would only be spelled out on the matrix CP Spell-out cycle.<sup>7</sup> As mentioned previously, narrow syntactic extraction of  $\nu$ P to SpecCP is impossible after Spell-out of CP, due to the PIC. Therefore, Swedish tense-hopping as Local Dislocation would create a timing paradox in the order of operations. The entire derivation would have to be complete (i.e. spelled out) before tense-hopping could occur in the matrix clause at PF, but narrow syntactic movement (e.g.  $\nu$ P-topicalization) would have to occur after tense-hopping. We will address these issues further in the following sections, noting for now that a Lowering analysis of Swedish tense-hopping obviates the aforementioned problems, since T may lower structurally into  $\nu$ P during the Spell-out cycle of  $\nu$ P, and thus before derivation of CP is complete.<sup>8</sup>

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<sup>7</sup>This is assuming, as I do throughout this thesis, that TP itself is not a phase (contra Marušič 2005). However, there is independent reason to assume this. For example, if TP were a phase, then the topicalized  $\nu$ P in Swedish would necessarily have to move to SpecTP before Spell-out of TP in order to avoid a violation of the PIC, which requires that all phrases that ‘escape’ a phase move to the edge of that phase before Spell-out (or be base-generated at the phase edge). However, if this were the case, then a Local Dislocation analysis of Swedish tense-hopping is still predicted to be impossible, as T would not be spelled out in a string-adjacent position to the verb. The  $\nu$ P containing the verb would be located in SpecTP when (or, at the very least, before) T is evaluated at PF (i.e. the structure of (6b) before TP Spell-out would be [<sub>TP</sub> [ <sub>$\nu$ P</sub> *läsa boken*]<sub>i</sub> [<sub>TP</sub> T<sub>PRES</sub> *t<sub>i</sub>* ]], from which it is impossible to derive PF-adjacency of *läsa* and T<sub>PRES</sub>). Thus, I will not explore this possibility further.

<sup>8</sup>Note that this does not make any strong claim about whether Lowering occurs in the narrow syntactic structure or on the PF branch. However, see fn. 12 and upcoming sections for a discussion of this.

Crucially, if tense-hopping were derived via identical means in English and Swedish, we would not predict such an asymmetry in fronted  $\nu$ Ps. Therefore, as tense-hopping in Swedish must be Lowering, due to the fact that the data indicate that this is a downward movement that leaves behind a trace copy, in addition to the limitations of the required order of operations, tense-hopping in English cannot be Lowering, giving us a reason to favor the pre-adjunct merger Local Dislocation analysis of English tense-hopping, as argued for by Ochi (1999).

The following table summarizes this argument:

(8) *Possible Models of Tense-hopping*

|                          | <b>Late Lowering</b> | <b>Derivational Lowering</b> |
|--------------------------|----------------------|------------------------------|
| <b>Local Dislocation</b> | English/*Swedish     | <i>English/*Swedish</i>      |
| <b>Lowering</b>          | English/*Swedish     | *English/ <i>Swedish</i>     |

The only combination that can account for all of the facts is a derivational model in which Lowering takes place during the cyclic process of syntactic derivation and tense-hopping is Lowering in Swedish and Local Dislocation in English. In the following section, we will see further evidence that supports this distinction.

## 2.3 Further support from V2 movement

In this section, I analyze V2 phenomena across languages and develop a unified approach to these patterns. I argue that, once we adopt derivational Lowering, all V2-type phenomena in Germanic languages can be explained as resulting from a [-T] feature on matrix C. This analysis will allow us to make some important claims regarding the architecture of syntactic derivations, such as a reformulation of the definition of the head of a syntactic chain—namely, the head of a chain is not necessarily the highest copy, but rather the most recently merged copy.

### 2.3.1 Tense-attraction vs. verb-attraction

As shown in (6a), Swedish moves the matrix verb to verb-second position in the absence of  $\nu$ P-topicalization. However, when the  $\nu$ P is topicalized (6b), the inflected

matrix verb appears within the fronted *vP* and the semantically impoverished verb *gör* ‘does’ appears in V2 position. I argue that this pattern allows us to make certain claims about the nature of V2 movement cross-linguistically; namely, matrix V2 head movement does not target the verb itself, but rather targets tense. The model of V2 argued for here not only supports a Lowering analysis of Swedish tense-hopping, but also reinforces a Local Dislocation analysis of English tense-hopping.

First, let us briefly look at another V2 language in order to establish a general pattern for V2 constructions. In German, like in Swedish, the inflected matrix verb in a standard declarative construction appears in verb-second position (note that I assume that German VPs and *vPs* are head-final, contra Kayne 1994):

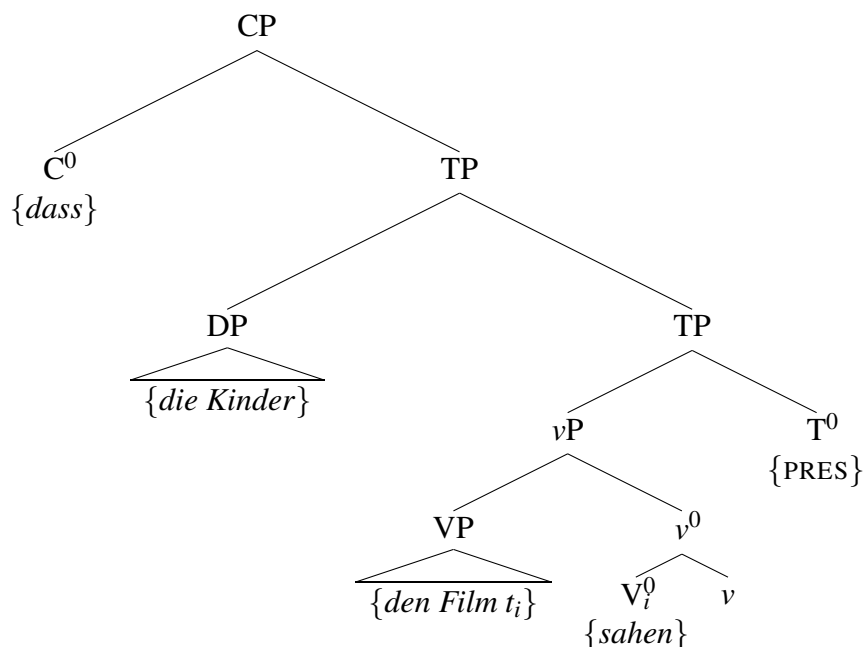
- (9) a. \*Die Kinder den Film gesehen haben.  
the children the film seen have.PRES
- b. Die Kinder haben den Film gesehen.  
the children have.PRES the film seen  
‘The children have seen the film.’
- c. \*Die Kinder den Film sahen.  
the children the film see.PAST
- d. Die Kinder sahen den Film.  
the children see.PAST the film  
‘The children saw the film.’

Assuming that the verbs *haben* in (9b) and *sahen* in (9d) have undergone *v*-to-T-to-C movement (Schwartz and Vikner 1996, Vikner 1995, cf. Travis 1984, 1986, 1991), there are two possible-feature based scenarios under which this movement is derived:

- (10) a. *Verb attraction*  
C directly targets the verb for movement to V2 position (i.e.  $C_{[-v]}$ ).<sup>9</sup>
- b. *Tense attraction*  
C targets T for movement to V2 position; an independent head movement operation creates a complex  $v+T$  head before C is merged, and so the verb is raised, as well, during T-to-C movement (i.e.  $C_{[-T]}$ ).

In German, it is difficult to either prove or disprove either of the possibilities in (10). However, in order for (10b) to be a viable candidate, independent evidence is needed to show that the verb moves to T in non-V2 environments in German, e.g. embedded clauses. Assuming that TP in German, like  $vP$ , is head-final, this is also difficult to show. Consider the following possible structure of an embedded clause in German:

- (11) a. Ich weiss, [ dass die Kinder den Film sahen].  
I know.PRES [ that the children the film see.PAST]  
'I know that the children saw the film.'
- b. Ich weiss ...



<sup>9</sup>I assume that all heads in the functional domain that raise verbs target a  $v$ -feature, given the PHIC. See the later section on verb-raising languages.

In (11b), since there is never a structural intervener between the syntactic positions of  $v$  and T (e.g. an adjunct that is unquestionably right-adjoined to  $vP$ ), there is no straightforward structural way to determine whether string-vacuous movement of  $v$  to T occurs. Schwartz and Vikner (1996) argue, however, that  $v$  does raise to T in German. Their argument is based primarily on the richness of inflection of German verbs. Many analyses (e.g. Bobaljik 2000b, Holmberg and Platzack 1995) have argued for a correlation between verb-raising and a rich system of verbal morphology. It has been observed that languages that exhibit  $v$ -to-T movement (e.g. Italian, French) tend to have a more varied paradigm of verbal inflection than tense-hopping languages (e.g. English, Swedish).<sup>10</sup> Note that German displays a much richer inflectional paradigm than Swedish or English:

|      |               |     |                |     |                |
|------|---------------|-----|----------------|-----|----------------|
| (12) | <u>German</u> | vs. | <u>Swedish</u> | vs. | <u>English</u> |
|      | ich nehme     |     | jag tar        |     | 'I take'       |
|      | du nimmst     |     | du tar         |     | 'you(sg) take' |
|      | er nimmt      |     | han tar        |     | 'he takes'     |
|      | wir nehmen    |     | vi tar         |     | 'we take'      |
|      | ihr nehmt     |     | ni tar         |     | 'you(pl) take' |
|      | sie nehmen    |     | de tar         |     | 'they take'    |

While this does not provide irrefutable proof that  $v$  independently raises to T in German, it does allow us to entertain the possibility that the tense-attraction analysis of V2 movement is the correct one.<sup>11</sup> Furthermore, as we will see below, this analysis allows for a more uniform system of V2 phenomena cross-linguistically.

### 2.3.2 Derivational vs. representational syntactic chains

I have argued that T lowers to  $v$  cyclically in Swedish. This raises a new theoretical question: when a higher head merges and probes a chain that contains a lowered head, which copy in that chain is targeted for movement? I believe the answer to this question allows us to derive the V2 head pattern straightforwardly in Swedish.

<sup>10</sup>See §5.2 for further investigation into the Rich Agreement Hypothesis.

<sup>11</sup>Note that if  $v$  does not raise to T in German, then German is also a tense-hopping language, as the verb in the embedded clause carries finite tense morphology. There is no strong empirical evidence to suggest that this is or isn't the case, however. Also, see the appendix to this chapter on the possibility of matrix  $vP$ -fronting in certain registers of German.

As noted above, we will assume the tense-attraction analysis of V2. Recall, however, that unlike the proposed scenario for German, verbs do not raise to T in Swedish—evidenced by the fact that Swedish allows fronting of a *v*P containing the matrix verb—, yet T-to-C V2 movement still targets the verb and tense as a single syntactic constituent, as shown in (6a), repeated in (13) below, in which the inflected verb *läser* occupies the C/V2 position.

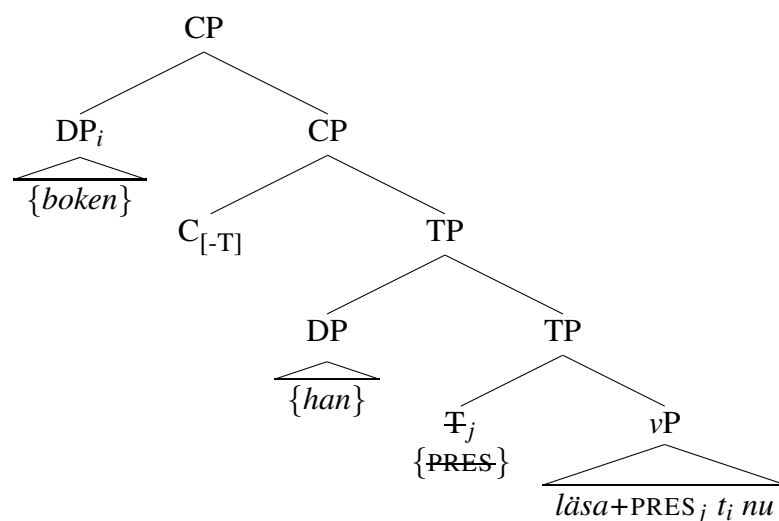
- (13)      [<sub>DP</sub> Boken]    läser        han nu.  
                  book.DEF read.PRES he    now  
                  ‘He is reading the book now.’

This pattern is explained if T undergoes Lowering to *v* before C merges into the narrow syntactic derivation and targets T for movement; since Lowering of tense is a syntactic head-to-head movement, it forms a complex syntactic object containing both T and *v*. I claim that, with a slight modification to our view of derivational probing operations and syntactic chains (see below), T-to-C V2 movement will target the complex T+*v* structure formed via Lowering, when possible (i.e. when the inflected verb is still within the c-command domain of C when T-to-C movement is evaluated, which is the case in the absence of *v*P-fronting; see below).<sup>12</sup> I propose that the following is the (rough) structure of (13) at the point at which T-to-C V2 movement is evaluated (see §3.3 for a step-by-step derivation of this structure, in which I illustrate that tense-lowering occurs before C is merged into the derivation; note also that I will later address the timing of phrasal versus head movement in the V2 pattern):

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<sup>12</sup>Since the complex *v*+T head is visible to higher heads, this analysis suggests that the Lowering operation occurs in the narrow syntax, rather than solely on the PF branch. I return to this issue in later sections, where I compare and contrast a theory of Lowering on the PF branch with a theory of Lowering in the narrow syntax. While both models are theoretically possible, we will ultimately see that the narrow syntactic theory of Lowering is the less problematic of the two options. Crucially, however, I will continue to argue that Lowering is motivated by Spell-out operations, and is thus closely linked with the process of assigning phonological form to syntactic structures. It is important to note for now only that a Lowering operation creates a complex morpho-syntactic *v*+T head at some point of the derivation, and that this complex head becomes targetable for T-to-C V2 movement.

(14) *Boken läser han nu.*



In (14), the trace of T created via Lowering forms a chain with the derivationally most recent copy on *v* adjoined to *läsa*, since the trace c-commands the lower copy. I argue that when T-to-C movement is evaluated, C does not target the structurally closest copy of T (i.e. the trace of T in TP), but rather targets the lower copy adjoined to *v*. Thus, when C probes for T, it targets the most recent copy of T and raises the *v*+T (i.e. *läsa+PRES*) head to V2 position.<sup>13</sup>

Crucially, it is not the structurally highest copy of T that is targeted for movement in (14). This analysis entails an important revision to the notion of “syntactic chains”, since, traditionally, it is the structurally highest copy in a chain that is targeted for movement. Under this traditional view, a head Y that probes an element X will always target the closest (i.e. highest) copy of X found in the syntactic representation when Y is merged. However, I argue that syntactic chains are purely derivational, rather than representational. While I maintain that all members of a chain must be in a c-command relation (i.e. a chain consists only of copies that c-command or are c-commanded by another copy of themselves),<sup>14</sup> I adopt the following definition of the head of a syntactic chain:

<sup>13</sup>Recall that, as mentioned in Chapter 2, there is no *a priori* reason to think that movement through a trace of a lowered head is impossible.

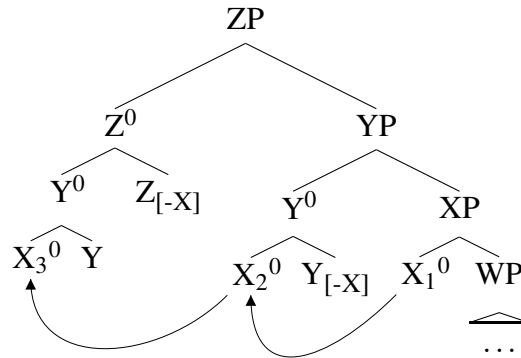
<sup>14</sup>See Epstein et al. (1998) and Kawashima and Kitahara (1996) for a derivational view of c-command relations.

(15) *Head of chain (derivational):*

In a syntactic chain  $C_H$ , where  $C_H = \{\alpha_i \dots \alpha_i \dots\}$ ,  $|C_H| > 1$ , and each  $\alpha$  is a copy of  $\beta$  that c-commands and/or is c-commanded by another copy of  $\beta$ , the head of  $C_H$  is the  $\alpha$  that was most recently merged into the derivation.<sup>15</sup>

Under (15), the head of the chain created by Lowering of T in (14) is the copy contained within the  $\nu P$ , rather than the copy that is structurally highest (i.e. the copy in the base position of T). I argue that it is the head of this chain—under the above definition—that is targeted in feature-probing operations. Thus, in all probing operations, the probing head targets (or attempts to target) the most derivationally recent copy of the targeted constituent.<sup>16</sup> In the absence of Lowering, the most recent copy within a targeted chain will invariably be the structurally highest copy. In other words, in cases in which all syntactic transformations proceed as raising operations (i.e. re-merger of a copy to a structurally higher position), all trace copies within a chain will be found in a structurally lower position than the derivationally most recent copy, and so the head of the chain will be the highest copy; e.g. (numeric subscripts on ‘X’ indicate the order in which each copy is merged/re-merged):<sup>17,18</sup>

## (16) Raising



In (16), upward head movement transformations have created three copies of X. After the first head movement, the chain  $\{X_2, X_1\}$  is created, where the order of elements indicates a c-command relation (i.e.  $X_2$  c-commands  $X_1$ ). When  $Z_{[-X]}^0$  merges and targets X for movement,  $X_2$  is both the derivationally most recent and

<sup>15</sup>If  $|C_H| = 1$ , then the single member of  $C_H$  is vacuously the head of  $C_H$ .

<sup>16</sup>See below for an analysis of “broken chains”, i.e. cases in which the derivationally most recent copy is inaccessible to a probing head.

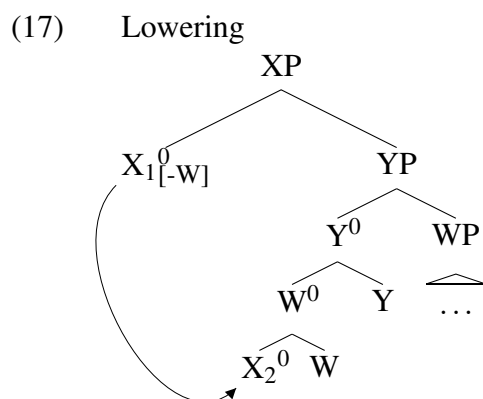
<sup>17</sup>I limit myself to head movement here, though the same claims hold for phrasal movement.

<sup>18</sup>All elements in (16) are contained within the same Spell-out domain; see §3.1.



the structurally highest copy of X, and it is targeted for movement to  $Z^0$  (pied-piping  $Y^0$  in the process), creating the chain  $\{X_3, X_2, X_1\}$ . In this chain,  $X_3$  is now the head, under either a representational or derivational definition of “head of chain”, and so will be targeted in any subsequent transformations of X to a higher head.

However, when Lowering occurs, it is not immediately obvious which copy will qualify as the head of the resulting chain; e.g.:<sup>19</sup>



Lowering of X in (17) creates the chain  $\{X_1, X_2\}$ . However,  $X_1$  is the structurally highest copy, while  $X_2$  is the derivationally most recent copy. When compared with the raising example in (16), we see that a distinction between “structurally highest copy” and “derivationally most recent copy” only arises in such cases of Lowering. Given that the matrix verb in Swedish is moved to C in standard V2 movement (and interrogatives; see below), we can maintain a tense-attraction (i.e. T-to-C) analysis of V2 head movement by adopting the revised definition of “head of chain” as the most recent, rather than the highest, copy in a chain. In a tense-hopping language like Swedish, finite T invariably lowers to  $v$ . If and when  $C_{[-T]}$  merges, it targets the head of the T chain (where possible; see below), which, at this point in the derivation, is the copy adjoined to the verb in  $vP$ , and so the verb is carried along in the T-to-C transformation.<sup>20</sup>

Computationally speaking, I believe this to be a conceptually desirable model of syntactic chains and derivations. Under the simple view of syntactic derivation as a process that manipulates individual elements from a numeration, combining

<sup>19</sup>X and Y in (17) are merged in separate Spell-out domains; see §3.1.

<sup>20</sup>Although the lowered T head has undergone Spell-out and is thus embedded in the phase head, I argue in §3.3 that it may still be targeted for movement by virtue of the fact that a higher element in its well-formed chain (i.e. the trace of T) is still visible to higher elements (see esp. fn. 59).

and re-combining those elements in principled ways, it is the copy of each individual element which has most recently been manipulated by the computational component that is active in the on-line derivation. Syntactic transformations consist of moving an element from one position to a new position derivationally, i.e. in a step-wise fashion. As mentioned earlier, trace copies represent the derivational history of a particular syntactic element; that is, traces show where an element has been, rather than where it is currently at a given point of the derivation. However, I argue that on-line derivation should be most sensitive to the most recent copies of the elements involved—i.e. the current locations of those elements—, rather than “looking back” to the historical positions of a given element.<sup>21</sup> Thus, whenever possible, a syntactic transformation will target the most recently active copy (i.e. the most recently merged copy) in a derivation, instead of targeting a derivationally “older” copy, i.e. a trace. This reduces the computational burden on syntactic derivation, since, all things being equal, the most economical derivation will simply continue the progressive movement of an active copy. A consequence of this is that, under most circumstances, trace copies within a chain are derivationally inert, regardless of their position with respect to the most derivationally recent copy.<sup>22</sup> We return to this in a moment.

The following summarizes the effects of this model for standard V2 movement in Swedish:

- Finite T undergoes head-to-head Lowering to *v* in both matrix and embedded clauses in Swedish, leaving a trace copy of T in TP.
- If and when C<sub>[-T]</sub> merges, it will target the derivationally most recent copy of T if that copy is contained in its c-command domain (see below).
- As the derivationally most recent copy of T is adjoined to the verb, the verb will be pied-piped in T-to-C V2 (and interrogative; see §2.3.5) movement.

This therefore allows for movement of the main verb to V2 position in a tense-lowering language like Swedish under a tense-attraction analysis of V2 constructions. As noted previously, a Local Dislocation analysis of tense-hopping is incapable of creating a morpho-syntactic *v*+T constituent at any level of the

<sup>21</sup>Note that I say “most sensitive” since it is possible for traces to be targeted in transformations when the derivationally most recent copy is inaccessible; see below.

<sup>22</sup>As pointed out by Lisa Travis (p.c.), this treats syntactic objects as “real” objects. When looking for a real object, you target its last known position.

derivation, as Local Dislocation creates complex morpho-phonological, rather than morpho-syntactic, objects. Since  $v+T$  is targeted as a morpho-syntactic constituent in T-to-C movements, under the proposed model, we have further support for a Lowering analysis of Swedish tense-hopping.

### 2.3.3 Timing of V2, re-merger of trace copies, and “stowaway” movement

We can now also explain the presence of the ‘dummy’ verb *göra* in Swedish  $vP$ -topicalization. Recall that in (6b), repeated in (18) below, the matrix verb is contained in the fronted  $vP$ , and the V2 position is occupied by the semantically impoverished verb *gör*:

- (18)  $[_{vP}$  Läser boken] gör han nu.  
 read.PRES book.DEF do.PRES he now  
 ‘Reading the book he is now.’

Furthermore, the tense on the verb *göra* must be identical to the tense on the verb in the fronted  $vP$ , suggesting that these overt tense morphemes are two copies of a single T head (examples from Källgren and Prince 1989, ex. (4)).

- (19) a.  $*[_{vP}$  Läser boken] gjorde han.  
 read.PRES book.DEF do.PAST he  
 b.  $[_{vP}$  Läste boken] gjorde han.  
 read.PAST book.DEF do.PAST he

I therefore assume, and argue further below, that the form of *göra* present in (18) and (19b) is a resumptive pronunciation of a trace copy of T, and that these examples therefore have only one lexical verb, *läsa*. This has an immediate consequence for the timing of V2 head and phrasal movements. Namely,  $vP$  must move to SpecCP before T-to-C V2 head movement is evaluated. This must hold under any theory of V2 movement (e.g. tense-attraction or verb-attraction); if the  $vP$  were *in situ* when head movement to C is evaluated, then any model of V2 movement would predict that the  $v+T$  constituent would be moved to C, like in other V2 constructions in Swedish. Subsequently, the  $vP$  containing just the direct object *boken* in (18) would undergo remnant movement to SpecCP (see fn. 27), making it indistinguishable from (13); e.g.  $[_{vP} t_i \text{ boken}]_k \text{ läser}_i \text{ han } t_k \text{ nu.}$  Therefore, it must be the case that the

verb (or, more appropriately, the most recent copy of T that is adjoined to the verb) is not within the c-command domain of C when V2 head movement is evaluated. This is derived only if XP movement to C happens before head movement to C, since the verb contained within  $\nu$ P must escape the syntactic environment in which it is an appropriate target for V2 head movement to C. Further research is needed as to why this is the case. However, such an investigation would take us far afield from our current concern with downward transformations, and so I leave this as an open question. I note for now that the only problem this model immediately poses is that it violates the Extension Condition, in that a head movement to X that follows a phrasal movement to SpecXP is targeting a non-root position. However, as mentioned briefly in Chapter 1, head movement in general faces this same dilemma, and so I do not believe that this constitutes a serious objection to this order of movement operations. We will thus assume from now on that  $\nu$ P in Swedish  $\nu$ P-topicalization moves to SpecCP before V2 head movement to C is evaluated.

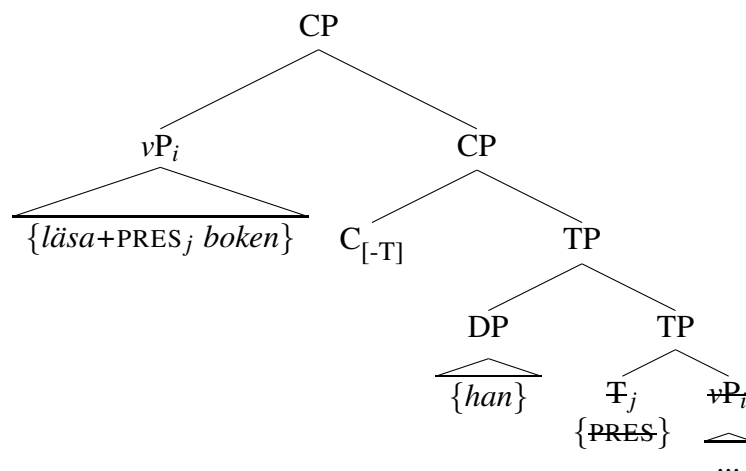
Taking the above into consideration, it is therefore the case that in the  $\nu$ P movement examples (18) and (19b), unlike in the  $\nu$ P-*in situ* example (13), the active (i.e. the derivationally most recent) copy of T is no longer contained within the c-command domain of C when C probes for T. In (18) and (19b), the  $\nu$ P containing the  $\nu$ +T constituent has already been fronted before head movement to C is evaluated, and so the active copy of T is found in SpecCP, where it cannot be a goal for the probing C head. In other words, the tense chain has been “broken”. Therefore, I argue that since the derivationally active copy of T cannot be targeted for movement to C, but C must still satisfy its [-T] feature, C instead targets an intermediate copy of T for V2 movement, which will be realized phonologically via ‘do’/göra-support. I argue that this is a type of syntactic repair mechanism which occurs when only trace copies of the targeted element are found in the c-command domain of the probing head. This is formalized as follows:

- (20) *Trace re-merger*  
 When a head  $\alpha$  probes for a feature  $[\beta]$ , it targets the active (i.e. the most recently created) copy of a syntactic element  $\gamma$  carrying  $[\beta]$ . If the active copy of  $\gamma_{[\beta]}$  is not contained within the c-command domain of  $\alpha$ ,  $\alpha$  targets the closest copy of  $\gamma_{[\beta]}$ .

I’ll first illustrate how (20) accounts for the Swedish pattern, and then discuss some of its consequences. The pattern in Swedish  $\nu$ P-fronting arises as the result of the

second clause in (20), since, as mentioned above, the active copy of T is found in SpecCP when C probes for T. We begin with the structure for (18) at the point at which T-to-C V2 movement is evaluated.<sup>23,24</sup>

(21) *Läser boken gör han nu.*



In (21), the T head has lowered (i.e. re-merged) to the head of  $vP$ , which contains the verb root *läsa*. The  $vP$  is later fronted to SpecCP. We may call this “stowaway” movement (Lisa Travis, p.c.), since a head X moves into a phrase YP before that YP is targeted for movement. The YP therefore carries along its “stowed away” passenger X.<sup>25</sup> After the stowaway movement process of T-to- $v$  Lowering followed by  $vP$ -fronting, head movement to satisfy the V2 requirement is evaluated. We see here that, crucially, the active copy of T, which is contained within the fronted  $vP$  (i.e. the stowed away copy of T), is no longer within the c-command domain of C. Therefore, since the active copy is not targetable by C, unlike when  $vP$  remains *in*

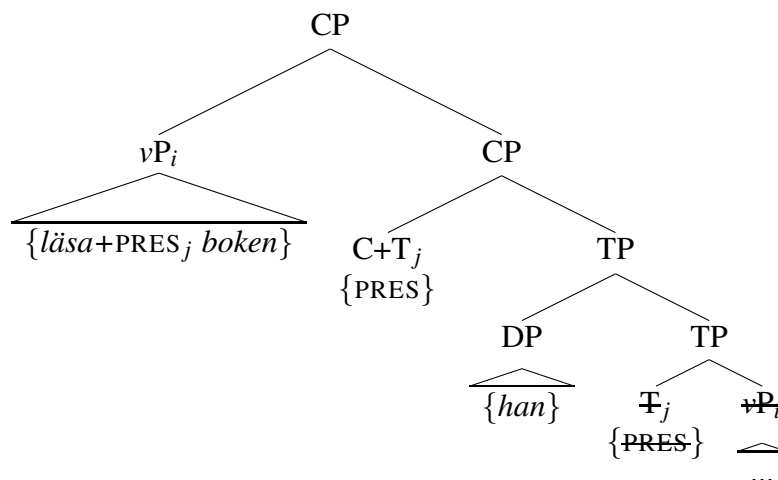
<sup>23</sup>Note that the adverb *nu* ‘now’ is omitted from this representation for clarity. It may either be an adjunct to TP or a late-merged adjunct to the trace of  $vP$ . However, this is not crucial for the current analysis.

<sup>24</sup>Although there is a copy of T that is found in the lower copy of  $vP$  in (21), as a result of T-to- $v$  Lowering, it is not the active copy, nor is it the closest copy to C. Therefore, following (20), this copy is not targeted for movement.

<sup>25</sup>Note that this is quite different from “smuggling” (Collins 2005). In smuggling, a phrase YP contains an element X. However, X cannot be accessed by a higher constituent Z in its base position due to e.g. relativized minimality considerations. Licit movement of YP to a higher position may “smuggle” X to a position from which it may be accessed by Z. The primary difference between “stowaway” and “smuggling” movement is that in stowaway movement, X is generated outside of YP and moves into YP before YP is targeted for movement; in smuggling, X is base-generated within YP and only moves out of YP after movement of YP. See also fn. 27 for a comparison of stowaway and remnant movement.

*situ*, C targets the closest trace copy of T that it c-commands for T-to-C movement, re-merging another copy of T in the C head to check C's [-T] feature, as follows:<sup>26</sup>

(22) *Läser boken gör han nu.*



Note that we now have a “broken” tense chain. Stowaway movement of T via T-to- $v$  Lowering and  $vP$ -fronting to SpecCP has created two chains for the  $\{\text{PRES}\}$  head; one that contains a single member that is found in the fronted  $vP$  (i.e. this copy does not c-command any other copy of  $\{\text{PRES}\}$ , nor is it c-commanded by another copy, and so it is vacuously the head of its chain), and another that is headed by the copy in C (i.e. given the proposed order of operations, the copy of T in C is now the active copy in this chain). As all movement represented in (21)-(22) is overt, I propose that the head of each  $\{\text{PRES}\}$  chain is pronounced, as is argued to be the case with all PF chains (Bobaljik 1995, Groat and O’Neil 1996, Nissenbaum

<sup>26</sup>The copies of T that are not represented with ~~strike through~~ are those that are pronounced; see the following discussion.

2000).<sup>27,28</sup> Since the head of the second chain contains only the bound morpheme

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<sup>27</sup>Note that this stowaway movement is the structural inverse of remnant movement. Under remnant movement, an element is raised out of an XP before that XP is targeted for movement, whereas in stowaway movement an element, namely T, is lowered into an XP before that XP is moved. Müller (1998) proposes a *Proper Chain-Binding Condition* (PCBC), which requires that the trace of a remnant-moved XP be c-commanded by the antecedent of any trace within that XP. That is, an element Y that has been moved out of XP before XP moves higher must bind the trace of XP. However, in the Swedish *v*P-topicalization cases of stowaway movement, the copy of T contained within the fronted *v*P does not bind any trace of itself or a constituent in which it was once contained. Therefore, at PF interpretation, no chain whatsoever can be formed between the fronted copy of T and its trace copies. My proposal is simply that, 1) since the fronted copy does not form any sort of chain with other copies of T, it is pronounced, and 2) the head of the chain of trace copies in C and the base position of T is likewise pronounced.

<sup>28</sup>In the case of embedded clauses in Swedish, it is the copy of T found on the *in situ* verb—i.e. below the base position of T—, that is pronounced. Thus, the definition of “head of chain” in (15) holds for these pronunciation facts, as well, since it is the copy of T found on the verb that is the active copy in this chain.

{PRES}, the dummy verb *göra* ‘do’ is inserted, akin to *do*-support in English.<sup>29,30</sup>

### 2.3.4 Some consequences of trace re-merger

As argued above, the theory of trace re-merger allows us to account for the tense resumption facts in Swedish *vP*-topicalization. Importantly, trace re-merger will only take effect in exceptional circumstances, namely in cases in which a single head *X* first targets a phrase *YP* for movement to *SpecXP* and then attempts to target an element contained within *YP* for head movement (as in the Lowering example where *C* targets *vP* and then attempts to target *T*). It may be theoretically possible that trace re-merger can occur in the absence of Lowering. For example, consider the following structure, where *X* targets *YP* for phrasal movement and *Z* for head

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<sup>29</sup>Cases of *göra*-support in Swedish are quite rare, given that 1) V2 movement in matrix clauses will always create a complex *v+T+C* head in the absence of *vP*-topicalization, and thus the overt copy of *T* will form a chain with all other copies of *T*; 2) negation is not a blocker for tense-hopping, like it is in English (see §3); and 3) *vP*-ellipsis is unavailable in Swedish.

It must be noted that Swedish does have *vP*-pronominalization, in which the *vP* itself is replaced with *göra det* ‘do it’, which is similar, though not identical, to *do-so* replacement in English; e.g.:

- (i) Kari kan svenska, och det gör Kicki också.  
 Kari know.PRES Swedish and it do.PRES Kicki too.  
 ‘Kari knows Swedish, and so does Kicki.’

However, *vP*-pronominalization is only grammatical when the object *det* is included. The verb *göra* in these cases is invariably transitive.

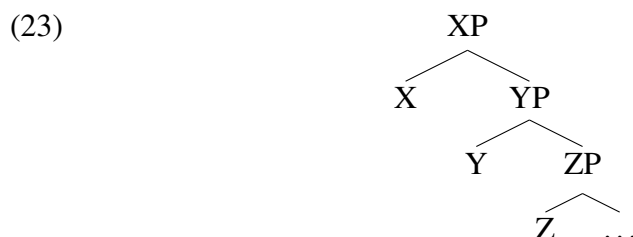
- (ii) \*Kari kan svenska, och Kicki gör också.  
 Kari know.PRES Swedish and Kicki do.PRES too.

Given that the object *det* is absent in cases of *vP*-topicalization, and that *vP*-pronominalization requires an antecedent clause, which is absent in *vP*-topicalization, I follow Källgren and Prince (1989) in assuming that the *göra* that appears in *vP*-topicalization is a distinct entity from that of *vP*-pronominalization. In the cases of *vP*-topicalization presented here, I assume that there is but one *vP*, which is found in *SpecCP*, and that the *göra* of *vP*-topicalization is therefore not the result of *vP*-pronominalization, but rather pronunciation of an unbound trace copy of *T*. Here, *göra* is inserted at PF to satisfy the stray-affix filter, similar to the *do* of English *do*-support (see §3).

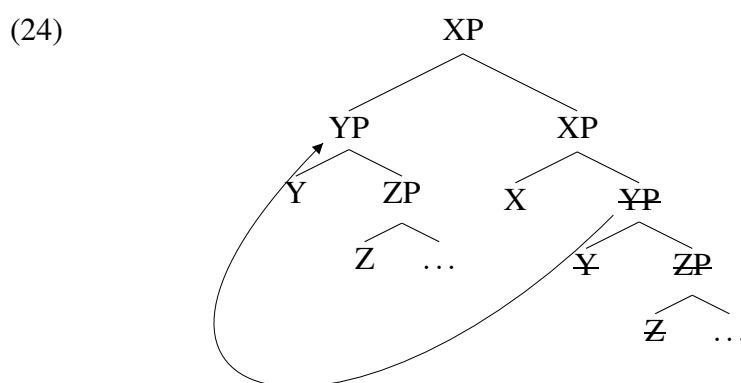
<sup>30</sup>As a sidenote, I must concede that the facts under this analysis still do not allow us to unquestionably choose the tense-attraction analysis of V2 head movement over the verb-attraction analysis. If the derivation proceeds as above, except that *C* carries a *[-v]* feature, then *C* may target a trace of the *v+T* head rather than simply a trace of *T*. It may be possible to devise a rule of resumption at PF under which a copy {*läsa+PRES*} in *C* in a *vP*-topicalization structure is pronounced as *gör*. However, since this verb-attraction analysis requires us to posit this additional PF rule, whereas the tense-attraction analysis requires us only to posit the cross-linguistically-motivated operation of ‘do’-support, I will maintain the tense-attraction analysis. We will later see that this analysis allows us to draw a closer parallel with movement facts in other languages, such as English.



movement:



If phrasal movement to SpecXP occurs before head movement to X, the following is the structure after movement of YP:



Now, if X probes for Z, the active copy of Z is not contained within its c-command domain, and so trace re-merger predicts that the trace copy of Z will be re-merged to X and pronounced under resumption. Although research on this topic is still ongoing, I can think of no empirical evidence that either supports or refutes the availability of such a derivation in the absence of Lowering. I have found no case in which a head X targets both a phrasal constituent YP and a head contained within that YP in a construction that exclusively exhibits raising. A much more earnest investigation into these issues is needed. However, whatever the empirical findings may be, I believe that the previous analysis of trace re-merger in tense-lowering

$\nu$ P-topicalization constructions can be maintained.<sup>31,32</sup>

In this section, I have shown that a highly derivational conception of syntactic processes, rather than a purely representational one, can help to unify the models of raising and Lowering under a single, overarching system of linguistic computation. We will expand this system in the upcoming sections.

### 2.3.5 Summary and consequences for T-to-C in English

The following briefly summarizes the proposed pattern of tense-hopping in Swedish:

- Movement of the matrix verb in V2 constructions is derived cross-linguistically by a T-to-C movement operation that follows a previous morpho-syntactic merger of T and the verb (e.g.  $\nu$ -to-T raising or T-to- $\nu$  lowering).
- In all matrix and embedded clauses in Swedish containing a bound morpheme in T, T lowers to  $\nu$ .
- When matrix  $C_{[-T]}$  probes to check its uninterpretable feature in Swedish, one of two things may occur:
  - a) If  $\nu$ P remains *in situ*, C targets the T-feature of the post-Lowering  $\nu$ +T structure and pied-pipes the main verb to V2 position.
  - b) If  $\nu$ P has fronted, the copy of T on the verb is no longer targetable by C, and so C targets a trace copy of T for re-merger, producing *göra*-support.

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<sup>31</sup>For example, if it turns out to be the case that in a structure like (23) Z-to-X head movement occurs before movement of YP to SpecXP, it may be argued that this order of operations took place due to the fact that the base position of Z is lower than the base position of YP. A head that targets both a phrase and a head will not necessarily move the phrase first, but rather simply targets the more deeply embedded element first. In the case of the V2  $\nu$ P-topicalization cases, the base position of  $\nu$ P is more deeply embedded than the base position of T, and so C targets  $\nu$ P for movement to SpecCP before targeting the lesser embedded T head to satisfy its  $[-T]$  feature. However, without more evidence, I do not wish to conjecture further on this.

<sup>32</sup>I should point out that the claims in this section are essentially a modification to Rizzi's (1990) Relativized Minimality, which requires that any probing head target the closest element in its c-command domain that satisfies its feature requirements. As I have noted, in cases of raising, "closest" and "derivationally active" are synonymous. However, when we incorporate Lowering, we must specify that it is the active copy that satisfies derivational economy in feature-checking operations. I take this to be a minor adjustment to Relativized Minimality, but further research is necessary.

The analysis presented above makes a crucial, though perhaps unsurprising, prediction regarding T-to-C movement. Namely, T-to-C movement will only pied-pipe main verbs in those languages that have independent *v*-to-T raising or T-to-*v* lowering; i.e. in those languages in which T forms a complex syntactic constituent with the verb before T-to C movement is evaluated. As main verbs in English never raise to C, this prediction supports a model of English tense-hopping as Local Dislocation. Namely, if tense and the main verb do not together form a complex syntactic head at any point in the derivation in English, as neither verb-raising nor tense-lowering occurs, then movement of T to C is correctly predicted to never pied-pipe a main verb in English. Not only is this evident in interrogatives (25) (compare Swedish (26)), but also the few remaining cases of V2 movement in English (e.g. neg-inversion (27)):

- (25) a. Did he walk?  
b. \*Walked he?

- (26) Gick han?  
walk.PAST he  
'Did he walk?'

- (27) a. In all my travels, never did I find a more loathsome place.  
b. \*In all my travels, never found I a more loathsome place.

The English examples above indicate that T has not morpho-syntactically merged with the verb before T-to-C movement is evaluated, unlike in Swedish. In English, simplex T moves to C before Spell-out of CP, and thus before Local Dislocation of T and the verb is evaluated. As PF string-adjacency of tense and the verb is not met in the morpho-phonological representations of these examples, due to the intervening subject, *do*-support is required.

Note that the English facts support the tense-attraction analysis of V2, as well. As noted earlier, it is possible to account for the V2 facts in languages like German and Swedish via the tense-attraction analysis, assuming that a previous morpho-syntactic merger has combined T and *v*. If this is the case, then the vestigial V2 movement found in English neg-inversion (27) is no different from its Germanic counterparts in terms of its featural motivations. In all V2 constructions in these

languages, it is a [-T] feature on C, rather than a [-v] feature, that derives the observed patterns. The only difference in English is that T and *v* do not undergo a morpho-syntactic merger, and so the verb is not carried along during T-to-C V2 movement. Since this model creates a unified system of V2, I will assume that it is correct.

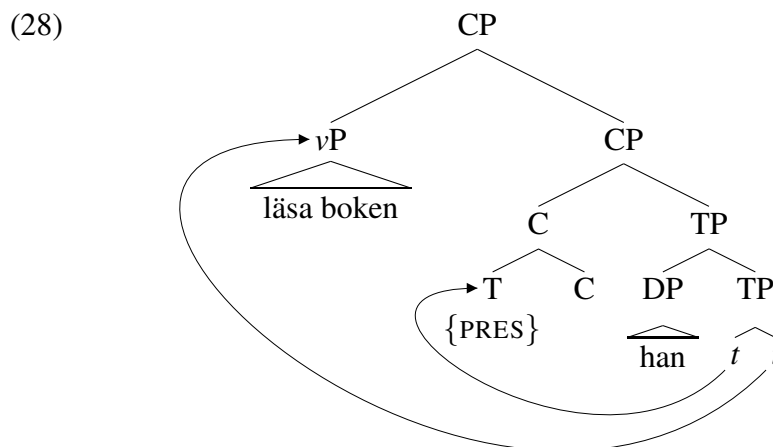
To summarize, English and Swedish appear identical in embedded clauses in that they both exhibit tense-hopping. However, in terms of V2/T-to-C movement and *v*P-fronting, certain important differences exist. I have argued that, in non-auxiliary constructions, T-to-C movement in Swedish will always pied-pipe the highest main verb (except in *v*P-topicalization constructions), due to the prior T-to-*v* Lowering during the Spell-out cycle of *v*P (see below). Similarly, in Swedish *v*P-topicalization, stowaway movement of T occurs due to T-to-*v* Lowering followed by *v*P movement. As for English, it will never pied-pipe a main verb to C, since the merger of tense and the verb is evaluated on the morpho-phonological string after Spell-out of CP (see Ch.4 for an analysis of auxiliary constructions). Likewise, since Local Dislocation of the bound tense morpheme is not analyzed until after *v*P-fronting in English, a fronted *v*P will not contain an inflected verb. Therefore, though the pattern of tense morphology in English in isolation might not permit us to unquestionably select one theory of tense-hopping over the other, when compared with cross-linguistic evidence of tense-hopping, we converge on a much more conclusive analysis. Additionally, this analysis has allowed us to more closely inspect the nature of syntactic chains (i.e. derivational vs. representational) and to propose a cross-linguistic featural uniformity in interrogative and V2 constructions.

In keeping with the findings of this section, we will assume from now on that 1) tense-hopping occurs in Swedish as head-to-head Lowering, and 2) tense-hopping occurs in English as Local Dislocation, which takes place only when both the bound tense morpheme and the verb are morpho-phonologically string-adjacent in the PF representation, modulo adjuncts.

### 3 Some consequences for cyclic Spell-out

Importantly, the data from Swedish show that Embick and Noyer's *Late Lowering Hypothesis* is untenable. Given that T in Swedish must lower to the verb before the narrow syntactic operation of *v*P-fronting, it cannot be the case that Lowering

occurs after all narrow syntactic derivation has taken place. If Lowering of T were evaluated only after  $\nu$ P-fronting had occurred, then the fronted verb would no longer be a suitable target for the tense-lowering operation, as the overt copy of the verb would not be located in the complement of T. Under the LLH, the following would be the structure that is evaluated on the PF branch:<sup>33</sup>



<sup>33</sup>I have thus far been making the uncontroversial assumption that  $\nu$ P-fronting is a narrow syntactic operation. However, I must point out that the problem currently under consideration would be resolved if  $\nu$ P-fronting took place solely on the PF branch. Under such an analysis, we could maintain the LLH, assuming that the following operations occur in Swedish at PF after Spell-out of the entire structure: 1) T lowers to  $\nu$ , which is contained in *in situ* (i.e. not-yet-fronted)  $\nu$ P; 2)  $\nu$ P undergoes phrasal PF movement to SpecCP (see discussion of Sauerland and Elbourne (2002) in fn. 62); and 3) T-to-C head movement is evaluated on this PF structure. It would therefore be the case that  $\nu$ P-fronting does not necessarily precede late Lowering.

However, a purely phonological analysis of  $\nu$ P-fronting entails that constructions with a fronted  $\nu$ P and those with a non-fronted  $\nu$ P will be semantically identical, since each would be formed from an identical narrow syntactic structure, which is then fed to LF. As pointed out by Lechner (2003) and others, this is not the case;  $\nu$ P-fronting has a clear scope-freezing effect:

- (i) a. No one will teach every student.  $\neg\exists > \forall / \forall > \neg\exists$   
 b. ... and teach every student, no one will.  $\neg\exists > \forall / *\forall > \neg\exists$

Briefly, it is argued that the fronted  $\nu$ P in (ib) undergoes obligatory LF reconstruction to its base position so that the  $\nu$ P-internal subject trace is properly bound. However, such reconstruction is unnecessary in (ia), and so quantifier-raising of the object at LF is possible. Though I will not address the particulars of this pattern (see Lechner 2003 and references therein), I note that it cannot be the case that each of these examples is derived from the same narrow syntactic structure. LF reconstruction of the fronted  $\nu$ P, and the subsequent unavailability of object QR, is only required if the  $\nu$ P fronts in the narrow syntactic structure; i.e., if the  $\nu$ P occupies its fronted position when sent to the LF component for interpretation (and evaluation for LF processes like QR and reconstruction). If the narrow syntax fed identical structures to LF for both examples in (i), with  $\nu$ P-fronting occurring solely in the PF structure, QR of the object should be equally possible for both, contrary to fact. I thus maintain that  $\nu$ P-fronting is a narrow syntactic operation, and therefore must necessarily precede Lowering under the LLH. I furthermore assume that, lacking evidence to the contrary, this also holds for  $\nu$ P-fronting in Swedish.

In (28), following the LLH, all narrow syntactic operations have taken place before Lowering is evaluated. However, there is no clear way in which Lowering of T in this structure could target the overt copy of the verb in the fronted  $\nu$ P. Rather, tense must adjoin to the verb before the  $\nu$ P undergoes movement to SpecCP. This requires that Lowering be evaluated (at least at certain points) throughout the derivation, and, crucially, that it occur before certain narrow syntactic operations, such as  $\nu$ P-fronting.

These observations, in addition to many others, will lead us to make two important claims about Lowering in the following sections. First, since Lowering must occur before  $\nu$ P-fronting, I argue that it must be evaluated cyclically and that, in fact, Lowering occurs as a result of the feature-checking constraints imposed by the cyclic Spell-out of phases (i.e. the *Phase Head Impenetrability Condition*, which will be addressed in more detail in §3.1 and §3.2). Second, the fact that Lowering operations have direct consequences for narrow syntactic movements (e.g. the  $\nu$ P-fronting operation above and, as I have shown in the previous section, V2 head movement) strongly suggests that Lowering occurs in the narrow syntactic derivation, rather than on the PF branch (§3.3).

### 3.1 Lowering, phases, and derivation

As mentioned above, the Swedish  $\nu$ P-fronting data support a model of cyclic Spell-out in which Lowering operations are evaluated on Spell-out cycles that precede subsequent narrow syntactic operations. The model I propose here relies on the following assumptions:

- All hierarchical, syntactic transformations, including Lowering, are feature-driven.
- The default feature-checking strategy is raising, and it will occur whenever possible.
- Spell-out of a phase cycle makes the features embedded within the Spell-out domain of that phase unavailable for subsequent feature-checking operations.<sup>34</sup>
- The Earliness Principle holds (Pesetsky 1989); i.e. a head will check its uninterpretable features as soon as possible after it is merged.

There is one further, somewhat obvious, requirement that must hold to derive Lowering:

- A Lowering head must at least be merged in the narrow syntactic derivation before it undergoes Lowering.

In this and subsequent sections, I will show that the above allow for only one model of cyclic Spell-out, namely a model in which 1) a phase head is spelled out along with its complement, and 2) Spell-out of a phase is triggered by merger of a higher head (i.e. a head that is not contained in that phase's sub-array of the numeration).

First, let us look at a traditional model of phases, under which a phase head (e.g.  $\nu$  and C) spells out its phrasal complement after merger of the phase head and movement to the phase edge (i.e. after head movement to  $\nu$  or C and phrasal movement to Spec $\nu$ P or SpecCP; e.g. Chomsky 2001, Nissenbaum 2000). Under this view of phases, the Spell-out domain of a phase consists of the complement of the phase head, rather than the entire phase itself. Consequently, only the complement of the phase head will undergo post-Spell-out operations (e.g. VI) on each phase cycle. The motivation underlying this view of phases is based in the observation that any element that moves out of a phase must first move to the edge of that phase (or be base-generated at the phase edge, as in the case of subjects). For example, Legate (2003), following Fox (2000), illustrates that the grammaticality of (29a) below requires that the moved *wh*-phrase be able to reconstruct at the edge of the  $\nu$ P phase (' $\checkmark$ ' = grammatical reconstruction site; '\*' = ungrammatical

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<sup>34</sup>This does not entail that features located at the edge of a Spell-out domain are unavailable for such feature-checking operations. See §5.

reconstruction site):

- (29) a. [Which of the papers that  $he_i$  gave  $Mary_j$ ] did every student <sub>$i$</sub>  [<sub>vP</sub> ✓ ask her <sub>$j$</sub>  to read \* carefully]?
- b. \*[Which of the papers that  $he_i$  gave  $Mary_j$ ] did she <sub>$j$</sub>  [<sub>vP</sub> \* ask every student <sub>$i$</sub>  to revise \*]?

In (29), the *wh*-phrase must reconstruct to a position in which 1) the pronoun  $he_i$  may be bound by the quantifier *every student <sub>$i$</sub>*  and 2) the pronoun  $her_j$  does not bind the R-expression *Mary <sub>$j$</sub>*  (i.e. to avoid a violation of Condition C of the binding theory).<sup>35</sup> In (29b), no such position exists, deriving ungrammaticality. However, in (29a), if the *wh*-phrase reconstructs at the edge of vP, then grammaticality is correctly predicted. These data thus indicate that the *wh*-phrase has necessarily moved to the edge of vP and left a trace. This is predicted under a theory of phase Spell-out if an object DP that is to raise higher in the structure must first move to the edge of the vP phase before Spell-out of the phase. Therefore, since the object of a verb must vacate the complement position before Spell-out of the vP if it is to move higher, it is natural to assume that the object is contained in the Spell-out domain of the phase. Given just this evidence, we might further assume that the complement of the phase head constitutes the entire Spell-out domain of the phase, and that nothing contained within the Spell-out domain after Spell-out of the phase may be accessed by later narrow syntactic computation, which is precisely what is proposed under the phase complement model of Spell-out.<sup>36</sup> The object DP in (29) thus moves to the edge of vP before Spell-out of vP in order to escape the Spell-out domain of the phase.

Crucially, such a model of Spell-out cannot account for the presence of Lowering in Swedish, given our earlier assumptions. This is illustrated with the step-by-step, partial derivation that follows, where the elements in **bold** indicate the syntactic constituents that have undergone Spell-out to the PF branch:

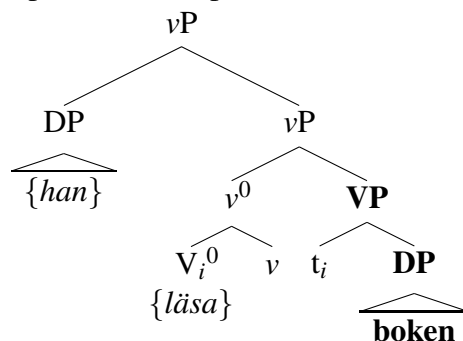
<sup>35</sup>It must also be the case that the relative clause adjunct in these examples merges at least before the *wh*-phrase reaches its surface position, or that reconstruction of the intermediate trace includes the adjunct, in order for the pronoun to be bound by the quantifier.

<sup>36</sup>If nothing in the Spell-out domain of a phase is accessible to the narrow syntax after Spell-out of a phase (i.e. there is no edge condition that allows extraction from the edge of a phase's Spell-out domain, contra Fox and Pesetsky 2005), then a phase complement Spell-out model would still allow for verb-raising, since the *v* head itself, which contains V, would not have undergone Spell-out. We address this issue further below and in §5.

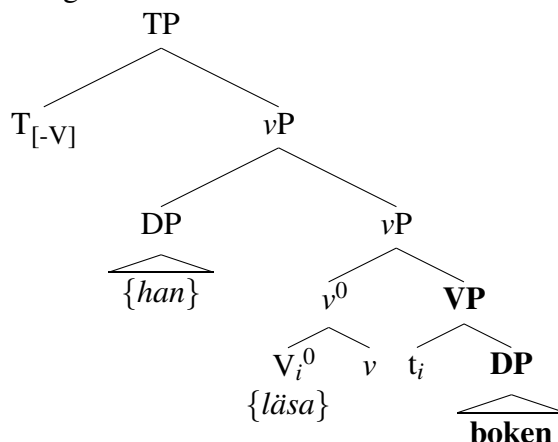


- (30) Han läser boken.  
 he read.PRES book.DEF  
 'He reads the book.'

a. Spell-out of  $vP$  phase



b. Merger of T  
 TP



The step in (30b) immediately creates a problem for our Lowering analysis. Under the theory of phase complement Spell-out, only those elements contained within VP are impenetrable (i.e. unavailable for narrow syntactic operations) when T is merged. This means that T should be able to probe the V-feature contained within the complex  $v$  head and raise the verb. T and V are contained within the same Spell-out domain here; neither has undergone Spell-out, and so the features of both are equally active in the narrow syntax at this point of the derivation (i.e. the *Feature Accessibility Hypothesis*; see Chapter 2, §3).<sup>37</sup> Therefore, following my earlier assumptions, raising to check features should be possible and, given the Earliness Principle, should occur as soon as possible after merger of T. There is no logical, non-stipulative way to account for the absence of verb-raising—and the presence of

<sup>37</sup>Note that we would also predict verb-raising if T carried a  $[-v]$  feature in (30b). See §5.

tense-lowering—here, given our previous assumptions.<sup>38</sup>

Again, I argue that all feature-checking transformations within a Spell-out domain occur as narrow syntactic raising given that 1) all features of any constituent that has not undergone Spell-out are visible to any c-commanding head, and 2) narrow syntactic raising is the default transformation to check uninterpretable features. Since narrow syntactic raising of the verb to T is impossible in Swedish (at least directly, and always in embedded clauses), and tense-lowering occurs instead, this then implies that T and V are in fact not contained within the same Spell-out domain, contra the phase complement Spell-out model (i.e. their feature specifications are never simultaneously equally active during narrow syntactic computation, unlike in the representation in (30b)). This scenario is derived if we extend the Spell-out domain of a phase to include the head of that phase. In this way, the base positions of T and *v* are contained within different Spell-out domains, and thus it becomes possible to motivate a Lowering operation via feature-checking means.<sup>39</sup> Namely, it allows us to posit the *Phase Head Impenetrability Condition*, repeated below.

(31) *Phase Head Impenetrability Condition (PHIC)*

Features embedded within a complex phase head  $\alpha$  become unavailable for further narrow syntactic feature-checking transformations as a result of Spell-out of  $\alpha P$ . Only the features of  $\alpha$  itself and its specifier(s) will be visible after Spell-out.

As mentioned in Chapter 2, I claim that, since (31) precludes standard narrow syntactic feature-checking (i.e. via raising) between  $T_{[-V]}$  and the  $V^0$  embedded within the phase head  $v^0$  of its complement, Lowering of  $T_{[-V]}$  will occur as a repair mechanism to check its uninterpretable V-feature (see Chapter 2 and the following sections for more on the PHIC). Therefore, I argue that Lowering is driven by the effects of Spell-out on a phase head.

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<sup>38</sup>Recall that T must lower in Swedish before *vP*-fronting, as the fronted *vP* contains an inflected verb. Again assuming the Earliness Principle, *vP*-fronting to SpecCP will occur as soon as possible after C merges into the derivation. Furthermore, given the PIC, *vP* must move to SpecCP before Spell-out of the CP phase. Therefore, there is no scenario under which T may lower to the verb during the Spell-out of CP, since T-to-*v* Lowering requires that *vP* be in its base position when Lowering occurs. Thus, tense-lowering must take place before the narrow syntactic merger of C, but, as we have just seen, this is problematic under a phase complement Spell-out model, since T and *v+V* are contained within the same Spell-out domain.

<sup>39</sup>As I have previously pointed out, Lowering only ever appears to occur between a head that takes a phase complement and the head of that phase.

Assuming that Lowering is thus intricately tied to cyclic Spell-out operations, we can now investigate the exact timing of Lowering with respect to those Spell-out operations.

### 3.2 The timing of Lowering

We must now ask whether a Lowering head moves into the head of its phase complement before, after, or during Spell-out of that phase. Given that any sort of phase impenetrability should be the result of the consequences of a Spell-out operation, it cannot be the case that Lowering, which is here argued to result from the PHIC, happens before its complement has at least begun the Spell-out process. In other words, as noted above, if the features of a probing head and a phase head are equally active in the narrow syntax—which would necessarily be the case if Lowering occurred before the phase head had begun the Spell-out process, given the *Feature Accessibility Hypothesis*—, raising would be predicted.

We are therefore left with the following two possibilities: either 1) a head lowers into a phase  $\alpha$  after the Spell-out cycle of  $\alpha$  is complete, or 2) a head lowers into a phase  $\alpha$  during the Spell-out process of  $\alpha$  (i.e. after Spell-out has begun, but before it is complete). In the following sections we look at each of these possibilities in turn, and I argue that the former model is highly problematic in light of the previous Lowering analysis of morphological optionality in reduplication, in addition to other theoretical concerns. Consequently, I favor the latter model, which will ultimately lead us to posit the Domain-based Triggered Spell-out Hypothesis (DTSH), under which a phase is triggered for Spell-out upon merger of a non-tautophasal head. This discussion will once again show that, by incorporating downward transformations into our linguistic architecture, we gain a deeper understanding of the basic characteristics of the computational processes of the language faculty, in particular the cyclic nature of those processes.<sup>40</sup>

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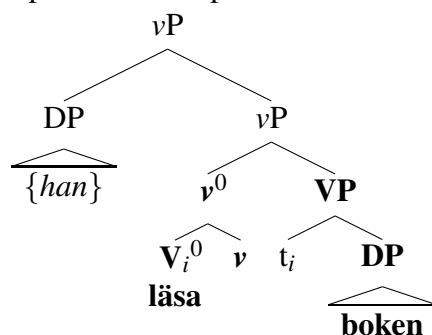
<sup>40</sup>It is important to note that the following discussion somewhat tacitly assumes that Lowering occurs in the narrow syntax, rather than on the PF branch. This claim will be made more explicit in §3.3.

### 3.2.1 Lowering to a spelled-out phase

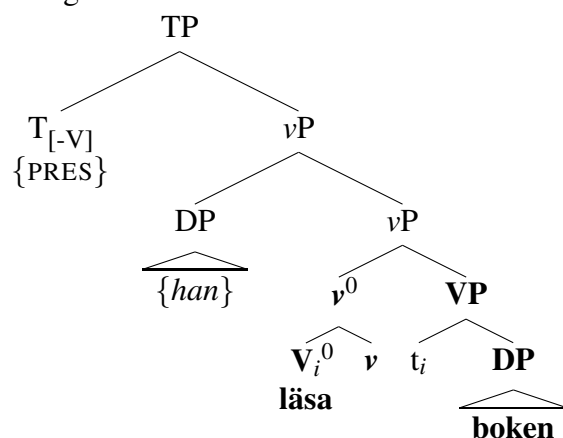
I have argued that the process of cyclic Spell-out is the fundamental motivation behind Lowering operations. It is therefore reasonable to assume that a head is analyzed for Lowering when it merges with a spelled-out phase constituent. The following example from Swedish illustrates this scenario; here, the phase head  $v^0$  completes its Spell-out cycle before  $T_{[-V]}$  is merged into the derivation:<sup>41</sup>

- (32) Han läser boken.  
 he read.PRES book.DEF  
 ‘He reads the book.’

- a. Spell-out of  $vP$  phase:



- b. Merger of T:



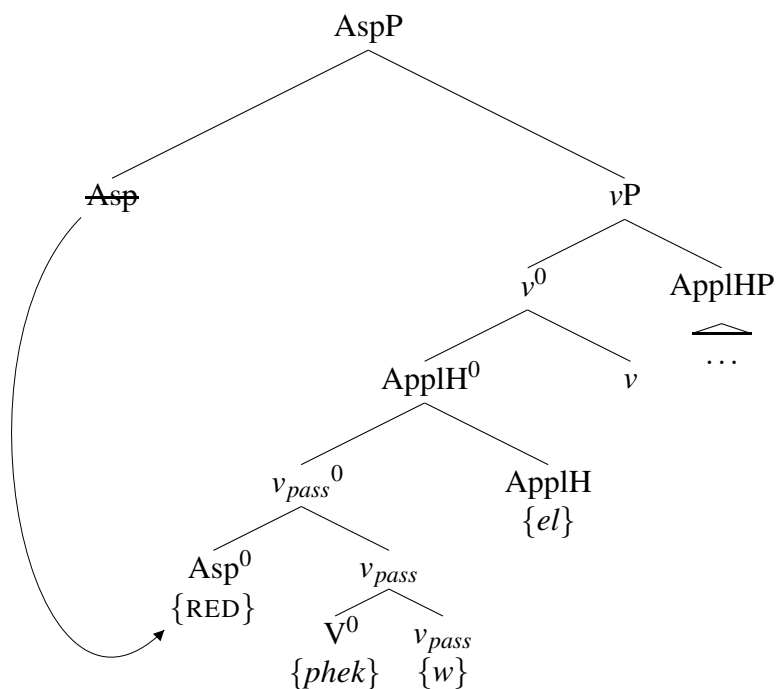
Given the PHIC, we might argue that, since narrow syntactic raising is impossible here to check T's  $[-V]$  feature, when T merges it must lower into the spelled-out phase in order to check its uninterpretable feature. Under this scenario, a phase

<sup>41</sup>I continue to remain agnostic about the Spell-out status of specifiers, and thus simply mark the phase head and its complement for Spell-out. However, see Chapter 5 for a possible model of Spell-out in which specifiers are included in the Spell-out domain.

sends its Spell-out domain (i.e. the phase head and its complement) to PF when derivation of that phase is complete (32a), and all Spell-out operations apply to that domain. If a head that is subsequently merged into the derivation carries an uninterpretable feature that can only be checked against an interpretable feature embedded within the lower phase head (32b), that higher head will lower into the phase, since raising is precluded by the PHIC.

However, as mentioned above, there is reason to doubt that this exact scenario is the correct one. Recall that in Chapter 2 §2.2.3 I argued that the reduplicative  $\text{Asp}^0$  head in Ndebele must lower to the complex  $\nu$  head of its complement before the morpho-phonological Spell-out operations of Vocabulary Insertion and Local Dislocation apply to the morpho-syntactic terminals of the complex phase head. We saw that, in constructions with the passive, high applicative, and reduplicative morphemes, the reduplicant must be able to scope over just the verb root and passive morphemes before the passive undergoes Local Dislocation with the high applicative morpheme, e.g.:

(33) a.



b. VI cycles:

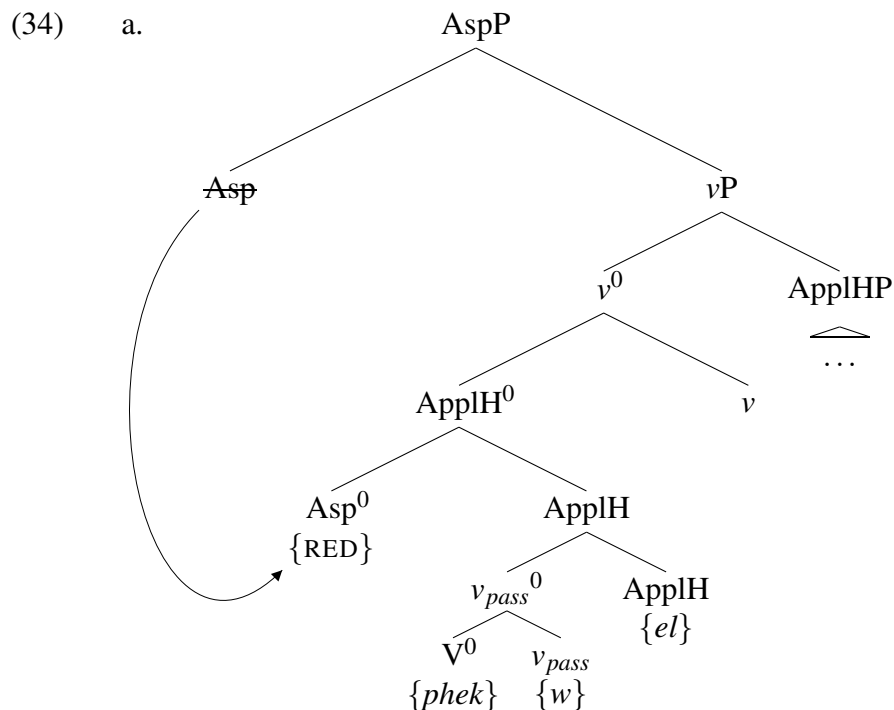
Cycle 1: [phek ^ w]

Cycle 2: [σσ ^ phek ^ w]

Copying of phonological segments:

Cycle 2': [**ph**ekw ^ phek ^ w]Cycle 3: [**ph**ekw ^ phek ^ w ^ el]Local Dislocation of *w* and *el*:Cycle 3': [**ph**ekw ^ phek ^ el+w]

Additionally, if Asp<sup>0</sup> lowers to the ApplH<sup>0</sup> head, then reduplicative copying occurs after Local Dislocation of the passive and applicative morphemes:



b. VI cycles:

Cycle 1: [phek ^ w]

Cycle 2: [phek ^ w ^ el]

Local Dislocation of *w* and *el*:

Cycle 2': [phek ^ el+w]

Cycle 3: [σσ ^ phek ^ el+w]

Copying of phonological segments:

Cycle 3': [**pheke** ^ phek ^ el+w]

It would be difficult to account for both of these examples if the reduplicative head lowered after Spell-out of the complex *v* phase head. Under this scenario, Spell-out operations, including Local Dislocation, would apply to the complex *v* phase head before Lowering took place. This would produce the phonological string [phek-el-w] in both (33) and (34). However, in the case of (33), the lowered Asp head must have access to just the phonological string [phek-w]. To produce such a scenario would require the complete undoing of the Local Dislocation operation; essentially, the phonological form of the complex phase head needs

to be completely re-analyzed after the Lowering operation takes place.<sup>42</sup> The order of operations would thus be: 1) the phase head is spelled out upon syntactic completion of the  $\nu$ P phase; 2) phonology is assigned to the phase head, producing [phek-el-w] after Local Dislocation; 3) Asp merges and undergoes Lowering;<sup>43</sup> 4) the introduction of a new head into the complex phase head requires that the entire phase head be re-analyzed for phonology; and 5) subsequently, phonology is mapped to all terminals of the complex phase head again, and Local Dislocation of the passive and applicative once again applies. Such a re-analysis would completely obscure a previous cycle of phonology, as only the post-Lowering cycle would surface overtly. It is thus impossible to rule out such a scenario on empirical grounds.

A model in which Lowering occurs to a spelled-out phase head and subsequently induces a re-analysis of phonology (i.e. a “re-Spell-out”) creates some additional theoretical problems. For example, Nissenbaum (2000) argues that, while late merger of adjuncts to a syntactic position within a spelled-out phase is possible, when that newly merged constituent is evaluated at PF it may only be phonologically realized at a linear edge of the previously spelled-out phase.<sup>44</sup> This restriction is based in the generally accepted argument that phases reduce the computational burden of mapping syntax to phonology; thus, an element that is merged to a syntactic object (SO) after Spell-out of that SO may only be concatenated to the extant PF representation of that SO, and may not be linearly interpolated within the already computed PF representation. This is formulated as follows:

- (35) *Linear Edge Condition* (LEC) (Nissenbaum 2000)  
 For any syntactic object *SO* accessed in an array, merge of new material is possible inside *SO* only at the linear edge.

Interpolation into a spelled-out phase would require re-analysis of the established linearization relations within that phase, thus increasing the computational burden of the syntax-phonology interface operations. However, Lowering into an already

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<sup>42</sup>See concluding remarks of Chapter 2, §2.2.3 for a brief discussion as to why the morpho-syntactic copying alternative of Ndebele reduplication is problematic.

<sup>43</sup>Again, I argue in §3.3 that this Lowering takes place in the narrow syntactic structure.

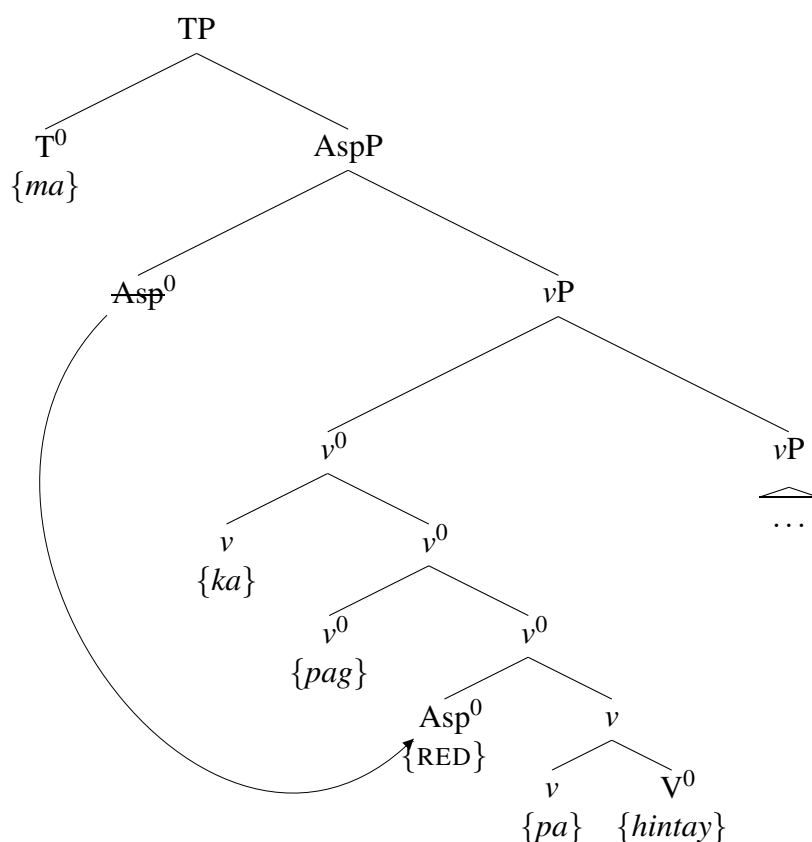
<sup>44</sup>For the sake of conciseness, I point the reader to Nissenbaum (2000: Ch5) for arguments in favor of this restriction, rather than providing a summary of them here.



spelled-out SO necessarily requires a re-analysis of linearization, as evidenced by the required undoing of the Local Dislocation operation in Ndebele. While Nissenbaum (2000) is concerned primarily with the late merger of adjuncts (see Chapter 4 for more), I believe that the general restriction of the LEC should apply to Lowering operations, as well, but this is problematic under the model of Lowering that is currently under discussion.

Further evidence that Lowering avoids a violation of the LEC comes from Tagalog reduplication. Recall that the Lowering  $\text{Asp}^0$  head in Tagalog may be realized at PF between other morphemes of the complex phase head. An example of this is repeated below.

(36) ma-ka-pag-[**paa**]-pa-hintay



Given the potential for (grammatical) interpolation of a Lowering head inside a phase head, we must either assume that Lowering avoids a violation of the LEC due to a complete re-analysis of the phonology of the spelled-out phase head (thus

increasing the burden on the syntax-phonology interface),<sup>45</sup> or that Lowering occurs before phonology is assigned to the phase head, in which case an LEC violation is straightforwardly obviated.<sup>46</sup>

Aside from considerations of a possible phonological re-analysis and obviation of LEC violations, there is a further reason to doubt that a head undergoes Lowering when its targeted feature is embedded in an already spelled-out head. Namely, it would be difficult to discount iterative head-lowering under this model. For example, consider the following negation structure in English (see Chapter 4 for more on  $\Sigma P$  and an argument that finite T in English carries a [-V] feature):

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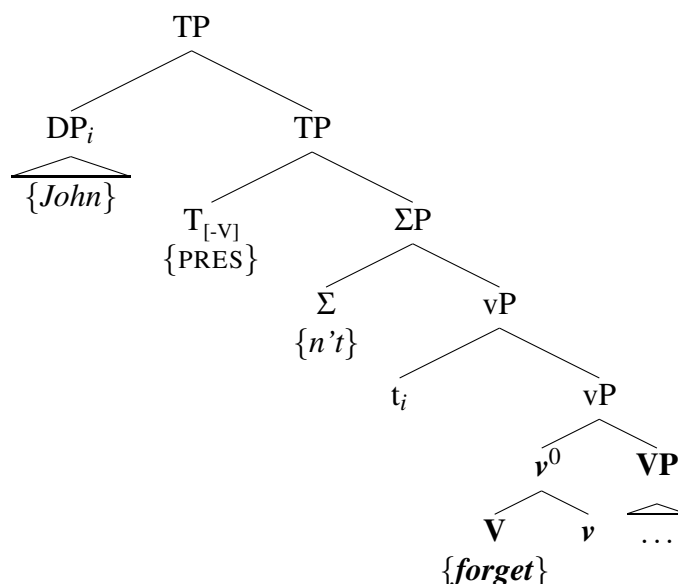
<sup>45</sup>Of course, if such phonological re-analysis is possible, we must re-evaluate the theoretical arguments underlying the LEC, and must somehow prohibit this type of re-analysis in cases of late-merged adjuncts.

<sup>46</sup>Even tense-lowering in Swedish would arguably violate the LEC if it occurred after Spell-out of the verb, since the finite tense morpheme is realized at the end of the verb, rather than the beginning, which is assumedly not the linear edge of the phase (e.g. the  $vP$  phase [*läsa boken*], where the object *boken* remains in the complement position; Lowering produces [*läser boken*], where the tense morpheme is realized in a phase-internal position). Here, T would be re-merged to and pronounced at a non-linear edge of the already computed  $vP$  phase. The current interpretation of the LEC predicts that any bound morpheme that is syntactically merged inside a phase after Spell-out of that phase can only be realized as a prefix to the leftmost element of the Spell-out domain, or, alternatively, a suffix to the rightmost element of the Spell-out domain.

I must also point out that Local Dislocation of T and the verb in English moves T to a phase-internal position, which may at first seem to indicate a violation of the LEC; e.g. (phase boundary indicated with a '/'): [*John* ^ -s ^ / *forget* ^ *the* ^ *address*] → [*John* ^ /*forget*+s ^ *the* ^ *address*]. However, this operation is qualitatively different from adjunction or Lowering after Spell-out of the constituent that is the targeted site of the merger operation. Local Dislocation operates on the morpho-phonological representation itself, and so does not involve morpho-syntactic merger to a non-linear edge position, in keeping with the LEC. Therefore, it is not the case that T in English is narrow syntactically merged and spelled out in a position internal to the previously spelled-out  $vP$  phase, but rather that it is spelled out in a position adjacent to that phase and then undergoes morphological merger under string-adjacency. I thus assume that this operation in no way violates the LEC (I return to the issue of the LEC and late merger of adjuncts in English tense-hopping in Chapter 4).

Furthermore, recall that neither reduplication in Tagalog nor tense-hopping in Swedish can be accounted for under a Local Dislocation analysis, and should both therefore be subject to the constraints imposed by the LEC if Lowering were to occur after Spell-out of the targeted  $v$  head.

(37) *John doesn't forget ...*



If we assume simply that head-lowering occurs when the targeted feature of a probing head is embedded in a phase head, then it should theoretically be possible for T in (37) to probe down into the spelled-out phase head and undergo iterative head-lowering through the clitic head  $\{n't\}$  to reach the verb, forming *\*John forgetsn't*. It is clearly the case that clitic negation does not disrupt upward head movement (e.g. *Hasn't John forgotten ...?*), and so, if the above scenario were correct, the clitic should also not block downward head movement, by hypothesis.<sup>47</sup> Yet, as was argued in Chapter 2, and given the impossibility of tense-lowering in structures like (37) above, iterative head-lowering cannot occur. In fact, as we have seen, all available evidence points to the fact that only a head that merges directly with a phase may undergo Lowering. Under a model in which a head lowers to a phase head after Spell-out of that phase, this locality condition would need to be stipulated such that only a head that takes a spelled-out phase as its complement can access a feature embedded in the phase head via a Lowering operation.

We have so far seen several reasons to discredit a Lowering model in which Spell-out of the head that is the targeted landing site is complete before merger of

<sup>47</sup>In Chapter 4 I will argue further that head-lowering in a structure like (37) is impossible even when  $\Sigma P$  is phonologically empty. Thus, since I argue that (37) represents the basic skeletal structure of all clauses in English, syntactic head-to-head tense-lowering in English is predicted to always be impossible.

the Lowering head. In the following section I propose an alternative model that both allows Lowering before phonology is assigned to the phase head and correctly rules out iterative head-lowering. This model is based in the notion of triggered Spell-out.

### 3.2.2 Domain-based Triggered Spell-out Hypothesis (DTSH)

As we have seen, it is problematic to devise a feature-driven analysis of Lowering in which Lowering is evaluated either before or after Spell-out of the targeted phase head. If feature-checking between the probe and goal were evaluated before Spell-out had applied to either, we predict that raising would occur, as no type of phase impenetrability would apply. If feature-checking via Lowering were evaluated after Spell-out of the phase head, we face difficulties with phonology (e.g. the LEC) and cannot easily rule out iterative head-lowering. The only remaining alternative is that Lowering operations are evaluated *during* the Spell-out of the phase complement of a Lowering head. In this section, I propose a model of Spell-out under which Lowering can indeed occur during the Spell-out cycle of the complement of the Lowering head. Under this model, the Spell-out process of a phase is activated not upon derivational completion of the phase, but rather when the next highest head (e.g. the Lowering head) merges.

I have argued that only a head that merges directly with a phase (e.g.  $Asp^0$  in Tagalog and Ndebele and  $T^0$  in Swedish) can access a feature embedded in the phase head in a head-lowering operation. Higher heads (e.g.  $T^0$  in English (37)) cannot access these features. This requires that 1) features embedded in a phase head are somehow only visible to a head  $\beta$  that merges directly with a phase, and 2) the features embedded in a phase head become completely inaccessible before the merger of any head higher than  $\beta$ . This implies that heads that merge directly with a phase carry a special status with respect to feature-checking operations; i.e. a head  $\beta$  that merges directly with a phase cannot access features embedded in the phase head for raising, but those features are not completely invisible to  $\beta$  (like they are to higher heads). This special status of heads that take phases as their complement

is derived if we adopt the following model of Spell-out:<sup>48</sup>

(38) *Triggered Spell-out*

A phase  $\alpha P$  sends its Spell-out domain (i.e. the phase head  $\alpha$  and its complement) to the interface only and always upon merger of the next highest head.<sup>49</sup>

In this way, in all cases of Lowering, it is the narrow syntactic merger of the Lowering head that triggers Spell-out of its phase complement. Because of this, the Lowering head will be present in the narrow syntactic derivation during the Spell-out cycle of its complement, i.e. after Spell-out has been triggered, but before Spell-out is complete. The fact that only heads that are Spell-out triggers can undergo Lowering therefore derives their special status; only a head that merges directly with a phase—thus triggering Spell-out—will ever be a candidate for a Lowering operation. Any head that is merged subsequent to the completed Spell-out cycle enters the syntactic derivation after the point at which features embedded in a phase have become totally impenetrable. In this way, there is a narrow window of opportunity in the derivation during which a Spell-out trigger may lower—i.e. after that head has merged and triggered Spell-out, but before the phase is sent to PF.<sup>50</sup> The exact timing of these operations will be illustrated in detail in the upcoming discussion.

It might at first appear that a triggered Spell-out model is unnecessary if we simply assume that it is TP, rather than  $vP$  that is the phase, and that the phase head T spells out its complement, similar to the traditional model of Spell-out addressed earlier. While this model would suffice for all cases of tense-lowering in Swedish, there is evidence from other languages that calls such a model into question. For example, in Tagalog and Ndebele, I argued that  $vP$  undergoes Spell-out when it merges with Asp, not T; the phase boundary in these reduplication cases is the

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<sup>48</sup>Svenonius (2004) also proposes a triggering model of Spell-out in which Spell-out of a phase may be delayed until all uninterpretable features of the phase head are checked, which may require that a higher head check the relevant features of the phase head. The triggering model proposed here differs from Svenonius' model, though it is possible that the two are compatible. However, we must leave such a comparative investigation for future research (but see Ch.4, fn.19).

<sup>49</sup>I also assume that a Spell-out operation occurs at the end of the derivation; i.e. when all elements of the numeration are exhausted and all narrow syntactic operations are complete, the computational component spells out the resulting structure. However, since we are only looking at a transformation that occurs across phase boundaries, this end of derivation Spell-out operation does not play a major role in the current discussion.

<sup>50</sup>Again assuming narrow syntactic Lowering; see §3.3.

boundary between Asp and  $\nu$ P, not T and AspP, thus suggesting that it is not the merger of T that exclusively drives Spell-out of the lower phase.  $\nu$ P is not always the direct complement of T, yet it undergoes Spell-out whenever it merges with any head in the functional domain (see below), regardless of whether that head is T. This pattern is only derived under a triggered Spell-out model, since this model makes no reference to the category of the triggering head, but is rather only sensitive to the fact that a phase  $\alpha$ P is merged with a head that is not contained in  $\alpha$ P's sub-array of the numeration. Therefore, again, we will not entertain the notion that TP is a phase.

Another conceptually desirable consequence of a triggered Spell-out model is that it offers a “signal” to the computational component that derivation of a phase is complete, thus provoking the computational component to mark that domain for Spell-out. Recall, for example, that I argued in Chapter 2 that stacked  $\nu$ Ps in Tagalog and Ndebele constitute a single phase. If each  $\nu$  were a “phase head” that initiated a Spell-out operation, we would predict the lexical domain in these languages to consist of multiple phases (and, under our current analysis, potentially multiple Lowering operations at each phase boundary). However, in the absence of evidence to support such a scenario, a triggering model creates a simpler system in which all stacked  $\nu$ Ps in these languages will undergo a single Spell-out operation when they merge with a head from the functional domain. Essentially, under the triggering model of Spell-out, merger of a head from the functional domain signals to the computational component that derivation of the lexical elements is complete. This “changing of gears” acts as a message to computation to start the Spell-out process of the previous domain. I thus advocate the following definition of a phase:<sup>51</sup>

(39) *Domain-based Phase Model*

A phase corresponds to a sub-array of the numeration containing either all the lexical elements of a clause (e.g.  $\{V, \nu, \{DP\}\}$ ), all the functional elements of a clause (e.g.  $\{C, T, OAsp, Neg\}$ , or all the discourse-related elements of a clause (e.g.  $\{Top, Foc\}$ ).

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<sup>51</sup>Note that this split is nearly, if not completely, identical to Grohmann's (2003) “prolific domains”. Grohmann's  $\Theta$ -domain parallels our lexical domain, his  $\Phi$ -domain corresponds closely with our functional domain, and his  $\Omega$ -domain parallels our discourse-related domain. Given that he argues that these domains constitute units of interpretation at the PF and LF interfaces, the phase split put forth here can simply be taken as a straightforward adaptation of his theory.

Therefore, under the model presented here, Spell-out occurs when one of these sub-arrays is derivationally exhausted and work on the derivation of a new sub-array begins. We can combine the Domain-based Phase Model with the model of Triggered Spell-out in the following way:

- (40) *Domain-based Triggered Spell-out Hypothesis (DTSH)*  
 A phase  $\alpha$ P sends its Spell-out domain to the interface only and always upon merger of a head from a phase domain not containing  $\alpha$ , where phase domains are divided into lexical, functional, and discourse elements.

Though we will return to this discussion later, I note for now that the *Domain-based Triggered Spell-out Hypothesis* allows for a Lowering head to be present in the narrow syntactic derivation during Spell-out of its phase complement, and correctly predicts the typology of heads that may undergo Lowering (e.g. functional heads lower to the lexical domain, discourse heads lower to the functional domain, etc.).<sup>52</sup>

The following partial derivation illustrates the relevant order of operations for a Lowering construction under the DTSH:<sup>53</sup>

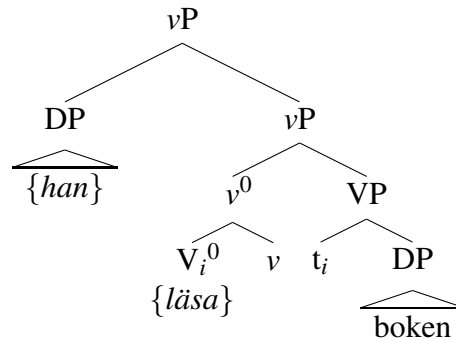
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<sup>52</sup>I will focus here on the lexical vs. functional split. However, recall that Lowering of agreement markers in Turkish was argued to be movement from the discourse domain to the functional domain (see Ch2, §3.2). In particular, a discourse agreement marker undergoes Lowering in Turkish when it merges with the functional CP phase, and the head of that phase contains an embedded interpretable feature that can check the uninterpretable feature of the agreement marker.

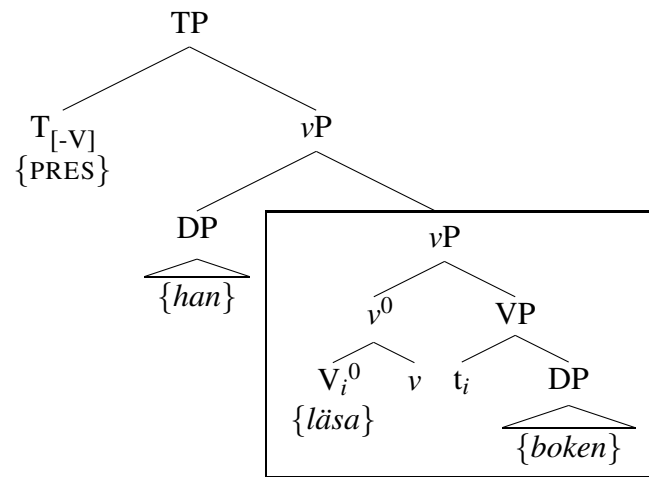
<sup>53</sup>Note that elements contained in a box are those that have been triggered for Spell-out; that is, boxed elements are those that are currently undergoing the Spell-out process in the computation. Elements that are in **bold** are those that have completed the Spell-out process.

- (41) Han läser boken.  
 he read.PRES book.DEF  
 'He reads the book.'

a. Derivation of  $vP$  phase:

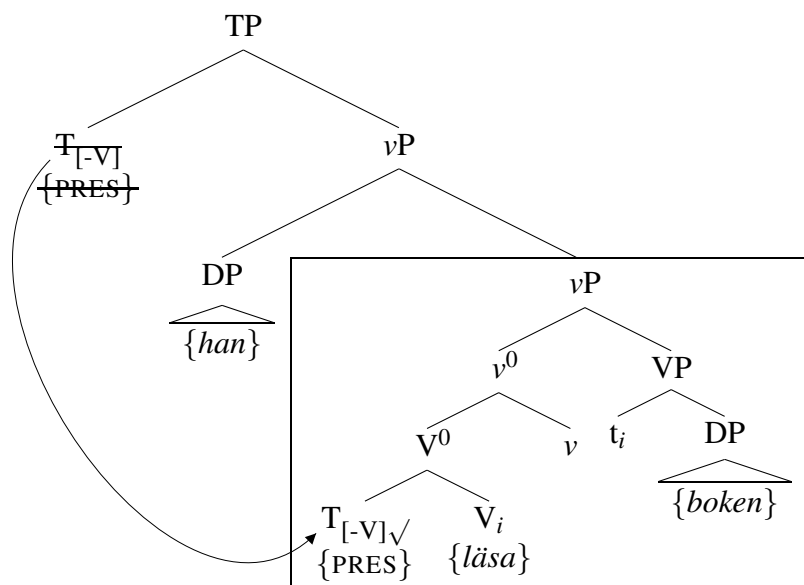


b. Merger of T;  $vP$  phase triggered for Spell-out (= boxed elements); raising to check [-V] now impossible (i.e. PHIC effects are operative once Spell-out is triggered).<sup>54</sup>

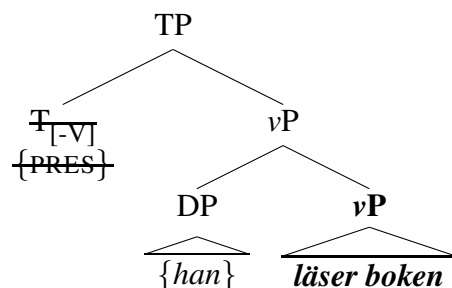




- c. T lowers during Spell-out of  $vP$  to check its  $[-V]$  feature:



- d. Vocabulary Insertion applies to terminals; Spell-out of  $vP$  concludes:



The triggering operation activates the Spell-out process in (41). It is at this point that the phase is marked for transfer to the PF branch and phase impenetrability applies. As a result of the PHIC, raising to check T's uninterpretable feature is now impossible. However, by virtue of the fact that the Spell-out trigger T is present in the derivation during the Spell-out process of  $vP$ , it may undergo the last resort feature-checking mechanism of Lowering before that Spell-out process

<sup>54</sup>Note again that it is only crucial to the current analysis that the Spell-out domain of the phase that has been triggered for Spell-out contain the phase head and its complement. While it is possible that the specifier also undergoes Spell-out, but, like the phase head, is still targetable for movement from the phase edge (see §5), I will not address this issue in the current section (but see Ch.5 §2).

is complete. In a sense, T “piggybacks” on the Spell-out cycle of  $\nu$ P in order to check its feature. Any head that is subsequently merged will not have this option available to it, since it will have merged after the Spell-out cycle is complete. In this way, I argue that only a Spell-out trigger may lower, since Lowering can only occur *during* the Spell-out of a phase. This allows us to account for the absence of iterative head-lowering. Furthermore, since a Spell-out trigger adjoins to the phase head before that phase head completes its Spell-out cycle, we avoid the previous problems of phonological re-analysis and LEC violations. The Lowering head will be present on the phase head when Vocabulary Insertion applies to the phase, and so it is included in the first—and only—mapping of phonology to the phase head.

This analysis clearly relies on a very specific model of the timing of Spell-out operations. However, in addition to the fact that this view of Spell-out obviates all of the aforementioned problems of motivating a feature-based account of Lowering, I believe that it also provides a theoretically desirable model of linguistic computation, since, as mentioned earlier, it allows for a principled, computationally motivated view of Spell-out. Rather than stipulating that certain lexical, functional, or even discourse items are inherently defined as “phase heads” that drive Spell-out operations, it is the computational switch from lexical to functional and functional to discourse domains that drives Spell-out. We return to this issue in Chapter 4.

Furthermore, this model of Spell-out makes the correct predictions for English tense-hopping. Since T is only spelled out on the  $\nu$ P phase if it undergoes Lowering, T in English, which is not a Spell-out trigger and thus cannot lower,<sup>55</sup> will not be assigned phonological features until the Spell-out cycle of CP. Because of this, T may move to C before it undergoes Spell-out, which may disrupt the morpho-phonological string-adjacency of tense and the verb. However, before we analyze the English facts in more detail, we return to the issue of where Lowering occurs; that is, in which modular computational component does the Lowering operation take place?

### 3.3 The locus of Lowering

In the preceding discussions, I hinted at an analysis in which Lowering occurs in the narrow syntactic derivation, rather than on the PF branch (contra Embick

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<sup>55</sup>As I argue in Chapter 4, Spell-out of  $\nu$ P in English is never triggered by the T head, but rather by Asp (in an auxiliary construction) or  $\Sigma$  (in a non-auxiliary construction; see Laka 1990).

and Noyer 2001). In this section, I compare a narrow syntactic and a PF model of Lowering. Keeping the previous model of Lowering under the Domain-based Triggered Spell-out Hypothesis in mind, I will show that a model of narrow syntactic Lowering is highly preferred to a PF model.

In the previous section I argued that a Lowering head merges to a phase head during the Spell-out cycle of that phase. However, it is important to note that the process of Spell-out involves the transfer of narrow syntactic structure to the PF branch. Thus, the process of Spell-out involves both narrow syntactic and PF stages. We must therefore ask whether a Lowering head merges to the phase head before or after that transfer process. These two possibilities for the locus of the Lowering operation are defined as follows:

(42) Two structural possibilities for Lowering:

a. *PF Lowering*

A Lowering head is re-merged to the morpho-syntactic structure of the phase located on the PF branch after transfer from the narrow syntax, but before Vocabulary Insertion.

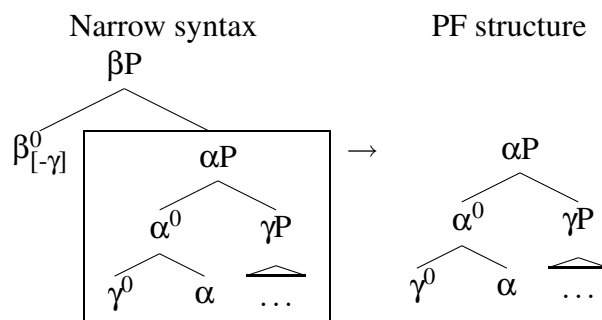
b. *Narrow syntactic Lowering*

A Lowering head is re-merged to the narrow syntactic structure of the phase before the phase is transferred to the PF branch.

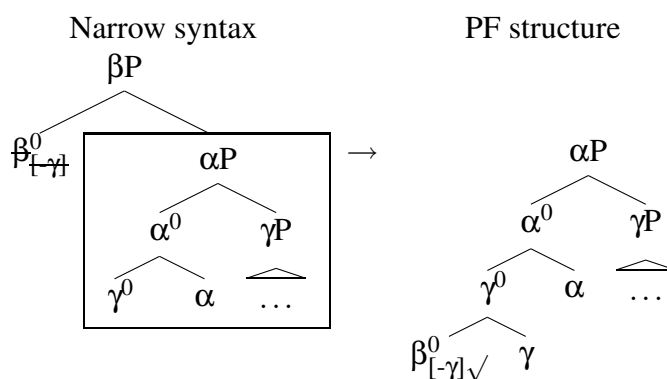
The PF Lowering model in (42a) most closely resembles the previous theory of Lowering proposed by Embick and Noyer (2001), as it maintains the restriction against downward movement in the narrow syntactic derivation. Under this model, the downward transformation is only reflected in the structure present on the PF branch after transfer of the narrow syntactic derivation, and so the extant narrow syntactic structure remains unaffected by the Lowering operation. This is illustrated in the following schematic derivation, where  $\alpha P$  is a phase:

## (43) Lowering in the PF structure

- a.
- $\alpha P$
- triggered for Spell-out and transferred to the PF branch:

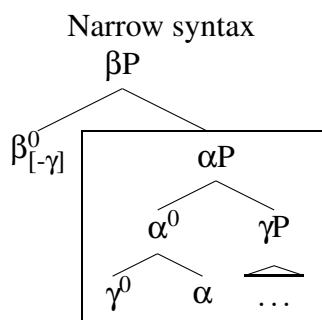


- b. PHIC is in effect;
- $\beta$
- re-merged to PF structure:

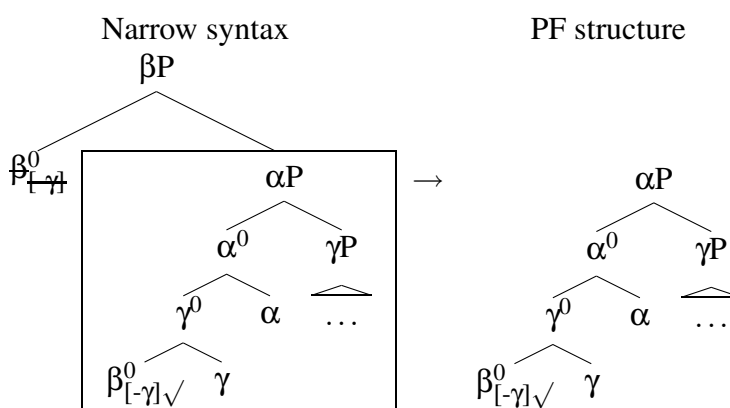


In this model of Lowering, the re-merger operation of the Lowering head only affects the morpho-syntactic structure on the PF branch, since Lowering targets the phase head after that head has been transferred to PF. The alternative in (42b) is schematized below:

- (44) Lowering in the narrow syntax  
 a.  $\alpha$ P triggered for Spell-out:



- b. PHIC is in effect;  $\beta$  re-merged to narrow syntactic structure; narrow syntax transferred to PF branch:



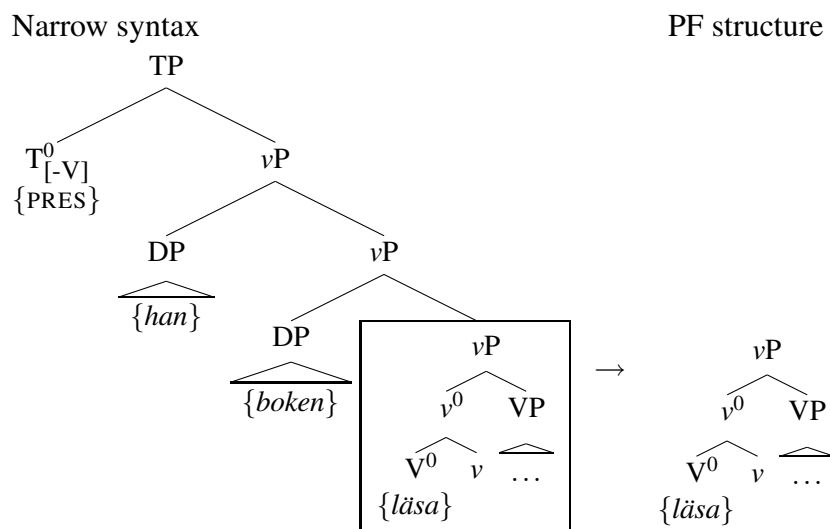
Here, the re-merger of  $\beta$  occurs before the narrow syntax is transferred to the PF branch, but after the Spell-out process has been triggered; i.e., the Spell-out process here consists of the ordered steps of triggering, Lowering, then transfer. Therefore, the structure of the narrow syntax will be altered in a Lowering operation, which is then reflected in the structure sent to PF.

Each of these models has its advantages and disadvantages. To illustrate these, I use an example of V2 in Swedish. Recall that I argued earlier that tense-lowering to lexical verbs occurs in all Swedish matrix clauses. Let us first examine the derivation of a standard Swedish V2 construction under the PF Lowering model.

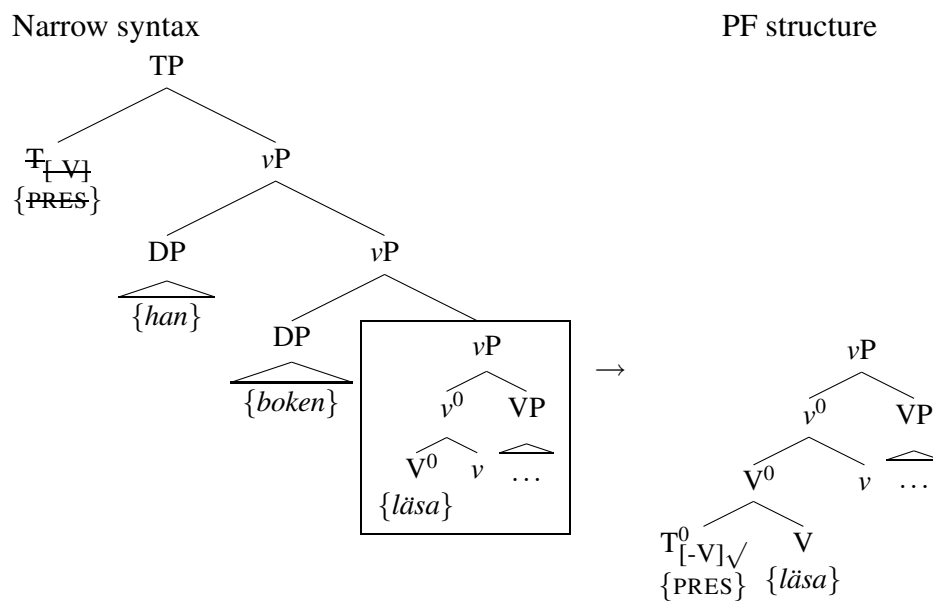
- (45) *PF Lowering*

Boken    läser    han.  
 book.DEF read.PRES he  
 'He reads the book.'

- a. Spell-out triggering and transfer of vP phase to PF:<sup>56</sup>

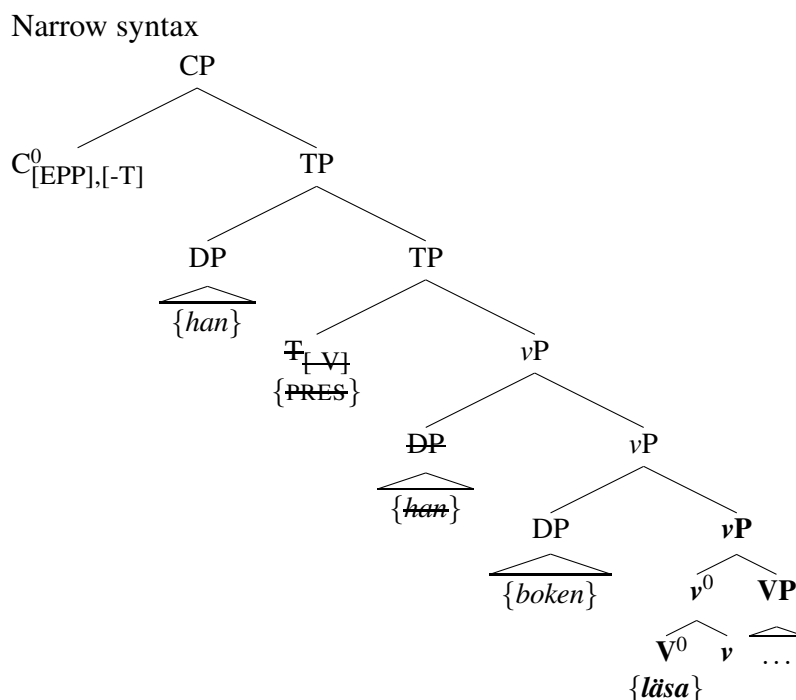


- b. PHIC is in effect; T re-merged to PF structure:



<sup>56</sup>Since *boken* will raise to SpecCP in this structure, it must escape the vP phase by moving to SpecvP before Spell-out. I adopt a ‘tucking in’ model of movement to specifier position here, following Richards (2001), but this is not crucial to the current discussion.

- c. Spell-out of  $vP$  concludes; subject moves to SpecTP; C merges and targets T:<sup>57</sup>



Since Lowering here is carried out as a re-merger operation to the morpho-syntactic structure on the PF branch, the narrow syntactic structure in (45c) displays no reflex of this movement. Because of this, there is no copy of T contained within the narrow syntactic  $v^0$  head. However, recall that I argued in Section 2.1 that V2 head movement in Swedish occurs since  $C_{[-T]}$  targets the derivationally most recent copy of T, which is now contained on the verb (45b). Under the above scenario, this requires that some sort of chain be formed between the narrow syntactic trace of T in TP and the lowered copy of T on the PF branch (i.e. the copy that has adjoined to the verb). If we assume that the narrow syntax somehow keeps a record of the derivational history of the T head, then it may indeed be possible that this record includes the information that the T head was most recently merged with the verb on the PF branch. In this way, it is theoretically possible that when  $C_{[-T]}$  probes the T chain for V2 head movement, it can see that the head of the T chain is adjoined to the verb in the PF representation, and that this visibility

<sup>57</sup>Since C will target *boken* for movement to SpecCP, I assume that V2 C carries an EPP feature that drives phrasal movement, in addition to the  $[-T]$  that drives head movement.

somehow derives movement of the verb to V2 position. However, this creates an overly complex scenario, as it requires cross-module chain formation (e.g. a direct chain between the narrow syntactic copy of T and the copy on the PF branch), in addition to some otherwise unmotivated rules of narrow syntactic movement (e.g. if an element Y adjoins morpho-syntactically to an element X on the PF branch, any element Z that subsequently targets Y for narrow syntactic movement must also move X; for example, if T adjoins to *v* on the PF branch, when C targets T for movement in the narrow syntax, it must also move *v*). Given that these theoretical problems only arise in cases of Lowering, which, to the best of my knowledge, have not previously been subject to the type of rigorous analysis attempted here, I cannot say for certain that this analysis is incorrect, though it is rife with stipulations.<sup>58</sup>

However, I can argue that the alternative analysis is much more straightforward, as it does not require that the narrow syntax have direct access to the PF representation. The following represents the same derivation as above, except with Lowering taking place in the narrow syntax:

(46) *Narrow syntactic Lowering*

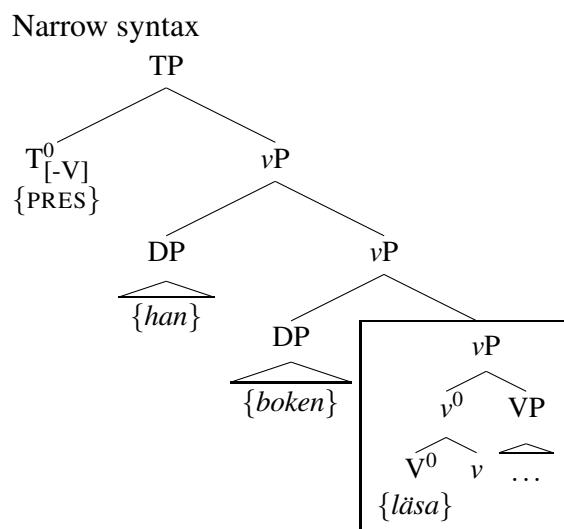
Boken    läser    han.  
 book.DEF read.PRES he  
 'He reads the book.'

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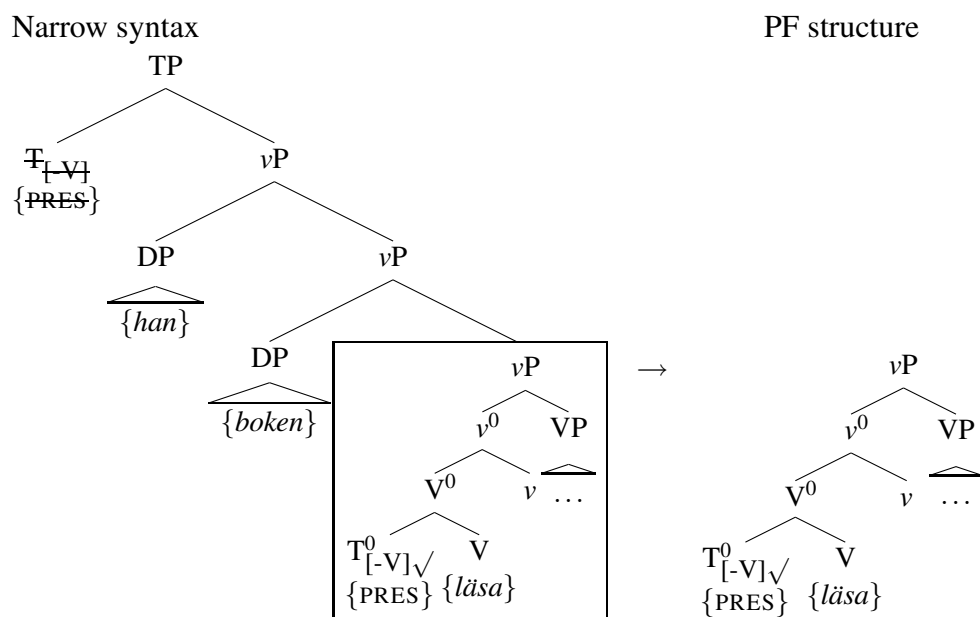
<sup>58</sup>Note, of course, that these problems are obviated if C directly targets the verb in V2 movement. However, as argued previously, the verb-attraction analysis of V2 is equally problematic in that it creates a cross-linguistic V2 asymmetry and makes it difficult to account for *göra*-support in Swedish *v*P-topicalization. Furthermore, the exact same problems above arise in verbal pied-piping in Swedish T-to-C movement in interrogatives.



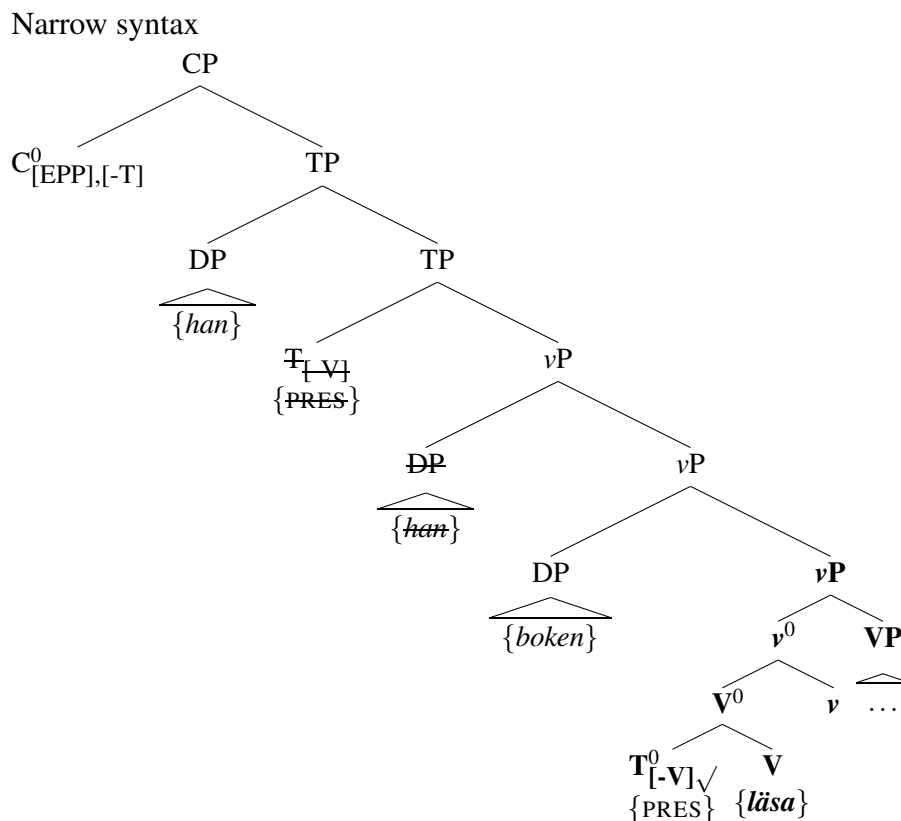
- a.  $vP$  triggered for Spell-out:



- b. PHIC is in effect; T re-merged to narrow syntactic structure;  
resulting structure sent to PF:



- c. Spell-out of  $vP$  concludes; subject moves to SpecTP; C merges and targets T:



Under this model, the PHIC applies once Spell-out is triggered (e.g. once T merges into the derivation), and Lowering is evaluated before the phase is transferred to the PF branch. T “piggybacks” on the Spell-out cycle of  $vP$  by adjoining to the phase head before that phase interfaces with the PF component. In this way, all morpho-syntactic transformations occur on the narrow syntactic side of Spell-out, and all morpho-phonological transformations occur on the representation at PF. Thus, all hierarchical transformations fall under the domain of narrow syntactic computation, and all linearization operations fall under the domain of PF computation. Under this model, once a phase is transferred to the PF branch, it can immediately undergo Vocabulary Insertion/linearization, without the need for post-Spell-out morpho-syntactic transformations on the PF branch. This derives what I consider to be a much more clear-cut system of modularity.

Consequently, and crucially, in the narrow syntactic structure (46c), the copy of T that is adjoined to the verb is present in the narrow syntax, and so an analysis in which  $C_{[-T]}$  targets this most recent copy is much more easily motivated than under

a PF Lowering model. For example, although the copy of T found on the verb in (46c) cannot be directly targeted by C, due to the PHIC, this copy still forms a narrow syntactic chain with the higher copy of T, which is still accessible to C. Therefore, I argue that when C probes the T chain, it may still raise the head of that chain—i.e., the derivationally most recent copy, which is now found in the narrow syntactic structure—, by virtue of the intermediate link in that chain, as the head of the chain is still c-commanded by C. Since the head of this T chain now forms a complex constituent with the verb, verbal pied-piping occurs to C/V2 position, deriving the following representation after V2 head and phrasal movement, before the Spell-out of CP:<sup>59</sup>

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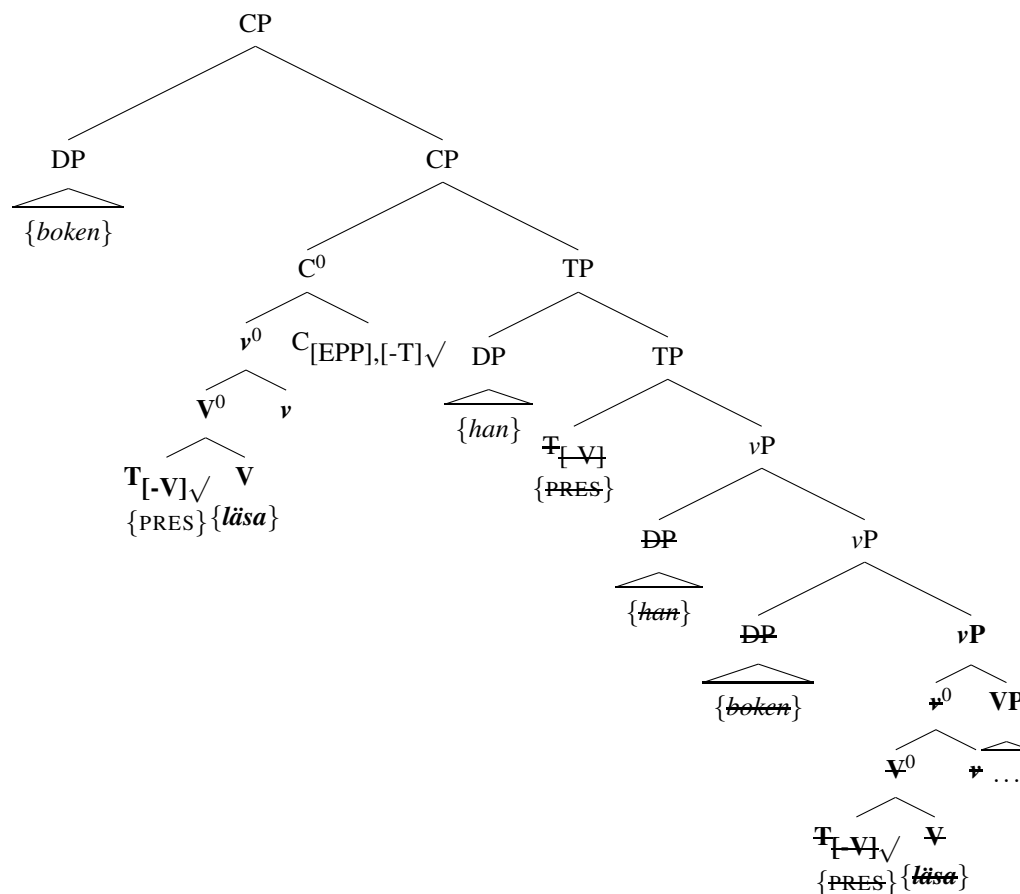
<sup>59</sup>It is important to note that I argue that this is the only type of scenario in which a higher head (i.e. a non-Spell-out trigger) can target a feature embedded in a phase head. The only way in which a non-trigger head  $\beta$  may target a head  $\gamma$  that is embedded in a phase head is if  $\beta$  has access to a member of  $\gamma$ 's chain,  $\gamma'$ . I formulate this as follows (note that this is not bidirectional):

- (i) A probing head  $\beta$  may target a head  $\gamma$  for movement if:
- $\gamma$  is embedded in a phase head  $\alpha$ ;
  - $\beta$  is contained in the same phase as a trace  $\gamma'$ ;
  - $\beta$  c-commands  $\gamma'$ ; and
  - $\gamma'$  c-commands  $\gamma$ .

Thus, movement of a phase head via pied-piping can occur if a higher head can target the trace of a head that has lowered into the phase head. In the case in question, C and the trace of T are contained in the same phase, and since C c-commands the trace of T, and the trace of T c-commands the derivationally most recent copy of T, C can target T for movement, pied-piping the phase head to which T is adjoined, deriving V2 movement. This, of course, does not allow a higher, non-triggering head to target features embedded in a phase head in the absence of such a chain.

(47) *Boken läser han.*

Narrow syntactic structure after V2 movements:



Therefore, given that all the evidence observed thus far indicates that C in Swedish may target a lowered T head for both V2 and interrogative narrow syntactic movement, pied-piping the verb in the process, I take this to be a strong indication that the lowered T head is visible to the narrow syntactic structure, and that Lowering therefore occurs in the narrow syntax before a phase is transferred to the PF branch.

To conclude this section, it is worth noting that Lowering during Spell-out due to the PHIC is not a case of “look-ahead”. While it might appear that impenetrability-driven Lowering is occurring before the impenetrability takes effect, notice that all elements that are involved in the feature-driven movement operation are found in the narrow syntax at the point at which the downward

movement is evaluated. This, therefore, does not meet the standard definition of look-ahead, which involves movement of an element before the movement-inducing element is merged into the syntax. I thus argue that it is possible for a head to scan its c-command domain and determine whether its complement has been marked for Spell-out, allowing for the last resort Lowering operation to take place before it is too late for that head to check its uninterpretable feature(s). Consequently, it is not the case that a Lowering movement is unmotivated when it occurs.

In this and the preceding sections I have argued for a model of Lowering in which Lowering occurs in the narrow syntax due to the interaction of the Phase Head Impenetrability Condition and the Domain-based Triggered Spell-out Hypothesis. A head that is a Spell-out trigger may lower to the phase head to check an uninterpretable feature after Spell-out has been triggered, but before the narrow syntactic structure is transferred to the PF branch for phonological evaluation. Note that such a model straightforwardly explains the *v*P-fronting facts in Swedish; namely, if T lowers to the *v* phase head in the narrow syntax, subsequent movement of the *v*P to SpecCP will necessarily reflect that Lowering operation and the verb in the fronted *v*P will be overtly inflected. Importantly, this model of narrow syntactic Lowering allows for a strict separation between the domains of syntactic and phonological operations; all transformations of syntactic hierarchy occur in the same domain (i.e., the narrow syntax), while operations on the PF branch consist solely of the assignment of phonological form to the resulting syntactic structure and the linearization of that form. In the following section, I address a possible objection to Lowering in the narrow syntactic structure, namely the creation of unbound traces, and argue that this objection is unfounded.

### **3.4 Narrow syntactic head-lowering and unbound traces**

The preceding section raises an important issue regarding the nature of traces of syntactic head movement. In particular, I have posited a scenario under which a trace of head movement need not necessarily be bound in the narrow syntax. In the cases in question, head-to-head Lowering in the narrow syntax creates a structure in which the hierarchically higher copy is not the derivationally most recent—i.e., it is a trace copy that is not c-commanded by another copy. It is an uncontroversial claim in research on the syntax-semantics interface that unbound traces cannot be

interpreted by the conceptual-intentional system, and so the presence of such a trace in the LF representation produces a crash. This has been the primary force underlying objections to the possibility of downward movement in the narrow syntax, leading e.g. Embick and Noyer (2001) to postulate that downward syntactic head-to-head movement occurs on the PF branch, thus leaving the narrow syntactic structure—which is later fed to LF—free of unbound traces.<sup>60</sup> However, in this section I argue that a theory of total syntactic reconstruction of chains of head movement at LF obviates this problem, thus allowing for narrow syntactic head-to-head Lowering.

It is generally believed that head movement carries no semantic repercussions, unlike certain phrasal movements (e.g. quantifier-raising).<sup>61</sup> For example, the very different surface positions of both the matrix verb and tense heads in verb-raising (e.g. French), tense-hopping (e.g. English), and V2 (e.g. German) languages show no signs of effecting any fundamental semantic differences (see Chomsky

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<sup>60</sup> An assumption underlying both Embick and Noyer's (2001) analysis and the current thesis is that unbound traces do not create a problem for interpretation at the articulatory-perceptual interface. As I argued in §2.3.2, it is simply the most recent copy in a chain that is pronounced.

<sup>61</sup> Note that Lechner (2006) argues that certain head movements do in fact have semantic effects. For example, he argues that a split-scope reading of a sentence such as *Not every boy can make the team*, in which the modal takes scope over the quantified subject—i.e. [*not* > *can* >  $\forall$ ], must be due to LF head movement of the modal to a position above SpecTP but below the LF-derived position of negation. However, this analysis relies on the additional claim that all subjects must be interpreted in SpecTP (or higher) and cannot be reconstructed into SpecvP; note that if negation can take wide scope and the quantifier can reconstruct to SpecvP, the split-scope [*not* > *can* >  $\forall$ ] can be derived with *in situ* interpretation of the modal head in T. This anti-subject reconstruction claim is based on some somewhat complex semantic judgements involving raising predicates and quantifiers. For example, he argues that the absence of a *de dicto* reading of a sentence like *Every movie which was promoted by a critic seemed to impress the jury* is due to the unavailability of reconstruction of the universal quantifier along with the relative clause in SpecvP. The fact that the existentially quantified *a critic*, which is contained in the subject relative clause, can only receive a *de re* interpretation indicates that it cannot reconstruct below *seem*. Lechner uses this fact to argue that the entire subject itself cannot reconstruct to SpecvP, and that, indeed, no subject can reconstruct to SpecvP. Given the intricate nature of this argument, we will not address it further here. Note, however, that it may simply be the case that the role of adjuncts and late adjunction, and the interaction of these with Spell-out to LF, is the semantic culprit here, and not head movement. If the relative clause adjunct [*which was promoted by a critic*] adjoins to the constituent [*every movie*] only after this QP has raised to SpecTP, then this may explain why reconstruction of the entire subject in SpecvP is precluded. If late merger of adjuncts is obligatory—as argued by Stepanov (2000, 2001)—then reconstruction of the subject in SpecvP would be impossible in this case, as no copy of the relative clause is contained in this position. However, this would not rule out reconstruction in SpecvP of a subject that does not contain an adjunct. Thus, if the claim that no subject can reconstruct to SpecvP is found to not hold, then there is no longer evidence of “semantically active head movement”. I leave this for future research.

2001:37-8 and Matushansky 2006:102-5). Given this absence of semantic effects, it is argued that chains of head movement are always interpreted under total reconstruction at LF; i.e. a head is interpreted in its base-generated position, regardless of any transformational operations. I adopt this view here, and I assume, given no evidence to the contrary, that narrow syntactic downward head movement, just like narrow syntactic upward head movement, has no effect on semantic interpretation. Consequently, a head that has undergone narrow syntactic Lowering is interpreted at LF under total reconstruction.

Several theories of total reconstruction at LF have been proposed, many of which have been applied to both head and phrasal movement. I will focus here on two general models of total reconstruction, which I call *semantic reconstruction* and *syntactic reconstruction*, following the terminology of Fox and Nissenbaum (2004). We will see that both of these models adequately account for the absence of semantic effects in cases of upward head movement, but that only syntactic reconstruction straightforwardly allows for the possibility of narrow syntactic head-to-head Lowering.<sup>62</sup>

We will first address head movement under semantic reconstruction. As pointed out by Matushansky (2006), the fact that narrow syntactic upward head movement does not change the semantic interpretation of a clause is unsurprising under a formal approach to semantics like that of Heim and Kratzer (1998). In a case of verb-raising like the following, the moved head must leave behind a trace variable of the same semantic type as that head, since semantic composition of the object and subject with the trace would otherwise be impossible (movement of the subject

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<sup>62</sup>Another important proposal regarding total reconstruction is that such cases are due instead to movement on the PF branch. Thus, any overt transformation that does not affect semantic interpretation is phonological, rather than syntactic. Chomsky (2001:37-8) suggests that all head movement is phonological, occurring to satisfy the morpho-phonological affixal needs of certain heads (see appendices to Matushansky 2006 for some counter-arguments in favor of narrow syntactic head movement).

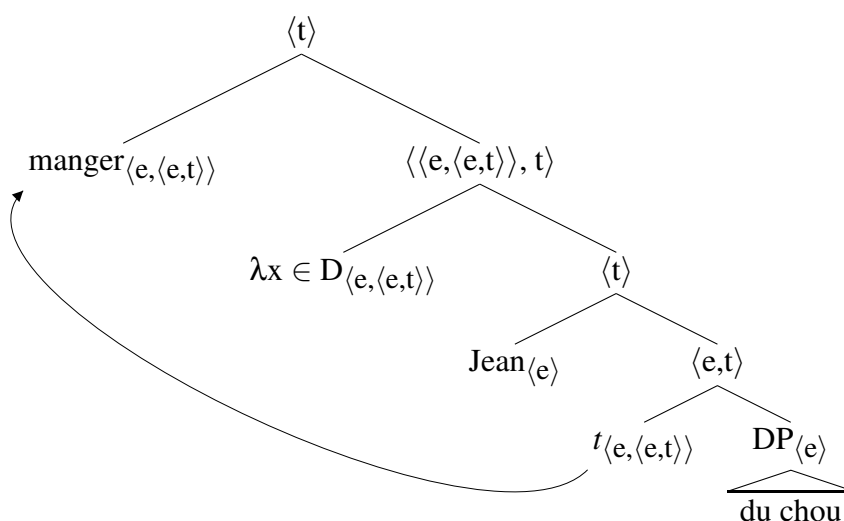
Sauerland and Elbourne (2002) have made similar claims for total reconstruction of phrases. Consider the following example, where the DP [*an Austrian*] is necessarily interpreted in the position of its trace:

(i) [An Austrian]<sub>i</sub> is likely *t<sub>i</sub>* to win the gold medal.

Sauerland and Elbourne argue that the DP remains *in situ* in the narrow syntactic structure—thus also occupying this position at LF—and only undergoes movement to matrix subject position on the PF branch, which suggests that the EPP is a phonological rather than syntactic requirement.

omitted for clarity):<sup>63</sup>

- (48) Jean mange du chou.  
 Jean eat.PRES DET cabbage  
 ‘Jean eats cabbage.’



Likewise, the moved head retains its semantic type, and head movement creates a lambda-abstract with that same semantic type. When the structure in (48) is interpreted at LF, the lambda-abstraced predicate of type  $\langle \langle e, \langle e, t \rangle \rangle, t \rangle$  takes the

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Though more research is needed into these phonological accounts of total reconstruction, it is clear that they are incompatible with the overall computational architecture proposed in this thesis. For example, the current model limits PF transformations to string-adjacent elements (i.e. Local Dislocation), and promotes a strict modularity of all transformational processes; that is, all hierarchical transformations—including head-to-head Lowering—occur in the (narrow) syntactic component, while all and only morpho-phonologically sensitive operations occur on the PF branch. If we allow for PF transformations that do not obey the linear nature of phonological representations (e.g. head-to-head movement over phrases and phrasal movement over both heads and phrases), the line between what is phonological and what is syntactic becomes blurred. Though this, in itself, is not a sufficient reason to outright reject phonological models of total reconstruction, I will not entertain such analyses in the current discussion, given that their base assumptions on what is possible in the phonological component are so radically different from those made here. I will thus continue to argue that all (hierarchically sensitive) head movement operations take place in the narrow syntax.

<sup>63</sup>The structure in (48) assumes Matushansky's (2006) model of head movement in which a head moves to a higher specifier position in the syntax and then only later undergoes a morphological merger with the lower head on the PF branch (i.e. in the morphological component). As we will not be adopting this system of head movement here, I will not address it further. Note, however, that as I will be rejecting this model of semantic reconstruction for head movement, the omission of such a discussion is not crucial.



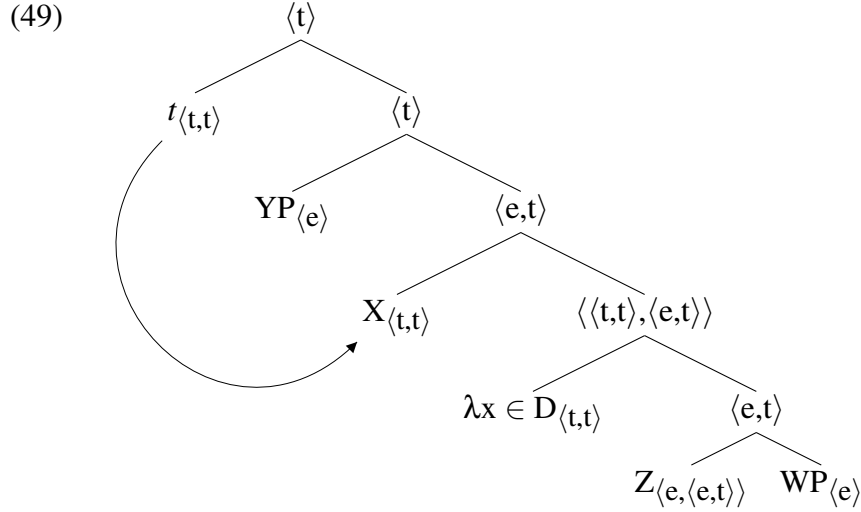
moved head as its argument. Since the lambda-operator binds the trace variable, that trace is assigned the interpretation of the lambda-predicate's argument (i.e. the moved head). Because of this semantic reconstruction, the head is interpreted as if it had never moved—though the head is, strictly speaking, interpreted in its derived position at LF, the movement is semantically vacuous as a result of the interaction of semantic types and variable-binding.<sup>64</sup> Thus, semantic reconstruction provides a means to explain the absence of semantic effects in upward head movement, under the assumption that all head movement operations are interpreted in a similar fashion to the above example.

However, this model of semantic reconstruction does not work for interpretation of heads that have undergone narrow syntactic Lowering. Let us assume that downward head movement works similarly to upward head movement in terms of lambda-abstraction, in that a lambda-operator is introduced over the sister of the moved element. This derives a hypothetical LF tree structure like the following:<sup>65</sup>

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<sup>64</sup>Total reconstruction has been argued to work similarly for phrasal movements, as well (see e.g. Engdahl 1986 and Chierchia 1995). Generally, under such analyses, total semantic reconstruction occurs when a moved element, its trace, and the relevant lambda-abstract all share the same semantic type, thus resulting in interpretation of the moved element in its trace position, as illustrated above. Movements that affect semantic interpretation do not follow this pattern. For example, movement of a quantifier of type  $\langle\langle e, t \rangle, t\rangle$  (under an inverse scope reading) creates a lambda-abstract of type  $\langle e \rangle$  (over its type  $\langle t \rangle$  sister), as well as a trace of type  $\langle e \rangle$  (as the result of trace conversion; see Fox 2000). For the sake of conciseness, I will not address these issues of phrasal movement at length here, but will rather focus on the implications of syntactic and semantic reconstruction for head movement operations.

<sup>65</sup>Note, again, that this tree assumes a model of head movement like that of Matushansky (2006). Here, the head has moved to the next lowest specifier position. As such an LF tree is independently ruled out due to the presence of the higher unbound trace, the exact landing site of the lowered head is unimportant here.



Not surprisingly, Lowering creates no type mismatches between sister predicate-argument pairs; just as in (48), lambda-abstraction adds an argument of type  $x$  to its sister, which is then satisfied by the moved element of type  $x$  upon semantic composition. Thus, the original semantic type of the node over which lambda-abstraction takes place necessarily survives through the lambda-predicate; e.g., the semantic type of the node that dominates  $Z$  and  $WP$  in (49) ( $\langle e, t \rangle$ ) is recovered after predication of the lambda-predicate (type  $\langle \langle t, t \rangle, \langle e, t \rangle \rangle$ ) with the lowered head (type  $\langle t, t \rangle$ ). The problem here is therefore not one of semantic types. What makes (49) an impossible LF structure is that the lambda-operator doesn't bind anything, in addition to the related—and most important—fact that the trace variable that is left after Lowering is not bound. Since the lambda-operator that is created by this movement does not c-command the trace variable, the trace can receive no interpretation, and so this structure would presumably crash at the C-I interface. Such a model of total reconstruction thus serves only to reinforce the original objection to downward narrow syntactic movement; namely, unbound traces created via Lowering are uninterpretable.

However, as we have seen, there is sufficient reason to believe that downward head movements occur in the narrow syntax; e.g. the fact that T-to- $v$  Lowering is reflected in the narrow syntactic operation of  $vP$ -fronting in Swedish, which cannot easily be accounted for if Lowering is merely operative on the PF branch. If both upward and downward head movements take place in the narrow syntactic derivation, then the mechanism that interprets the resulting chains at LF must be able to analyze chains of the form  $\{X_2, X_1\}$  and  $\{X_1, X_2\}$ , where order indicates

c-command and numerical subscript indicates the order of merger. In both of these chains it is the copy  $X_1$  that is interpreted.

The theory of syntactic reconstruction allows for chains formed by both upward and downward head movement to be interpreted similarly. Under this analysis of total reconstruction, all copies except the first are deleted in the LF representation; in both of the aforementioned chains,  $X_2$  is deleted in the LF representation and  $X_1$  is the only copy that is interpreted.<sup>66</sup> In this way, interpretation as total reconstruction is due, essentially, to a complete “undoing” of movement operations, resulting in interpretation of an element in its base-generated position. This type of syntactic reconstruction has been proposed often in the literature for upwardly-moved elements (see e.g. May 1977 and Hornstein 1995),<sup>67</sup> but it is clear to see that it can also easily account for the interpretation of chains of downwardly-moved heads. A head that has undergone downward movement in the narrow syntax will be syntactically reconstructed to the unbound trace position at LF, thus effectively eliminating the unbound trace from the LF representation. As such, under total syntactic reconstruction, no traces of head movement exist in the LF representation, which completely obviates the problem of unbound head traces and, consequently, gives us no reason to posit a restriction against downward head movement in the narrow syntactic derivation.<sup>68</sup> As only the theory of syntactic reconstruction is compatible with the narrow syntactic model proposed in this work, I will assume that it is the correct analysis of the interpretation of chains of head

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<sup>66</sup>Any lambda-operators that were created as a result of movement would likewise be deleted when total syntactic reconstruction applies.

<sup>67</sup>Several theories of syntactic reconstruction (e.g. Hornstein 1995) are articulated in terms of a copy theory of movement, under which only the earliest copy in the chain is interpreted at LF. For our purposes here, the details of these proposals are not crucial, as they all share the same characteristic that only the first-merged copy is relevant for LF interpretation under total reconstruction.

<sup>68</sup>See Fox and Nissenbaum (2004) for an argument that total reconstruction of phrases also occurs under syntactic reconstruction, as opposed to semantic reconstruction.

movement.<sup>69,70</sup>

### 3.5 Section summary: more consequences of phase triggering and narrow syntactic Lowering

The following two bullets summarize the major claims of the preceding sections:

- After derivation of a phase sub-array, that phase is triggered for Spell-out upon narrow syntactic merger of a head from a separate phase sub-array (or when the end of derivation is reached). Phase impenetrability applies at this point in the derivation.
- If the triggering head carries an uninterpretable feature that must be checked against an interpretable feature embedded in the head of its complement, the triggering head is re-merged to the head of its complement before the phase is transferred to the PF branch, due to the PHIC. As the trace copy left in the structurally higher base position will be interpreted under total syntactic reconstruction, no problems are created for the syntax-semantics interface.

While the preceding analysis might appear to simply quibble about minor details of Lowering operations, the conclusions we have drawn have serious repercussions for a general model of syntactic derivations. For example, we have provided support for a model of phase Spell-out in which the highest head in the phase is included in the Spell-out domain. A consequence of this model is that any movement of this phase

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<sup>69</sup>It is worth noting that Matushansky (2006) does not come down in favor of syntactic vs. semantic reconstruction for chains of head movement, noting that both are equally plausible theories for the interpretation of upwardly-moved heads. I have shown here, however, that incorporation of downward head movements provides support for the syntactic reconstruction model.

<sup>70</sup>I would be negligent if I did not also point out that the potential exists for a successful theory of semantic reconstruction that includes narrow syntactic Lowering. However, to formulate such a model would require a much more intricate study of the mechanisms underlying variable-binding at LF. For example, it may be the case that, under a copy theory of movement, all chains of head movement are interpreted such that higher copies bind lower copies, which are interpreted as variables. Thus, upward vs. downward movement would be irrelevant for the purposes of the interpretation of copy chains—i.e., interpretation as a variable is not dependent on whether a copy is not the derivationally most recent, but is due rather to its c-command relations with other copies. However, such a system might predict that Lowering could, in fact, have semantic repercussions, since, unlike upward movement, the structurally lowest copy in a Lowering chain is not the base-generated one. Given that I have found no evidence to support this distinction, and because such an investigation would take us far afield of our central concerns, I will assume that the syntactic reconstruction model is the appropriate way to view the interpretation of chains of head movement, though I will not rule out other possibilities that also allow for narrow syntactic head-lowering.

head into a higher phase must be due to an uninterpretable feature on a higher head that directly targets the feature of that phase head itself, since features embedded in that phase head are inaccessible due to phase impenetrability. This entails that all verb-raising from  $vP$  into the functional domain is due to a  $[-v]$  feature on a head in the functional domain (see §5).<sup>71</sup> Also, the triggering model of Spell-out suggests that the notion of “phase head” is in fact not a linguistic primitive, or, at the very least, that it is not a phase head itself that is responsible for Spell-out.<sup>72</sup> Rather, Spell-out occurs due to a shift in the computational process (e.g. lexical to functional). In this way, a workspace model of derivation is supported (see Ch.5 §3). In other words, the computational component manipulates items from one sub-array (e.g. the sub-array containing the lexical items of a clause) and then must clear its workspace (i.e. send the resulting derivation to PF) once work begins on another sub-array (e.g. the sub-array containing the functional elements of a clause). It is this conceptual model of derivation and Spell-out that we will adopt for the remainder of this thesis.<sup>73</sup> In the following sections, I will continue to address the implications of the claims presented here for other syntactic and post-syntactic phenomena, as well as the implications for a general architecture of linguistic computation.

## 4 A sidenote on the T-to-C movement asymmetry

As mentioned in the introduction to Section 2, a Local Dislocation analysis of English tense-hopping calls into question the necessity of a T-to-C movement

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<sup>71</sup>Once the verb is in the functional domain, however, further movements may be driven by other features, e.g. as was argued to be the case in V2 movement in German, in which a  $[-T]$  feature on C moves the  $v+V+T$  head.

<sup>72</sup>Note that, though phase heads might not be linguistic primitives, I will continue to refer to the highest head in the Spell-out domain as a “phase head” for ease of exposition.

<sup>73</sup>Though I address this more in Chapter 4, I should point out here that this model of Spell-out crucially does not make reference to the status of checked or unchecked features within a Spell-out domain. That is, contra Felser (2003) and Svenonius (2004) (and even Chomsky’s (1986) *Complete Functional Complex*), the process of Spell-out is determined simply by mechanical means of computational syntactic derivation. In essence, given a set of sub-arrays from the numeration  $\{S_1, S_2, S_3\}$ , Spell-out of  $S_n$  will occur when derivation of  $S_{n+1}$  begins, regardless of the content or configuration of  $S_n$ . As I will argue in Chapter 4, though the computational component attempts to check as many features as possible before (or, as we will see, after) Spell-out, the operation of Spell-out itself is not intrinsically dependent on the checked or unchecked status of the elements contained in each  $S_n$ . Thus, Spell-out itself is a simple transfer operation, and it is only the later interface with the phonetic and interpretive components that derives crash or convergence.

asymmetry between subject and object *wh*-questions. In this section, I will simply show briefly why this is the case.

In English, tense-hopping occurs in subject *wh*-questions, but not in object *wh*-questions (modulo the effects of emphatic affirmation; see Chapter 4 §2.1.4):

- (50)    a.    Who likes John?  
           b.    \*Who does like John?  
           c.    Who does Bill like?  
           d.    \*Who Bill likes?

As we have seen, under a Lowering analysis of tense-hopping, T-to-*v* Lowering occurs when *v*P is the complement of T, and is impossible if T has moved to a position in which *v*P is no longer its complement. This would therefore indicate that T has raised to C in the object *wh*-question (50c), but not in the subject *wh*-question (50a). Several analyses have been proposed to account for this apparent syntactic asymmetry. For example, Koopman (1983) argues that movement of T to C in examples like (50b) would disallow the moved *wh*-phrase in SpecCP from properly governing its trace in SpecTP (SpecIP), in violation of the ECP (*Empty Category Principle*). Consequently, T-to-C movement is suppressed in order to obviate a violation of the ECP.

With the advent of the Minimalist Program, Pesetsky and Torrego (2001) take a different approach, arguing that movement of the *wh*-subject alone satisfies all necessary features of the *wh*-interrogative C, but that movement of the *wh*-object is evaluated too late to check all of C's features, since T raises to C before the *wh*-object is targeted for movement. Pesetsky and Torrego's (2001) model of the T-to-C asymmetry is outlined briefly in the following bullets:

- A *wh*-interrogative C carries an uninterpretable T feature and an EPP feature (which additionally carries an uninterpretable *wh*-feature; I adopt this feature scenario, as well).
- All DPs carry a T-feature (which Pesetsky and Torrego associate with Case).
- They propose a set of rules that I will conflate as the rule *Attract Closest*. *Attract Closest* requires that a probing head target the closest element that satisfies any of its features. If the head contains remaining features after the first operation, it may probe again to satisfy those features.

Briefly, and perhaps oversimplifying a bit, Pesetsky and Torrego argue that when a *wh*-interrogative C probes its c-command domain, it will target the first element that satisfies any one of its features (e.g. [-T] or [-*wh*]), due to *Attract Closest*. Pesetsky and Torrego argue that both SpecTP and T are equidistant from C. Thus, in a *wh*-subject construction, a *wh*-interrogative C could target either the nominative *wh*-subject in SpecTP or the head T to satisfy its [-T] feature, since DPs carry T-features under this analysis. However, targeting T would only check the [-T] feature on C and not the [-*wh*] feature. Therefore, they argue that it is more economical to move just the *wh*-subject (i.e. one movement that satisfies both the [-T] and [-*wh*] features) than to move both the *wh*-subject and T (i.e. two movements). Therefore, there is no need for T-to-C movement, and T remains in a syntactic position from which it may lower to the verb.<sup>74</sup> Conversely, when there is a *wh*-object, the closest element that satisfies one of C's features is T, and so T is moved to C.<sup>75,76</sup> However, T does not satisfy C's [-*wh*] feature, and so C must probe again deeper into the structure, targeting the object *wh*-phrase for movement to SpecCP.

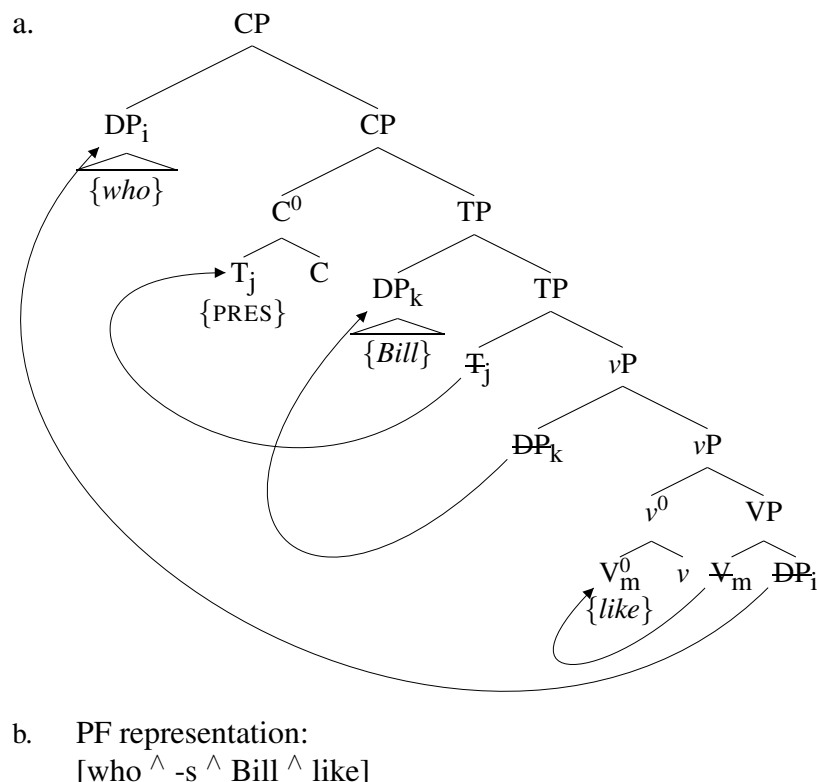
Pesetsky and Torrego extend this analysis to cover a vast array of different syntactic phenomena (see Pesetsky and Torrego 2004, 2005). However, I have argued above that tense-hopping in English is, in fact, not a result of Lowering, but is rather evaluated as a case of Local Dislocation under morpho-phonological string-adjacency. Under the proposed analysis, there is no need for a T-to-C movement asymmetry. For example, let's first consider the object *wh*-question in (50c):

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<sup>74</sup>Note that in standard *yes/no* interrogatives (e.g. *Did Bill leave?*), which contain only a [-T] feature on C, I assume that head movement of T is required under this analysis because there is no additional EPP feature on this C. Thus, even though T and the nominative subject are equidistant from C, and both carry a T-feature, movement of the phrasal subject does not occur as C carries no phrasal movement-motivating EPP feature.

<sup>75</sup>Crucially, this analysis implicitly relies on some version of the *Late Lowering Hypothesis*, since T cannot have lowered to the verb before C probes its c-command domain. Otherwise, under a model of cyclic evaluation of Lowering, like the one proposed in this chapter, we would expect pied-piping of the verb to C exactly as in Swedish.

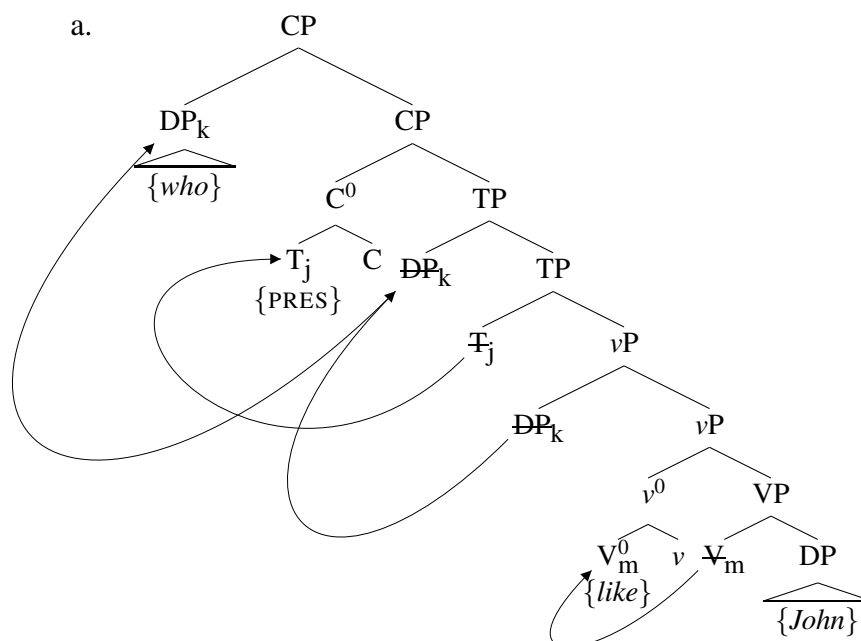
<sup>76</sup>Note, however, that the non-*wh*-subject in a *wh*-object construction also carries a T-feature under this analysis. Though this subject and T are equidistant from C<sub>[-T]</sub>, the subject is never targeted for movement to SpecCP in such constructions. This is presumably due to the lack of an EPP specification on C's [-T] feature; thus, in a way, a head movement to satisfy C's [-T] feature is more economical than a phrasal movement.

(51) *Who does Bill like?*

When phonology is mapped to the syntactic structure in (51a), producing the linear representation in (51b), Local Dislocation of the bound tense morpheme and the verb is impossible due to the intervening subject, and so *do*-support occurs.<sup>77</sup> Similarly, consider the following structure, in which a *wh*-subject has moved to SpecCP, and T-to-C movement has also taken place:

<sup>77</sup>Note that the cyclicity of phases and Vocabulary Insertion cycles is not crucial to the current discussion, and so I omit them for simplicity.



(52) *Who likes John?*

b. PF representation:  
[who ^ -s ^ like ^ John]

When the syntactic structure in (52a) is mapped to phonology, Vocabulary Insertion produces the linearized string in (52b). Here, even though T has moved to C in the narrow syntactic structure, the bound tense morpheme and the verb are morpho-phonologically string-adjacent, and so tense-hopping may occur as Local Dislocation. Note, however, that if T had remained *in situ* in (52a), the same morpho-phonological string would have been produced. Therefore, while the Local Dislocation model of English tense-hopping does not refute the existence of a T-to-C movement asymmetry in *wh*-questions, we cannot take such an asymmetry as a given based solely on the tense-hopping facts. As a result, the current discussion does not negate the findings of Pesetsky and Torrego, but rather requires us to find alternative evidence to support the presence of a T-to-C movement asymmetry in English matrix *wh*-questions. If no such evidence can be found, then English tense-hopping provides no support for the model of syntactic derivations proposed by Pesetsky and Torrego. I leave this for future investigation.

## 5 Implications for verb-raising languages

As mentioned several times previously, many languages raise the verb out of  $vP$  into the functional domain; e.g., the matrix verb in French raises over the  $vP$ -adjunct:

- (53) Jean oublie<sub>*i*</sub> [ <sub>$vP$</sub>  **complètement** *t<sub>i</sub>* l'adresse ].  
 Jean forget.3S.PRES completely DET.address  
 'Jean completely forgets the address.'

I will assume that the position the verb has moved to is T, though this does not preclude the existence of intervening functional projections (i.e. the split-INFL hypothesis, Pollock 1989; see §5.2). This pattern suggests that the featural motivations of  $v$ -to-T head movement are different from those of T-to- $v$  Lowering. Under the current model, it must be the case that T is targeting a feature on the verb that has not become impenetrable due to Spell-out. Recall that the PHIC makes only those features embedded within a phase head inaccessible for subsequent narrow syntactic probing operations. I argue that the feature of the phase head itself (in this case,  $v$ ) is still accessible to the narrow syntax after Spell-out (or after Spell-out triggering; see below). Therefore, I propose that the difference between tense-lowering and verb-raising languages is the following:

- (54) *Tense-lowering vs. verb-raising*  
 a. Tense-lowering occurs when T carries a [-V] feature, and T takes  $vP$  as a complement.<sup>78</sup>  
 b. Verb-raising occurs when T carries a [- $v$ ] feature.

In the following section I show that there are two theoretical structural possibilities for deriving verb-raising under the current model, both of which are equally viable but carry different consequences for derivational computation.

### 5.1 Two options for verb-raising

Since the PHIC allows narrow syntactic operations to target the  $v$ -feature of the phase head, we predict that Spell-out of  $vP$  will not prevent verb-raising when T carries a [- $v$ ] feature. However, we must ask whether the verb raises out of  $vP$

<sup>78</sup>Since I argue that English is not a tense-lowering language, this structural configuration does not necessarily hold in English syntax; see Chapter 4.

before or after the complex  $v$  head is transferred to the PF branch. I illustrate each of these possibilities below and briefly discuss their consequences. However, though I believe that one of the models is theoretically advantageous, I will not come down in strong favor of one over the other.

Recall that the PHIC applies once Spell-out is triggered. The relevant effect of the PHIC for the preceding discussions is that a narrow syntactic raising operation to check a feature on the triggering head against a feature embedded in the phase head is ruled out from this point forward in the derivation. However, this still leaves open the possibility of feature-checking via raising between a feature on the triggering head and the feature of the phase head itself, since Spell-out triggering does not make the feature of the phase head impenetrable. Therefore, it is perfectly plausible that the following order of operations occurs in a verb-raising language (note that I maintain that the adjunct is late-merged after the derivation in (55) is complete; I have also omitted the subject from Spec $v$ P for clarity):<sup>79</sup>

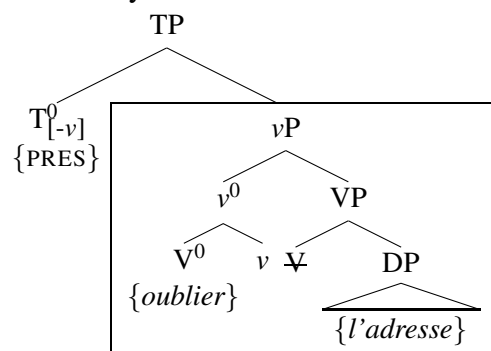
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<sup>79</sup>Note that in a split-INFL structure, a functional head such as Agr<sup>0</sup> may be the Spell-out trigger. In this case, it is also possible that Agr carries a  $[-v]$  feature and behaves identically to T in (55).

(55) *Jean oublie complètement l'adresse.*

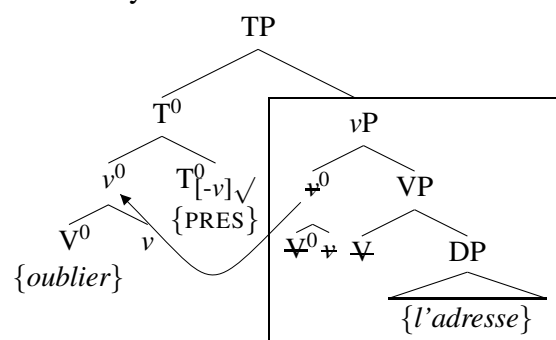
- a. T merges and triggers Spell-out of  $vP$ ; PHIC applies

Narrow syntax

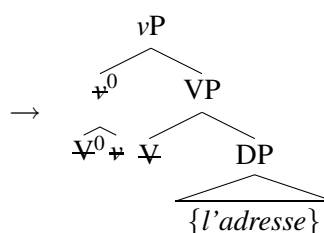


- b. T raises  $v$  before phase is transferred to PF

Narrow syntax



PF structure



As the PHIC does not make the  $v$ -feature impenetrable upon triggering of Spell-out, there may be nothing that prevents raising of  $v$  before transfer of the phase to PF. However, this requires a bit of a derivational back and forth, since, as argued in Section 3.1, Spell-out must be triggered immediately upon merger of a head to the syntactic object that results from derivational exhaustion of the phase sub-array. That is, the order of operations is the following: [Spell-out triggering  $\gg$  narrow syntactic raising  $\gg$  transfer of triggered phase to PF]. Under this model of verb-raising, a narrow syntactic operation is interleaved between two operations related to Spell-out. This is perhaps not the most desirable scenario, but there is

no reason to believe that it is impossible.<sup>80</sup> Another, less crucial, consequence of this order of operations is that, since the verb has raised to T before transfer of the phase to the PF branch, the trace of the verb that is sent to PF in (55b) is not interpreted by VI, and thus the verb will not be assigned phonological features until the next Spell-out cycle. This may allow for a cleaner analysis of suppletion in verb-raising paradigms (i.e. all morphemes of the verb will be analyzed for phonological form on the same Spell-out cycle, rather than on different Spell-out cycles), but we will see in Chapter 4 that this is not sufficient reason to adopt such a model of verb-raising, given the necessity of morpho-phonological readjustment rules on the PF branch for cases of suppletion and stem-allomorphy in English main verbs (see also §5.2 below).

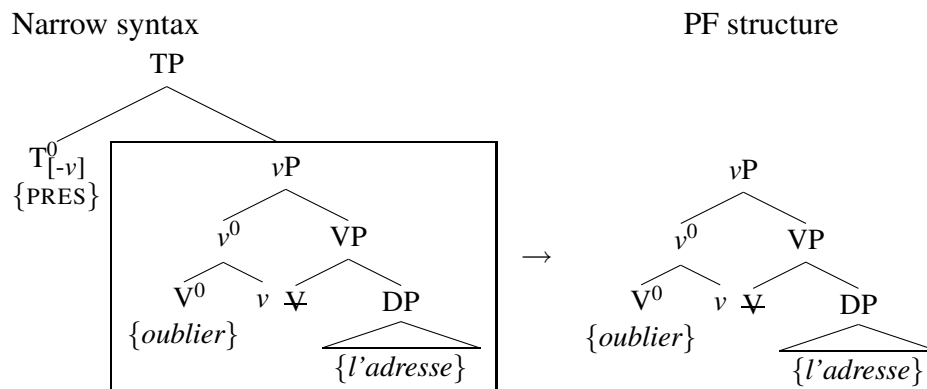
The alternative to this model is one in which verb-raising occurs after the phase has been transferred to PF, which is illustrated as follows (recall that elements in **bold** are those that have completed the Spell-out process):

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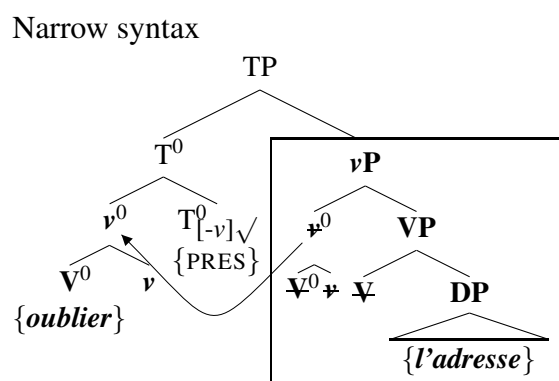
<sup>80</sup>Note that I argued earlier that Lowering is a narrow syntactic transformation that is interleaved in the Spell-out process. Thus, a similar model of narrow syntactic raising across a phase boundary would create more uniformity between the two operations. However, this may not be a goal that we should be shooting for. See fn. 82.

(56) *Jean oublie complètement l'adresse.*

- a. T merges and triggers Spell-out of  $vP$ ; PHIC applies;  
Spell-out domain transferred to PF



- b. T raises  $v$  after phase is transferred to PF



Here, the verb completes the Spell-out process before it is targeted for narrow syntactic raising to T. Since the PHIC does not make the feature of  $v$  itself impenetrable, we allow for a strict version of a “phase edge condition” in which higher heads may still probe the feature(s) lying at the very edge of the spelled-out phase (see Fox and Pesetsky (2005) for a similar model). Therefore, under the above scenario, an element that has undergone Spell-out may be targeted for narrow syntactic transformations as long as the probe targets a feature that has not been rendered impenetrable by the process of Spell-out. Thus, the targetable edge of the Spell-out domain does not consist of the entire morpho-syntactic element found at the edge (e.g. the entire complex  $v$  head itself), but rather only the highest

feature of that element.<sup>81</sup>

A consequence of this model is that elements that have undergone Spell-out may, under certain specific circumstances, participate in subsequent narrow syntactic operations. I can think of no reason why this should not be the case if syntactic computation adheres to the confines proposed above. Furthermore, this model allows for a more concise order of operations, namely [Spell-out triggering  $\gg$  transfer of Spell-out domain to PF  $\gg$  narrow syntactic operations]. Thus, Spell-out triggering and transfer occur in step, and so no narrow syntactic re-merger operations interrupt the process of Spell-out.<sup>82</sup> Thus, once Spell-out is triggered, narrow syntactic derivation is put on hold until the Spell-out process is complete. Taking this computational uniformity into consideration, I believe that the post-transfer model of verb-raising is preferable to the pre-transfer model. However, further research is needed before a strong determination can be made. The exact timing of verb-raising with respect to phase transfer to the PF branch will not be of the utmost importance for the remainder of this thesis. For example, I suggest in the following section that the fact that verb-raising languages exhibit richer verbal inflection paradigms than tense-hopping languages is not due to the timing of their raising with respect to  $\nu$ P Spell-out—that is, rich agreement is not the result of a verb being assigned phonology on the same Spell-out cycle as its inflectional morphemes—, but is rather a result of the properties of the finite tense morpheme that targets the verb.

## 5.2 A possible correlation with the Rich Agreement Hypothesis

As mentioned in Section 2.3.1, several studies have posited a *Rich Agreement Hypothesis*, which proposes a link between overtly varied paradigms of

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<sup>81</sup>It must also be the case that any operation that targets this least embedded feature of the spelled-out domain for a structural transformation also carries along the entire morpho-syntactic structure contained within the targeted element. I take this to be an uncontroversial assumption, since Spell-out does not alter the morpho-syntactic constituency of the narrow syntactic structure, but rather makes embedded elements untargetable by higher heads.

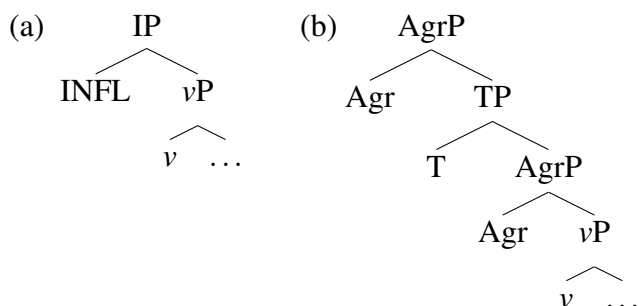
<sup>82</sup>Note that narrow syntactic Lowering between Spell-out triggering and phase transfer is an exception, which is to be expected given that Lowering is a last resort repair mechanism. Assuming that the most economical form of derivation and Spell-out does not involve narrow syntactic re-merger operations during the overall process of Spell-out, the featural repair mechanism of Lowering is expected to be relatively less economical. Otherwise, if Lowering satisfied derivational economy on par with raising, we might expect far more Lowering operations to occur cross-linguistically and in other syntactic domains (e.g. phase-internally).

person-number agreement morphology on verbs and syntactic verb-raising, and a corresponding link between a more uniform inflectional paradigm for verbs and tense-hopping (e.g. Bobaljik 2000b, Holmberg and Platzack 1995). That is, verb-raising languages tend to show richer verbal inflection than tense-hopping languages. In this section, I will briefly argue that the correlation between rich inflection and verb-raising is not due to the simple fact that verbs either do or do not raise into the functional domain, but rather that it is the feature on T that may be responsible for the presence or absence of rich agreement.

I first note that I follow Bobaljik (2000b) in assuming that rich verbal agreement is the result, rather than the cause, of properties of the syntax. That is, verbs display rich inflection because they raise (or because of the syntactic properties that cause them raise); they do not raise because they exhibit rich inflection (cf. Rohrbacher 1994). In this way, rich agreement morphology on a verb does not induce verb-raising, but rather rich agreement surfaces as a consequence of verb-raising. This is in keeping with the claims of Distributed Morphology, since the phonological representation of verbal inflection does not affect the syntactic derivation, as there is no phonology in syntax.

Bobaljik (2000b), following Bobaljik and Thráinsson (1998) and Johnson (1990) (based in the work of Pollock 1989), proposes the *Split IP Parameter*, under which languages vary as to whether they have an unarticulated, “pre-Pollockian” INFL or a split-INFL containing multiple projections. Tense-hopping/impoverished inflection languages are argued to have a structure like (57a) below, whereas verb-raising/rich inflection languages have a structure like (57b) (adapted from Bobaljik 2000b).<sup>83</sup>

(57) *Split IP Parameter*



<sup>83</sup>Note that I will often refer to the un-split INFL head simply as “T”.



Bobaljik argues that a split vs. non-split IP is an inherent property of a given language, and not a reflex of the presence or absence of rich verbal inflection (in his words, the rich morphology “does not ‘cause’ the IP to split any more than puddles on the street ‘cause’ rain”; Bobaljik 2000b:14). The availability of a more articulated INFL structure allows for 1) more syntactic landing sites for verb-movement (which is required to explain the pattern of infinitival verb movement in French; see Ch.4 §3), and, more importantly for the current discussion, 2) multiple syntactic insertion points for a wide variety of tense-agreement feature bundles. Thus, given the availability of more morpho-syntactic positions in a split-INFL language vs. a simple INFL language, it is to be expected that a split-INFL language will display a more varied paradigm of functional, inflectional features.

However, this model, in itself, does not explain directly *why* verbs raise in split-INFL languages and not in simple INFL languages. What is it about a split-INFL that requires the verb to raise? Bobaljik and Thráinsson (1998), following Bobaljik (1995), argue that it is a simple matter of locality. Assuming that the morphemes in INFL must check a feature against the verb, the structure in (57a) provides sufficient locality for this feature-checking operation, but the structure in (57b) does not. Therefore, the verb must raise in (57b) to establish the locality required for feature-checking with e.g. the higher Agr head.

While I believe that the analysis of a split-INFL for verb-raising languages and a simple INFL for tense-hopping languages is on the right track,<sup>84</sup> I propose that we can draw an even tighter correlation between the presence vs. absence of rich agreement and the featural motivations underlying verb-raising vs. tense-hopping. Recall that in my previous analysis of the features underlying this distinction, verb-raising languages carry a [-v] feature on T and tense-lowering languages carry a [-V] feature on T.<sup>85</sup> I argue that, while it may be the case that a split vs. non-split INFL correlates with the feature specification of T (i.e. a [-v] feature on T correlates with a split-INFL and a [-V] on T with an unarticulated INFL), this feature specification itself may play a more direct role in the presence or absence of rich verbal agreement. The observation underlying this tentative claim is a rather

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<sup>84</sup>For example, tense-lowering in Swedish would be impossible if Swedish had a split-INFL, since the head-complement locality of T and the verb would then be disrupted.

<sup>85</sup>See §3 and Ch.4 §2 for the claim that all tense-hopping languages, including English, carry a [-V] on T.

simple, and perhaps not entirely novel, one. Namely, those languages that exhibit verb-raising show a closer overt relationship with the  $\phi$ -feature complex (e.g. person agreement) of the verb phrase than do tense-hopping languages (Chomsky 1995). Furthermore, in a paradigm of rich verbal inflection, the richness of the inflection reflects the  $\phi$ -feature properties of the grammatical subject, as in the following paradigm of Icelandic, a verb-raising language (Bobaljik 2000b):

(58) *Icelandic present tense*

|     |       |     |                 |
|-----|-------|-----|-----------------|
| 1SG | kasta | -Ø  | ‘I throw’       |
| 2SG | kasta | -r  | ‘you(sg) throw’ |
| 3SG | kasta | -r  | ‘he throws’     |
| 1PL | köst  | -um | ‘we throw’      |
| 2PL | kast  | -ið | ‘you(pl) throw’ |
| 3PL | kast  | -a  | ‘they throw’    |

Taking into account the *VP-internal subject hypothesis*, first proposed by Kuroda (1988), and following the work of Kratzer (1996), the external argument, which is the canonical thematic subject, is projected by the  $v$  head. The V head, however, does not project an external argument; an internal argument of V may become the derived grammatical subject only in cases in which an external argument is not syntactically present (or at least not in its canonical SpecvP position). The generalization here is simply that  $v$  is closely related to the grammatical subject. Thus, given this derivational syntactic relatedness, it is also reasonable to argue that  $v$  is somehow closely related to the  $\phi$ -features of the argument that it projects.<sup>86</sup> This allows us to make the following observation: an INFL that targets  $v$  directly displays a higher morpho-phonological sensitivity to the  $\phi$ -features of the grammatical subject than an INFL that targets V directly. Since SpecvP is the canonical merger position of the grammatical subject, it stands to reason that rich subject agreement surfaces as a result of the fact that T targets the head that is most closely associated with the subject. In other words, INFL displays rich agreement in  $\phi$ -features because it targets an element that is derivationally related to the  $\phi$ -features of the subject. In this way, the causal link here is one between the feature specification on T and the presence of rich inflection, rather than the presence of verb-raising

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<sup>86</sup>Alternatively, in the absence of an external argument, an internal argument must move to SpecvP before moving to subject position, given the PIC, allowing  $v$  to somehow associate with the  $\phi$ -features of that argument. Again, this is simply a preliminary analysis.

and the presence of rich inflection.<sup>87,88</sup> In this way, the fact that verb-raising occurs in rich inflection languages may simply be an epiphenomenon of the derivational architecture. Since the PHIC does not make the  $v$ -feature inaccessible to a higher  $T_{[-v]}$ , verb-raising is permitted. However, it is not this syntactic operation that directly results in rich inflection, but rather the fact that  $T$  targets the  $v$  head rather than the  $V$  head.<sup>89</sup> This is clearly a purely theoretical, rather than empirical, argument. However, I believe that it supports the proposed difference in the feature specifications of verb-raising and tense-hopping languages. The following briefly summarizes this proposal:

- Languages with rich inflection carry a  $[-v]$  feature in INFL.
- Languages with impoverished inflection carry a  $[-V]$  in INFL.
- Both verb-raising and tense-hopping occur as a result of how these feature specifications interact with the derivational architecture, especially with respect to the PHIC.
- As a result, there is no direct causal link between verb-raising and rich agreement. Rather, both verb-raising and rich agreement are side effects of the same morpho-syntactic property, namely a  $[-v]$  feature on  $T$ .
- Relatedly, both versions of tense-hopping (i.e. Lowering and Local Dislocation; see Chapter 4) and the lack of rich agreement stem from the same underlying property, namely a  $[-V]$  feature on  $T$ .

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<sup>87</sup>Note that this is not entirely different from Bobaljik's (2000b) proposal, since I maintain that a  $[-v]$  feature in INFL correlates with a split-INFL. That is, a split-INFL arises in the presence of a  $[-v]$  feature, and vice versa. If there is a causal relation between these two properties, it would be difficult to determine. Similarly, while I accept that a split-INFL corresponds with rich agreement, the model I propose here simply points out that another morpho-syntactic correlation may play a role in the presence of rich inflection.

<sup>88</sup>It is also important to point out that I am not positing a causal derivational link between the  $\phi$ -features of  $v$  and those represented on  $T$ . I am merely arguing for a typological tendency in which an INFL morpheme that displays rich agreement is generally associated with an element,  $v$ , that is, in turn, generally associated with the external argument, which is the canonical subject. Thus, constructions in these languages that lack an external argument (e.g. passives, perhaps) are not problematic for this correlation, since the correlation I'm proposing is rather loose. To state it differently, I am arguing for a typological parameter that reflects the most standard constructions of a language.

<sup>89</sup>That is to say, from this perspective, it is not the fact that INFL is split that causes rich inflection or verb-raising, but rather it is simply the feature specification in INFL that results in both of these properties. However, again, since these two things are so closely related, it is difficult to tease apart which is the underlying cause of rich inflection, and, in fact, it may simply be that both a split-INFL and a  $[-v]$  feature are equally responsible.

Much further research is needed into this model, but I believe that it can be supported on conceptual grounds. For example, we derive a linguistically sound typology of different species of INFL; e.g. a split-INFL that comprises several syntactic projections that are all in a way sensitive to  $\phi$ -feature-related elements of the verb phrase, and a morpho-syntactically impoverished, unarticulated INFL that is sensitive only to the verb root.<sup>90</sup>

## 6 Chapter summary

The following briefly lists several of the most important claims of this chapter:

- Tense-hopping is Lowering in Swedish and Local Dislocation in English.
- Probing operations target the derivationally most recent elements, which are not necessarily the structurally highest elements.
- Lowering occurs cyclically and is evaluated on the Spell-out of each phase.
- A phase is triggered for Spell-out only when the next highest head merges; the *Domain-based Triggered Spell-out Hypothesis* (DTSH).
- The highest head of the phase is spelled out along with its complement, and the PHIC applies.
- Lowering occurs in the narrow syntax before a phase is transferred to the PF branch.
- A Local Dislocation analysis of English tense-hopping calls into question the need for a T-to-C movement asymmetry in matrix *wh*-questions.
- The presence of rich verbal inflection may be the direct result of the feature specification in INFL, rather than the actual movement of the verb to INFL (or the fact that INFL is split).

As the above list shows, we have covered quite a lot of ground in this chapter. However, our model of tense-hopping is still incomplete. Most importantly, we have not yet addressed the phenomenon of auxiliary-raising in English. We must

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<sup>90</sup>Note, however, that the claims of this section also allow for a language that does not contain a split-INFL, but still shows rich agreement; i.e. a language with [-v] on T but no Agr projections. Further research may attest the existence of such a language. However, further research is also needed into the possible consistent appearance of a split-INFL when there is a [-v] feature on T.

ask why finite T undergoes tense-hopping to main verbs in English, but raises auxiliary verbs.<sup>91</sup> In the next chapter, I will show that an analysis that incorporates these facts into the current model of tense-hopping has important implications for the system of linguistic computation, including the division of syntactic structure into separate phase domains and the timing of feature-checking operations. This analysis will allow us to explore in more detail the Local Dislocation mechanism that gives rise to tense-hopping in English, and the consequences of this for other aspects of the syntax-phonology interface. With this further investigation, we will arrive at a more complete picture of the cross-linguistic phenomenon of tense-hopping.

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<sup>91</sup>See Ch.4 §2.3 for a brief note on the problematic issues of auxiliaries in Swedish.

## Appendix: ‘do’-support and $\nu$ P-fronting in colloquial German

In Section 2.3, it was argued that the German V2 pattern arises from an independent  $\nu$ -to-T movement (driven by a [- $\nu$ ] feature on T) followed by a T-to-C movement, similar to both Swedish V2 movement and the historically lingering cases of V2 in English. The presence of independent  $\nu$ -to-T movement implies that there is no process of ‘do’-support in German; i.e., as the bound tense morpheme will never surface in a non-local position to the verb, there will never be a need to rescue the stranded affix. While this is true in standard German, I should point out that it does not hold for all varieties of German. In particular, we see in the following example from a non-standard colloquial dialect of German that matrix  $\nu$ P-fronting with a corresponding ‘do’-support is possible in this dialect (see Erb 2001 for more):

- (1) a. [ $\nu$ P Klavier gespielt] hat Hans.  
           piano played have.PRES Hans  
           ‘Played the piano, Hans has.’
- b. [ $\nu$ P Klavier spielen] tut Hans.  
           piano play.INF do.PRES Hans  
           ‘Play the piano, Hans does.’

While (1a) is acceptable in all registers of German, the availability of (1b), which contains both  $\nu$ P-fronting and ‘do’-support, is limited to certain highly informal registers, in addition to children’s speech.<sup>1</sup> Note that these are both cases of  $\nu$ P-fronting, and the patterns of tense morphology are very similar to those of English  $\nu$ P-fronting (e.g. the verb in the fronted  $\nu$ P in (1b) is uninflected, suggesting that neither verb-raising nor tense-lowering has occurred in this example, as in matrix  $\nu$ P-fronting in English).

Though further research is needed into these differences in register, we might conjecture that the underlying difference between the two registers is as follows:

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<sup>1</sup>Note that movement of matrix  $\nu$ P to SpecCP and the resulting ‘do’-support is considered questionable or even ungrammatical in standard registers (Eva Dobler, p.c.).

in standard German, string-vacuous narrow syntactic movement of matrix  $v$  to T occurs, thus precluding overt matrix  $v$ P-fronting (i.e. the verb would no longer be contained within an XP constituent that is targetable for V2 movement to SpecCP);<sup>2</sup> in the colloquial dialects that allow  $v$ P-fronting and ‘do’-support,  $v$  does not undergo syntactic raising to T, and so overt movement of matrix  $v$ P (including the verb) is possible. Note that in these colloquial registers, ‘do’-support may occur in V2 position even in the absence of  $v$ P-fronting:

- (2)    Hans tut            [<sub>VP</sub> Klavier spielen]  
        Hans do.PRES    piano    play.INF  
        ‘Hans plays the piano.’

In the standard dialect,  $v$  invariably moves to T, and so ‘do’-support will never arise. However, in the non-standard colloquial dialect, this movement does not occur—or, at least, it may not occur consistently—, which allows for stranding of the tense morpheme and the subsequent rescue mechanism of ‘do’-support. Note that, as  $v$ -to-T movement is string-vacuous in German, movement vs. non-movement of the verb to T will seldom, if ever, show any overt effect. From the perspective of acquisition, there may be a dearth of positive evidence that indicates that  $v$ -to-T movement is obligatory, thus giving rise to the non-standard forms of the colloquial dialect, as I assume that the default hypothesis is to leave the verb *in situ* in absence of evidence to the contrary.

Briefly, I believe that the fact that ‘do’-support occurs even in the informal (2), and that ‘do’-support is impossible in standard registers of German, supports both the aforementioned syntactic distinction between these registers, in addition to the claim in Section 2.3 that V2 head movement is driven by a [-T] feature on C. In (1b) and (2), as the verb does not raise to T, T-to-C V2 movement must be followed by a PF operation of ‘do’-support, whereas, in (1a) and similar cases of V2 in standard German, previous  $v$ -to-T movement allows T-to-C V2 movement to pied-pipe the matrix verb to V2 position. Thus, even these dialectal differences can be accounted for straightforwardly under the syntactic model proposed in this thesis.

As a final note to this chapter, I would like to thank David Embick, Andrés Pablo Salanova, and Michael Wagner for encouraging further research into these kinds of micro-variations in Germanic syntax during the oral defense of this thesis.

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<sup>2</sup>Indeed, Wurmbrand (2004) argues that TP cannot front in German.

For example, it was mentioned that, although the Danish verb system is typically analyzed quite similarly to Swedish, there are some small differences, such as the following:

- (3) Jasper love-de at vask-e bil-en og [vask-e  
 Jasper promise-PAST to wash-INF car-DEF and wash-INF  
 bilen] gjor-de ha så sandelig.  
 car-DEF do-PAST he so truly  
 ‘Jasper promised to wash the car, and wash the car, he did  
 indeed.’

Here, the verb in the fronted vP does not match the tense of the dummy ‘do’ verb, unlike in Swedish. Further investigations into such patterns across the Germanic language family will undoubtedly bear upon the claims made in this thesis. Of course, it is my hope that future findings will serve to reinforce and refine the claims made here.



## 4

# Aux-raising and Spell-out

## 1 Introduction

In the previous chapter I argued that tense-hopping occurs in Swedish as a feature-driven Lowering operation arising from the constraints imposed by the *Phase Head Impenetrability Condition*, but that tense-hopping in English takes place in the PF representation as Local Dislocation. In this chapter, I explore these distinct models of tense-hopping further, paying specific attention to the asymmetry in the movement properties of auxiliary and main verbs in English. In Section 2, I propose a simplified, Minimalist analysis of this pattern that requires no look-ahead, no purely optional movement, nor a mixed lexicalist/non-lexicalist model of verbal morphology (cf. Lasnik 1995; see below), but rather relies on the ability to check morpho-syntactic features after Spell-out, i.e. on the PF branch, when the need arises. I claim that English, like Swedish, carries an uninterpretable V-feature on finite tense, and that auxiliary verbs in English raise to check this feature via narrow syntactic head-raising. However, narrow syntactic head-raising cannot check this feature in the case of main verbs due to the PHIC, as these, unlike auxiliaries, are not generated in the same phase as finite T in English, thus requiring the computational component to implement a tense-hopping strategy instead. Furthermore, extending the proposal of Laka (1990), I posit that there is an ever-present syntactic projection in all clauses,  $\Sigma P$ , that houses negation and affirmation. I argue that the three-way distinction between negation (e.g. *Bill didn't leave*), emphatic affirmation (e.g. *Bill **did** leave*), and non-emphatic

affirmation (e.g. *Bill left*) is due to differences in the content of  $\Sigma P$ , which is never absent from the syntactic structure. Whereas Laka's Lowering analysis of the tense-hopping transformation prevented her from including  $\Sigma P$  in non-emphatic affirmation structures in English, the Local Dislocation analysis presented here not only allows for its inclusion in the syntax of all clauses, but also crucially relies on its presence, thus allowing for a more uniform syntactic structure across clause types. Moreover, I claim that it is the different syntactic positions that this  $\Sigma P$  occupies in Swedish vs. English that are solely responsible for the Lowering vs. Local Dislocation tense-hopping distinction between these two languages; namely, while finite T in both languages carries an uninterpretable V-feature,  $\Sigma P$  is an adjunct in Swedish, and so does not block Lowering of T, but is generated on the spine of the clause in English, and so disrupts the head-complement locality condition required for T-to-v Lowering, thus requiring that finite T in English check its [-V] feature under Local Dislocation.

The perhaps most surprising claim here is that Local Dislocation—an operation occurring after Spell-out on the PF branch—may check uninterpretable morpho-syntactic features. I will argue that the capacity of the computational component to check uninterpretable features on the PF branch is a conceptual necessity from a strictly Minimalist perspective, under which there are but two true interfaces (i.e. pronunciation and interpretation). Section 3 briefly explores the role of this projection further (e.g. the different patterns of negation cross-linguistically). Subsequent sections will address additional issues raised by the proposed model, including the interaction of late adjunction and Spell-out, and the mechanisms underlying instances of stem-allomorphy in verbal paradigms.

## 2 Spell-out and feature-checking

In this section, I address the consequences of the previous proposals for a theory of auxiliary-raising in English, investigating the syntactic role of the  $\Sigma P$  projection and the domain of feature-checking operations.

## 2.1 Aux-raising

Any theory of tense-hopping in English should also be able to account for the absence of tense-hopping in auxiliary constructions and, relatedly, the presence of auxiliary-raising. In this section, I develop a unified, feature-driven theory of auxiliary-raising, based in our previous analysis of tense-hopping transformations, that has profound implications for the interaction of Spell-out and feature-checking operations.

### 2.1.1 Auxiliaries in English

It is a well known fact that, although main verbs do not raise out of  $vP$  in English, auxiliary verbs raise to T. The examples in (1a-b) show that the auxiliary *have* appears to the left of the  $vP$ -adjunct and negation. The examples in (1c-d) illustrate that the auxiliary has adjoined to T before T-to-C interrogative movement is evaluated.<sup>1</sup>

- (1) a. John has **often** forgotten the address.
- b. John has **not** forgotten the address.
- c. Has John forgotten the address?
- d. \*Does John have forgotten the address?

These data indicate that auxiliary verbs in English are not subject to tense-hopping, unlike main verbs. Several analyses have been proposed to explain this asymmetry between main and auxiliary verbs. For example, Chomsky (1993) adopts a purely lexicalist view of all verbal morphology, arguing that all inflected verbs raise at some point in the derivation. The difference between a verb-raising language and a tense-hopping language is that verbs raise overtly in verb-raising languages (i.e. the V-features of Agr are strong) and that verbs raise covertly in tense-hopping languages (i.e. the V-features of Agr are weak). Chomsky argues that auxiliary verbs in English must raise overtly, however. He posits that the auxiliaries *have* and *be* are semantically vacuous, and thus they are invisible to operations at LF (i.e. covert operations). Therefore, if the auxiliaries do not raise overtly, they cannot raise at all, leaving the V-features of Agr unchecked. I, of course, do not adopt this analysis here, given that we are working within the framework

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<sup>1</sup>See §2.3 for the status of auxiliary verbs in Swedish.

of Distributed Morphology. I will point out, however, that even under lexicalist Minimalist assumptions, this theory raises some questions. For example, the overt derivational component must somehow be cognizant of the fact that auxiliary verbs will be unable to move at LF, and so it moves them overtly, assuming that overt movement is evaluated before covert movement (e.g., as in Nissenbaum 2000 and many others). While this is not an implausible scenario, it does require a perhaps undesirable derivational look-ahead in which overt operations can foresee the impossibility of later covert movements. More important, however, is the fact that it weakens the dichotomy of strong vs. weak features in that an overt movement may be induced by both, depending on the semantic interpretability of the moving elements.

Taking into consideration similar problematic aspects of a purely lexicalist account of this asymmetry, Lasnik (1995) proposes a hybrid lexicalist/non-lexicalist model of English verbal morphology. In particular, he argues that all verbs that raise cross-linguistically are fully inflected in the lexicon and carry uninterpretable features, whereas verbs that do not raise are uninflected in the lexicon and carry no uninterpretable features. Thus, for example, all French verbs and English auxiliary verbs come into the syntax with all of their inflectional features, but English main verbs enter the syntax in their bare form. Correspondingly, there are two types of INFL cross-linguistically (and even within a single language); one is a set of abstract features and the other is a morpho-phonological affix. These correspond, respectively, to verb-raising constructions and tense-hopping constructions. For example, in English the featural INFL only enters the syntactic derivation when it scopes over a fully inflected verb (i.e. an auxiliary) and raises that verb, checking the features of both the featural INFL and the inflected verb; the INFL that is a morpho-phonological affix only merges into the derivation when it scopes over an uninflected verb (neither of which carry uninterpretable features), and will undergo tense-hopping under PF string-adjacency via a mechanism similar to our Local Dislocation analysis above. A consequence of this model is that if a featural INFL scoped over an uninflected verb, the derivation would crash, as INFL's features would go unchecked; likewise, if an affixal INFL scoped over an inflected verb, the features of the verb would go unchecked, and the derivation would crash. Thus, only derivations that contain both a featural INFL and an inflected verb (e.g. a finite auxiliary construction), or both an affixal INFL and a bare verb (e.g. a finite main

verb construction), will converge.

While I clearly believe that Lasnik's analysis of tense-hopping in main verbs in English is on the right track, an immediate problem with this model, and one that Lasnik recognizes, is that it cannot easily account for the tense-hopping facts in Swedish. Swedish verbs do not raise independently to T (suggesting they are like English main verbs, i.e. bare), yet they also show signs of having a featural INFL (e.g. as evidenced by the fact that, like in French, T-to-C movement targets the main verb, as illustrated earlier). While I won't go into the details of his solution, Lasnik suggests that Swedish verbs, like French verbs and English auxiliaries, come into the derivation fully inflected, but that the features on the featural INFL are weak in Swedish, whereas they are strong in English and French. However, with this claim, I believe that this system does not take us much further beyond Chomsky's (1993) original claims.

Furthermore, the fact that Lasnik's model crucially relies on a hybrid lexicalist/non-lexicalist model of inflection is directly in opposition to the strict non-lexicalist model of Distributed Morphology advocated in this thesis. In the following sections, I propose that a simple adjustment to our view of where auxiliary verbs are merged in the narrow syntax allows us to derive a purely non-lexicalist model of auxiliary-raising in English under the model of syntactic derivation proposed in Chapter 3. Furthermore, I argue that we can do so without positing multiple lexical entries for individual morphemes, in addition to allowing for the exact same feature specifications for main and auxiliary verbs in English.

### **2.1.2 A simplified approach to English aux-raising**

First recall that I make the default Minimalist assumption that all syntactic transformations are feature-driven. Thus, narrow syntactic raising of auxiliary verbs should be no exception, like under Lasnik's (1995) theory. Let us furthermore assume, for the sake of argument, that auxiliary verbs are structurally and featurally identical to all other verbs; i.e., like lexical verbs, auxiliary verbs can be decomposed into a V head and a (possibly defective, i.e. non-argument-introducing) *v* head.<sup>2</sup> Finally, let us assume that auxiliary-raising occurs due to an uninterpretable feature on finite T, rather than an uninterpretable feature on the

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<sup>2</sup>Note that this will ultimately not be crucial to our analysis of English auxiliaries, but it does allow for structural uniformity among all verb types.

auxiliary itself (contra Omaki 2008). Note that when auxiliaries are stacked, as shown in (2a), only one auxiliary obligatorily moves to T, thus indicating that it is not a lexically specified uninterpretable feature on the auxiliary that motivates movement, as this feature would go unchecked on the lower auxiliary in such a construction, predicting a derivational crash.<sup>3</sup> Furthermore, as shown in (2b), when T does not contain a finite bound morpheme, auxiliary-raising does not occur.

- (2) a. Bill has not been sleeping well.  
       b. Sue will not have finished the book by tomorrow.<sup>4</sup>

I will additionally assume that the feature on finite T in English is consistent. In other words, contra Lasnik (1995), any finite tense morpheme consistently carries the same uninterpretable feature, and there is no corresponding version of the morpheme in the lexicon that lacks this feature, thus further minimizing the internal complexity of the lexicon. Taking these assumptions into account, we are again faced with two theoretical possibilities to derive auxiliary-raising; finite English T bears either a [-v] feature or a [-V] feature. Not surprisingly, we can immediately rule out a [-v] feature on English finite T. As argued earlier, any language that carries [-v] on finite T will exhibit verb-raising of all matrix verbs, which is clearly not the case in English. I thus argue that finite T in English, like finite T in Swedish, carries a [-V] feature. It is this feature that drives auxiliary-raising. This therefore creates a uniformity in the feature specifications of INFL in tense-hopping languages, further supporting the model of the *Rich Agreement Hypothesis* in Section 5.2 of Chapter 3 (i.e. languages that lack rich verbal inflection carry a [-V] feature on T). Before I present an argument as to why the same feature specification on T produces different tense-hopping patterns in English and Swedish, I will first show how a [-V] feature on finite English T is satisfied by verb-raising instead of tense-lowering in the presence of an auxiliary.

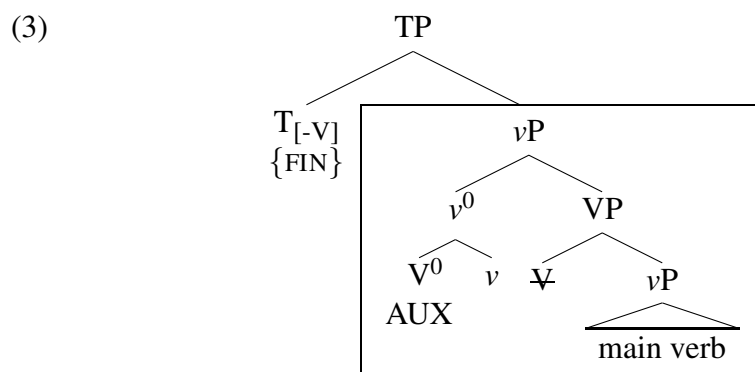
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<sup>3</sup>Lasnik (1995) and Omaki (2008) must posit multiple lexical entries for auxiliaries; one that contains uninterpretable features and undergoes raising and another that contains no uninterpretable features and does not undergo raising (or, alternatively, inflected and non-inflected lexical entries for auxiliaries). However, I maintain that auxiliaries, like main verbs, carry no uninterpretable features themselves, and that there is only one lexical entry per morpheme.

<sup>4</sup>There is also the availability of constituent, rather than sentential, negation here; e.g. *Bill has been [not [sleeping well]], Sue will have [not [finished the book]]*. However, these require more focus on *not* than do the examples in (2). I take this distinction to be one in the syntactic position of negation, rather than the position of the auxiliaries. See §3.

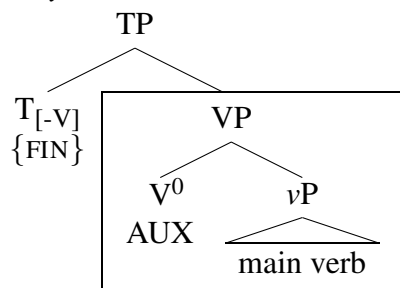
### 2.1.3 Auxiliaries as functional elements

I previously argued that a [-V] feature on Swedish T causes Lowering of T to the  $v$  head of its phase complement due to the PHIC. Thus, this same structural scenario cannot hold for auxiliary-raising in English. In other words, the structure for English auxiliary constructions cannot be the following, where finite T carrying a [-V] feature takes a  $v$ P phase complement whose head consists of a  $v^0$  with an embedded V auxiliary (box indicates the Spell-out domain):



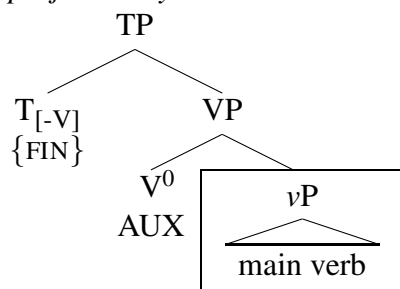
Therefore, assuming that the PHIC holds, it must be the case that auxiliaries either have a different structure from (3) or are merged in a different position from that illustrated in (3), since finite T does not lower to auxiliary verbs. We are again faced with two possibilities; either 1) the auxiliary is merged in the lower phase (i.e. it is included in the lexical phase sub-array along with the lexical verb) but projects only a VP, and not a  $v$ P, or 2) the auxiliary is merged in the same phase as T (i.e. it is included in the functional sub-array), in which case it could project either just a VP or a higher  $v$ P and still be targetable for movement to T, since the PHIC would not apply. Each of these options is illustrated below (see later discussion for the syntactic position of Asp in auxiliary constructions):

- (4) *Option 1: AUX merged in lexical domain/phase and projects only a VP*



Here, similar to  $v$ -to- $T_{[-v]}$  verb-raising, the PHIC does not prevent narrow syntactic raising of the auxiliary V to finite T, since  $V^0$  is the highest head in the Spell-out domain, and so it is accessible to the higher T head; i.e. the feature at the edge of this phase is the V-feature of the auxiliary.

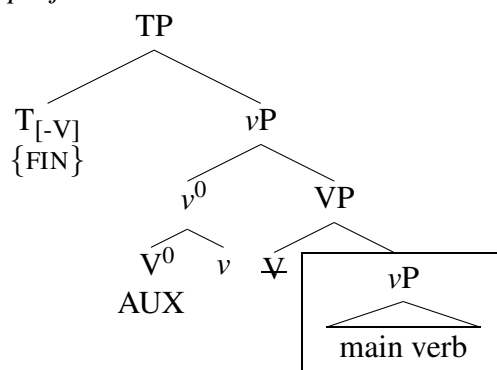
- (5) *Option 2a: AUX merged in functional domain/phase and projects only a VP*



In (5), the auxiliary is included in the sub-array of functional elements. Therefore, when the auxiliary merges, it is itself the trigger for Spell-out of the functional elements in the lower  $vP$ , since I argue that a phase is triggered for Spell-out when a head from a separate sub-array is merged into the derivation (but see the upcoming discussion on the position of Asp in auxiliary constructions). In this way, since AUX and T are found in the same Spell-out domain, the V-feature of AUX is visible to T for narrow syntactic raising.



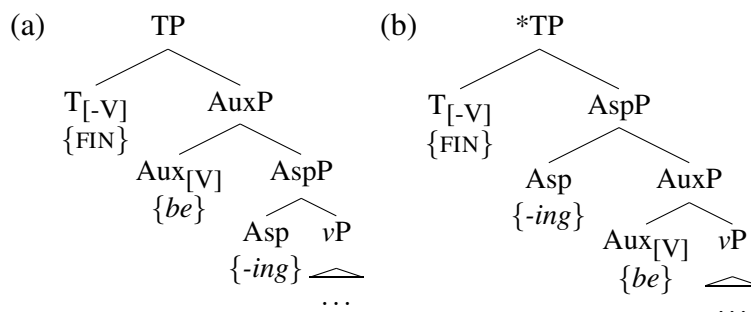
- (6) *Option 2b: AUX merged in functional domain/phase and projects a vP*



Option 2b in (6) is similar to Option 2a in (5). Here, also, since the auxiliary is contained in the same Spell-out domain as T, narrow syntactic raising is predicted to be possible to check the [-V] feature on T; the fact that  $V^0$  is embedded in  $v^0$  does not hinder the feature-checking process within a Spell-out domain, since the PHIC is not a consideration when evaluating phase-internal head movement. For our purposes, Options 2a and 2b are equivalent, since they make no different empirical or theoretical predictions within the current model. However, since Option 2b allows for a greater uniformity between the structure of main and auxiliary verbs, we will adopt this as the working alternative to Option 1.<sup>5</sup>

As mentioned previously, all of the above options can potentially account for the pattern of auxiliary-raising in English. However, Option 1, in which the auxiliary verb is generated within the lexical domain/phase, creates a problem for progressive (and, as I will argue later, perfective) aspectual morphology. Assuming that the progressive *-ing* morpheme in English is generated in its own syntactic head, it is necessarily the case that it is generated below the auxiliary. Otherwise, auxiliary-raising would drag along this morpheme due to the Head Movement Constraint (Travis 1984). The basic structure must therefore be that in (7a), rather than (7b) (here I label the auxiliary verb projection simply as AuxP, since it is not the structure of the auxiliary projection itself we are concerned with, but rather its position with respect to T and the progressive morpheme).

<sup>5</sup>Several main verbs also project a “defective”  $v$ ; e.g. unaccusatives. Therefore, Option 2b allows for a linguistic model in which all verbs—main and auxiliary—project a  $v$ , though the properties of that  $v$  may vary.

(7) *Progressive aspect; e.g. 'Is Bill running?'*

Only the general structure in (7a) can account for the Aux-to-T raising facts in English, since the progressive morpheme is not adjoined to the auxiliary, as would be required if Aux-to-T head movement occurred in (7b). Recall, however, that progressive aspect is argued to be generated in Outer Aspect, just like the reduplicants in Tagalog and Ndebele (see Chapter 2, §2.1.2.2). That is, under the current analysis, Outer Aspect/progressive is merged in the functional domain, rather than the lexical domain, since it acts as a Spell-out trigger for the lexical domain, deriving Asp-to-*v* Lowering in Tagalog and Ndebele. Therefore, if Asp in (7a) is merged within the same Spell-out domain as T, it is necessarily the case that the auxiliary is also merged in this functional domain, rather than in the lexical domain with the main verb. An alternative is that the structure in (7a) is correct, but both the auxiliary verb and the progressive morpheme are merged in the lower/lexical phase (i.e. Outer Aspect is functional in Tagalog and Ndebele, but lexical in English); in this case, under Option 1, in which the auxiliary projects only a VP, the auxiliary would still be accessible to T for raising in (7a). However, as we will see in §3.2.2, evidence from ellipsis suggests that the progressive *-ing* morpheme undergoes Lowering to the lexical verb, which, under the model proposed in this thesis, indicates that there is a phase boundary between progressive Asp and the *vP* in (7a). Therefore, I adopt the model in which auxiliary verbs are merged in the same phase as the finite T that attracts them in auxiliary-raising. English auxiliaries are thus functional elements, and are included in the same phase sub-array as (outer) Asp, T, C, and, as we will see,  $\Sigma$  (e.g. negation).

A distinction between auxiliaries as functional elements and main verbs as lexical elements allows for the verb-raising asymmetry in English. Since auxiliaries are generated in the same phase domain as finite  $T_{[-V]}$ , T can target the auxiliary

for raising, as the default feature-checking transformation for elements in the same Spell-out domain is raising. However, since  $T_{[-V]}$  and lexical verbs are merged in different phase domains, the PHIC will apply and raising of the lexical verb embedded in  $v^0$  is impossible to check T's  $[-V]$  feature (see below for how this feature gets checked in the absence of auxiliary-raising). However, this main vs. auxiliary verb distinction is not completely arbitrary. Not only does it account for the surface patterns of these two types of verbs, but it can also be motivated on semantic grounds. For example, recall that Chomsky (1993) argued that auxiliaries are “semantically vacuous”, whereas main verbs are semantically contentful. I believe that this same distinction can be recast as “English auxiliaries are functional, whereas English main verbs are lexical.” Note that English auxiliaries, unlike English main verbs, encode strictly grammatical properties, e.g. progressive *be* and perfective *have*.<sup>6</sup> That is, they do not introduce new semantic eventualities, or even provide information about the content of eventualities (i.e. what eventuality the clause expresses; e.g. walking, reading, eating, arriving, etc.), but rather add additional information about the grammatical aspect of an eventuality. In this way,—though they are, strictly speaking, verbs—, auxiliaries exhibit a close relationship with the functional Tense/Aspect/Mood properties of a clause. Therefore, I believe it is reasonable to suggest that they, as well, are included in the derivational sub-array that corresponds to functional elements in English.<sup>7</sup>

#### 2.1.4 $\Sigma P$ and the absence of tense-lowering in English

In the preceding analysis, the auxiliary verb structurally intervenes between finite T and the lexical main verb. Therefore, it is not predicted that T would target the lexical main verb, since the V-feature on the auxiliary is the derivationally most recent instance of this feature when T merges and probes to check its  $[-V]$  feature.<sup>8</sup> However, in the absence of an auxiliary, we might predict the following structure for an English clause:

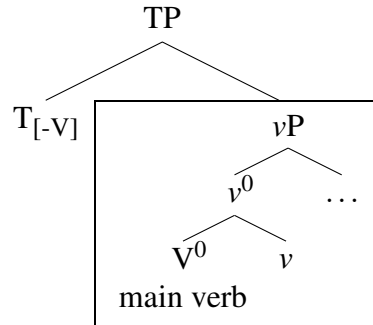
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<sup>6</sup>This summation can easily be extended to copular forms of *be*, which generally take a predicative complement, though I will not address these constructions here.

<sup>7</sup>But see §2.3 for the possibility of cross-linguistic variation with respect to which phase contains auxiliary verbs.

<sup>8</sup>See Chapter 3, fn. 32 for a brief discussion of Relativized Minimality.

(8)

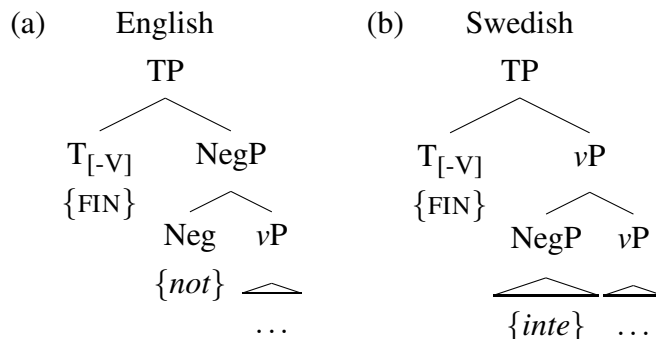


The structure in (8) is identical to that of Swedish tense-lowering. However, as argued previously, finite T in English does not undergo head-to-head Lowering to main verbs. Therefore, it cannot be the case that Swedish and English non-auxiliary clauses are both structurally and featurally identical.

Note that a crucial way in which English and Swedish differ is that negation is a blocker for tense-hopping in English, but not in Swedish:

- (9) a. I did not read the book.  
 b. ...att jag inte läste boken.  
 ...that I not read.PAST book.DEF  
 ‘...that I did not read the book.’

A standard assumption regarding these facts—and one that I adopt here—is that negation in Swedish is an adjunct and that negation in English is generated on the spine of the derivation (i.e. it undergoes set-merge, by which it is a head that merges with a complement and projects, as opposed to the adjunct-merger operation of pair-merge; see Chomsky 2001) (Holmberg 1993). This produces the following two structures for English and Swedish negation, respectively (we will investigate the structure of the phrase housing negation below):

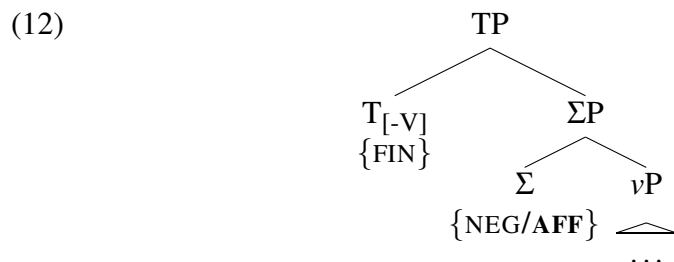
(10) *Negation in English and Swedish*

Under this structural model of negation, adjunct negation in Swedish (10b) will not block T-to-*v* Lowering, whether negation is merged early or late. Moreover, the English structure in (10a) precludes Lowering of T to the verb under our current model. Only a head that triggers Spell-out can undergo Lowering. In (10a), the Spell-out trigger is Neg, not T. Therefore, by the time T merges into the derivation in English, the V-feature on the main verb will have become impenetrable due to the PHIC, and thus it is inaccessible to T. We return to the status of [-V] on T shortly.

Laka (1990), following Chomsky (1957), observed that a similar blocking of tense-hopping occurs in emphatic affirmation structures in English; e.g. (where **bold** indicates strong prosodic focus):

- (11) a. Bill **did** sell the car.  
 b. \*Bill did sell the car.

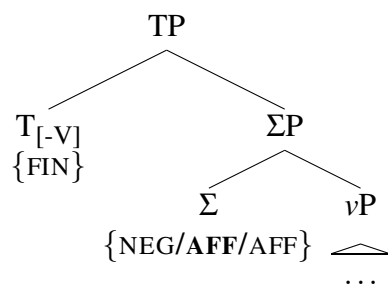
Laka proposes that the *do*-support that arises in both negation and emphatic affirmation constructions is tightly related. Namely, she claims that both negation and emphatic affirmation are generated in the same syntactic projection,  $\Sigma P$ . Therefore, the basic structure of an English clause with *do*-support is the following ('**AFF**' = emphatic affirmation):



Under Laka's analysis,  $\Sigma$  acts as a structural intervener for Lowering of T to the verb in negation and emphatic affirmation constructions. This is also the claim of this thesis. In (12),  $\Sigma$  is the Spell-out trigger for vP, and so T will be unable to lower to the verb. However, given the ungrammaticality of (11b), she assumes that  $\Sigma$  is absent from the structure in non-emphatic affirmation constructions (i.e. standard declaratives). That is, since there does not appear to be a structural intervener for Lowering, as tense-hopping takes place here, a Lowering analysis of English tense-hopping requires that T take vP as its complement in (11b), precluding the presence of  $\Sigma$ .

I propose that this is not the case, and that  $\Sigma$  is present in all clauses. Under a Local Dislocation analysis of English tense-hopping, an intervening  $\Sigma$  will be a blocker for tense-hopping only if it is phonologically contentful. However, regardless of its phonological status, an intervening  $\Sigma$  head between finite T and vP will always block head-to-head Lowering, as desired. Under this model, the following is the structure for all clauses in English; the content of  $\Sigma$  determines whether the clause is negative, emphatically affirmative, or non-emphatically affirmative (= 'AFF').<sup>9</sup>

<sup>9</sup>The distinction between emphatic and non-emphatic affirmation is merely the presence or absence of a focus feature. Focus features can be added to almost any syntactic constituent; e.g. *John doesn't like **cats**, he likes **dogs***. Therefore, an assumption implicit in the following discussion is that there is only one {AFF} morpheme, which is inherently phonologically null, but that a focus feature may be added to this morpheme, making it phonologically non-null, and thus a blocker for Local Dislocation.

(13) *Basic structure of all finite English clauses*

Under (13), Lowering of T to  $v$  is correctly predicted to always be impossible in English. However, only the phonologically contentful  $\Sigma$  morphemes (e.g. *not* and the prosodic focus feature of **AFF**) will disrupt the morpho-phonological string-adjacency of finite T and the verb (modulo T-to-C and  $v$ P movement). The phonologically null **AFF** will be invisible in the morpho-phonological representation, and so string-adjacency of finite tense and the verb obtains; e.g.:<sup>10</sup>

$$(14) \quad [-s \wedge \text{AFF}(=\emptyset) \wedge \text{read}] = [-s \wedge \text{read}] \rightarrow [\text{read}+s]$$

This model creates a syntactic uniformity among different clause types. Here, the distinction between negation, emphatic affirmation, and non-emphatic affirmation is not due to a difference in syntactic structure (i.e. the presence or absence of certain functional items in the numeration/derivation), but is rather the result of different specifications of the ever-present functional head  $\Sigma$ . Therefore, it is not the case that a non-emphatic affirmation clause is derived via the absence of a functional element, but, rather, all clause types are determined by the content of the  $\Sigma$  head, which is always included in the numeration. Note that this is most likely the case for Swedish, as well (and, for that matter, perhaps all languages). As illustrated by the negation facts,  $\Sigma$ P in Swedish is an adjunct, and so no matter what the content of  $\Sigma$ , it will never block tense-lowering in Swedish.

<sup>10</sup>Since the phonological matrix of the non-emphatic affirmation morpheme, i.e. **AFF**, is null, the prosodic focus feature in emphatic affirmation must be phonologically realized on another morpho-phonological constituent, namely finite tense. I assume that the phonetic locus of a strong prosodic focus feature is determined at pronunciation. The focus feature on emphatic affirmation thus first acts as a phonological intervener for Local Dislocation, and is only later “attached” to the finite tense morpheme upon pronunciation. In this way, the morpho-phonological representation of a construction with emphatic affirmation would be the following when Local Dislocation is analyzed (where **F** = focus feature):  $[-s \wedge \mathbf{F} \wedge \text{read}]$ .

In the case of auxiliaries in English, note that  $\Sigma$  is a functional element, and so is merged in the same functional domain as auxiliaries and T. Therefore,  $\Sigma$  will never block narrow syntactic raising of an auxiliary to T. We return to this issue in Section 3.

The consistent presence of a  $\Sigma$ P projection on the spine of the derivation in English correctly precludes T-to- $\nu$  Lowering in all cases, and the phonological emptiness of the non-emphatic affirmation version of  $\Sigma$  correctly allows for tense-hopping under Local Dislocation in standard English declarative clauses. However, there remains a serious issue to be addressed. Namely, in the absence of narrow syntactic auxiliary-raising, the [-V] feature on T is unable to be checked in the narrow syntax in English, given the unavailability of both verb-raising and tense-lowering. In the following section, I argue that this is exactly the case.

## 2.2 Feature-checking after Spell-out

Note that the [-V] feature on finite T in English (13) can't be checked via narrow syntactic raising, since the only heads whose features are accessible in its probing domain are  $\nu$  and  $\Sigma$ , neither of which contains an accessible copy of the necessary interpretable V-feature. Therefore, under the proposed model, this [-V] feature will go unchecked in the narrow syntax in the absence of an auxiliary. Indeed, in the following sections, I propose that finite T in English non-auxiliary constructions does not check its [-V] feature in the narrow syntax, but rather checks this feature on the PF branch either as the result of Local Dislocation with the interpretable V-feature of the main verb or via *do*-support. I argue that this is possible under a strict definition of “interface” coupled with a Strong Minimalist Feature-checking Hypothesis (SMFH), which permits the checking of uninterpretable features on the PF branch after Spell-out.

### 2.2.1 Local Dislocation as a “feature-checking” operation

Recall that the PHIC states that features embedded within a complex phase head become unavailable for *narrow syntactic* feature-checking after Spell-out of that phase. Therefore, after Spell-out of  $\nu$ P, the only feature of the phase head that is still visible to the narrow syntax is the interpretable  $\nu$ -feature of the phase head. This is because all features of the phase have been transferred to the PF



branch, and the narrow syntax can then only see the least embedded feature of that syntactic phase constituent (i.e. the “edge” feature).<sup>11</sup> All other features of the phase are still present in the PF representation after Spell-out, however. Under the derivational model proposed here, Spell-out triggering marks the embedded elements of a phase for transfer to PF, thus rendering them impenetrable in the narrow syntax. The transfer operation copies the narrow syntactic structure to the PF branch, where it is evaluated for phonological form. However, Spell-out transfer and Vocabulary Insertion do not erase morpho-syntactic features of morphemes at PF.<sup>12</sup> That is, VI does not make these features “impenetrable” on the PF branch. Rather, operations on the PF branch add phonological form to those morphemes and linearize them with respect to one another, thus erasing the syntactic hierarchy, but not the morpho-syntactic features. In this way, Vocabulary Insertion is not a replacement operation, but truly a mapping operation in that it maps phonological form onto morpho-syntactic feature bundles, making them interpretable for the purposes of pronunciation, but does not delete the features of those bundles in the process. Therefore, I argue that the interpretable V-feature contained within the morpho-phonological representation of the complex *v* head is still available to check uninterpretable V-features on the PF branch; though the transfer operation makes the V-feature impenetrable in the narrow syntactic derivation, that feature remains active in the representation on the PF branch. Similarly, an uninterpretable feature that is transferred to the PF branch will remain uninterpretable after the transfer process, and so in order for the representation to converge, this feature must be checked before pronunciation via PF operations, or else the structure crashes (see below). For example, Spell-out of a structure corresponding to the sentence *John walked* will produce a morpho-phonological string at PF like the following (‘✓’ indicates a checked feature):<sup>13</sup>

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<sup>11</sup>Recall, however, that a cross-phasal narrow syntactic chain formed via Lowering allows a certain level of access to an impenetrable feature; see Chapter 3, §3.3. However, given the absence of tense-lowering in English, such a chain is not present.

<sup>12</sup>Indeed, given that Local Dislocation is (ostensibly) often sensitive to morpho-syntactic category (see §2.2.4), the category feature of a morpheme must still be present after VI. This is also supported by the fact that assignment of prosody, which occurs very late, must also be able to see category information (e.g. *réject* (N) vs. *rejéct* (V)).

<sup>13</sup>Note that ΣP contains the non-emphatic affirmation morpheme in (15), and so does not block Local Dislocation.

- (15) *John walked.*  
 $[John \wedge -ed_{[-V]} \wedge walk_{[+v, +V]}] \rightarrow [John \wedge walk_{[+v, +V]} + -ed_{[-V]} \checkmark]$

Here, Local Dislocation of past tense and the verb checks the  $[-V]$  feature on finite T. I propose that the following occurs on the Vocabulary Insertion cycle on which phonology is mapped to the finite past tense morpheme:

1. Phonological form is mapped to the  $\{PAST, -V\}$  feature bundle, resulting in the form  $[-ed]_{[-V]}$ .
2. Since VI results in a bound inflectional morpheme,  $[-ed]_{[-V]}$  undergoes Local Dislocation with the verb, given that string-adjacency holds.
3. Since  $[-ed]_{[-V]}$  and the verb have now been fused into a single constituent, the  $[-V]$  feature on the tense morpheme is checked by virtue of its locality with the interpretable V-feature.

Thus, Local Dislocation may result in feature-checking. I will address aspects of each of the above steps in turn. First, note that in Step 1 Vocabulary Insertion assigns phonological form to the  $\{PAST\}$  feature, but leaves the  $[-V]$  feature intact; the  $[-V]$  feature here is not itself mapped to any phonological form. I take this to be a result of the *Subset Principle* (Halle and Marantz 1993), stated below:

- (16) *Subset Principle*  
 A vocabulary item  $V_i$  is inserted into a functional morpheme  $M$  iff (i) and (ii) hold:
- (i) The morpho-syntactic features of  $V_i$  are a subset of the morpho-syntactic features of  $M$ .
  - (ii)  $V_i$  is the most specific vocabulary item that satisfies (i).

With respect to Step 1, I argue that  $M = \{PAST, -V\}$  and  $V_i = \{\{PAST\}, [-ed]\}$ , where  $V_i$  is the vocabulary item that maps the morpho-phonological element  $[-ed]$  to the morpho-syntactic feature  $\{PAST\}$ . There is no  $V_i$  in English that directly maps phonology to the entire feature bundle  $\{PAST, -V\}$ , and so the

Subset Principle holds.<sup>14</sup> Because of this, any uninterpretable features that are not assigned phonology are left unaffected by the VI process. Accordingly, after VI applies to {PAST, -V}, the [-V] feature is still active, and so, as I argue below, must be checked before pronunciation.<sup>15</sup>

With regard to Steps 2 and 3, the claim here is not that the Local Dislocation operation is feature-driven (or, indeed, that any Local Dislocation is actually feature-driven), but rather that Local Dislocation may check strong uninterpretable syntactic features as an epiphenomenon. The Local Dislocation of finite tense in English may be, and most probably is, driven by the stray affix filter. I simply claim that if this process also happens to create an appropriate feature-checking configuration (i.e. if it creates a structure in which the interpretable and uninterpretable features are sufficiently “local”), then the relevant uninterpretable features will be checked. This then allows the PF representation to converge at the articulatory-perceptual interface (see below). In terms of the notion of “locality” here, I merely assume that the local domain for feature-checking in the morpho-phonological representation is the M-word, which, as we saw in Chapter 2, Section 2.1.3, is considered a locality domain for other purposes (e.g. Subword-to-Subword Local Dislocation).

The model developed thus far allows for the [-V] feature on English finite T to be checked via raising of an auxiliary or Local Dislocation with a main verb. In the following section we address what happens when neither of these mechanisms is

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<sup>14</sup>Recall that I argued that vocabulary items exist that are directly sensitive to the interpretable/uninterpretable status of features contained in the morpho-syntactic bundle. In Chapter 2, §3 I claimed that a *k*-paradigm agreement allomorph is mapped to Top in Turkish when Top’s {nom} feature is checked, but that a *z*-paradigm allomorph is mapped to Top when {nom} is unchecked. For example, the *Vi* for a *z*-paradigm marker would look roughly as follows: {{Top, -nom}, [z-marker]}. Therefore, the {-nom} feature here is checked by virtue of the vocabulary item. In the case of *k*-paradigm markers, the vocabulary item has the form {{Top, (✓)nom}, [k-marker]}, where Vocabulary Insertion is sensitive to the checked status of the {nom} feature. However, I claim above that in English there is no single vocabulary item that can map phonology to both the {PAST} and {-V} features. Therefore, satisfaction of the {PAST, -V} feature bundle must occur in two steps.

<sup>15</sup>Note that under most circumstances those features that are left unaffected by the application of the Subset Principle carry only interpretable features, and so will simply go unpronounced. For example, assuming a feature bundle  $M = \{X, Y, Z\}$  and a “best fit”  $Vi = \{\{X, Y\}, [W]\}$ , when [W] is mapped to the featural subset {X, Y}, {Z} will simply not receive a phonological representation if it carries only interpretable features, and thus does not cause a problem for the articulatory-perceptual interface. However, in the case under consideration here, the unaffected feature is uninterpretable, and so must still be checked before pronunciation.

available.

### 2.2.2 *do*-support as a “feature-checking” operation

When auxiliary-raising and Local Dislocation are both impossible, English allows the PF mechanism of *do*-support to satisfy the stray affix filter, which also checks the [-V] feature on finite T. This suggests that *do* is the least semantically (or simply least featurally) contentful element that contains an interpretable V-feature. The following illustrates this briefly:

- (17) *Did John walk?*  
 $[-\text{ed}_{[-V]} \wedge \text{John} \wedge \text{walk}_{[+v, +V]}]$

Here, T has moved to C, and so Local Dislocation of T and the verb cannot occur to satisfy the stray affix filter and consequently check the [-V] feature on finite T, due to the intervening overt subject. *do*-support is then required to satisfy the stray affix filter, and—again perhaps as an epiphenomenon—checks the [-V] feature on finite T.

I must note that *do*-support is not a standard instance of Vocabulary Insertion. I claim that there is no *Vi* in English such as  $\{\{-V\}, [\text{do}]\}$ , which would entail that [do] is the standard morpho-phonological representation mapped to the feature  $\{-V\}$ . If this were the case, then we would expect *do*-support to arise in all cases in which Vocabulary Insertion applies to the feature bundle  $\{\text{PAST/PRES}, -V\}$  (i.e.  $\{\text{PAST/PRES}\} \rightarrow [-\text{ed}/-\text{s}]$  and  $\{-V\} \rightarrow [\text{do}]$ ), which is clearly not the case in English, given the presence of Local Dislocation. I argue, instead, that *do*-support is *the* last resort repair mechanism to satisfy the stray affix filter and check a [-V] feature before pronunciation. In this way, *do*-support is evaluated after all Vocabulary Insertion and Local Dislocation cycles, and thus only occurs when previous operations have failed to satisfy the stray affix filter or check the [-V] feature.<sup>16</sup>

This analysis implies a feature-checking hierarchy (in terms of derivational chronology) like the following:

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<sup>16</sup>Furthermore, it is not necessarily the case that all languages allow for a type of *do*-support, or that this type of very late insertion phenomenon is limited to an operation that resolves the stray affix filter or checks a [-V] feature. I assume that the availability of *do*-support-type operations is language-specific.

- (18) Raising  $\gg$  Lowering  $\gg$  Local Dislocation  $\gg$  *do*-support (or similar insertion phenomena)

The order in (18) requires that, whenever possible, narrow syntactic raising will occur to check an uninterpretable feature. If raising of a head isn't possible in the narrow syntax (due to the PHIC), then Lowering is evaluated. When Lowering isn't possible, Local Dislocation may check the relevant uninterpretable feature (perhaps as an epiphenomenon), and, when all else fails, a mechanism like *do*-support may check the remaining uninterpretable feature (again, perhaps as an epiphenomenon), if the language in question allows such a mechanism.<sup>17</sup> This hierarchy corresponds directly with the order of operations proposed in this thesis. For example, narrow syntactic computation is always the first process to occur when a derivation begins. As argued previously, raising is the default narrow syntactic transformational operation. Lowering will only occur under the duress of phase Spell-out. Subsequently, those elements that have been spelled out will be evaluated for Vocabulary Insertion and Local Dislocation. Finally, after all of these processes are complete, *do*-support may occur to satisfy the stray affix filter and check a remaining [-V] feature. Notably, if any uninterpretable features remain after this entire process, the resulting representation will crash at the articulatory-perceptual interface, which we address in the following section.<sup>18</sup>

### 2.2.3 A note on checking features after Spell-out: the Strong Minimalist Feature-checking Hypothesis

The seemingly “novel” claim here is that strong uninterpretable syntactic features can be checked after the narrow syntax is spelled out to the PF component. Many others have claimed that all strong uninterpretable features within a phase must necessarily be checked before Spell-out of the syntactic derivation to PF

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<sup>17</sup>Note that the “epiphenomenon” status of Local Dislocation and *do*-support as feature-checking operations is not absolutely necessary; feature-checking could indeed drive these operations. However, I simply do not believe that it's the case that all Local Dislocation and *do*-support operations are the result of syntactic feature-checking requirements. See §2.2.4 for more.

<sup>18</sup>A potential objection to the proposed analysis of verbal morphology in English is that it does not allow for the [-V] feature on finite T to ever go unchecked, since at least *do*-support should always be an option. Consequently, we do not predict a crash to ever be possible because of the [-V] feature, since the [-V] feature will be rescuable under all circumstances. However, I believe that the evidence from *do*-support in English suggests that this is indeed the case.

(e.g. Svenonius 2004).<sup>19</sup> However, I argue that this latter claim is conceptually undesirable, and that the ability to check features after Spell-out must necessarily be an available mechanism of linguistic computation.

I first note that the operation of Spell-out to PF is not a true interface operation, at least as it is viewed under DM (i.e. first Spell-out occurs, then Vocabulary Insertion/Local Dislocation, and only then phonological/phonetic interpretation). Under the Minimalist Program, the only two interfaces are the conceptual-intentional (C-I) and articulatory-perceptual (A-P) systems (i.e. interpretation and pronunciation, respectively). The operation of PF Spell-out, as defined above, does not link directly with the A-P system, given that operations may occur after the narrow syntax is spelled out to the PF branch, but before pronunciation (this most likely holds for LF Spell-out and the C-I interface, as well). Therefore, Spell-out is simply something that happens during the overall derivational process of mapping syntax to the interfaces. If it is true that strong uninterpretable features must be checked by the time the A-P interface is reached, as argued in the Minimalist literature, then this necessarily allows for the possibility of feature-checking after Spell-out, but before this interface is reached. Otherwise, we would have to say that strong uninterpretable features must be checked at the time of Spell-out, which requires that they actually be checked well before the representation interfaces with the A-P system (i.e. before post-syntactic operations take place, and thus before pronunciation). This would therefore leave us with a scenario in which the checking of strong uninterpretable features is not concerned with interface conditions *per se*, but rather with the transfer of narrow syntax to the discrete PF component of computation (again, the same could probably be said of weak uninterpretable features and the LF component). If this were the case, then there would be no true interface conditions, as far as strong uninterpretable features are concerned, since a narrow syntactic derivation with remaining strong

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<sup>19</sup>Interestingly, Svenonius (2004) makes this claim primarily to motivate a triggering model of Spell-out not entirely unlike the one presented in this thesis. Svenonius' model requires that Spell-out of a phase be delayed so that extraction from that phase may occur. He derives this delay by positing that 1) a phase is not spelled out until all uninterpretable features on the phase head are checked and 2) a higher head, which he terms the "trigger", may check those features and thus cause Spell-out of the phase. I believe that, with a few adjustments, Svenonius' theory of Spell-out can be made compatible with the one presented here. However, given the intricate nature of his arguments, such a discussion would require a very lengthy exposition, and so I leave this investigation for future work.

uninterpretable features would “crash” long before it was able to be evaluated at the actual interface of pronunciation (i.e. both crash and convergence of phonological representations cease to be evaluated at the actual A-P interface, but rather at a given stage of narrow syntactic derivation). This model seems dangerously close to re-introducing an S-structure level of representation, since the status of checked/unchecked features would be evaluated at an intermediate stage of the overall derivation of a phase. Thus, I maintain that, under the simplest theory, strong uninterpretable features should only have to be checked by the time the output representation to the A-P interface is finalized, which only occurs after all post-syntactic processes are complete. This is formalized as follows:

- (19) *Strong Minimalist Feature-checking Hypothesis (SMFH)*  
 The interpretability of morpho-syntactic features is evaluated only at the interfaces; strong features at the articulatory-perceptual interface and weak features at the conceptual-intentional interface.

Under my analysis, Spell-out is not a direct interface operation, as is also suggested by the DM architecture. Rather, Spell-out is a transfer operation that sends narrow syntactic structures to the PF (and LF) derivational component(s) once all merger and raising operations possible have been completed on a lexical, functional, or discourse phase sub-array and the resulting derivation merges with a head from another sub-array (or the entire derivation is complete). Note that this model requires no inspection of the derived structure before Spell-out, since the transfer operation is completely automatic and consistent, and thus does not re-introduce an intermediate level of representation. As a result, the structure that is sent to these post-syntactic components may still contain uninterpretable features, which, following the SMFH, it may be possible to check via the limited post-Spell-out operations available in those derivational components before they interface with the C-I and A-P systems (e.g., on the PF branch, the operations of Local Dislocation and *do*-support).

Of course, Earliness still holds as an economy condition on derivation; for example, the narrow syntax will check any and all uninterpretable features that it can via narrow syntactic operations, such as raising, before Spell-out occurs (see (18)). However, the post-Spell-out components are equipped with a few very limited operations that may check any residual features that were not able

to be checked in the narrow syntax, for whatever reason. Therefore, under the system outlined above, a derivation crashes only when both narrow syntactic and post-syntactic operations are unable to check all uninterpretable features by the time the representation interfaces with the C-I or A-P systems (i.e. after all post-syntactic operations).<sup>20</sup> I thus maintain that the ability to check uninterpretable features after Spell-out is very much in keeping with the spirit of the Minimalist Program, once we include the possibility of post-Spell-out, pre-interface transformational operations.

#### 2.2.4 A brief note on category-sensitive affixation

We have seen in the previous chapters that not all Local Dislocation operations share the same surface properties. This is particularly evident in the ostensible category-sensitivity of some Local Dislocations and the diametric category-insensitivity of other Local Dislocations. In this section I claim that this apparent dichotomy of Local Dislocation operations is perhaps misleading and should not be taken as definitive evidence for the existence of multiple species of morpho-phonological merger. Rather, taking into account the data observed thus far and the model of computation proposed in the preceding sections, it might be argued that the apparent category-sensitivity of some Local Dislocation operations is the direct result of uninterpretable morpho-syntactic features that are still present after Spell-out. In this section, as a relevant exhaustive study is beyond the scope of the current work, I simply suggest this morphological model as a theoretical possibility.

Recall that Local Dislocation of Latin *-que* ‘and’ occurs to any word, regardless of its morpho-syntactic category (note that, in the examples below, the initial Spell-out position of *-que* is always immediately to the left of its ultimately targeted base).

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<sup>20</sup>I assume that any derivation that violates the Earliness Principle—i.e. a derivation that sends a structure to Spell-out with uninterpretable features that could have been checked in the narrow syntax—will incur an economy violation and, as a result, will also not converge.



- (20) a. diu noctu-que  
day.ABL night.ABL-and  
'by day and by night'
- b. maius-que commodum  
more-and profit.ACC  
'and more profit'
- c. vivimus vigemus-que  
live.1PL.PRES flourish.1PL.PRES-and  
'we live and flourish'

The pattern in (20) suggests that the affix *-que* carries no category requirement with respect to its base, since it attaches, respectively, to a noun, an adjective, and a verb. This thus provides a clear example of category-insensitive Local Dislocation. However, as noted in previous chapters, Local Dislocation of a finite tense morpheme in English may only occur to a verb:

- (21) a. [Bill ^ -s ^ like ^ cake] → *Bill like-s cake*
- b. [Bill ^ -s ^ not ^ like ^ cake] ↛ *Bill not-s like cake*
- b'. [Bill ^ -s ^ not ^ like ^ cake] → *Bill doe-s not like cake*

If the element directly to the right of the finite tense morpheme is not a verb (in the absence of aux-raising and before the late merger of adjuncts), *do*-support is required in English. In this way, Local Dislocation of this morpheme appears to be category-sensitive. Consequently, this evidence points to a system in which Local Dislocation is not a uniform process across affixal transformations; i.e. some morpho-phonological affixation under string-adjacency is sensitive to syntactic category, while other, structurally identical operations are not.

While it may be easy to justify such a dual system of Local Dislocation by assuming that category-(in)sensitivity is an idiosyncratic property of individual Vocabulary items, I suggest that this is perhaps unnecessary. Although much more research is needed into the nature of affixation cross-linguistically, I believe that our previous claims regarding the derivational architecture—in particular, the argument that uninterpretable morpho-syntactic features may survive through to the PF branch—make it possible for us to adopt a theoretical model in which all Local Dislocation is inherently driven by similar morpho-phonological requirements and

never by considerations of morpho-syntactic category. For example, under this view, the encliticization of Latin *-que* and the suffixation of English finite tense are derived via identical mechanical means, and are driven by the same requirement (e.g. by a condition that they be bound). The only difference between these two is that the finite tense morpheme in English, unlike Latin *-que*, retains an uninterpretable feature after Spell-out which must be checked before the A-P interface. The Local Dislocation operation itself is not category-sensitive in English, but if a Local Dislocation took place that did not check this uninterpretable feature, the representation would ultimately crash.<sup>21</sup> I thus suggest that it is at least a possibility that so-called “category-sensitive” Local Dislocation does not form part of the ontology of linguistic computation. The apparent sensitivity to morpho-syntactic category is simply the result of the epiphenomenon of feature-checking on the PF branch. A “category-sensitive” Local Dislocation operation is one in which a morpho-phonological merger fortuitously derives the locality necessary for feature-checking at PF, thus allowing the representation to converge at the articulatory-perceptual interface.

What is most interesting about this possibility is that it allows for a morphological model under which all category selectional criteria of affixes can be reduced to the presence of uninterpretable morpho-syntactic features, thus more tightly unifying morphological and syntactic computation under a single umbrella of feature-checking. For example, just as narrow syntactic head movement is driven by uninterpretable features and often results in category-sensitive morphological affixation, the category-sensitivity of post-syntactic affixation may also be due to these same features. In the case of the latter, this occurs as a result of the unavailability of narrow syntactic checking of these features due e.g. to the PHIC. This analysis clearly makes a very strong claim about the fundamentals of morphology, but note that all examples seen so far in this thesis, and those that appear in upcoming sections, are compatible with this model. While I will not explore this model in any further detail here, I suggest it as a possible avenue for future research within the Distributed Morphology framework.

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<sup>21</sup>We are concerned here only with the motivations underlying Local Dislocation. I point the reader to Embick (2006) for more on the structural properties of Local Dislocation operations.

## 2.3 A sidenote on Swedish auxiliaries

Interestingly, as Lasnik (1995) observed, following Wexler (1994), auxiliaries in Swedish pattern identically with main verbs, i.e. they do not raise independently to T. This is shown in the following examples, where the auxiliary must remain below adjuncts to the highest vP:

- (22) a. \*Du tänker att jag har **inte ofta** sett  
 you think.PRES that I have.PRES not often see.PERF  
 homom.  
 him
- b. Du tänker att jag **inte ofta** har sett  
 you think.PRES that I not often have.PRES see.PERF  
 homom.  
 him  
 ‘You think that I have not seen him often.’

Under the current model, this pattern implies that auxiliaries in Swedish, unlike those of English, are merged in the same phase as main verbs, i.e. the lower, lexical phase. Because of this, they are also subject to tense-lowering due to the PHIC. This scenario is not hugely problematic for the current analysis. Namely, it is easy to argue that auxiliary verbs straddle the morpho-syntactic/semantic line between functional and lexical: as mentioned earlier, in terms of their function they group with other functional elements, denoting properties of aspect; however, in terms of their category they group with lexical elements, as they are, after all, verbs. Therefore, this seems to be a dividing line on which languages might easily vary parametrically; some languages will merge auxiliaries along with functional elements, while others will do so with lexical elements. Though more research on this cross-linguistic variation is necessary, I believe this explanation of the cross-linguistic asymmetry to be a plausible one.<sup>22</sup>

<sup>22</sup>Note that while I will assume that Lasnik’s (1995) observation is correct—i.e., that auxiliaries remain within vP in Swedish—, there are a few facts that remain a mystery. For example, it appears that certain adverbs may intervene between the auxiliary and perfective verb (Katarina Smedfors p.c.):

- (i) Du vet att jag har **helt** glömt adressen.  
 you know.PRES that I have.PRES completely forgotten address.DEF

## 2.4 Section summary

Much further research is needed into the model of derivation and Spell-out presented in this section, including a more detailed contrastive study with other proposed theories of the interaction of feature-checking and Spell-out operations. However, I must leave this for future work. For now, it suffices to note that the model presented above allows for a streamlined, non-lexicalist theory of the different placements of inflected main and auxiliary verbs in English. The following provides a simple summary of these arguments (based on the languages and patterns observed and studied in this work):

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‘You know that I have completely forgotten the address.’

- (ii) Jag vet            inte om han har            **helt**            glömt    adressen.  
 I    know.PRES not if    he    have.PRES completely forgotten address.DEF  
 ‘I don’t know if he has completely forgotten the address.’

While this may simply be a case of the adjunct *helt* adjoining to the lower *vP* of the perfective, it is unclear why such an adjunction is impossible for negation. Furthermore, if auxiliaries remain within *vP* in Swedish, then we might expect them to pattern identically with main verbs in terms of *vP*-fronting. However, this is not the case (from Källgren and Prince 1989):

- (iii) \*[Är        lycklig]<sub>i</sub> gör        han *t<sub>i</sub>*.  
           be.PRES happy    do.PRES he

I must leave investigation of these facts for the future, but I note that there is still something “special” about auxiliaries verbs in Swedish that has yet to be determined.

- All verbs cross-linguistically enter the derivation as bare, uninflected verbs and contain no uninterpretable features of their own (at least none that interact with the inflectional morpheme).
- Likewise, each inflectional morpheme only has one lexical entry (e.g. a present tense morpheme in a given language will always carry the same feature specification in all clauses).
- $\Sigma$ P in Swedish does not structurally intervene between tense and the verb, thus allowing tense-lowering to occur to check T's [-V] feature (i.e. T is the Spell-out trigger). This correctly predicts that a matrix verb will always be inflected in Swedish whenever a bound morpheme is merged in T.
- $\Sigma$ P structurally intervenes between T and the verb in all English clauses. Thus, Lowering of T is impossible as it is not the Spell-out trigger. Tense-hopping via Local Dislocation correctly predicts that tense-hopping occurs in English only when  $\Sigma$ P contains no phonologically overt elements and finite tense and the verb are string-adjacent in the morpho-phonological representation.
- Since auxiliaries are merged in the same phase as T in English, phase impenetrability does not apply between finite T and the auxiliary, thus correctly predicting that finite T can target the topmost tautophasal auxiliary for raising.

That is to say, a model that includes a triggering model of Spell-out, the PHIC, the possibility of merging auxiliaries in the functional domain, and the availability of checking remaining uninterpretable features on the PF branch allows us to account for all of the cross-linguistic patterns of verbal inflection and placement discussed above in a completely non-lexicalist way. Moreover, this model allows us to maintain a one-to-one correspondence between overt morphemes and morpho-syntactic feature bundles, thus obviating the need for multiple lexical entries and the subsequent rules on the environments in which they can merge. Thus, I believe that the theory presented here exhibits the parsimony of a sufficiently explanatory account of these cross-linguistic patterns of verbs and their inflectional morphology. In the following section we will quickly address a few remaining issues in the interactions of tense, auxiliaries, and  $\Sigma$ , including some aspects of how these interact in languages other than English and Swedish.

### 3 More on $\Sigma$ P and auxiliaries

In this section we will analyze several aspects of the patterns of negation (i.e.  $\Sigma_{\text{neg}}$ ) and auxiliaries in both French and English, in addition to other properties of auxiliary constructions in English, such as an asymmetry in ellipsis of perfective and progressive clauses. I will argue that there is evidence to indicate that some languages and dialects allow variation in the placement of the functional morpheme  $\Sigma$  with respect to the tautophasal auxiliary verb. Furthermore, the evidence from ellipsis in English suggests that the progressive *-ing* morpheme lowers to the verb, indicating that this Asp head must take the lexical  $v$ P phase as its complement under the proposed model. Though the majority of the following discussion does not deal directly with downward movements, it serves to illustrate that the model of derivation and Spell-out proposed above to account for tense-hopping and auxiliary-raising has some additional interesting consequences for narrow syntactic structure and operations. While an extensive treatment of these constructions is beyond the scope of this section, I believe that the analyses made here will provide a stepping stone for future research.

#### 3.1 Auxiliary-raising in French

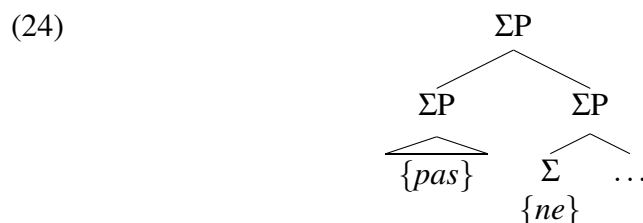
Assuming that finite T in French carries a  $[-v]$  feature and that the structure of auxiliaries is identical to main verbs (i.e. auxiliaries consist of a V and a  $v$  head), it is not surprising that inflected auxiliaries occupy the same surface position as inflected main verbs; e.g., in the following, the auxiliaries *ai* (from infinitival *avoir* ‘to have’) and *suis* (from infinitival *être* ‘to be’) both appear to the left of negative *pas* ‘not’, just like main verbs (see below for an analysis of the clitic negation *ne*):<sup>23</sup>

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<sup>23</sup>Note that *être* ‘to be’, as well as *avoir* ‘to have’, is a perfective auxiliary in French, unlike progressive *be* in English.

- (23) a. Je ne mange **pas** ton gâteau.  
 I *ne* eat.1S.PRES not your cake  
 'I don't eat/am not eating your cake.'
- b. Je n'ai **pas** mangé ton gâteau.  
 I *ne*.have.1S.PRES not eat.PERF your cake.  
 'I didn't eat your cake.'
- c. Je n'arrive **pas**.  
 I *ne*.arrive.1S.PRES not.  
 'I don't arrive/am not arriving.'
- d. Je ne suis **pas** arrivé.  
 I *ne* be.1S.PRES not arrive.PERF  
 'I did not arrive.'

Under the current model, nothing, including the PHIC, prevents finite T in French from checking its [-v] via raising of an auxiliary or main verb, regardless of where the verb is merged (i.e. in the lexical or functional phase). Therefore, in inflected clauses, both auxiliaries and main verbs behave identically in that both raise to T to appear to the left of negative *pas*. I assume that the following is the structure of the negative  $\Sigma P$  projection in French (Pollock 1989):



As shown above, negative *pas* is contained in the specifier of  $\Sigma P$  and the clitic negation *ne* is found in the  $\Sigma$  head. Thus, any auxiliary or main verb generated below  $\Sigma P$  will necessarily pick up the clitic *ne* in the  $\Sigma$  head on its way to finite T, but *pas* will remain in the specifier of  $\Sigma P$ . Note, however, that an asymmetry arises in infinitival clauses (infinitival forms are underlined).

- (25) Je regrette de ...  
 I regret.1S.PRES of ...  
 'I regret ...'
- a. ne **pas** manger ...
  - b. \*ne manger **pas** ...
  - c. ne **pas** avoir mangé ...
  - d. n'avoir **pas** mangé ...
  - e. ne **pas** arriver ...
  - f. \*n'arriver **pas** ...
  - g. ne **pas** être arrivé ...
  - h. n'être **pas** arrivé ...

(25) shows that main verb infinitivals can only appear to the right of negation, whereas auxiliary verb infinitivals may appear to either the left or the right of negative *pas*. The simple observation here is that main verbs do not raise to infinitival T, but that auxiliary verbs can raise to infinitival T, though this is not strictly necessary. Pollock (1989) attributes this pattern to the availability of an optional movement of infinitival auxiliary verbs. In other words, infinitival auxiliaries may optionally move from a position below negation/ $\Sigma$  to T, which is above  $\Sigma$ .<sup>24</sup> However, under a strict view of syntactic movement in which there is no true optionality and all movement is instead driven by uninterpretable features, this implies that there are two versions of infinitival T; one that can scope over both main verbs and auxiliaries and does not carry any uninterpretable features, and another that may scope over just auxiliaries and carries an uninterpretable  $\nu$ -feature (or, alternatively, two versions of each infinitival auxiliary verb; one that has features that cause it to raise and one that does not).

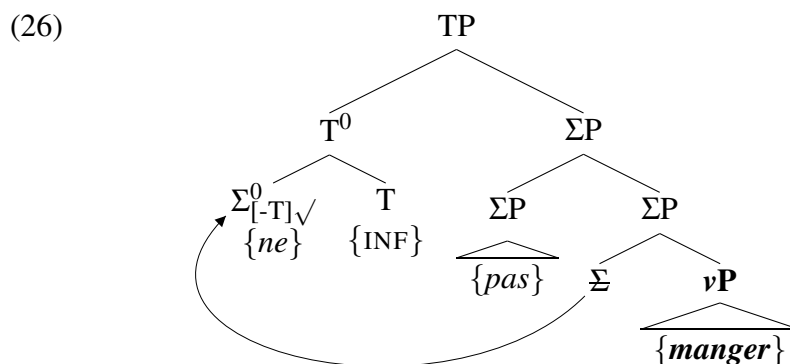
I propose, however, that we can account for this asymmetry without resorting to optional movement or multiple lexical entries for individual morphemes. Instead, I argue that auxiliaries in French, like auxiliaries in English, are merged in the functional domain, whereas main verbs are merged in the lexical domain. Furthermore, infinitival T itself carries no uninterpretable features, but rather it is

<sup>24</sup>I will not be concerned here with some other aspects of this apparent optionality. For example, the variable ordering of certain adjuncts with respect to infinitival verbs; e.g., *manger souvent du chou* or *souvent manger du chou*. While such an omission would admittedly be a drawback to an overall analysis of these patterns in French, an account of this particular aspect of the variation would not add anything to the current investigation of the  $\Sigma$ P projection. It is my hope, however, that we will eventually be able explain this pattern without resorting to purely optional syntactic movement.

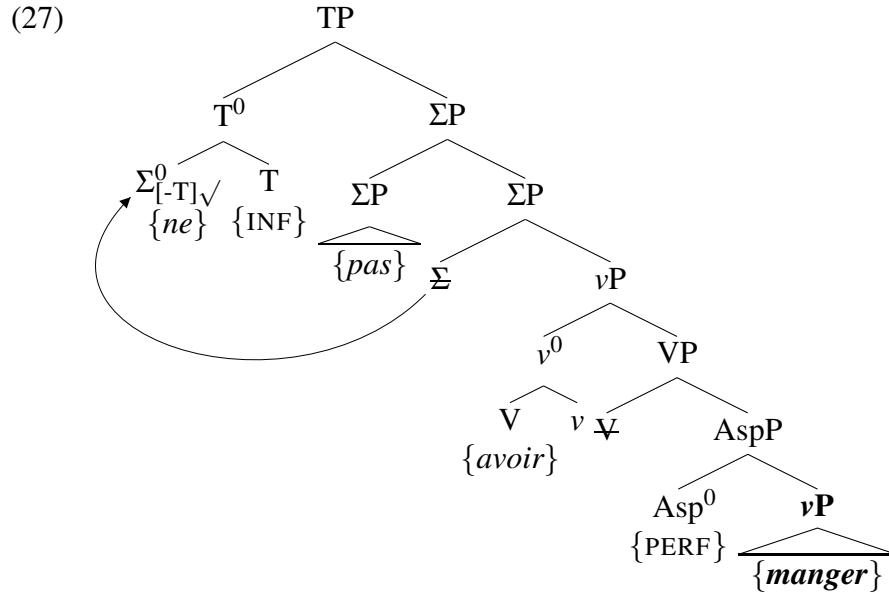


the negative  $\Sigma$  head that carries a  $[-T]$  feature. Finally, I posit that the position of  $\Sigma$  with respect to the auxiliary in the functional domain can vary; i.e.  $\Sigma P$  may be merged either above or below the functional auxiliary verb projection. This, I argue, is what derives the optionality in the observable pattern of auxiliary verbs in relation to negation.

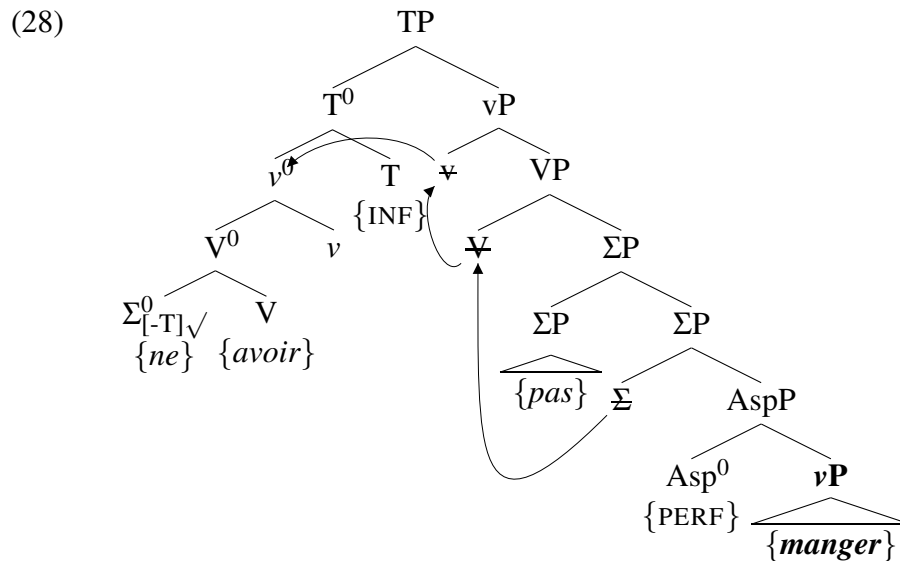
Before I show how this model accounts for the variation in auxiliary placement, I first note that the structure in (24) implies that the  $\Sigma$  head *ne* must move independently from verb movement. We observe that main verb infinitivals remain below  $\Sigma P$ , yet the clitic *ne* moves to a position in which it is spelled out to the left of its specifier *pas*, as in *ne pas manger* (note *\*pas ne manger*). Therefore, if *ne* carries a  $[-T]$  feature that it must satisfy via raising to either finite or infinitival T, we correctly predict that *ne* will always precede *pas*; e.g., roughly (split-INFL projections omitted for clarity; elements in **bold** are those spelled out on the lexical phase cycle):



When the surface pattern of the auxiliary is equivalent to that of main verbs (e.g. *ne pas avoir*), I argue that this is because the auxiliary is also merged below  $\Sigma P$ , as in (27) below; note, however, that the auxiliary is still merged in the functional domain above the perfective aspectual morpheme.



Note that the sub-array of functional elements here consists of {Asp, avoir, v, ne, {pas}, T}. I argue that the elements of  $\Sigma P$  may be merged either above the auxiliary  $vP$ , as in (27), or below the auxiliary elements in  $vP$ , as in (28). In the structure in (28),  $\Sigma$ -to- $T$  movement will necessarily pick up the intervening auxiliary verb due to the Head Movement Constraint, producing the string *n'avoir pas mangé*.



Given that both auxiliary verbs and  $\Sigma$  are functional elements in French, and thus are merged on the same derivational phase, the order in which these two are merged with respect to each other is not fixed. If auxiliaries are truly “semantically

vacuous”, as argued by Chomsky (1993), then this variation in their position relative to negation should create no semantically intelligible difference.<sup>25</sup> Thus, under this analysis, it is not the case that the auxiliary itself undergoes optional movement, but rather that it may optionally be merged either above or below negation (or, more appropriately, negation may take either the auxiliary verb or the perfective verb as its complement), and, depending on the option taken, the auxiliary either will or will not be found in the path of obligatory  $\Sigma$ -to-T movement. Crucially, since main verbs are necessarily merged in the lexical domain (i.e. below  $\Sigma$ P), they will never be interveners for  $\Sigma$ -to-T movement, thus correctly ruling out strings like *\*ne manger pas*, since *manger* will never be in a position in which it can be picked up by  $\Sigma$  on its way to T.<sup>26</sup>

Zanuttini (1996) also draws a correlation between tense and sentential negation. In particular, she argues that a clitic-type negation such as *ne* can only appear in constructions in which it is licensed by a tense head. Though this might at first seem almost identical to the current analysis, she claims that this licensing requirement is satisfied only when a negative head (i.e. a clitic negation) takes a TP as its complement. That is, if a Neg head is generated on the spine of a structure, it must have TP as its complement. Therefore, such a negative/ $\Sigma$  head may not be generated below TP. As a result, languages that have only clitic negation, such as Italian, may not directly negate non-TP elements; e.g.:

(29) *Italian*

- a. Maria **non** ha parlato molto.  
     Maria NEG have.3S.PRES talk.PERF much  
     ‘Maria hasn’t talked much.’
- b. \*Maria ha **non** parlato molto.

<sup>25</sup>Note that the claim here is not that all functional elements may be merged in any order, but rather that the syntactic scope of negation in French is variable. Additionally, I should point out that it may be theoretically possible that  $\Sigma$  be merged between Asp and vP in (28), but that such a merger would disrupt the locality required for affixation of the perfective morpheme to the main verb, be this via raising, lowering, or Local Dislocation, thus creating an irreparable violation of the stray affix filter.

<sup>26</sup>In finite constructions, since both the highest verb and *ne* raise to T (though for different reasons), we correctly predict that finite T will always contain both *ne* and a verb in a negation construction. In finite auxiliary constructions, it therefore does not make a difference whether the auxiliary is merged above or below  $\Sigma$ P, since the auxiliary moves to finite T to satisfy T’s [-v] feature and *ne* will also move to T to satisfy its own [-T] feature.

In (29b), the clitic negation takes the (perfective) *vP* as its complement, instead of *TP*, and so, according to Zanuttini, the selectional constraints of the negative head are not met, and the derivation crashes. However, languages that have a so-called “adverbial negation” (which Zanuttini argues is an adjunct to the verb phrase), corresponding to French *pas*, can negate such non-*TP* elements, as in the French (30) and the Piedmontese (31) (note that *ne* in French is only optionally pronounced).

(30) *French*

- a. Marie (n') a **pas** parlé beaucoup.  
 Marie (ne) have.3S.PRES NEG talk.PERF much  
 ‘Marie hasn’t talked much.’
- b. \*Marie (ne) pas a parlé beaucoup.

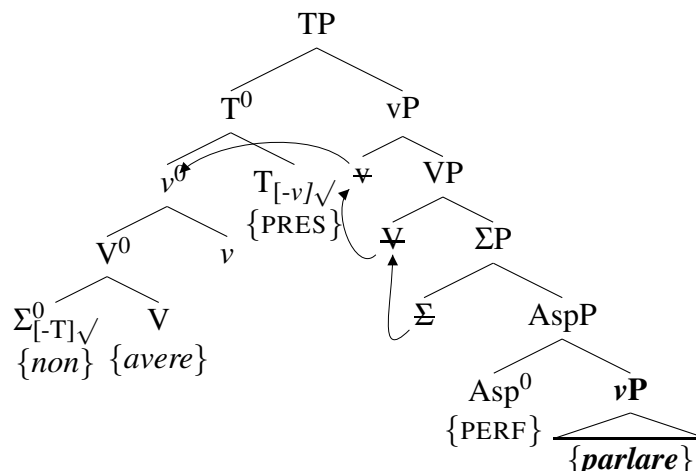
(31) *Piedmontese*

- a. Maria a l’ha **nen** parlà tant.  
 Mary CL have.3S.PRES NEG talk.PERF much  
 ‘Mary hasn’t talked much.’
- b. \*Maria a **nen** l’ha parlà tant.

Furthermore, as the ungrammatical examples in (30b) and (31b) show, the adverbial-type negation cannot directly modify a *TP*.<sup>27</sup> I believe these patterns are accounted for under the current model by assuming not that a *Neg/Σ* head must take a *TP* complement, but rather that the negative *Σ* head (i.e. the clitic negation) must always move to *T*. The ungrammaticality of (29) is thus not due to a requirement that *Neg* be generated directly above *TP*, but rather that negative *non* must move to *T* in Italian, where it will adjoin with the auxiliary that has also moved to *T*. Consequently, Italian *non* may not remain low, like in (29), since it will not check its [-*T*] feature in this position. For example, if *ΣP* is merged below the auxiliary in (29), the following is the derivation (note that *SpecΣP* is empty in standard Italian negation):

<sup>27</sup>This analysis implies that negative *pas* and *ne* in French are merged in separate syntactic positions; i.e. *pas* is an adjunct to *vP* and *ne* is merged in a position in which it takes *TP* as a complement. Furthermore, such an analysis requires a theory of optional infinitival movement in French, since movement of *ne* could not affect the position of the lower auxiliary.

(32)



I thus argue that the reason that a clitic negation must appear adjoined to the verb in T is because negative  $\Sigma$  must raise to T. Therefore, it is not necessarily the case that the so-called adverbial negation elements are adverbs at all, but may rather be specifiers of the  $\Sigma P$  projection, as argued above.<sup>28</sup> These specifiers of  $\Sigma P$  have no uninterpretable features, and thus no movement requirements, and so may remain in a lower syntactic position than the  $\Sigma$  head.

Much more could be said on this topic, but I will leave it for future work. To summarize the above arguments, I claim that auxiliaries in French are merged in the functional domain either above or below the  $\Sigma P$  projection. This derives movement of the auxiliary when it intervenes in obligatory  $\Sigma$ -to-T movement, and non-movement of the auxiliary to T when it does not, in addition to non-movement of infinitival main verbs to T. The greatest advantage of this theory is that it requires no purely optional movement or multiple lexical entries, but rather relies on a derivational optionality in the ordering of merger of elements from the phase sub-array. While this optionality does not seem to create a semantic difference, it accounts for the observed minor syntactic variation. In the following section we will see that these notions can be applied to English auxiliary constructions, as well.

<sup>28</sup>Note that it is perfectly possible that these elements are  $\Sigma P$  adjuncts, like in Swedish, though, again, this is not necessarily the case in French and Piedmontese. However, this would require us to again posit two completely separate negation projections—one an adjunct, and the other a projecting head on the spine of the derivation—, which is unnecessary under the current analysis.

## 3.2 Additional consequences for English

In the following two sections I will show some additional consequences of the above analysis of  $\Sigma$ P for English. I will also suggest a model of auxiliary constructions that may help to account for an asymmetric pattern in  $\nu$ P-ellipsis.

### 3.2.1 $\Sigma$ P in English: *n't* vs. *not*

The following examples show that there exists an asymmetry in clitic vs. free morpheme negation in English (i.e. *n't* vs. *not*):<sup>29</sup>

- (33)
- a. John does not forget the address.
  - b. Does John not forget the address?
  - c. \*Does not John forget the address?
  - d. John doesn't forget the address.
  - e. Doesn't John forget the address?
  - f. \*Does John n't forget the address?

The pattern here is clear; clitic *n't* is carried along in T-to-C movement, whereas the free morpheme *not* is left in its base position. Though there are many facets of this distinction that could be addressed (e.g. the varying semantics and pragmatics between the two types of negation), I will here offer only a brief morpho-syntactic account of this pattern. Namely, I argue that  $\Sigma$ P in English is identical to French, except in the fact that an overt  $\Sigma$  head—in this case *n't*—and an overt specifier of  $\Sigma$ P—in this case *not*—are mutually exclusive in English, whereas *ne* and *pas* appear simultaneously in French.<sup>30</sup> The  $\Sigma$  head *n't*, like the  $\Sigma$  heads *ne* in French and *non* in Italian, carries a [-T] feature, and so will always raise to T, whereas *not*, as it is generated in Spec $\Sigma$ P and contains no uninterpretable features, will not be affected by any head movement operations. As the following show, *n't*, like *ne*, will always form a complex constituent with an auxiliary that has raised to finite T:

- (34)
- a. Hasn't John forgotten the address?
  - b. Isn't John leaving?

However, the examples in (34) allow for two structural possibilities; like in French, it may be the case that  $\Sigma$ P in English is merged either above or below the auxiliary.

<sup>29</sup>See Zwicky and Pullum (1983) for an extensive treatment of this distinction.

<sup>30</sup>I will not address why this distinction holds, but see Watanabe (2004) and references therein for more on negative concord languages.

In order to determine whether both merger positions are possible in English, we must look at auxiliary constructions with modals, which do not target the auxiliary verb for raising, rather than constructions with finite T.<sup>31</sup>

- (35) Shouldn't John have forgotten the address?

The example in (35) clearly shows that the clitic *n't* has raised to the modal in T before T-to-C movement, supporting the current analysis. This indicates that the hierarchical order  $T \gg \Sigma \gg \text{Aux}$  is possible in English, where  $\Sigma$  raises independently to T and Aux remains low. However, if a hierarchical order  $T \gg \text{Aux} \gg \Sigma$  is allowed, as in French, then we predict the following to be grammatical, after  $\Sigma$ -to-T raising and T-to-C movement:

- (36) (?)Shouldn't have John forgotten the address?

$\Sigma$ -to-T movement should pick up the intervening auxiliary, forming a complex  $\Sigma+\text{Aux}+\text{T}$  head that is targeted for T-to-C movement. However, though (36) is ungrammatical in standard dialects of English, Johnson (1988) points out that such “complex inversion” is grammatical in certain non-standard dialects. I tentatively suggest that this dialectal difference is due to the optionality of placing  $\Sigma\text{P}$  below the auxiliary in the non-standard dialect, and the unavailability of such a hierarchy in the standard dialect.<sup>32</sup>

Furthermore, note that in the non-standard dialect, such modal+Aux complex inversion constructions are possible even in the absence of negation.

- (37) What could have Mary bought? (*non-standard*)

This suggests that even  $\{\text{AFF}\} \Sigma$  moves to T (i.e. affirmative  $\Sigma$  also has a [-T] feature). I argue that this is indeed the case. Support for this claim comes from

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<sup>31</sup>Note that French, unlike English, does not have modals that are merged directly in T, and so a similar test for French is impossible.

<sup>32</sup>Johnson (1988) attributes the difference to 1) universal movement of “have” to INFL, irrespective of the contents of INFL, and 2) mandatory excorporation of INFL from “have” in Subject-Aux inversion in the standard dialect, but the absence of excorporation in the non-standard dialect. However, I will not entertain the excorporation analysis here, as I believe it to be problematic. For example, it must be asked why excorporation of “should” is mandatory in the standard dialect when INFL contains “should+have”, but excorporation of finite T is prohibited with “T<sub>[FIN]</sub>+have”; e.g. \**Does John have forgotten the address?*

emphatic affirmation interrogative constructions in the standard dialect, like the following:

- (38) a. **Did** John forget the address?  
 b. **Has** John forgotten the address?

Assuming that the prosodic focus feature in these constructions is added to affirmative  $\Sigma$ , as argued previously, and a hierarchical order in the standard dialect of  $T \gg \Sigma \gg (\text{Aux})$ , in order for the focus feature on  $\Sigma$  to be consistently realized in the pre-subject position in interrogatives it is necessarily the case that affirmative  $\Sigma$  raises to T prior to T-to-C movement. Though Aux-to-T movement will pick up affirmative  $\Sigma$  in (38b) under the functional hierarchy of the standard dialect of English, the affirmative  $\Sigma$  that carries the focus feature must raise to T independently in (38a) in order to be realized on the dummy *do* verb in C; otherwise, the focus feature remains low and would not be string-adjacent to T/*did* at PF. This does not create any problems for our previous analysis of affirmative  $\Sigma$  in either English or French,<sup>33</sup> and, indeed, creates a more uniform picture of the typology of  $\Sigma$  heads. Therefore, I argue that the non-standard (37) is derived from the syntactic hierarchy  $T \gg \text{Aux} \gg \Sigma$ , where affirmative  $\Sigma$  raises to T, picking up the auxiliary and forming a complex T+Aux+ $\Sigma$  head (i.e. *could+have+AFF*), which is later targeted for T-to-C movement.

Note, however, that not all combinations of T+Aux are possible in complex inversion in the non-standard dialect of English.

- (39) a. \*Shouldn't be Pam remembering her name?  
 b. ??May have John forgotten the address?

Johnson (1988) notes that complex inversion is impossible with the auxiliary *be*, and is only grammatical with the modals *should*, *would*, *could*, becoming significantly degraded with modals such as *can*, *may*, *must*. Under the current proposal, while it may be argued that the non-standard dialect only allows low merger of  $\Sigma$ P below the auxiliary *have*, and not *be*,<sup>34</sup> the degradation found with

<sup>33</sup>For example, movement of affirmative  $\Sigma$  to T will always be a string-vacuous movement in standard English, and will never show an overt morpho-phonological effect in French infinitivals, due to  $\Sigma$ 's lack of phonology.

<sup>34</sup>This may be due to a restriction on breaking up the progressive aspect projection from its accompanying auxiliary. However, I currently have no analysis as to why such a syntactic restriction on English progressive would hold. See the following discussion for a possible alternative solution.



certain modals and *have* in complex inversion cannot be explained so easily. That is to say, a purely syntactic analysis would struggle to account for the modal asymmetry in complex inversion with *have*, assuming a syntactic equality of modals generated in T.

Though much further research is needed, I suggest that the patterns witnessed above can be explained better through restrictions on morpho-phonology than through restrictions on morpho-syntax. In particular, I argue that the illicit constructions in the standard and non-standard dialects of English may be due to morpho-phonological gaps (i.e. the absence of appropriate Vocabulary items), rather than the impossibility of particular syntactic derivations.

First, consider the affirmative and clitic negation forms of the following modals and finite forms of *have*, *be*, and *do*, all of which appear in T in both dialects of English under consideration:

(40)

| Affirmative    | Negative <i>n't</i>         |
|----------------|-----------------------------|
| could          | couldn't                    |
| should         | shouldn't                   |
| would          | wouldn't                    |
| can            | can't                       |
| must           | mustn't                     |
| may            | <b>*mayn't</b>              |
| will           | <b>won't</b>                |
| have           | haven't                     |
| has            | hasn't                      |
| am             | <b>*amn't</b>               |
| is             | isn't                       |
| are            | aren't                      |
| do (IPA: [du]) | <b>don't</b> (IPA: [downt]) |
| does           | doesn't                     |

Note that all of the morphemes in (40) are functional elements (e.g. tense, modals, auxiliaries, negation), and so are assigned phonology on the same Spell-out cycle. Moreover, each word above is derived from a complex head under the current analysis, due to  $\Sigma$ -to-T movement and aux-raising. As a result, all of the morpho-syntactic features of these individual morphemes will be sent to PF simultaneously (see §5 for phonological alternations in lexical verbs). Given their simultaneous visibility and syntactic constituency, it is not necessarily the

case that each morpho-syntactic feature contained within these complex heads is evaluated for phonology separately (see Bobaljik (2000a) for a model in which VI can be sensitive to multiple morpho-syntactic features). In fact, I argue that the morpho-phonological gaps *\*amn't* and *\*mayn't*, in addition to the vowel change in *do* → *don't* and the near suppletion in *will* → *won't*, indicate that it is not the case that the  $\Sigma$  head is assigned phonology completely separately from the element to which it is adjoined.<sup>35,36</sup> For example, given a complex head that contains the features  $\{be, ISG, PRES, NEG\}$ ,<sup>37</sup> where NEG = the negative  $\Sigma$  head (i.e. [n't]), it is not the case that Vocabulary Insertion targets just the individual subsets  $\{be, ISG, PRES\}=[am]$  and  $\{NEG\}=[n't]$  of this complex head, but rather that VI can only target the entire feature bundle of the complex head.<sup>38,39</sup> I suggest that in the case of the *\*amn't* gap, there is no Vocabulary item in (standard) English that can be mapped to the feature bundle  $\{be, ISG, PRES, NEG\}$ .<sup>40</sup> Furthermore, given the previous claim that affirmative  $\Sigma$  also raises to T, it may be the case that the relevant feature bundle for non-negative [am] at VI is not  $\{be, ISG, PRES\}$ , but rather  $\{be, ISG, PRES, AFF\}$ . In this way, all Vocabulary items that are mapped to the functional morpho-syntactic feature bundles in (40) are sensitive to which type of  $\Sigma$  is present in the feature bundle. I suggest here that this scenario may allow us

<sup>35</sup>There is also an infinitival *\*ton't* gap in English; e.g. *He tries to not eat much./\*He tries ton't eat much*. However, I won't address this here, as there is much debate as to the exact syntactic position of infinitival *to*.

<sup>36</sup>See Bresnan (2001a) and Frampton (2001) for more on these patterns.

<sup>37</sup>Given the absence of a split-INFL in English, as argued previously, I assume that the features  $\{ISG, PRES\}$  are both contained in the finite T head. Whether the  $\{ISG\}$  feature is lexically specified or assigned under agreement is not crucial to this analysis.

<sup>38</sup>It is certainly plausible that the gaps and distinct *n't* forms are the result of morpho-phonological readjustment rules (see §5). For example, English might contain readjustment rules that transform [wilnt] to [wownt] and [dunt] to [downt], perhaps in addition to rules that transform [æmnt] to [∅] and [meint] to [∅]; however, it would be odd to posit readjustment rules that derive an unintelligible, ungrammatical output. Whereas a phonological form like [ai wilnt gow] may be readjusted to [ai wownt gow] 'I won't go', a phonological form like [ai meint gow] cannot be converted to [ai ∅ gow] and still reflect the syntactic derivation. Therefore, in order to account for all of these forms in a unified way, I will assume that they are all syntactically derivable, and that their surface forms (or absence) can be attributed to something other than morpho-phonological readjustment.

<sup>39</sup>In terms of Halle and Marantz (1993), the terminal nodes T and  $\Sigma$  undergo mandatory *fusion* to become a single locus for Vocabulary Insertion.

<sup>40</sup>Note that there is no way to account for the actual existence of these idiosyncratic gaps in a principled manner. That is, there is no theoretical mechanism that would outright prohibit *amn't* and *mayn't* from existing in English. It is simply the case that they don't. Therefore, I offer this analysis merely as a way of accounting for how these absences can be derived under the proposed model of morphology.

to account for not only the gaps in (40), but also the restrictions on the patterns of complex inversion in both the standard and non-standard dialects of English.<sup>41</sup>

To illustrate, consider the unproblematic forms *would* and *wouldn't*. Under the current model, the complex head corresponding to *would* contains the features  $\{\textit{would}, \textit{AFF}\}$  (in the absence of T-to-C movement), given that  $\Sigma$  always raises to T. In the case of *wouldn't*, the feature bundle is  $\{\textit{would}, \textit{NEG}\}$ . As these are the only two feature bundles possible for the *in situ* modal (i.e. there will never be a modal in T that does not also contain some version of  $\Sigma$ ), it is possible that each of these feature bundles is mapped as a whole to different Vocabulary items. Under this proposal, English contains a Vocabulary item  $\{\{\textit{would}, \textit{AFF}\}, [\textit{wʊd}]\}$ , where the phonological form  $[\textit{wʊd}]$  is mapped to the morpho-syntactic feature bundle  $\{\textit{would}, \textit{AFF}\}$ , and another Vocabulary item  $\{\{\textit{would}, \textit{NEG}\}, [\textit{wʊdnt}]\}$ . There is thus no Vocabulary item that maps phonology onto a simple feature bundle  $\{\textit{would}\}$ .<sup>42</sup> Though this may seem to create an unnecessary burden on the Vocabulary—since now *would* and *wouldn't* are not directly linked in the Vocabulary in any transparent way (however, neither are *will* and *won't*)—it does allow us to account for the gaps and phonological “changes” in (40). For example, under this analysis, English contains a Vocabulary item  $\{\{\textit{may}, \textit{AFF}\}, [\textit{meɪ}]\}$ , but not one for  $\{\{\textit{may}, \textit{NEG}\}, [\textit{meɪnt}]\}$ . If  $\Sigma$ -to-T movement results in a feature bundle  $\{\textit{may}, \textit{NEG}\}$ , then VI will be unable to process this bundle, as there is no appropriate Vocabulary item that allows this bundle to be realized phonologically, and so the construction will crash.<sup>43</sup> In this way, unsurprisingly, the gaps here are purely

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<sup>41</sup>Note that French has no morpho-phonological gaps with negative *ne*; all verbs, both auxiliary and lexical, can take a *ne* clitic. Under this model, this indicates that VI in French does indeed assign phonology to the subset  $\{\textit{NEG}\}$  of a complex T. However, note that whereas all verbs in French may be adjoined to  $\Sigma$ , only a small subset of verbs (i.e. auxiliaries), modals, and the dummy verb *do* may create a complex syntactic head with  $\Sigma$  in English. Therefore, I simply assume that this syntactic limitation corresponds to a limited inventory of Vocabulary items, though I will not posit a causal link. That is to say, given the highly restricted distribution of *n't* in English, as opposed to the unrestricted distribution of *ne* in French, I believe it is reasonable to propose that the Vocabulary is sensitive to the  $\Sigma$  morpheme adjoined to an auxiliary, modal, or dummy *do* in English.

<sup>42</sup>Recall that the Subset Principle allows for mapping of a Vocabulary item  $\{\{\textit{X}, \textit{Y}\}, [\textit{W}]\}$  to a feature bundle  $\{\textit{X}, \textit{Y}, \textit{Z}\}$ , but not to a feature bundle  $\{\textit{X}\}$ . That is, the Vocabulary item must contain a subset of the features of the morpho-syntactic feature bundle. A Vocabulary item that contains more features than the targeted morpho-syntactic feature bundle cannot be mapped to that bundle.

<sup>43</sup>Note, again, that I assume that the Subset Principle holds. Therefore, there is no Vocabulary item in English that can map phonology directly to a feature  $\{\textit{NEG}\}$  (i.e.  $[\textit{n't}]$ ), nor one that can map phonology directly to  $\{\textit{may}\}$ .

morpho-phonological, rather than morpho-syntactic.<sup>44</sup>

In a similar vein, it may be the case that the restrictions on “complex inversion” are also the result of morpho-phonological gaps rather than morpho-syntactic prohibitions. If the complex feature bundles created by  $\Sigma$ -to-T movement must be analyzed as a whole at VI, it may be the case that the non-standard dialect simply contains Vocabulary items that the standard dialect does not. For example, the non-standard dialect may contain a Vocabulary item  $\{\{should, NEG, have\}, [\text{ʊdnt hæv}]\}$ , but not  $\{\{may, AFF, have\}, [mei hæv]\}$ . The standard dialect would contain neither of these.<sup>45</sup> Therefore, a syntactic derivation in which  $\Sigma$  is merged below the auxiliary will only converge at PF in those cases in which a Vocabulary item exists that can map phonology onto the complex head that results from  $\Sigma$ -to-T movement. In this way, the dialectal difference in English is not attributable to differences in what is possible in morpho-syntactic computation, but rather to the presence or absence of elements in the Vocabulary. I believe that this is a plausible model of the distinction, as the Vocabulary is a store of linguistic items that are acquired in language-learning, whereas the mechanisms underlying syntactic computation are argued to be universal. I thus hold that, under the best scenario, dialectal differences should be the result of a discrepancy in the learned Vocabulary items—and, perhaps to a lesser degree, differences in the featural properties of lexical items (e.g., see appendix to Chapter 3)—rather than the availability or unavailability of certain computational processes.

While I cannot seriously propose this as a definitive analysis of these distinctions, given its highly stipulative nature,<sup>46</sup> I use these facts to suggest that the absence of a low merger site for  $\Sigma P$  in the standard dialect may not, in fact, be due to a syntactic restriction, but that the resulting morpho-syntactic structure will be ruled

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<sup>44</sup>In the case of *do* - *don't* and *will* - *won't*, it is the case that each individual Vocabulary item maps a different phonological matrix onto its respective feature bundle. In the cases of *do* - *don't*, this occurs at the “very late” insertion stage as a rescue mechanism of the stray affix filter.

<sup>45</sup>It is worth pointing out that, in my limited experience with the complex-inversion dialect, the modal+aux structure is almost always pronounced with the clitic auxiliary, e.g. *could've* or *shouldn't've*. Though I won't analyze this further, it does suggest that an analysis in which all of these features of the word are analyzed as a group for VI is plausible.

<sup>46</sup>Note, however, that this model closely parallels that of Zwicky and Pullum (1983), who argue that English *n't* is, in fact, not a clitic but rather an inflectional morpheme. As they point out, this means that *n't*-affixed forms like *can't* and *wouldn't* are individual lexical items under their framework. As we are adopting a non-lexicalist view of morphology, the corollary here is simply that these forms are individual Vocabulary items.

out on independent morpho-phonological grounds. In other words, I suggest that  $\Sigma$ P may be merged low in both dialects, but only the non-standard dialect contains the appropriate Vocabulary items to resolve the resulting structure at PF, and even then it may only do so for a subset of possible cases. I leave this discussion here, noting that much further research is needed, including investigation of anomalous *aren't* (e.g. *Aren't I beautiful?/\*Amn't I beautiful./\*I aren't beautiful.*)<sup>47</sup> and apparently “low” negation in auxiliaries (e.g. *John should have not forgotten the address./John should be not eating peanuts.*).<sup>48</sup> Nevertheless, given the preceding discussion, I conclude that the  $\Sigma$  head invariably undergoes movement to T, due to a [-T] feature, and that, while the syntactic hierarchy  $T \gg \text{Aux} \gg \Sigma$  is not available in the standard dialect of English (due perhaps to morpho-phonological constraints), it is possible under certain circumstances in a non-standard dialect of English. That is, different merger positions of  $\Sigma$  with respect to functional auxiliaries is a possibility cross-linguistically.

### 3.2.2 Auxiliaries and ellipsis

In this section, I will show how the model of syntactic structure presented in this thesis allows us to account for certain problematic issues in  $\nu$ P-ellipsis patterns in English. In particular, I will argue that the proposed theory of Lowering provides an explanatory solution to a well-known asymmetry in English  $\nu$ P-ellipsis.

We will begin with a very brief overview of ellipsis. The following data show that ellipsis is not just phonological, but is rather sensitive to syntactic and/or semantic concerns (i.e. it is not simply the case that a constituent that has a phonologically identical antecedent may be left unpronounced; antecedent in square brackets '[ ]'; elided constituent in angled brackets '<>'; see Tancredi 1992 for more):

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<sup>47</sup>Note that it is necessarily the case that the addition of an interrogative C feature to the morpho-syntactic feature bundle affects the VI process in anomalous *aren't* constructions. Whereas there is no Vocabulary item  $\{\{be, 1\text{SG}, \text{PRES}, \text{NEG}\}, [\text{æmnt}]\}$ , we might explain anomalous *aren't* as the result of a Vocabulary item  $\{\{be, 1\text{SG}, \text{PRES}, \text{NEG}, +Q\}, [\text{arnt}]\}$ . The Subset Principle would then correctly preclude usage of the latter Vocabulary item for the former bundle of features, i.e. in the absence of T-to-C movement.

<sup>48</sup>Note that these latter examples may not be cases of sentential negation at all, but rather constituent negation (i.e. a negative phrase adjoined directly to  $\nu$ P, perhaps in specifier position; see Johnson 1988).

- (41) a. John likes flying planes, and Bill likes flying planes.  
 b. John [likes flying planes], and Bill does <like flying planes>, too.

(41a) is four-ways ambiguous. Each string *flying planes* can be interpreted as either “aircraft that fly” or “piloting an aircraft”. The interpretation given to one string is not dependent on the interpretation given to the other string. However, the ellipsis example in (41b) can only be two-ways ambiguous; either both John and Bill like aircraft that fly, or they both like piloting aircraft. The interpretation of the elided string in the second clause must match identically that of its antecedent in the first clause. Following Rooth (1992), I attribute this restriction to a requirement of *structural isomorphism* between the elided and antecedent constituents (cf. Merchant 2001). That is, an elided constituent must have an identical syntactic structure to its antecedent, and, as a result, structurally ambiguous mismatches like in (41a) will be impossible in ellipsis constructions. We will thus assume that structural isomorphism, or *parallelism*, is required for all cases of ellipsis.

With this in mind, now consider the following data, which all involve ellipsis of a vP constituent:<sup>49</sup>

- (42) a. Bill will eat, but Mary already did/has/\*was.  
 b. Bill ate, and Mary did/will/has/\*was, too.  
 c. Bill has eaten, and Mary did/will/\*was, too.  
 d. Bill was eating, and Mary ?did/?will/?has/was, too.<sup>50</sup>

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<sup>49</sup>In this section, I limit myself to coordination structures, since in these constructions the requirement on structural isomorphism/parallelism is more fixed than in e.g. constructions in which the elided constituent is found in an adjunct to the antecedent. For example, consider the following:

- (i) John likes flying planes because Bill does.

The ellipsis site here can be interpreted either as <*likes flying planes*> (with either interpretation, as above) or as <*fly planes*>; i.e., *John likes piloting aircraft because Bill pilots aircraft*. Under this latter interpretation, it may not in fact be the case that Bill enjoys piloting aircraft, but simply that he flies them. This interpretation is completely unavailable for the ellipsis site in the corresponding conjunction construction *John likes flying planes, and Bill does, too*, in which case it cannot be true that Bill simply flies planes, but hates doing so. This distinction is almost certainly due to the availability of different adjunction sites in (i). Here, the adjunct may attach to either the higher vP [*like flying planes*] or the lower vP [*fly planes*], giving rise to the variable interpretation of the ellipsis site, depending on the scope of the adjunct. However, in a coordination structure, such variable scope is impossible. Rather, the elided vP in the second conjunct must match identically the higher vP of the first conjunct and does not have exclusive access to just the lower vP. We will stick with coordination in order to avoid these ambiguities.

<sup>50</sup>See below for more on examples like this, in which the antecedent contains a progressive.

We observe here that *vP*-ellipsis is possible between any combination of finite tense, perfective aspect, and future tense, but that ellipsis of a progressive form is only possible when the antecedent is also progressive.<sup>51,52</sup> Again following Rooth's (1992) model of parallelism in ellipsis, this implies that the finite tense, perfective, and future forms are all structurally isomorphic, whereas the progressive is not structurally isomorphic with any of these.

Omaki (2008) argues that this asymmetry is due to a strong feature on progressive *-ing* that raises the verb, combined with his claim that head movement does not leave traces. Thus, given the absence of a copy of the verb in the progressive *vP* and the presence of a copy of the verb in all other forms, structural isomorphism cannot obtain between a progressive and non-progressive form. However, I argued earlier that head movement necessarily leaves traces (e.g. trace re-merger in Swedish *vP*-topicalization).<sup>53</sup> I claim here that we can instead account for this lack of structural isomorphism via the theory of Lowering, which derives non-isomorphic *vP* structures in a much more straightforward manner. Let's first consider the following structurally isomorphic *vPs*:

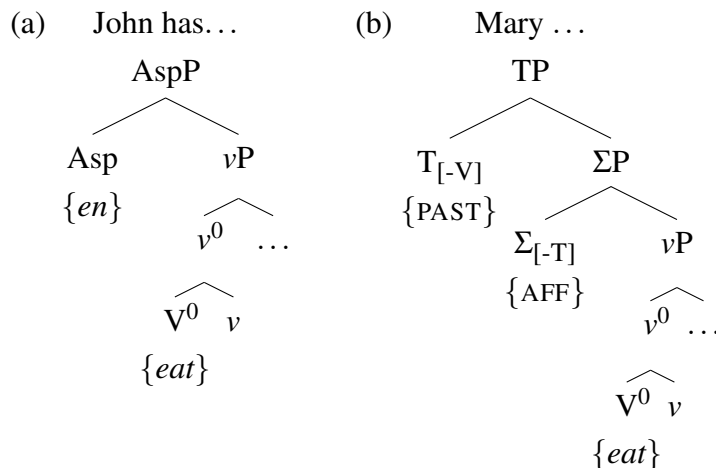
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<sup>51</sup>Modals also pattern with finite tense, perfective, etc. For example, *Bill has eaten, and Mary should, too*. However, there are certain semantic and pragmatic restrictions on all of these structures. For example, whereas *#Bill should eat, and Mary has, too* does not make much sense, the corresponding disjunction is perfectly acceptable, *Bill should eat, but Mary already has*. Note, however, that ellipsis of a progressive form with a non-progressive antecedent is unacceptable in both conjunction and disjunction constructions; e.g. *\*Bill ate at 5:00pm, but Mary already was at 4:00pm*. I therefore follow others (e.g. Lasnik 1995, Omaki 2008) in assuming that the prohibition against ellipsis in a mixed progressive coordination construction is structurally-based.

<sup>52</sup>Note also that the non-elided forms of these constructions are all acceptable, e.g. *Bill ate, and Mary was eating, too*. This suggests that it is not semantic limitations of coordination itself that disallow combinations of the progressive with other forms.

<sup>53</sup>Note also that a complete lack of head traces would make it difficult to account for the British English example *\*Have you ~~have~~ [have a good doctor]? No, but my cousin is <be a good doctor>*. Following Potsdam (1997), I assume that the ungrammaticality of this example can only result from a mismatch of trace copies of the moved heads, thus requiring that head movement leave traces.

(43) *John has eaten, and Mary did, too.*

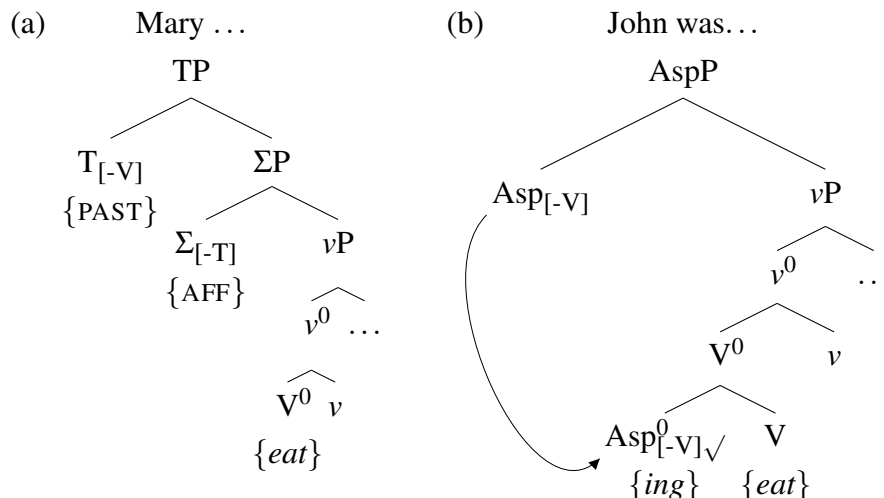


Here, since the *v*P<sub>s</sub> in (43a) and (43b) are isomorphic, as they each only contain the bare verb, *v*P-ellipsis is correctly predicted to be licensed. Now, in order to derive the lack of structural isomorphism between the progressive and all other forms, I propose that, instead of raising the verb to the progressive Asp head, the progressive head lowers to the verb, as follows:<sup>54</sup>

<sup>54</sup>Interestingly, the reduplicative aspectual morpheme in Tagalog, like the progressive in English, also denotes an unrealized aspect. While there may be no fundamental correlation here, the analyses of each morpheme presented in this thesis at least suggest that it might be possible to formulate a syntacticosemantic typology of heads that are potential candidates for Lowering cross-linguistically (i.e., cross-linguistically, heads that merge in a lower position in the functional domain are more likely to undergo Lowering than heads that merge in a higher functional position, which follows naturally from the theory of Lowering presented in this thesis).



(44) \**Mary ate, and John was, too.*



Progressive aspect, as it is a functional morpheme that always merges directly with a lexical vP, is an appropriate Spell-out trigger under our current analysis, and thus is a suitable candidate for a Lowering head. Therefore, Lowering of progressive Asp in (44b) adjoins this head to the complex head of vP, thus making the vP in (44b) structurally dissimilar to the vP in (44a). As a result, vP-ellipsis is correctly ruled out.

Note that the asymmetry between a Lowering progressive head and a non-Lowering perfective head has additional effects in British English. Consider the following vP-ellipsis examples (p.c. Lydia White):

- (45) *British English*
- a. John visited me, and Mary has, too.
  - b. John visited me, and Mary has done, too.
  - c. John was visiting me, and Mary was, too.
  - d. \*John was visiting me, and Mary was doing, too.

The most salient distinction here is that between (45b) and (45d). Whereas British English allows *do*-support for a stranded perfective morpheme, it cannot use this mechanism to rescue a stranded progressive morpheme. Note that structural isomorphism is met in each example in (45). However, when the vP is elided in (45d), the progressive morpheme must also be elided, unlike the perfective morpheme in (45b). Under the current analysis, this is due to the fact that the progressive morpheme has lowered into the lexical vP, and thus must be targeted

for ellipsis along with all other elements contained within that  $\nu$ P, whereas the perfective morpheme remains *in situ* outside of the lexical  $\nu$ P and so may be rescued at PF via *do*-support to satisfy the stray affix filter.<sup>55,56</sup>

Finally, note that for many speakers ellipsis of a non-progressive  $\nu$ P is acceptable when the antecedent is progressive, unlike when this situation is reversed:

- (46) a. Bill is eating now, but Mary already did at 5:00pm.  
b. \*Mary ate at 5:00pm, but Bill is now.

Following an idea put forth in Potsdam (1997), I suggest that this asymmetry is due to a simple recoverability condition on elided constituents, which is generalized very briefly as follows:

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<sup>55</sup>Note that British English allows two ways of dealing with the stranded perfective morpheme; either it is rescued under *do*-support or it is deleted (i.e. assigned null phonology). It is unclear why North American English only allows the latter mechanism. However, in the same vein as our previous discussion of dialectal differences, it could simply be the case that British English contains a Vocabulary item under *do*-support that successfully maps features onto a stranded perfective affix. This, of course, is not sufficiently explanatory.

Furthermore, it may be the case that  $\nu$ Ps in certain dialects of British English undergo *do*-replacement, rather than ellipsis (example from the television program *Little Britain USA*, Season 1, Episode 1):

- (i) Receptionist (*to little girl*): Do you want the double-hip replacement or not?  
Mother: No, clearly she doesn't need it.  
Receptionist: Well, she may do in the future.

Note, however, that the model above still holds in the case of *do*-replacement of  $\nu$ Ps. Namely, replacement will target the progressive morpheme, but not the perfective morpheme. In fact, a *do*-replacement model of these British English examples might help to explain why BE displays the string *have done*, but North American English does not. That is, it is not the case that *have done* in BE arises as a case of *do*-support of a stranded perfective morpheme, but rather is simply a standard case of Local Dislocation of the perfective morpheme with the *do* that has arisen under replacement of the  $\nu$ P. Thus, true *do*-support is not available for the perfective in either dialect. In any case, the observations still hold with respect to the unavailability of any of these operations in cases of the progressive under which either ellipsis or replacement of  $\nu$ P must target the lowered Asp head, as well.

<sup>56</sup>Though he does not address the issue, it's possible that Omaki's (2008) analysis could also account for this distinction. Under his raising analysis, the verb and the progressive morpheme also form a single complex constituent when ellipsis is evaluated. However, I will maintain the Lowering analysis above.

(47) *Ellipsis recoverability*

The morpho-syntactic/semantic information of an elided constituent must be recoverable from its antecedent. Consequently, an elided constituent may not contain more information than its antecedent.

This condition allows there to be a bit of leeway with respect to the parallelism constraint. Namely, parallelism becomes a subset relation, rather than an equality. In terms of the ellipsis asymmetry observed above, the proposed analysis of the progressive straightforwardly predicts that the condition in (47) will not be met when the elided constituent contains a lowered progressive morpheme and the antecedent does not. In this case, the elided *vP* contains an additional morpheme (the lowered progressive aspect head) that is not contained in the antecedent. However, when the elided *vP* does not contain a progressive morpheme, it is immaterial whether the antecedent contains this morpheme, as there is no need to meet recoverability of the progressive in this case.

In sum, I argue that the above asymmetry in ellipsis of the progressive form can be accounted for under a model in which the progressive Asp morpheme lowers into the lexical *vP*, following the model of Lowering presented earlier. This operation thus disrupts the structural isomorphism necessary for ellipsis with non-progressive forms. While there are, of course, several issues that remain to be addressed, I offer this analysis as a starting point for future research.

### 3.3 Section summary

In the previous sections, I argued that clitic negation and affirmation (i.e. the two versions of  $\Sigma$  heads) are more similar both within and across languages than previously thought. Furthermore, our analysis of auxiliary constructions and the model of Lowering developed here have allowed us to posit a theory of ellipsis that accounts for some interesting asymmetries in what is and isn't permissible in deletion within coordinated structures. While the above analyses are not intended to serve as exhaustive investigations of these patterns, the claims made here can undoubtedly take us in new and dynamic research directions in the future.

This concludes the current analysis of auxiliaries. In the following sections, I will address a few remaining issues in the model of Spell-out and downward movement proposed in this thesis.

## 4 Late adjunction

We will now look at another important aspect of the overall theory of downward movement presented in this thesis, namely the status of adjuncts. Recall that adjuncts are necessarily transparent for head-to-head Lowering, as is the case with all syntactic head movement. However, our theory of tense-hopping in English as Local Dislocation requires us to account for the absence of blocking effects of adjuncts that linearly intervene between the positions of finite tense and the verb. Following Lebeaux (1988) and Ochi (1999), I argued that this is due to the fact that adjuncts may be merged counter-cyclically, or “late”. In particular, adjuncts to  $vP$  are only merged after the tense and verb morphemes have undergone Spell-out, thus deriving the morpho-phonological locality necessary for Local Dislocation, as follows:

- (48) *John completely forgets the address.*
- a. Spell-out of CP:  
[John ^ -s ^ forget ^ the ^ address]
  - b. Local Dislocation of tense and the verb:  
[John ^ forget+s ^ the ^ address]
  - c. Late-merger of adjunct and Spell-out:  
[John ^ completely ^ forget+s ^ the ^ address]

In this section, I briefly address some remaining theoretical issues with this model of late adjunction, including the relation between narrow syntactic late adjunction and the creation of a phonological representation under Spell-out. This discussion will lead us to question the status of adjuncts as necessary blockers of Local Dislocation (Embick and Noyer 2001), which in turn will allow us to reanalyze a purported case of Lowering as pre-late adjunct merger Local Dislocation.

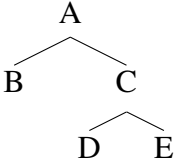
### 4.1 Conditions on late adjunction

As mentioned previously, Lebeaux (1988) argues that the complement/adjunct asymmetry observed below is accounted for by the possibility of counter-cyclic merger of adjuncts; namely, the adjunct is merged after *wh*-movement takes place, thus avoiding a Condition C violation (i.e. the pronoun in (49a) will not bind

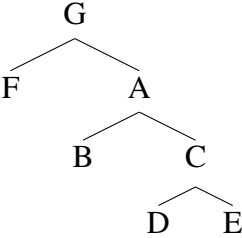
the R-expression in the adjunct, as the R-expression is not contained in the trace under reconstruction or a copy theory of movement, which is not the case for the R-expression of the complement in (49b)):

- (49) a. [Which argument that Bill<sub>j</sub> made]<sub>k</sub> does he<sub>i/j</sub> believe *t<sub>k</sub>*?  
 b. [Which argument that Bill<sub>j</sub> is a genius]<sub>k</sub> does he<sub>i/\*j</sub> believe *t<sub>k</sub>*?

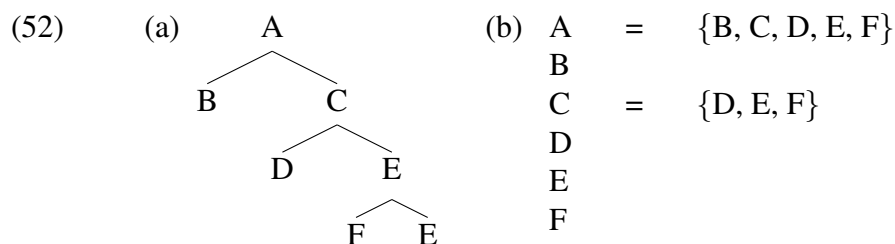
Stepanov (2000) goes one step further. Whereas it had been claimed previously that adjuncts *can* be merged late, he argues that they *must* be merged late. Briefly, Stepanov, following Watanabe (1995), advocates a “least tampering” model of syntactic derivation, which requires that the terms of a phrase marker not be altered until it is absolutely necessary to do so; i.e. once all other non-tampering mergers have been completed. To illustrate, consider the following phrase marker and its corresponding terms:

- (50) (a)  (b) 
$$\begin{array}{lcl} A & = & \{B, C, D, E\} \\ B & & \\ C & = & \{D, E\} \\ D & & \\ E & & \end{array}$$

Merger of an element F to the root of the phrase marker in (50a) creates no changes to the terms in (50b):

- (51) (a)  (b) 
$$\begin{array}{lcl} G & = & \{F, A, B, C, D, E\} \\ F & & \\ A & = & \{B, C, D, E\} \\ B & & \\ C & = & \{D, E\} \\ D & & \\ E & & \end{array}$$

However, merger to a non-root position (i.e. adjunction) necessarily requires that the terms in (50b) be redefined:



Essentially, Stepanov argues that economy considerations of syntactic derivation require that terms not be altered, or “tampered with”, during the normal course of derivation. Redefinition of terms may only occur if all normal, non-tampering syntactic derivation is complete yet there still remain elements in the numeration that must be merged, i.e. adjuncts. Only projecting mergers to the root are “non-tampering” operations.<sup>57</sup> This requires that adjuncts necessarily be merged late, after all other syntactic operations.

Stepanov’s (2000) theory, by itself, supports the Local Dislocation analysis of English tense-hopping when combined with a model of cyclic Spell-out. Under this view, all mergers and Spell-out operations of non-tampering (i.e. non-adjunct) elements will occur before the late merger of adjuncts, thus allowing for string-adjacency of tense and the verb, as described above. However, this analysis becomes problematic when we take into consideration Nissenbaum’s (2000) *Linear Edge Condition*, repeated below (see Chapter 3, §3.2):

- (53) *Linear Edge Condition* (LEC) (Nissenbaum 2000)  
For any syntactic object *SO* accessed in an array, merge of new material is possible inside *SO* only at the linear edge.

The LEC thus requires that any late-merged material appear at the phonological edge of any previously spelled-out domain. While I will not go into Nissenbaum’s argument for the LEC here, I note that it supports the notion of structural phonological integrity of a phase. In particular, it allows for a system in which a phonological representation becomes impenetrable once it is created, thus lessening the burden on the syntax-phonology interface, as there will be no need to alter the linearization scheme within a phonological object. For example, late adjunction of a constituent *X* to a non-linear edge of a phonological object [*A* <sup>^</sup> *B*] would

<sup>57</sup>Presumably, adjunction to the root *A* in (50) would be a tampering operation, as the terms of *A* would have to be redefined; e.g., where  $A = \{B, C, D, E\}$ , merger of the adjunct *F* to *A* requires *A* to be redefined as  $A = \{F, B, C, D, E\}$ , since the merger does not project.

require the establishment of a new linearization scheme  $[A \wedge X \wedge B]$ . Instead, any new material will simply be concatenated to, rather than inserted within, existing material; e.g.,  $[X \wedge [A \wedge B]]$  or  $[[A \wedge B] \wedge X]$ . Clearly, however, the LEC is not straightforwardly compatible with Stepanov's (2000) model of late merger. In particular, a theory that included both of these restrictions would seem to only allow for late adjunction to the left or right of all overt elements contained within the matrix CP. Using the example above, the entire CP would undergo Spell-out after all non-tampering mergers, creating  $[John \wedge forget+s \wedge the \wedge address]$  after Local Dislocation. If late adjunction occurs at this point, the LEC would seem to predict that *completely* could only appear in a position in which it linearly precedes *John* or follows *address*. However, this is clearly not the case.

Note that, as argued previously, late adjunction to vP must occur after Spell-out of CP in order to derive the locality required for Local Dislocation of tense (in CP) and the verb (in vP). We must therefore maintain Stepanov's view of (very late) late merger. Nevertheless, I argue that this does not mean that we must abandon the LEC entirely. In terms of the problem at hand—very late adjunction to vP—a slight modification to our view of the structure of the phonological representation of a multi-phasal clause will allow us to maintain both very late merger and the LEC. Notice that the problem here arises due to a view of phonological phases as successively embedded structures, e.g.:

- (54) *Embedded phonological phases*
- a. Spell-out of vP  
 $[_{vP} \text{ forget } \wedge \text{ the } \wedge \text{ address}]$
  - b. Spell-out of CP  
 $[_{CP} \text{ John } \wedge \text{ -s } \wedge [_{vP} \text{ forget } \wedge \text{ the } \wedge \text{ address}] ]$

Here, the Spell-out of CP creates a single phonological object that now contains the previously spelled out vP and the newly spelled-out material from CP. Thus, in the phonological representation of (54b), there are only two phonological edges available, making the attested late merger to a medial position problematic. However, this problem is easily remedied if we assume that phases are not embedded within each other in the phonological representation, but are rather combined via the more usual PF process of linearization under concatenation, as

follows:

- (55) *Concatenated phonological phases*
- a. Spell-out of  $\nu$ P  
 $[_{\nu P} \text{ forget } \wedge \text{ the } \wedge \text{ address}]$
  - b. Spell-out of CP  
 $[_{CP} \text{ John } \wedge \text{ -s } ] \wedge [_{\nu P} \text{ forget } \wedge \text{ the } \wedge \text{ address}]$

Here, each phase remains a unique phonological object, and thus the edges of those objects will continue to be visible for the purposes of the LEC. Namely, after Local Dislocation of tense and the verb (note that these are still string-adjacent), an adjunct that adjoins late in the narrow syntax may still be spelled out at the phonological edge of the  $\nu$ P phase, as this is still considered a phonological phase edge. Therefore, it is possible to maintain the LEC under the view that late merger must always target a phonological phase edge, and that the edges of any derivational phase will always satisfy this criterion. Note that this creates a uniformity in phonological representations. Recall that Subwords are concatenated to Subwords, and M-words that contain those Subwords are concatenated to other M-words. Concatenation of phases that contain these M-words simply extends the pattern. In more general terms, this view specifies the domain of the LEC as the phonological phase, and that the status of a Spell-out domain as a phonological phase at PF remains unaltered by subsequent Spell-out operations.

I should point out that this proposal only concerns the *phonological* representation of phases, and therefore has no repercussions for narrow syntactic operations. For example, although the edge of  $\nu$ P remains a phonological edge for the purposes of late adjunction, this does not imply that it also will continue to be a phase edge for the purposes of narrow syntactic derivation. In other words, the narrow syntactic effects of derivation by phase are not reducible to the phonological impenetrability properties of a phase. If narrow syntactic phase constraints were governed simply by the fact that Spell-out to PF makes a domain phonologically impenetrable, then covert movement after PF Spell-out (e.g. as in Nissenbaum 2000) would be impossible; e.g. a quantifier that is spelled out to PF in object position must be able to undergo a subsequent narrow syntactic movement, despite the fact that it is found in a phonologically impenetrable position when this covert



movement takes place. Therefore, the narrow syntactic constraints on phases must be purely derivational, and are not attributable to properties of the phonology (see Chapter 5 for more).

Though it remains to be seen whether this view of the restriction on late merger and Spell-out will hold for other cases of late adjunction, it suffices to account for the basic tense-hopping pattern of English. In the following section, we look at some of the consequences of late merger for other cases of Local Dislocation.

## 4.2 Adjuncts as blockers of Local Dislocation?

If Stepanov (2000) is correct in that adjuncts are always merged during the last step of the derivation, then we predict that adjuncts will never be interveners for Local Dislocation operations between non-adjunct items, on the assumption that non-adjunct elements undergo cyclic Spell-out before late merger takes place. However, Embick and Noyer (2001) argue that the opposite is true, i.e. adjuncts are always blockers of Local Dislocation. Their argument stems from the patterns observed with synthetic versus analytic comparative and superlative constructions in English. As noted in Chapter 1, the comparative and superlative morphemes are generally realized as affixes when they take disyllabic or monosyllabic complements (e.g. *happi-er/happi-est*, *ugli-er/ugli-est*, *rich-er/rich-est*) but as free morphemes when their complements are phonologically larger (e.g. *more/most intelligent* but *\*intelligent-er/\*intelligent-est*, *more/most beautiful* but *\*beautiful-er/\*beautiful-est*). However, when an adjunct intervenes, a synthetic comparative is impossible, regardless of the phonological size of the modified adjective:

- (56) a. \*She is the incredibly smart-est student.  
b. She is the mo-st incredibly smart student.

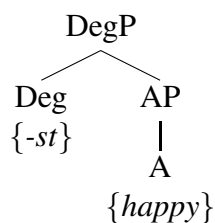
Embick and Noyer argue that this pattern arises due to the fact that the adjunct (i.e. *incredibly*) linearly intervenes between the comparative/superlative morpheme and the targeted adjective at PF (e.g.  $[-er \wedge \text{incredibly} \wedge \text{smart}]$ ), thus disrupting the locality required for Local Dislocation. This necessarily requires that the adjunct be present in the phonological representation when Local Dislocation of the comparative/superlative morpheme is evaluated, that is, the adjunct cannot be

merged on a later Spell-out cycle, contra the previous analysis of tense-hopping in English.

Nevertheless, as noted in Chapter 1, bracketing paradoxes with superlative/comparative constructions suggest that late adjunction may occur at the word-level. Newell (2005), following Nissenbaum (2000), argues that constructions such as *unhappier* are due to late merger of negative *un-*. Recall that *unhappier* has the logical structure [*more* [*not* [*happy*]]] rather than [*not* [*more* [*happy*]]]; i.e., the comparative degree head modifies the entire constituent *unhappy*. However, *unhappy* does not meet the phonological size condition for synthetic comparatives, as it is trisyllabic, yet the synthetic comparative is possible. Newell (2005) argues that this is due to late merger of *un-* (57b) after Spell-out and Local Dislocation of the comparative/superlative morpheme (57a) (recall that Local Dislocations that occur on an earlier Spell-out cycle cannot be undone by later Spell-out operations):

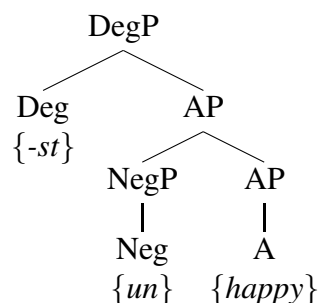
(57) *unhappiest*

a. Spell-out Cycle 1



$[-st \wedge \text{happy}] \rightarrow [\text{happiest}]$

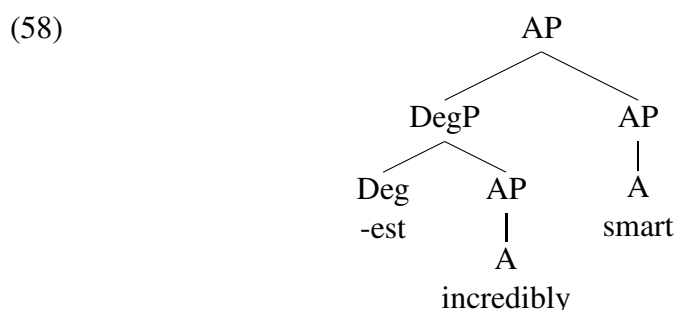
b. Spell-out Cycle 2



$[\text{un} \wedge [\text{happiest}]]$

Given this possibility of late adjunction at the word-level, we must ask why it is seemingly impossible at the level of the phrase. As again argued by Newell (2005) (see also Newell 2008), the answer is that the structure of adjunction in examples like (56) is unlike that of bracketing paradox examples like (57). Namely, the structure corresponding to the semantic interpretation of examples like (56) is  $[[\text{most} [\text{incredibly}]] [\text{smart}]]$ , rather than  $[\text{most} [\text{incredibly} [\text{smart}]]]$ . That is, the superlative directly modifies the adjunct *incredibly* rather than the entire modified adjective *incredibly smart* (i.e. the level of smartness is the most incredible, rather

than the level of incredible smartness being the highest). This requires that the degree head be merged along with the adjunct, as follows:



Given the structure in (58), as the superlative morpheme must be merged under the same adjunction operation as the adverb *incredibly*, there will never be a point in the derivation during which the superlative morpheme and the adjective are string-adjacent, since the adverb will be spelled out on the same cycle as the degree head. Local Dislocation is therefore correctly predicted to not take place, just as argued by Embick and Noyer (2001); i.e. the adjunct in a structure like (58) will always necessarily block Local Dislocation due to its merger properties.

However, we must still account for why the adjunct *incredibly* may not adjoin directly to the AP on a later Spell-out cycle, similar to *un-*. In other words, why can't we derive the structure [-est [*incredibly* [*smart*]]], which would allow for Local Dislocation under late adjunction? The answer, still following Newell, is again a semantic one. Note that a degree head may only scope over a gradable adjective:

- (59) a. more extravagant  
b. \*more dead<sup>58</sup>

Adverbs like *incredibly* also merge with gradable adjectives:

- (60) a. incredibly extravagant  
b. \*incredibly dead

Importantly, a modified gradable adjective is no longer gradable; that is, modification fixes the point of gradability of the adjective, making the resulting

<sup>58</sup>Of course, gradable readings can be forced onto non-gradable adjectives in certain pragmatic contexts. For example, consider a scenario in which there is an election in which two candidates are running for different offices. Candidate A wins 51% of the vote; Candidate B wins 98% of the vote. One might say that Candidate B is *more elected* than Candidate A, even though *elected* is normally a non-gradable adjective.

constituent (e.g. [*incredibly extravagant*]) non-gradable. Because of this, other elements that necessarily take semantically gradable arguments, such as the comparative/superlative, may not take this constituent as an argument. In this way, a structure like [-*est* [*incredibly* [*smart*]]] is ruled out on semantic grounds, since the argument of the superlative morpheme is the non-gradable [*incredibly* [*smart*]]. Crucially, negative *un-* does not convert a gradable adjective into a non-gradable one; rather, it simply reverses the directionality of the gradation, thus allowing for convergence at LF.

This analysis therefore implies that an adjunct will only be a blocker for Local Dislocation of non-adjunct elements if one of those elements is necessarily merged on the same cycle as the adjunct.<sup>59</sup> While this so far seems to hold, future research may require us to revisit the possibility of the early merger of adjuncts, contra Stepanov (2000).<sup>60</sup> For now, it suffices to note that the evidence supporting the possibility of late merger after Spell-out and Local Dislocation is strong.

### 4.3 Reanalysis of Bulgarian determiner-hopping

As mentioned at the end of Chapter 2, a Lowering analysis of determiner-hopping in Bulgarian DPs (as in Embick and Noyer 2001) is problematic under the system of downward movement proposed in this thesis. In (61), we see that a determiner in Bulgarian may undergo downward movement to a noun or an adjective, but not an adverb, which is transparent for the transformation:

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<sup>59</sup>This also allows for the possibility that an adjunct will be a blocker for another adjunct that is evaluated for Local Dislocation, as both of these will be merged late.

<sup>60</sup>For example, Embick (2007) argues that constructions like the following must be interpreted with the bracketing indicated; i.e., the adjunct alone directly modifies the adjective:

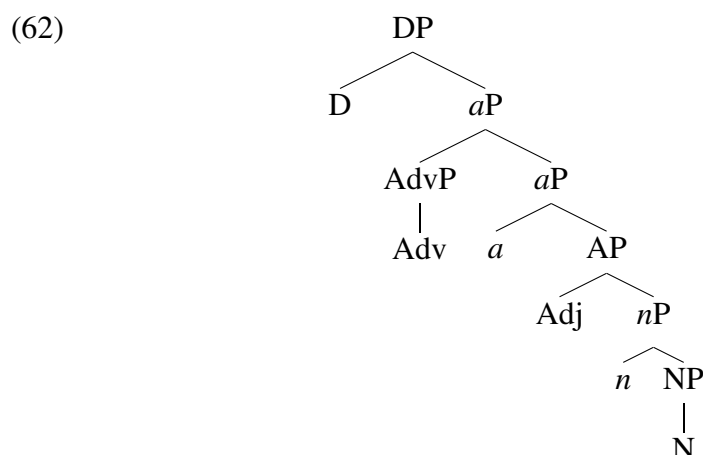
- (i) John is even [more [ploddingly slow]] than Bill.

Under the model proposed here, the unavailability of Local Dislocation in (i) requires that the adjunct be merged early. A possible explanation may lie in the “forced” gradability of the constituent [*ploddingly slow*] here (see fn. 58). In order to force gradability onto the complex constituent, it may—for reasons that are not yet clear—be necessary to merge the adjunct early rather than late. Under this tentative analysis, the forcing of gradability onto any otherwise non-gradable constituent must occur prior to the late-merger of adjuncts, and so late-merger of *ploddingly* in (i) would be impossible. This would correctly predict the impossibility of Local Dislocation in this case, but at this point such an analysis is merely conjecture that merits more extensive investigation.

- (61)
- a. kniga-ta  
book-DEF
  - b. xubaba-ta kniga  
nice-DEF book
  - c. \*mnog-ət star teatər  
very-DEF old theater
  - d. mnogo starij-ə teatər  
very old-DEF theater

If Lowering is feature-driven and phase-based, as argued, then a Lowering analysis of the above pattern would imply that either N or Adj may satisfy D's uninterpretable feature, and that both *nP* and *aP* are phases. While this latter claim is certainly plausible, the former raises questions as to the exact nature of the uninterpretable feature being checked here.

The model of pre-late merger Local Dislocation presented in this section allows us to easily explain the above pattern and obviate the problems of a Lowering account. In particular, following Embick and Noyer (2001), I assume the following general structure for Bulgarian DPs, with modifications for proposed phases (see Newell 2008):



Crucially, AdvP is an adjunct in (62), and, therefore, is merged late. Under the proposed model, the pattern of Bulgarian determiner-hopping is accounted for as a

category-insensitive Local Dislocation of the determiner before the late merger of adjuncts. D contains no uninterpretable feature to check under this analysis, but it must adjoin to the element directly to its right after it is spelled out.<sup>61</sup> The element directly to its right before the late merger of adjuncts will be either the adjective or the noun. I believe that this analysis captures the pattern more straightforwardly than a Lowering analysis, as it avoids the problem of optionality in feature-checking (i.e. Lowering to either Adj or N).

## 5 The consequences of cyclic Spell-out for verbal stem-allomorphy

The model of derivation and Spell-out advocated in this thesis has direct consequences for allomorphic variation in English verb stems. The data in (63) illustrate that regular inflected past tense verbs in English maintain separate, phonologically identifiable tense and stem/root morphemes. Crucially, note that the verb stem is phonologically identical to the uninflected form of the verb.

(63) Regular English verb stems

| <i>Uninflected</i> | <i>Past tense</i> | <i>Morphological form</i>                     |
|--------------------|-------------------|-----------------------------------------------|
| walk [wɔk]         | walked [wɔkt]     | [wɔk] <sub>STEM</sub> + [t] <sub>PAST</sub>   |
| help [hɛlp]        | helped [hɛlpt]    | [hɛlp] <sub>STEM</sub> + [t] <sub>PAST</sub>  |
| save [seɪv]        | saved [seɪvd]     | [seɪv] <sub>STEM</sub> + [d] <sub>PAST</sub>  |
| study [stʌdi]      | studied [stʌdid]  | [stʌdi] <sub>STEM</sub> + [d] <sub>PAST</sub> |

However, the table in (64) shows that several verb stems in English surface with distinct allomorphy in their past tense forms.<sup>62</sup>

<sup>61</sup>It is possible that *aP* is an early merged adjunct, rather than generated on the spine of the DP, and thus would still be a possible target for Local Dislocation of D.

<sup>62</sup>I represent the morphological make-up of these irregular forms in the traditional way, but see fn. 64.

## (64) Variable English verb stem-allomorphy

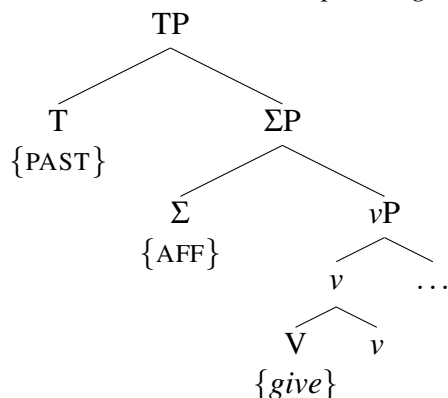
| <i>Uninflected</i> | <i>Past tense</i>                  | <i>Morphological form</i>                     |
|--------------------|------------------------------------|-----------------------------------------------|
| drink [drɪŋk]      | drank [dræŋk]<br>*drinked [drɪŋkt] | [dræŋk] <sub>STEM</sub> + [∅] <sub>PAST</sub> |
| teach [titʃ]       | taught [tɔt]<br>*tached [titʃt]    | [tɔt] <sub>STEM</sub> + [∅] <sub>PAST</sub>   |
| give [gɪv]         | gave [geɪv]<br>*gived [gɪvd]       | [geɪv] <sub>STEM</sub> + [∅] <sub>PAST</sub>  |
| stand [stænd]      | stood [stʊd]<br>*standed [stændəd] | [stʊd] <sub>STEM</sub> + [∅] <sub>PAST</sub>  |

These patterns raise the question as to how the combination of two individual morphemes may derive apparently bidirectional allomorphy within the framework of Distributed Morphology. In particular, given the model of English tense-hopping proposed in this thesis, we must ask when the conditioned allomorph of the stem enters into the phonological representation. The main goal of this section is therefore to address whether the overt allomorphs of the stems in (64) are assigned when the verb stem is first given phonological form after Spell-out, or if these forms surface as the result of a reanalysis of an extant phonological form after affixation under string-adjacency. For example, is the form [gɪv] readjusted to [geɪv] after Local Dislocation of the past tense morpheme, or is it simply the case that this intermediate stage never occurs, and [geɪv] is assigned directly to the stem during the first (and perhaps only) mapping of phonological features to the stem's morpho-syntactic feature bundle? I will argue that the model of Spell-out proposed in Chapter 3 supports a readjustment analysis for English verbal stem-allomorphy, i.e. the conditioned allomorph arises under phonological reanalysis only after a successful Local Dislocation operation.

There are two competing theories of stem-allomorphy that we will be addressing here. The first, advocated by Halle and Marantz (1993) and Embick and Marantz (2006), claims that VI applies in a strict bottom-up fashion, and may not look ahead to higher morpho-syntactic feature bundles when determining the phonological form of lower morphemes. In this way, variations in the morpho-phonology of lower morphemes due to the presence of higher morphemes is the result of morpho-phonological readjustment rules that apply after the higher morphemes are evaluated in the Vocabulary Insertion process. Under this view, the lower morphemes are assigned a default phonological representation, which

may later be altered when a higher morpheme is assessed by the phonological component. We represent the process of VI on an inflected verb, including such a morpho-phonological readjustment rule, as follows (recall that non-focused {AFF} is phonologically null):

- (65) a. *General structure corresponding to inflected verb*



- b. *VI applies to affixless stem*  
 {give} → [giv]
- c. *Past tense affix concatenated to extant overt stem*  
*(i.e. Local Dislocation applies)*<sup>63</sup>  
 [giv] + [-ed] → [grvd]
- d. *Morpho-phonological readjustment occurs*  
 [grvd] → [geiv]

Note here that, crucially, the phonological form of the stem is determined before affixation under string-adjacency. The form that results from affixation is later analyzed for readjustment.<sup>64</sup>

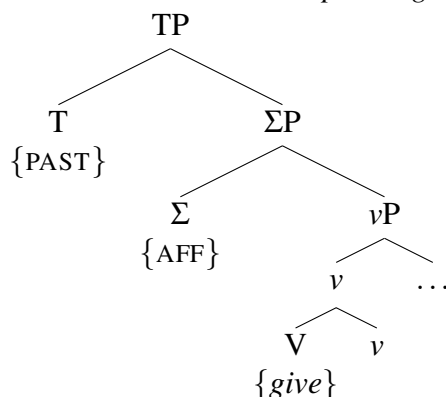
<sup>63</sup>Morphological regularity is assumed to hold at this intermediate stage. Furthermore, I assume that allomorphy of e.g. the past tense morpheme cannot be determined until after affixation via Local Dislocation. However, these assumptions regarding the details of affixal allomorphy will not be crucial for the main arguments of this section.

<sup>64</sup>Note that, in the cases in question, it is not necessary to assume that the past tense morpheme has null allomorphy, since it is the entire complex word (e.g. [grvd]) that is readjusted, and not simply a portion of this word. That is, it is not necessarily the case that there are two operations such that [giv] → [geiv] and [-d] → [∅], but it is rather just as possible (and perhaps more economical) that both the stem and the suffix are targeted as a unit for morpho-phonological readjustment. Thus, the allomorph that surfaces can be associated with features of both the stem and the affix, since the readjusted form only arises when both form a complex morpho-phonological object. Therefore, the allomorphy observed here is not stem-allomorphy *per se*, but rather stem+affix-allomorphy.



Many researchers have attempted to do away with such seemingly bulky readjustment rules (e.g. Siddiqi 2006), using the justification that it seems less than economical to provide a constituent with a phonological form just to have it undone or written over by a later process. For example, Bobaljik (2000a) proposes a model of contextual allomorphy under which it is theoretically possible to derive stem-allomorphy under affixation without resorting to intermediate phonological representations and subsequent morpho-phonological readjustment. Namely, it is argued that Vocabulary Insertion can look ahead to the morpho-syntactic features of higher heads (i.e. higher feature bundles) when determining the allomorph that will be mapped to a lower syntactic head.<sup>65</sup> In the case of English, this theory might be applied in the following way:

- (66) a. *General structure corresponding to inflected verb*



- b. *VI applies to affixless stem; minimal look-ahead to {PAST} feature in T is possible*  
 {give} → [geiv]
- c. *Past tense affix concatenated to extant overt stem*  
*(i.e. Local Dislocation applies; null allomorph surfaces)*  
 [geiv] + [∅]

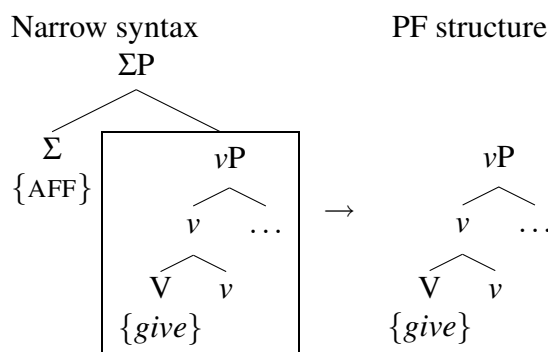
Under this model, the VI step in (66b) can look higher in the structure to the feature bundle in T, seeing that the stem {give} is in the scope of a past tense morpheme,

<sup>65</sup>Bobaljik (2000a) argues that, while higher morpho-syntactic features are visible to VI, the phonological representations of those features are not. Therefore, the phonological representation of higher affixes is predicted to never be able to affect the allomorphic representation of a base. However, as this is not the type of allomorphy we are currently dealing with, this limitation is not crucial to our discussion.

and thus assigns the allomorph [gerv] to the verb stem during this first (and only) pass of phonology.<sup>66</sup>

While Bobaljik's (2000a) limited look-ahead model allows for a simpler view of allomorphic variation under Vocabulary Insertion than a morpho-phonological readjustment analysis, it is untenable under the system of English tense-hopping proposed in this thesis. I will only briefly argue why this is case. Recall that we adopted a triggering model of Spell-out, under which a phase is sent to the PF branch and analyzed for phonology once a head from a higher phase is merged into the derivation. Recall also that all clauses in English are argued to include a non-adjunct  $\Sigma$ P projection below TP and above  $v$ P, as illustrated in (65a) and (66a). Thus, under most circumstances (i.e. in the absence of an aspectual auxiliary construction), the Spell-out trigger of the  $v$ P phase in English will be a  $\Sigma$  head. As a result, the main verb stem contained in  $v$ P will be sent to PF and assigned a phonological representation before T is merged into the narrow syntactic derivation, as illustrated below.

(67)  $\Sigma$  merges and triggers Spell-out of  $v$ P



Assuming that all elements that are sent to PF are analyzed for Vocabulary Insertion on that Spell-out cycle, it must be the case that the morpho-syntactic feature bundle of an English main verb stem (e.g. {give} above) is assigned phonology before a finite tense morpheme enters the syntactic derivation. Therefore, as such a morpheme is present neither in the structure at PF nor even in the narrow syntactic structure when phonology is first assigned to the verb stem, a look-ahead like that proposed by Bobaljik (2000a) cannot account for the patterns of stem-allomorphy

<sup>66</sup>Note that Bobaljik (2000a) does not explicitly address English verb stem-allomorphy (though see his fn. 20), but he does suggest that the system illustrated above applies generally in Germanic.

in English verbal paradigms. Simply put, all things being equal, the proposed model of Spell-out supports a morpho-phonological readjustment model of stem-allomorphy in English. Therefore, we can refine our previous claims about English verbal morphology in the following way: tense-hopping, including a possible morpho-phonological readjustment, will only occur in English when a finite tense morpheme is string-adjacent to a main verb.

Interestingly, the morpho-phonological forms of past participles in English pattern closely with the corresponding forms of the past tense. In the regular paradigm, these forms are homophonous (e.g. *the cat played with the string* and *the cat has played with the string*). Additionally, even certain irregular forms are identical under both inflections (e.g. *bet, bound, bled, brought, bought, caught, cut, fed, hung, kept, left, made, sought, sat, taught, won*, just to name a few; cf. *ate/eaten, became/become, began/begun, bit/bitten, forgot/forgotten, gave/given, hid/hidden, sang/sung, shook/shaken, sank/sunk*, etc., but note that many speakers overgeneralize the past tense/participle correlation in certain forms, e.g. *I have hid* for *I have hidden*, or, in some dialects, even *I have ate* for *I have eaten*, and, conversely, *he sung the song* for *he sang the song*.<sup>67</sup>). Recall that I argued earlier that the perfective aspectual morpheme adjoins to the verb via Local Dislocation, unlike the progressive aspectual morpheme, which adjoins to the verb via Lowering. Thus, the same morpho-phonological process adjoins both the finite past tense morpheme and perfective aspectual morpheme to a verb stem and, moreover, gives rise to similar (though not identical) patterns of allomorphic variation. Furthermore, the progressive inflection in English shows no morphological irregularity whatsoever (e.g. *be-ing, hav-ing, play-ing, see-ing*). While I will not attempt an in-depth analysis of these patterns here, I will simply remark that the correlation between the operation of Local Dislocation, which was motivated on independent grounds for both finite tense and perfective aspect in English, and morpho-phonological readjustment/verbal allomorphy is an intriguing one. Thus, the similar patterns of overt morphological variation in the past tense and perfective aspect, and the lack of such variation in the progressive, seem to lend support to the model proposed here, under which the former are derived in a similar morpho-phonological fashion (i.e. Local Dislocation) and the latter via a distinct morpho-syntactic operation (i.e. Lowering). Therefore, given that Local

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<sup>67</sup>This is particularly true of my native dialect (Southeast Virginia).

Dislocation is the latest available process of affixation, occurring only during or after the process of mapping phonological form on top of a syntactic structure, the fact that such morpho-phonological merger gives rise to such cases of allomorphy greatly strengthens the theoretical position of morpho-phonological readjustment rules.<sup>68</sup>

## 6 Chapter summary

We have dealt with a wide range of topics in the last two chapters. Nevertheless, from the analysis of different tense-hopping patterns of Swedish and English to the investigation of auxiliary verb asymmetries in both English and French, there has been the single underlying goal of explaining syntactic patterns of verb and tense morphology across languages without resorting to exceptional movement rules or multiple lexical entries. The greatest advantage to all of the proposals made here is that each morpheme requires only one underlying morpho-syntactic representation, and that any transformations involving that morpheme can be predicted from a simple set of structural and transformational constraints, including most importantly the PHIC and the possibility of Local Dislocation before the late merger of adjuncts. In order to derive these much simpler models of verb and tense morphology cross-linguistically, we have had to alter somewhat our view of how the language faculty creates structures. For example, we must accept that downward head movements are possible, though strictly and predictably limited. Additionally, we must allow for the possibility of checking strong morpho-syntactic features on the PF branch of computation. As I have shown, however, allowing for these few, yet crucial, adjustments to the derivational architecture produces a number of satisfying results. It is my hope that future research will continue to support the views and claims presented here.

In the following chapter, I conclude by briefly addressing a few more of the theoretical implications of the model of downward movement proposed in this thesis.

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<sup>68</sup>Swedish also displays past tense stem-allomorphy in verb paradigms: *springa* ‘to run’ → *sprang*/*\*springa-de* ‘ran’; cf. the regular *laga* ‘to prepare’ → *laga-de* ‘prepared’. Although finite T and the verb are contained in the same Spell-out domain in Swedish, as a result of Lowering, such allomorphy can also be accounted for under the morpho-phonological readjustment model proposed above for English, rather than a featural look-ahead like that of Bobaljik’s (2000a).

## 5

# Additional issues in the derivation and Spell-out of syntactic structure

## 1 Introduction

In this final chapter, we will look at a few issues that have been left unresolved in the previous analyses of downward movement. The goal of the following sections is to simply explore these issues and propose avenues of research that may lead us to eventually find solutions to the questions that arise. In Section 2, we revisit the Spell-out status of phrasal specifiers of phase projections, and I suggest that it is possible to devise of a model of cyclic Spell-out in which the phase head, its complement, and its specifier all undergo Spell-out on the same cycle. In Section 3, I note an apparent problem of the triggering model of Spell-out for covert phrasal movement. In particular, covert movement to SpecvP after merger of T appears to violate the constraint that all mergers target the root constituent (i.e. some version of the Extension Condition). I will suggest that a dual workspace model of syntactic derivation—as in Nunes (2001, 2004)—provides a possible solution to this problem, with the added implication that Lowering is a sideward movement between derivational phase workspaces. Section 4 provides a brief, overall conclusion to the thesis and suggests some additional areas for future research.

## 2 Ternary Spell-out Hypothesis

In the previous chapters I proposed the *Phase Head Impenetrability Condition* (PHIC), which requires that the head of a phase be included in the Spell-out domain of that phase, contra other models of Spell-out in which only the phrasal complement of the phase head undergoes Spell-out (e.g. Chomsky 2001, Nissenbaum 2000). However, I argued that this spelled-out head is still accessible due to an edge condition on phases; namely, higher narrow syntactic elements may target the least embedded (i.e. “topmost”) feature(s) of a spelled-out phase  $n$  any time before Spell-out of phase  $n+1$ . Thus, the least embedded feature(s) of a phase head—in other words, the feature(s) of the phase head itself—can be targeted for narrow syntactic movements.<sup>1</sup>

This raises the question as to whether the same scenario holds for the topmost *phrasal* constituent within a phase, i.e. the specifier of the phase head. Until now I have remained agnostic as to whether the specifier of a phase is included in the Spell-out domain of that phase. Assuming that the implications of the PHIC with respect to the Spell-out status of phase heads hold, we are left with two options regarding the Spell-out of specifiers: 1) a partial model of Spell-out in which just the phase head and its complement are included in the Spell-out domain, leaving the specifier of the phase intact, or 2) a full model of Spell-out in which the phase head, its complement, and its specifier are all included in the Spell-out domain of the phase.

In choosing between these two models of Spell-out, we should first note that the question of the status of specifiers under Spell-out of a phase becomes somewhat trivial in light of Uriagereka’s (1999) multiple Spell-out model. Consider the following data, which illustrate that extraction from a specifier is impossible (i.e. Huang’s (1982) *Condition on Extraction Domain* (CED) effects):

- (1) a. Who<sub>*i*</sub> did you see [a critic of *t<sub>i</sub>*]?  
       b. \*Who<sub>*i*</sub> did [a critic of *t<sub>i</sub>*] see you?

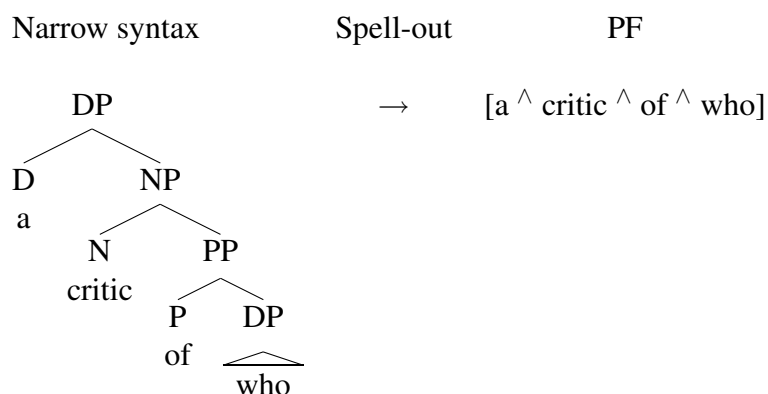
Uriagereka (1999) argues that such effects are accounted for if specifiers constitute their own Spell-out domains; i.e., in later terms, all specifiers are phases. In terms of

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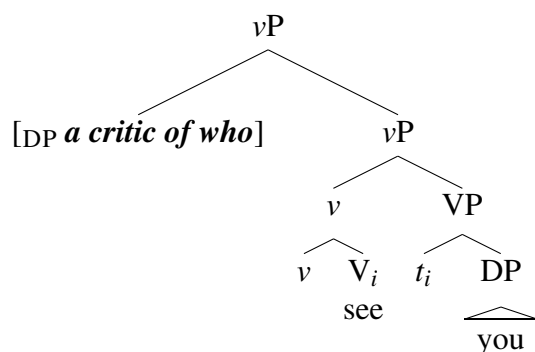
<sup>1</sup>Note that I allow for a situation in which multiple features may qualify as the “least embedded” features, as long as these are all contained in the phase head itself and not embedded in sub-constituents of that head.

the above example, the subject DP [*a critic of who*] is derived and spelled out before it merges to the SpecvP position, as follows (structures simplified; see the following section for a workspace model of derivation that allows for such a scenario):

- (2) a. Derivation of subject DP:



- b. Derivation of core vP:



When the subject merges in (2b), it is an already spelled-out—and thus impenetrable—domain. Clearly, since subjects may undergo subsequent narrow syntactic movement from SpecvP to SpecTP, the topmost (i.e. least embedded) feature of the phrase in SpecvP must be visible to higher syntactic constituents. However, the features embedded within these subject phrases are inaccessible. As Uriagereka points out, this not only accounts for the observed CED effects of subjects, but also allows for a simpler analysis of linearization at PF. In particular, the entire subject is analyzed as a single constituent for the purposes of linearization, and therefore it is not necessary to account for the linearization of sub-constituents within the subject with respect to the rest of the structure (e.g. *who* itself does not

need to be linearized with respect to elements in  $\nu P$ , as would be necessary under an approach to linearization like that in Kayne 1994).

If Uriagereka is correct that specifiers undergo Spell-out even before they are merged within a phase, then the issue of whether a specifier is sent (again) to PF on the Spell-out cycle of the phase reduces to the following question: is the (atomic) phrase in specifier position linearized with respect to the remainder of the phase on that phase's Spell-out cycle, and, if so, how might higher elements target that specifier for extraction (as a single unit)? I have already argued that the phase head may be targeted as a unit for extraction from the phase after Spell-out, and I now propose that it is possible that the specifier is subject to similar conditions on extraction from the phase. To this end, I suggest the following model of Spell-out (Jon Nissenbaum, p.c.):

(3) *Ternary Spell-out Hypothesis*

When a phase is triggered for Spell-out, the phase head, its specifier, and its complement are included in the Spell-out domain. After Spell-out of the phase, only the least embedded phrasal feature(s) (i.e. the topmost feature(s) of the phase's specifier) and head feature(s) (i.e. the feature(s) of the phase head) are accessible to higher elements.

As noted in the above definition, a ternary model of Spell-out requires that the least embedded features of both the phase head and the specifier be visible to higher elements; that is, if the specifier is included in the Spell-out domain of a phase, it is necessary that its least embedded feature still be accessible to higher narrow syntactic elements after this Spell-out operation *and* that the least embedded feature of the phase head also be accessible to higher elements. In this way, we simply need to modify our edge condition such that both the topmost phrase and head of a phase constitute the edge.<sup>2</sup> This scenario would allow for extraction of the phase head in the absence of extraction of the specifier, as some have argued is the case in Irish; i.e., the verb undergoes overt head movement to INFL but the subject remains *in situ* in Spec $\nu P$  (McCloskey 1991). Given the vastly different characteristics of head and phrasal movement, such a dual edge condition is not outside the realm of possibility. On this view, a spelled-out phase consists of three individual, atomized

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<sup>2</sup>I will assume that in the case of multiple specifiers, all specifiers are treated equally in terms of their inclusion in the Spell-out domain and their potential for extraction from the phase.



constituents [YP [X WP]]; the highest phrase, the specifier YP, may be targeted for subsequent phrasal movements and the highest head, X, for head movements, in keeping with the stated conditions on feature impenetrability.<sup>3</sup> This model of Spell-out essentially only modifies the view of the specifier position of a phase as an “escape hatch” for movement. In particular, the specifier of a phase constituent is an escape hatch for movement not because it lies outside the Spell-out domain of the phase, but rather because it is contained in the portion of the Spell-out domain that is still accessible to higher elements due to an edge condition on phases.

Such a model of Spell-out has some important consequences for certain syntactic phenomena. For example, this model supports an adjunct analysis of floating quantifiers, rather than a constituent analysis. Consider the following basic example of Q-float under a constituent analysis (e.g. Sportiche 1988):

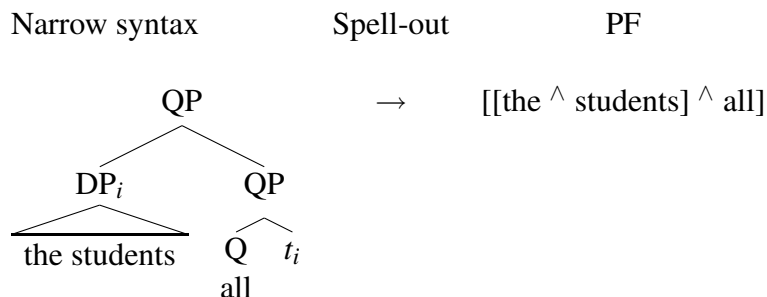
- (4)    a.    [QP All [DP the students]]<sub>i</sub> have *t<sub>i</sub>* left.  
           b.    [DP The students]<sub>i</sub> have [QP all *t<sub>i</sub>* ] left.

According to Sportiche, the semantic equivalence of the above examples implies that they are derived from the same underlying structure, namely that the QP [*all the students*] forms an underlying constituent in both. Under such a constituent analysis, the subject QP is first merged in SpecvP and then, in the Q-float example (4b), the embedded DP [*the students*] is extracted to SpecTP. Thus, it is argued that floated quantifiers arise when a movement operation has optionally targeted the complement of the quantifier, rather than the entire QP itself. Under Uriagereka’s multiple Spell-out analysis of CED effects, such a derivation is impossible; that is, [*all the students*] constitutes an impenetrable domain when it is merged in SpecvP. However, we might conjecture, as argued by Sportiche, that the embedded DP undergoes movement to SpecQP before extraction to SpecTP in a Q-float construction. Under Uriagereka’s model, this movement must occur during the isolated derivation of the QP, as follows:

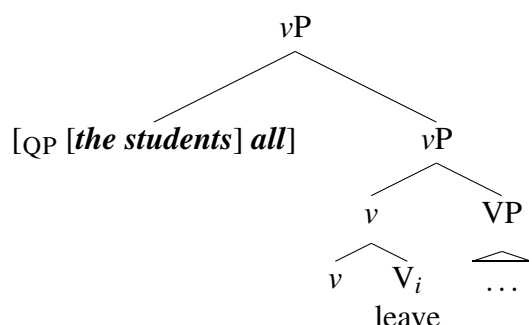
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<sup>3</sup>I will assume that extraction of the complement WP is only possible if it moves to the specifier of the phase before Spell-out—i.e., before PF Spell-out in the case of overt movement and before LF Spell-out in cases of covert movement; see §3.

- (5) a. Derivation of quantified subject; DP optionally raised to SpecQP:



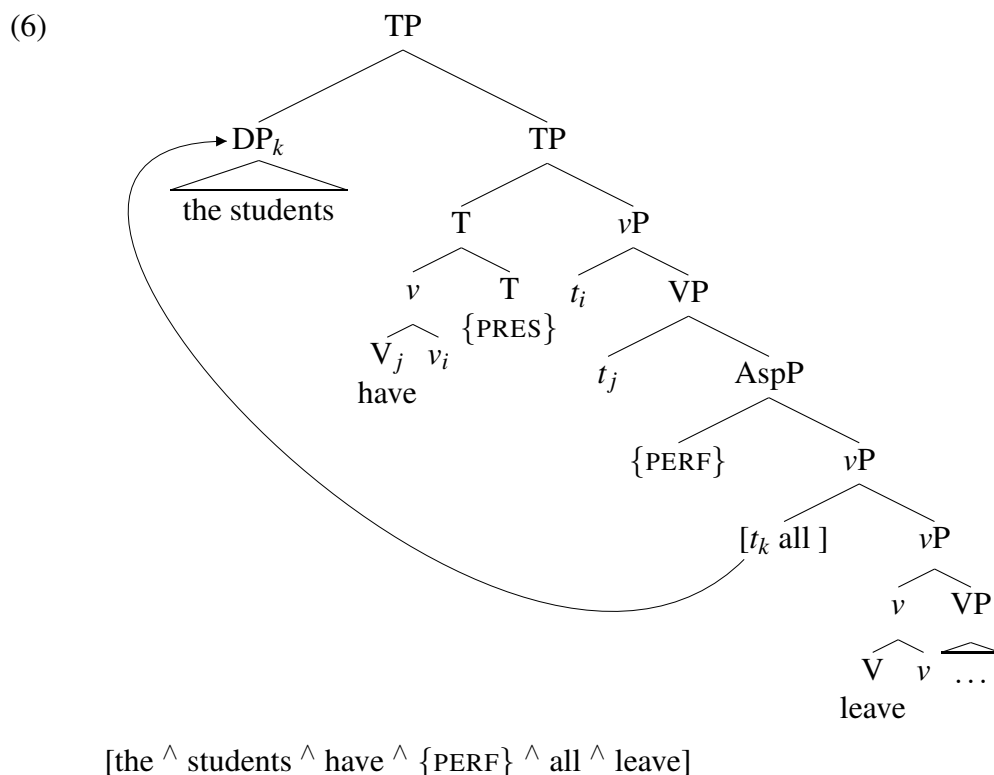
- b. Derivation of core vP:



After the derivation of (5b), the DP in SpecQP would be moved to SpecTP. Under a ternary model of Spell-out, this scenario requires not only that the specifier of the spelled-out phase be visible for extraction, but also that the specifier of that specifier (e.g. SpecQP) be independently accessible after Spell-out of vP. In such a case, the specifier of vP in (5b) would not be an individual, atomized constituent. This raises serious questions for the validity of a ternary model of Spell-out.<sup>4</sup> However, in lieu of addressing these, I simply note that a constituent model of Q-float is called into question by our previous analysis of perfective morphology in English. For example, if we assumed that movement from SpecQP were possible in (5b), this

<sup>4</sup>Even under Uriagereka's model, such a scenario requires that a phrasal constituent in the topmost specifier of a spelled-out domain be accessible for movement. However, Uriagereka's model, at least under a certain interpretation, can allow for such a movement. If we assume that the element  $[\text{QP } [\text{DP } \textit{the students}] \textit{ all}]$  is not included in the Spell-out domain of vP, then it is at least plausible that  $[\text{DP } \textit{the students}]$  in SpecQP is a visible "edge" for higher elements, since the QP has not been further embedded in a larger Spell-out domain. However, under a ternary model of Spell-out, the entire QP in SpecvP must become an atomized unit, and thus would only be targetable as such. Recall that under the model we are entertaining here, only the entire specifier and the entire head of the phase are targetable constituents, as only the least embedded features of these remain visible after Spell-out.

would derive the following structure and pre-Local Dislocation phonological string ( $\Sigma P$  omitted for clarity):



Here, Local Dislocation of {PERF} and *leave* is impossible, due to the intervening quantifier. Similarly, if a non-auxiliary example of Q-float like *the students all left* is analyzed such that *all* is left behind in SpecvP,<sup>5</sup> then Local Dislocation of finite tense and the verb would be impossible: [the  $\wedge$  students  $\wedge$  {PAST}  $\wedge$  all  $\wedge$  leave]. Following our morphological model, this suggests that the “floated” quantifier is actually an adjunct, as argued by Baltin (1995), and that, additionally, it is merged late.

The arguments both for and against analyses of Q-float as stranding (i.e. a

<sup>5</sup>That is, rather than an entire QP of a form like that in (5a) undergoing movement to SpecTP. Note that we cannot entirely rule out the possibility that a QP of the form [[*the students*] *all*] is moved to SpecTP in this example. Under a constituent analysis of Q-float, such movement is supported by modal examples like *the students all could leave*, in which *could* is in T and [[*the students*] *all*] in SpecTP. However, given the perfective example above, in addition to examples like *the students could all leave*, there is every indication that a floated quantifier can occupy a position that is lower than all functional elements. Thus, this should be the case in finite tense constructions, as well.

constituent analysis) or adjunction are extensive, given that the phenomenon of Q-float has garnered much attention over the past few decades. As an adequate overview of these proposals is outside of the scope of the current work, I simply note here that there are many other facts that call a constituent analysis into question.<sup>6</sup> For example, as noted by Williams (1982) and later investigated further by Dowty and Brodie (1984), it is not the case that all floated quantifiers are semantically identical to their non-floated counterparts; e.g. (from Bobaljik 2003):

- (7) a. All the contestants could have won.  $\diamond > \forall, \forall > \diamond$   
 b. The contestants could have all won.  $\diamond > \forall, *\forall > \diamond$

(7a) is ambiguous with respect to the relative scope of the modal and the quantifier, having either of the following interpretations: 1) it was possible that all the contestants would be winners, i.e. every contestant would receive a prize ( $\diamond > \forall$ ); or 2) every contestant had an equal chance to be the (possibly sole) winner ( $\forall > \diamond$ ). The Q-float example in (7b), however, only has the former interpretation, indicating that the floated quantifier can only take scope from its surface position. Note additionally that a non-floated quantifier can undergo quantifier-raising from an embedded clause to scope over a matrix subject, whereas a floated quantifier cannot:

- (8) a. Someone said that [**all** the students] have left.  $\exists > \forall, \forall > \exists$   
 b. Someone said that [the students] have **all** left.  $\exists > \forall, *\forall > \exists$

Though the scope-freezing facts of floated quantifiers are not entirely surprising, they do indicate that a notion of semantic equivalence cannot be used to justify a constituent analysis of Q-float.

Perhaps more convincing evidence against a constituent analysis is provided by the fact that not all floated quantifier constructions have grammatical non-floated counterparts, e.g.:

- (9) a. Bill, Ted, and Sue have **all** left.  
 b. \***All** (of) Bill, Ted, and Sue have left.
- (10) a. Some students might have **all** left together.  
 b. \***All** (of) some students might have left together.

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<sup>6</sup>See Bobaljik (2003) for a concise history of the developments in Q-float.

There is no clear way to posit a derivation of (9a) and (10a) in which the floated quantifier forms a constituent with the subject DP at any level, thus supporting an adjunct analysis. Though it remains unclear exactly how such an adjunct analysis of Q-float works, including the restrictions on such adjunction, I note that a ternary model of Spell-out is indeed compatible with such an analysis, assuming late adjunction. More precisely, if a subject in SpecvP does not contain a to-be-floated quantifier when vP undergoes Spell-out, the quantifier will play no role in the subsequent extraction of that phrase from the spelled-out phase; i.e., movement of this subject will not be movement from SpecQP (a specifier of a specifier of a phase), but rather simply movement directly from SpecvP.<sup>7</sup> Furthermore, a late-adjoined “floated” quantifier will never disrupt the string-adjacency required for Local Dislocation of non-adjunct elements.

Though there are of course several other issues that remain to be addressed with such a view of Spell-out, I will leave investigation of these for future research. For now, I simply note that, under the view of a triggering model of Spell-out, a ternary Spell-out model allows for the entire complement of the trigger to constitute the Spell-out domain. This allows us to reintroduce a more standard notion of locality in Spell-out operations. Under this model, all constituents within a phase are triggered for Spell-out when the next highest head merges. Under a model in which just the phase head and its complement, but not the specifier, are triggered for Spell-out by a higher head, we introduce a somewhat obscure head-to-head+complement relation; i.e., merger of a head triggers Spell-out of the first c-commanded head and its complement. While this is certainly a possible relation, the inclusion of the specifier in the Spell-out domain of a phase creates a more natural head-complement Spell-out relation between the triggering head and all the constituents of its phase complement.

As a final note, we might wish to ask if such a ternary model of Spell-out simply maintains the traditional view of complement Spell-out while redefining the set of (strong) phase heads. There are several ways in which it does not. For example, under a traditional model of Spell-out, a phase head  $\alpha$  sends its complement to Spell-out and no element within that complement may be extracted. Under the

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<sup>7</sup>I leave open the possibility that a late-merged “floated” quantifier adjoins to either vP or directly to the trace copy of DP, as both of these adjunction operations would satisfy the LEC. Additionally, note that this analysis crucially does not imply that non-floated quantifiers are adjuncts.

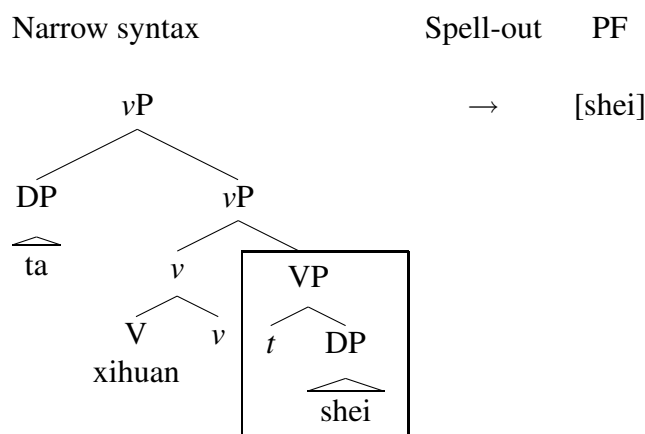
model proposed here, the specifier and head of the Spell-out domain may be extracted. Additionally, under the traditional view, only certain heads will spell out their complements, and they will do so consistently. Under the triggering model of Spell-out, the category of the triggering head is immaterial; the only requirement of a triggering head is that it not be contained in the previous phase's subarray. Thus, for example, a  $\nu P$  phase will undergo Spell-out if it merges with T, Asp, or  $\Sigma$ , but it is not necessarily the case that these heads spell out their complements; if T merges with a  $\nu P$  phase,  $\nu P$ —its complement—will undergo Spell-out, but if T merges with AspP, AspP will not undergo Spell-out, since its head is contained in the same phase sub-array as T. Thus, there is no notion in which a strong phase head spells out its complement, and, consequently, T, Asp, and  $\Sigma$  cannot be considered strong phase heads. Rather, all elements contained in a phase undergo Spell-out once derivation of a new phase begins. I believe this to be a conceptually simple and straightforward model of Spell-out, and it is my hope that future research supports it.

### 3 Covert phrase movement

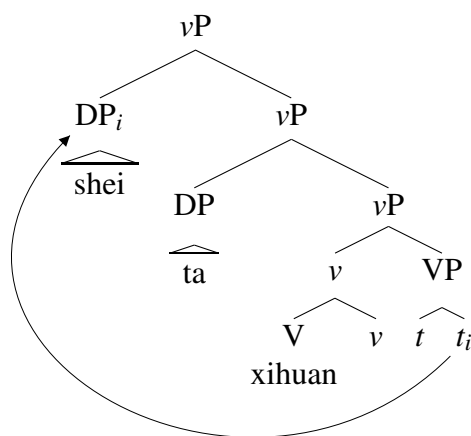
As is argued extensively in the literature (see, e.g., Nissenbaum 2000), covert movements take place within a phase immediately after completion of the Spell-out of the phase to PF. For example, in a *wh-in situ* language, a *wh*-phrase in object position will undergo movement to Spec $\nu P$  after that  $\nu P$  has been spelled out to PF. Under a traditional model of cyclic Spell-out, such movements are unproblematic. The following (simplified) example from Mandarin illustrates this:

(11) *Covert movement under a traditional model of cyclic Spell-out*

- a. Ta xihuan shei?  
 s/he like who  
 ‘Who does s/he like?’
- b. Merger and projection of  $v$ ; Spell-out of  $v$ ’s complement<sup>8</sup>



- c. Covert movement of object to Spec $v$ P



Under any formulation of the Extension Condition (i.e. all merger and re-merger/movement operations must target the root of the derivation; Chomsky 1993), the movement of the object DP in (11c) is admissible. After the derivation and Spell-out of (11b), the topmost  $v$ P unquestionably constitutes the root of the derivation. Thus, covert re-merger of the object DP to this  $v$ P in (11c) obeys the

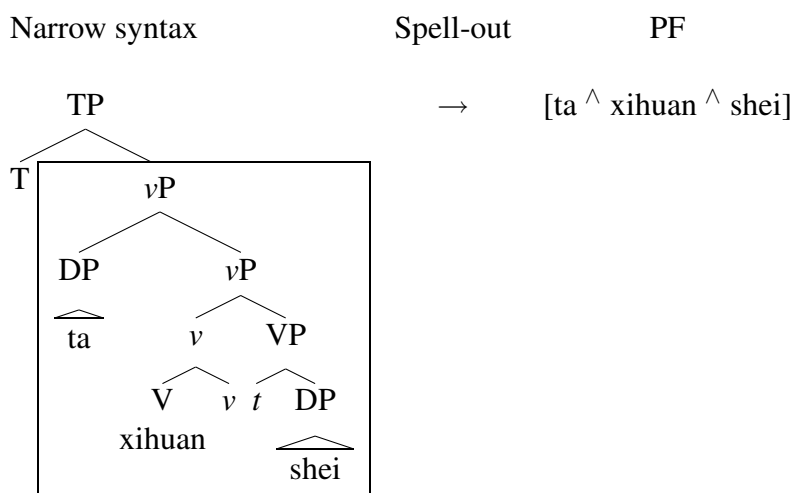
<sup>8</sup>I will follow the standard assumption that V-to- $v$  raising occurs before Spell-out under this model.

Extension Condition.<sup>9</sup>

Recall, however, that under the proposed triggering model of Spell-out, a phase is sent to PF only when the next highest head merges in the narrow syntax. This produces the following scenario for a covert movement like the one above:<sup>10</sup>

(12) *Covert movement under a triggering model of Spell-out*

a. Merger of T; Spell-out of triggered phase

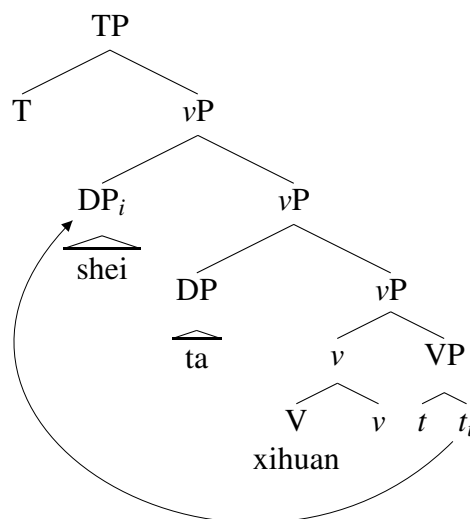


<sup>9</sup>The structure in (11c) does not adopt Richards's (2001) tucking-in model of multiple specifiers, under which movement to a filled specifier position creates a new specifier position below the extant one. However, such a scenario is not hugely problematic for the Extension Condition if we assume that any segment of the vP projection constitutes the "root"; in other words, creation of any specifier of the root obeys the Extension Condition. Nevertheless, we will be concerned with apparently more serious violations of the Extension Condition below.

<sup>10</sup>I adopt the ternary model of Spell-out here, though this plays no direct role in the problem we are addressing.



## b. Covert movement of object to SpecvP



Under a triggering model of Spell-out, this covert movement, as represented in (12b), would violate any formulation of the Extension Condition. Once T is merged in the narrow syntax, only TP (and possibly T) are valid targets for root-merger.<sup>11</sup> However, following standard assumptions, covert movements—just like overt movements—target the edge of the phase, rather than the edge of the phase trigger.<sup>12</sup>

There are certainly ways to work around this problem. For example, we could abandon any form of the Extension Condition altogether and simply specify that covert movement of a *wh*-phrase to SpecvP like in (12) occurs to check a weak uninterpretable feature found on *v*, under the perhaps uncontroversial assumption that weak uninterpretable features within a phase are simply checked after that phase undergoes Spell-out to PF.<sup>13</sup> Alternatively, we could follow Bobaljik (1995) and Groat and O’Neil (1996) in assuming that no phrasal covert movement exists at all; rather, covert movement is simply overt movement of formal features. If this

<sup>11</sup>See Nissenbaum (2000) for a version of the Extension Condition under which the “root” of the derivation consists of the topmost head (e.g. for head movement) and phrasal projections; c.f. Matushansky (2006).

<sup>12</sup>See, for example, the data from Legate (2003) in Chapter 3, §3.1. Note, however, that although Chomsky (1995) takes cyclic derivation (i.e. the Extension Condition) to be a property only of overt merger operations, the later advent of a phase-based model of Spell-out has allowed us to apply the same cyclic characteristics to covert mergers, as well (see Nissenbaum 2000).

<sup>13</sup>Recall that the model of derivation and Spell-out advocated in this thesis requires only that narrow syntactic operations check as many strong uninterpretable features as possible before Spell-out of a phase to PF, following the Earliness Principle.

were the case, then overt movement of the phonologically invisible formal features of the *wh*-phrase in (12) may occur to the root before T merges, thus obeying the Extension Condition. That is, “covert” feature-movement would occur to SpecvP before T merges and triggers the phase for Spell-out to PF.

However, I follow Nissenbaum (2000) (and many others) in assuming that overt and covert movements are more alike than dissimilar, with the only primary difference between the two being their timing with respect to PF Spell-out. Thus, I will maintain that phrases move covertly after Spell-out to PF, and that the structural restrictions on such phrasal movements mirror those of their overt counterparts. Furthermore, although the derivational architecture proposed in this thesis clearly does not allow for an inviolable Extension Condition—cf. the availability of narrow syntactic head-to-head Lowering—, I believe that the most economical theory of syntactic derivation would adhere to some form of the Extension Condition for non-last resort movement operations, e.g. covert phrasal movements.

We are thus faced with the problem of how to allow for the apparent non-root merger of the covert movement in (12). I suggest that a solution can be found in a workspaces model of syntactic derivation. As suggested by Uriagereka’s (1999) model of multiple Spell-out, and further illustrated by Nunes (2001, 2004), syntactic derivation of a larger structure may take place in smaller, independently isolated and separate sub-derivations. In other words, sub-parts of a construction may be created in individual, possibly simultaneous derivational workspaces. Nunes (2001) implements such a model to argue that presumably non-cyclic movements are, in fact, cyclic within their particular derivational workspace. For example, recall Lebeaux’s (1988) observation that relative clause adjuncts may be merged countercyclically:

- (13) a. \*[which [claim [that Bill<sub>1</sub> is a genius]]]<sub>j</sub> does he<sub>1</sub> believe  
           [which [claim [that Bill<sub>1</sub> is a genius]]]<sub>j</sub>.  
       b. [which claim [*Op<sub>i</sub>* that Bill<sub>1</sub> made *Op<sub>i</sub>*]]<sub>j</sub> does he<sub>1</sub> believe  
           [which claim]<sub>j</sub>.

Under most accounts of the late merger operation in (13b), the DP [which claim] undergoes movement to SpecCP and the relative adjunct [*Op<sub>i</sub>* that Bill<sub>1</sub> made *Op<sub>i</sub>*] is then merged countercyclically to the DP, as follows:

- (14) a.  $[_{CP} [_{DP} \text{ which claim}]_j \text{ does he}_1 \text{ believe } [_{\text{which claim}}]_j]$   
 b.  $[_{CP} [_{DP} [_{DP} \text{ which claim}] [_{Op_i} \text{ that Bill}_1 \text{ made } Op_i]]_j \text{ does he}_1 \text{ believe } [_{\text{which claim}}]_j]$

The countercyclic merger in (14b) clearly does not satisfy the Extension Condition, as the relative adjunct does not merge directly with the derivational root, CP.

Nunes argues that we can obviate this violation by adopting a dual (or multiple) workspaces model of derivation, in addition to allowing for movement between these simultaneous workspaces (i.e. *sideward movement*). An example like (13b) would be derived in the following way:

- (15) a.  $K = [_{CP_1} \text{ does [he believe [which claim]}^k]$   
 $L = [_{CP_2} Op_i \text{ that Bill made } Op_i]$   
 b.  $K = [_{CP_1} \text{ does [he believe [which claim]}^k]$   
 $M = [_{CP_2} [\text{which claim}]^k [_{CP_2} Op_i \text{ that Bill made } Op_i]]$   
 c.  $[_{CP_1} [_{CP_2} [\text{which claim}]^k [_{CP_2} Op_i \text{ that Bill made } Op_i]]$   
 $[_{CP_1} \text{ does [he believe [which claim]}^k]]$

Derivation of the relative clause adjunct L occurs in a separate workspace from the derivation of the core sentence K (15a). Sideward movement of *[which claim]* from K in (15b) merges this DP to the root of L, forming the new phrase structure M in keeping with the Extension Condition. Likewise, subsequent merger of M to K obeys the Extension Condition, creating the final form in (15c). In other words, all mergers and re-mergers consistently target the root of a derivational workspace.<sup>14</sup>

Returning to the problem of covert movement under a triggering model of Spell-out, we can simply adopt this multiple workspace model to provide different workspaces for each phase. More precisely, derivation of a new phase begins in a separate derivational workspace from that of the previous phase. It was previously argued that phases correspond to lexical and functional derivational workspaces, and I now suggest that these may be structurally separate at least at a certain point in the derivation. The following illustrates this for our previous example:

<sup>14</sup>Note that sideward movement cannot work similarly for complement structures. For example, if  $L = [\text{that Bill is a genius}]$ , sideward movement of *[which claim]* would produce  $[[\text{which claim}] [\text{that Bill is a genius}]]$ . Here, *[that Bill is a genius]* is not the structural complement of *claim*. As Nunes points out, if such a structure converges at all, it will produce a deviant interpretation at the C-I interface.

- (16) Ta xihuan shei?  
 s/he like who  
 'Who does s/he like?'
- a.  $K = [_{vP} \text{ ta xihuan shei}]$   
 $L = [T]$   
*K is triggered for Spell-out to PF once derivation of L begins; i.e. once elements from a new phase sub-array are selected by the derivational component*
- b.  $M = [_{vP} \text{ shei}_i [_{vP} \text{ ta xihuan shei}_i]]$   
 $L = [T]$   
*Covert movement of shei to SpecvP targets the root of K*
- c.  $[_{TP} T [_{vP} \text{ shei}_i [_{vP} \text{ ta xihuan shei}_i]]]$   
*T combines with its vP complement once all overt and covert operations within the complement are complete*

Such a workspace model allows us to maintain strict cyclicity for non-last resort movements, and requires only a few minor modifications to the model of Spell-out proposed in previous chapters. For example, as noted in (16a), creation of a new phase workspace triggers Spell-out of the previous phase workspace, rather than Spell-out being triggered by direct merger of a phase with a non-tautophasal element. Here, a phase will only undergo direct merger with a non-tautophasal element once all overt and covert operations within the phase are complete, that is, after PF and LF Spell-out of the phase. Thus, any movement that targets the phase root before the phase undergoes merger with this other element will obey the Extension Condition. Furthermore, a Lowering operation may no longer be viewed, strictly speaking, as movement of a head to the head of its complement, but must rather be defined as a sideward movement between derivational workspaces. Schematically, Lowering of T is represented as follows under this model:

- (17) a.  $K = [_{vP} \text{ Subj } [_{vP} \text{ v+V Obj}]]$   
 $L = [T]$   
*K triggered for Spell-out once derivation of L begins*
- b.  $M = [_{vP} \text{ Subj } [_{vP} \text{ v+V+T Obj}]]$   
*T undergoes sideward movement to topmost head of K due to the PHIC*

Such a view of Lowering under a triggering model of Spell-out differs only minimally from our previous proposals regarding this transformation. The motivations underlying the transformation are the same as before, and this model likewise limits Lowering to the head that will ultimately take the phase as its complement, i.e. the first head merged in phase  $n+1$ . The only difference here is that the operation that combines the workspace containing phase  $n$  and the workspace containing the potentially Lowering head takes place after both Lowering to and covert movement within phase  $n$  are evaluated. Thus, any mergers that target the root of the phase before the phase undergoes merger with a head from another workspace will obey cyclicity.<sup>15</sup> Though much more research into a workspaces model of Lowering is clearly necessary, I have presented it here simply as a possible means to resolve the apparent conflict between a triggering model of Spell-out and the presence of post-triggering covert movement.

## 4 Conclusion

Although the primary goal of this thesis has been to provide a principled account of downward movements within the framework of contemporary linguistic theory, the issues that have arisen as a result of this investigation bear directly on the most basic characteristics of linguistic computation. In this last section, I will briefly summarize some of these claims and their implications, and make a few suggestions for future avenues of research.

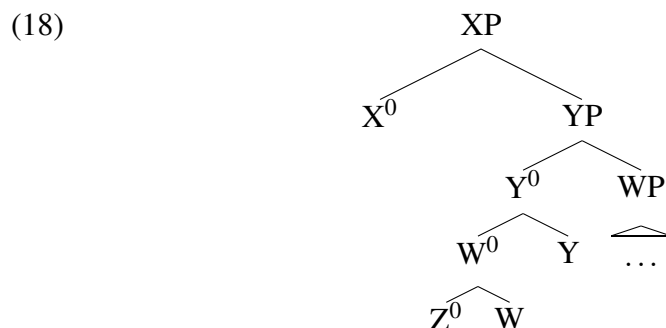
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<sup>15</sup>Nunes (2001) also uses the multiple workspaces and sideward movement model to derive a system of upward head movement that obeys the Extension Condition. For example, upward head movement of the verb in (17) may proceed as follows:

- (i) a.  $K = [_vP \text{ Subj } [_vP \text{ } v+V \text{ Obj}]]$   
 $L = [T]$
- b.  $K = [_vP \text{ Subj } [_vP \text{ } v+V \text{ Obj}]]$   
 $M = [v+V+T]$   
*The verb undergoes sideward movement to merge with the root of L*

Note, however, that sideward head movement in the opposite direction, as shown in (17), necessarily violates the Extension Condition, assuming our representations of the derivational workspaces to be accurate. Nevertheless, as stated previously, I do not consider this to be a problematic state of affairs, given the last resort nature of Lowering.

In Chapter 2 I made the claim that a Lowering head may target any  $X^0$ -level projection of the complex head of its complement—as a result of the *Head Adjunction Condition* (HAC)—, thus deriving the observed cases of morphological optionality via purely syntactic means, rather than conditions on morpho-phonological output representations. To account for the optionality in this movement, I argued that in a structure like the following, every zero-level projection contained within the complex head is structurally equidistant from  $X^0$ :



However, I now suggest that we can view the HAC from a slightly different perspective; namely, the HAC correlates with a general requirement that a moved head c-command the same elements as its landing site. Note that upward head movements produce a scenario in which the derived c-command domain of the moved head includes the c-command domain of its targeted landing site. For example,  $X^0$  in (18) c-commands YP, but  $Y^0$  does not c-command YP, since  $Y^0$  is dominated by YP but YP does not dominate itself; i.e., it is not the case that every category that dominates  $Y^0$  also dominates YP. Upward head movement of  $Y^0$  to  $X^0$  will alter the c-command relations such that  $Y^0$  also then c-commands YP (see Kayne 1994). Let us assume, for the sake of argument, that Lowering of  $X^0$  for feature-checking purposes in (18) must meet this same requirement, namely that the derived position of  $X^0$  c-command (at least) the same constituents as  $Y^0$ . That is, the targeted landing site of movement of  $X^0$  is simply  $Y^0$ .  $Y^0$  c-commands WP, and so, under this view,  $X^0$  must also c-command WP after it moves (or, since this is Lowering, it must continue to c-command WP). This scenario is obtained whether  $X^0$  adjoins to  $Y^0$ ,  $W^0$ , or  $Z^0$ , since all of these projections c-command WP.<sup>16</sup> Here, YP is the first projection all segments of which dominate  $Z^0$ ,  $W^0$ , or  $Y^0$ , and YP

<sup>16</sup>As argued in Chapter 2, adjunction to any of these zero-level projections will also create the locality necessary for feature-checking.

also dominates WP. Thus,  $X^0$  will also c-command WP if adjoined to any of these zero-level projections. The requirement that a moved head c-command the same constituents as its targeted landing site is therefore met.

If we accept that this requirement on c-command relations is a principle that underlies head movement, then we not only gain more support for the proposed optionality of landing sites when moving to a complex head, but we also gain a bit more understanding of head movement, in general. For example, on this view, it is not necessary to posit a requirement that a moved head c-command its trace. Rather, a moved head must simply c-command the same elements as the head that it adjoins to. If we adopt the Head Movement Constraint as a primitive of derivation, then these different requirements amount to the same thing in the case of upward head movement, but not downward head movement. Importantly, such theoretical questions only arise when we take downward movements into consideration, which I believe exemplifies the importance of incorporating these transformations into our core linguistic theory.

I have gone on to show that all of the observed instances of Lowering take place across what are independently assumed to be phase boundaries. For example, Lowering of a reduplicative Asp head to  $v$  in Tagalog and Ndebele, Lowering of T to  $v$  in Swedish, Lowering of progressive Asp to  $v$  in English, and Lowering of a discourse-related agreement morpheme to C in Turkish. Not only does this fact bolster support for a theory of phase domains, given that we can develop a syntactic typology of potentially Lowering heads in terms of their structural adjacency to such domains, but it also points to a causal link between cyclic Spell-out and Lowering. Adopting a feature-checking approach for all syntactic movement, I have formulated this link in terms of the *Phase Head Impenetrability Condition*, under which the process of Spell-out makes features embedded within the head of the phase inaccessible to higher heads, which can motivate Lowering as a last resort feature-checking mechanism. The very specific last resort nature of this transformation allows us to maintain some form of an Extension Condition as a factor in derivational economy.<sup>17</sup> In other words, syntactic structure-building operations will follow the Extension Condition except in those cases where doing

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<sup>17</sup>This is assuming that upward head movements may be incorporated as standard, completely economical transformations under some version of the Extension Condition, e.g. as in Matushansky (2006) or Nissenbaum (2000).

so would create a crashing representation. This is also essentially the reasoning of Stepanov (2000, 2001) for the late merger of adjuncts. A derivation will proceed via the most economical means possible—i.e., it will obey the Extension Condition—until it is forced to violate considerations of economy in order to satisfy Full Interpretation. In the case of adjuncts, as their merger does not extend the tree, they will be merged only after all tree-extending mergers are complete. Likewise, in the case of feature-checking via head movement, all such movements will be upward except when this is made impossible due to phase impenetrability. Note, however, that these less economical operations are tightly constrained; e.g., in the case of Lowering, this last resort mechanism is only available to the head that takes the phase as a complement, and, in the case of late adjunction, merger is only possible in accordance with the Linear Edge Condition (Nissenbaum 2000). In this way, these last resort and/or necessarily late operations inform our understanding of the fundamental aspects of derivational economy. That is, crudely, the exceptions prove the rules.

In later chapters, I have shown that the downward transformation of tense-hopping, and its variations cross-linguistically, can not only be incorporated into an overall architecture of derivation, but also that it can enlighten us as to some additional fundamental properties of that architecture. The following is just a brief summary of some of the implications of the morphological model of tense-hopping proposed in this thesis.

### **Domain-based Triggered Spell-out Hypothesis**

#### **Triggered Spell-out**

Any theory of head-to-head Lowering necessarily requires that the Lowering head be present in the syntactic derivation before it lowers. I have argued that this obtains, in combination with the PHIC, via a triggering model of Spell-out, under which the Spell-out process of a phase begins only after merger of the next highest head (i.e. once derivation of a new phase begins). I have argued that there are certain conceptually desirable consequences of this model. For example, it is no longer necessary that any lexical item be pre-specified with instructions to spell out a certain domain. Rather, the Spell-out operation occurs naturally due to a



derivational shift from one phase sub-array to another.<sup>18</sup>

In terms of tense-lowering in Swedish, this allows for derivations in which the following order of operations takes place in V2 matrix clauses: 1) T merges with  $\nu$ P and triggers  $\nu$ P for Spell-out; 2) T lowers to  $\nu$  in the narrow syntax during the Spell-out process of  $\nu$ P (i.e. T undergoes “piggyback” movement to check its [-V] feature); and 3)  $C[-T]$  then merges, targeting the most recent copy of T, which is now adjoined to the verb, and thus pied-pipes the complex  $\nu+V+T$  head. As I have argued, this allows for a more uniform feature-based analysis of V2-type phenomena cross-linguistically.

### Domain-based phases

Related to the triggering model of Spell-out, I have argued that phase sub-arrays are grouped along the standard lexical vs. functional vs. discourse division, following the patterns observed here and the claims of Grohmann (2003). Thus, for example, under the model of triggered Spell-out, lexical elements (the  $\nu$ P domain) will not be triggered for Spell-out until a functional element (the CP domain) is merged into the derivation.<sup>19</sup> This allows for a natural separation among cyclic domains on the assumption that the pre-syntactic selection of morpho-syntactic feature bundles groups these according to their classification as lexical, functional, or discourse-related. It is this derivational shift between domains that drives the Spell-out process, making Spell-out an automatic, predictable operation that involves no evaluation of the syntactic domain that is spelled out.<sup>20</sup> Additionally, we have seen that there may be cross-linguistic variation with respect to this classification in certain questionable instances, e.g. the inclusion of auxiliary verbs in the lexical or functional sub-array; for example, Swedish (possibly) vs. English and French.

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<sup>18</sup>Again, see Svenonius (2004) and Grohmann (2003) for related arguments.

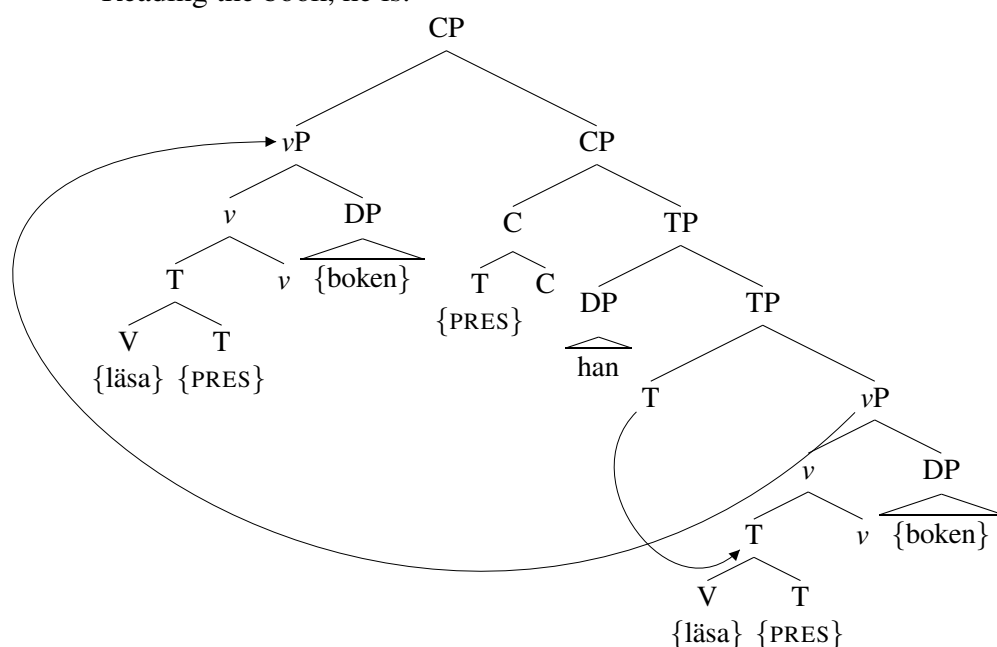
<sup>19</sup>See the previous section, in which it was suggested that a phase workspace  $n$  does not directly merge with an element from another phase workspace  $n+1$  until after both PF and LF Spell-out operations have applied to phase  $n$ .

<sup>20</sup>For example, it is not the case that the computational component will send a domain to Spell-out only once all of its relevant uninterpretable features have been checked—this would re-introduce an S-structure-type level of representation—, but rather that a phase undergoes Spell-out only and always when derivation of the next phase begins (or the entire derivation is complete). As I have argued, the Earliness Principle holds in that any strong uninterpretable features will be checked as soon as possible. However, this does not entail that all strong uninterpretable features will be checked before Spell-out. See below.

### Stowaway movement

A consequence of the narrow syntactic analysis of Lowering is the possibility of stowaway movement, under which a head X lowers into a constituent Y, with a subsequent operation targeting Y for movement to a higher position, necessarily carrying along its “stowed-away passenger” X. The most salient example of this type of movement in the preceding discussion is *v*P-fronting in Swedish. The following simplified structure illustrates this:

- (19) Läser boken gör han.  
 read.PRES book.DEF do.PRES he  
 ‘Reading the book, he is.’



Here, T lowers to the verb in *v*P, and *v*P is later targeted for movement to SpecCP. As T has stowed away in *v*P, the verb in the fronted *v*P is overtly inflected. However, the notion of stowaway movement might also be applied to other cases we have observed. For example, if we assume that verb-raising in Tagalog is due to a [-*v*] feature on a higher, functional head, then movement of a reduplicated verb is an example of stowaway movement of Asp; Asp first lowers to the verb, and then the verb itself is later targeted for movement to a higher position, carrying along Asp in its stowed away verb-internal position.

I mention stowaway movement here simply because it is only possible under a model of derivation that allows for downward movement in the narrow syntax. Thus, by positing such a model, we have augmented our typology of possible syntactic movements. It is my hope that adoption of this model allows us to identify additional cases of stowaway movement in future research.

### **Trace re-merger**

The tree in (19) also illustrates the proposed operation of trace re-merger, under which the closest trace copy will be targeted for feature-checking operations if a non-trace copy cannot be found in the probing head's c-command domain. In the case in question,  $\nu$ P has moved to SpecCP, along with the stowed-away non-trace copy of T, before C targets T for V2 head movement. At this point in the derivation, the only copies of T that are found within C's c-command domain are traces—i.e., the derivationally active/most recent copy in SpecCP is not c-commanded by C—, and so a trace of interpretable T is merged to  $C_{[-T]}$ . This trace is then pronounced under resumption with 'do'-support, as it no longer forms a chain with the overt copy in the fronted  $\nu$ P. While it is certainly possible that such cases of trace re-merger are not limited to constructions with downward and stowaway movement, such examples do suggest the very real possibility that traces may play a more active role in syntactic derivation than previously thought.

### **Late adjunction after Spell-out**

The analysis of English tense-hopping as Local Dislocation provides support for a theory of the late merger of adjuncts, and furthermore implies that a syntactic structure interfaces with the PF component several times throughout its derivation. For example, it was argued that a simple sentence in English must undergo at least three different PF Spell-out operations, namely Spell-out of  $\nu$ P, Spell-out of CP, and Spell-out after the late merger of adjuncts.<sup>21</sup> PF string-adjacency of T and the verb is necessarily evaluated after the first two cycles, but before the last. This model was further supported by Newell's (2005) analysis of bracketing paradoxes. Such analyses therefore make strong claims regarding the timing of derivational

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<sup>21</sup>Recall that the late Spell-out of adjuncts cannot alter the PF representations of individual phases that have already been established via previous Spell-out; it may only add to these in keeping with the LEC.

processes, and it is my hope that future research supports this model.

### **Feature-checking on the PF branch**

Last, but certainly not least, the synthesized analysis of tense-hopping and auxiliary-raising in English makes a strong prediction regarding the size of the computational window of opportunity to check uninterpretable features. In particular, I argued that any strong uninterpretable features that were unable to be checked in the narrow syntax may be checked on the PF branch before the A-P interface as a consequence of independently-motivated morpho-phonological operations. In the case of English, I argued that finite T carries a [-V] feature, which is checked via phase-internal narrow syntactic auxiliary-raising. However, in the absence of an auxiliary, this [-V] feature will go unchecked, due to the application of the PHIC to main verbs and the presence of a  $\Sigma$ P projection that blocks T-to-*v* Lowering. However, in order for the PF representation to converge at the A-P interface, this feature must be checked. I argued that such checking may occur after Spell-out via Local Dislocation of T and the verb or *do*-support.<sup>22</sup> As I have argued, feature-checking on the PF branch should be theoretically possible under the Minimalist Program, since the only requirement for strong uninterpretable features is that they be checked by the time the final PF representation is derived; i.e. before actual pronunciation at the A-P interface. This was formulated as the *Strong Minimalist Feature-checking Hypothesis*. I believe that this view of derivation has the potential to open doors to a wide range of new analyses of linguistic data.<sup>23</sup>

The most crucial next step in this enterprise would be a broader cross-linguistic study of downward transformations. Our focus here has primarily been limited to well-known examples of downward movements, with the possible exception of the examples of morphological optionality in Chapter 2. In order to provide

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<sup>22</sup>Recall that I argued that these operations are not necessarily driven by concerns of feature-checking. Rather, they arise due to considerations of morpho-phonological well-formedness. However, feature-checking occurs as an epiphenomenon of these operations.

<sup>23</sup>Another consequence of this model is that Vocabulary Insertion may be directly sensitive to the checked vs. unchecked status of a strong uninterpretable feature, as I argued is the case with Turkish agreement markers (Ch.2 §3.2).

even stronger support for the claims made here, it will be necessary to show that the proposed model can also account for similar transformations in lesser-studied languages. Some of the questions to keep in mind during this research are:

- Does the head that undergoes the downward movement take a complement that is independently argued to be a phase? If it does, does it also display a variation in position with respect to other overt morphemes of the landing site, if any?
- Is there any indication that the transformation is morpho-phonological? E.g., does it display any phonological sensitivity to its target? Does it display no category-sensitivity to its target?
- Can the head be independently targeted for syntactic movement (like T in English), or must it always be adjoined to its target (like non-trace T in Swedish)?

These questions should serve at the very least as a starting point for any investigation of the downward movement of a morpheme. It is my hope that once we begin to incorporate these issues into our analyses of linguistic phenomena, we will come to see that downward movements are not as uncommon as we may have thought.

Additionally, I would like to point out that it has not escaped my attention that many of the topics we have addressed here—e.g. tense-hopping, auxiliary-raising, etc.—have been debated since the earliest days of modern generative grammar. With each new advancement in the field, we gain new perspective and insight into these familiar patterns, and our analyses continually change and evolve over time. I can only hope that the analysis provided here makes a worthwhile contribution to that ongoing debate.

In closing, I believe the goal of this thesis has been clear: to show that downward movements should not be pushed to the wayside when developing core linguistic theory, but should rather be attributed the same relevance as any upward transformation. Indeed, I have argued that only by including all types of transformations in our investigation into the fundamental properties of linguistic computation can we derive a more complete picture of the language faculty. What I have done here is but a small, though I believe important, step in this direction.

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