

SYNTAX-PROSODY INTERACTIONS IN THE CLAUSAL DOMAIN:
HEAD MOVEMENT AND COALESCENCE

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Submitted to the USC Graduate School
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Linguistics
at the
University of Southern California

August, 2016

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Acknowledgements

I owe a great debt of gratitude to the many people who have helped to make this work possible. First and foremost, I must thank my advisor and dissertation chair, Andrew Simpson. For years, he has provided invaluable advice, encouragement, and patience, guiding me through false starts and helping me to focus on the questions and data that matter the most. The other members of my committee have been no less instrumental in the writing of this work. I thank Karen Jesney, Roumyana Pancheva, and Rachel Walker for their extensive comments and criticisms, which were unfailingly insightful and have greatly improved the dissertation. I would also like to thank Krishna Nayak for being a formidable external member who ensured that everything went as smoothly as I could have hoped.

I am grateful to the many people in the Department of Linguistics at USC who have made the past few years so rewarding. Among past and present faculty, I would like to thank Hagit Borer, Louis Goldstein, Elena Guerzoni, Hajime Hoji, Khalil Iskarous, Elsi Kaiser, Audrey Li, Toben Mintz, and Maria Luisa Zubizarreta. I also thank my fellow cohort, Emily Fedeles, Assaf Israel, Grace Livingstone, Mythili Menon, and Saurov Syed, for their support and friendship. I am indebted as well to my fellow students in syntax and phonology with whom I have had many valuable discussions: Priyanka Biswas, Reed Blaylock, Arunima Choudhury, Samantha Gordon, Peter Ara Guekguezian, Jessica Harmon, Charlie O'Hara, Alfredo García Pardo, and Caitlin Smith. I would also like to thank Janet Anderson, Andrés Benítez Pozo, Ana Besserman, Monica Do, Christina Hagedorn, Xiao He, Lucy Kim, Maury Lander-Portnoy, Cynthia Lee, Katy McKinney-

Bock, Sarah Ouwayda, Iris Ouyang, Barbara Tomaszewicz, Aaron Walker, and Yi-Hsien Walker for making the department a great place to call home.

This dissertation has benefitted greatly from discussions with numerous people outside of USC. For their time and input, I thank Theresa Biberauer, Emily Elfner, Bruce Hayes, Sharon Inkelas, Sameer ud Dowla Khan, Norvin Richards, Ian Roberts, Elisabeth Selkirk, and Sam Wolfe. I would also like to thank audiences at ETI3, AMP 2014, NELS 45, NELS 46, and Rethinking Verb Second for their feedback on portions of this research.

This work would not have happened without the brilliant teachers who led me to pursue graduate studies in linguistics. I would like to thank Brook Danielle Lillehaugen, who introduced me to the field while I was a high school student taking Linguistics 1 at UCLA in the summer of 2004. As an undergraduate at Haverford College, I was privileged to have been taught by Jason Kandybowicz, Shizhe Huang, Vera Lee-Schoenfeld, K. David Harrison, and Ted Fernald, who made the Tri-College Linguistics Program such a wonderful place.

Last but certainly not least, I am deeply grateful to my parents, Shiu-Mei Liu and Ta-Chuan Hsu, who have been endlessly supportive throughout my academic career.

Abstract of the dissertation

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This dissertation addresses two core questions in linguistic theory. [1] What are the sources of variation in word order, both within and across languages? [2] What information is shared between the syntactic and phonological modules of natural language grammar? It makes several proposals regarding possible mappings of syntactic structures to surface word order, and the role that phonological information plays in syntactic derivations. It argues that phonological considerations can influence word order by determining the optimal pronunciation of movement copies, and that some syntactic operations themselves are driven by a requirement to produce phonologically licit structures.

I first focus on the role of the Phonetic Form (PF) grammar in the linearization of movement copies and in the creation of prosodic structure. I present an analysis of a puzzling pattern in Bangla (a.k.a. Bengali) that involves variation in the placement of the subordinating complementizer *je*. I show that previous analyses, which rely purely on grammatical or discourse properties, do not adequately account for the data, and present new data on Bangla prosody to argue that variation in complementizer placement is

driven by a grounded phonological constraint against placement of *je* in the initial position of an Intonational Phrase. I argue that the PF component can be formalized as an Optimality-Theoretic grammar in which phonological and syntactic well-formedness conditions compete to determine the optimal pronunciation of movement copies.

The remainder of the dissertation turns to the accessibility of phonological information to syntactic operations. I propose the existence of a syntactic operation, Coalescence, which bundles structurally adjacent heads into a single, featurally complex head. This operation derives both variation in how category features are realized on heads, and certain types of head-adjunction and cliticization. I argue that the application of Coalescence is properly motivated and constrained by a requirement to eliminate heads that would be deficient in their phonological realization, suggesting that a restricted amount of information about phonological exponence is visible to syntactic operations. The approach is illustrated in analyses of cross-linguistic variation in the realization of positions within the clausal left periphery and the inflectional domain, with a focus on verb second effects.

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Chapter 1: Introduction

1.1 Overview

The goal of this dissertation is to undertake several studies of syntax-phonology interactions, focusing on word order and prosody at the left edge of the clause, or CP. It is primarily concerned with the mechanisms by which syntactic and prosodic factors determine word order, and makes several proposals regarding the relation between syntax and the Phonetic Form (PF) interface. The main proposals of the dissertation are itemized below:

(1) *Summary of main proposals*

- i. Patterns in which individual complementizers alternate between initial and clause-medial placement result from variation in the pronunciation of movement copies. Clause-medial complementizer placement is due to lower copy spell-out, the pronunciation of a non-highest copy of the complementizer's movement chain (Franks 1998; Pesetsky 1998; Bošković 2001; Bobaljik 2002). Such cases provide support for analyses of the left edge of the clause as an articulated series of functional projections (Rizzi 1997; Benincà and Poletto 2004, among many others).
- ii. The pronunciation of a lower copy of a movement chain can be compelled by language-particular restrictions on prosodic organization. Building on previous works, (Samek-Lodovici 2005; Vogel 2006; Anttila et al. 2010;

Elfner 2012; Clemens 2014; Bennett et al. 2016), the PF component is formalized as an Optimality-Theoretic grammar in which syntactic and phonological well-formedness conditions compete to determine the optimal pronunciation of copy chains. The restriction of prosodically-motivated word order mismatches to those allowed by manipulating copy pronunciation makes clear predictions about possible syntax-prosody mismatches.

- iii. There is a syntactic bundling operation, Coalescence, that applies between structurally adjacent heads to create a single terminal node that inherits their features. Coalescence allows for a unified analysis of bundling effects previously attributed to the lexicon (Feature Scattering: Giorgi and Pianesi 1996) and postsyntactic phonology (Morphological Merger: Marantz 1988; Halle and Marantz 1993; Matushansky 2006). Furthermore, it straightforwardly accounts for cross-linguistic and within-language variation in the realization of functional heads, and permits a resolution of longstanding problems posed by head movement in Minimalist syntax.
- iv. The application of Coalescence is motivated by a requirement to eliminate heads that would be deficient for interpretation at the PF interface by being affixal or null in their phonological representation. This indicates that some information about the phonological exponents of syntactic objects is accessible to syntactic operations, contra strong claims of Phonology-Free Syntax (Zwicky and Pullum 1986; Pullum and Zwicky 1989) and Late

Insertion of phonological features (Halle and Marantz 1993).

Chapters 2 and 3 of the dissertation address proposals (i) and (ii) in a study of the syntax and prosody of embedded clauses and the complementizer *je* in Bangla (a.k.a. Bengali). I show that possible non-initial placements of the *je* are best analyzed as the pronunciation of a lower copy of the complementizer's movement chain within the clausal left periphery. New data on Bangla prosody is presented to argue that lower copy pronunciation takes place uniquely to avoid the placement of *je* at the left edge of an intonational phrase. This motivates an analysis in which the PF grammar has access to movement copies, and the surface pronunciation of a movement chain depends on the interaction of well-formedness constraints that are both phonological and syntactic in nature.

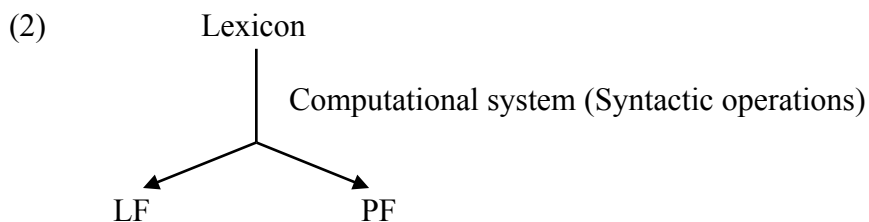
Proposals (iii) and (iv) are developed in Chapters 4 and 5, which examine a variety of "bundling" processes in which multiple syntactic category features are realized on single heads. In Chapter 4, I propose that cross-linguistic differences in the instantiation of left-peripheral functional projections results from variation in whether certain category features are realized on separate heads or bundled into single, featurally complex heads. This is shown to allow for a successful account of the typology of "relaxed" verb-second effects, which have been problematic to previous approaches to verb-second. Chapter 5 proposes that this type of bundling, along with adjunction structures previously attributed to postsyntactic operations, can be analyzed as the result of a single syntactic operation, Coalescence, if a limited amount of information about the phonological exponence is visible to syntactic operations.

1.2 Theoretical background

This section provides a brief overview of existing theories of syntax, phonology, and their interface assumed in the present work. It summarizes their basic claims and some remaining theoretical questions that they raise, and previews the main proposals of the dissertation.

1.2.1 The architecture of the grammar

Generative linguistic theory in the Principles and Parameters and contemporary Minimalist traditions assumes the Y-model architecture of grammar (Chomsky and Lasnik 1977; Chomsky 1995), also referred to as the Inverted Y-Model or Inverted T-Model. Although many variants and refinements of the basic architecture have been proposed, its basic structure is given in (2).



The key claims of the model are that the computational system of human language, which includes core syntactic operations, manipulates sets of items selected from the Lexicon to create an abstract, hierarchical, syntactic structure. At a point in the derivation called Spell-Out or Transfer, this structure is transferred to two interpretive interfaces, the Articulatory-Perceptual system (a.k.a. Phonetic Form; PF), which assigns a phonological

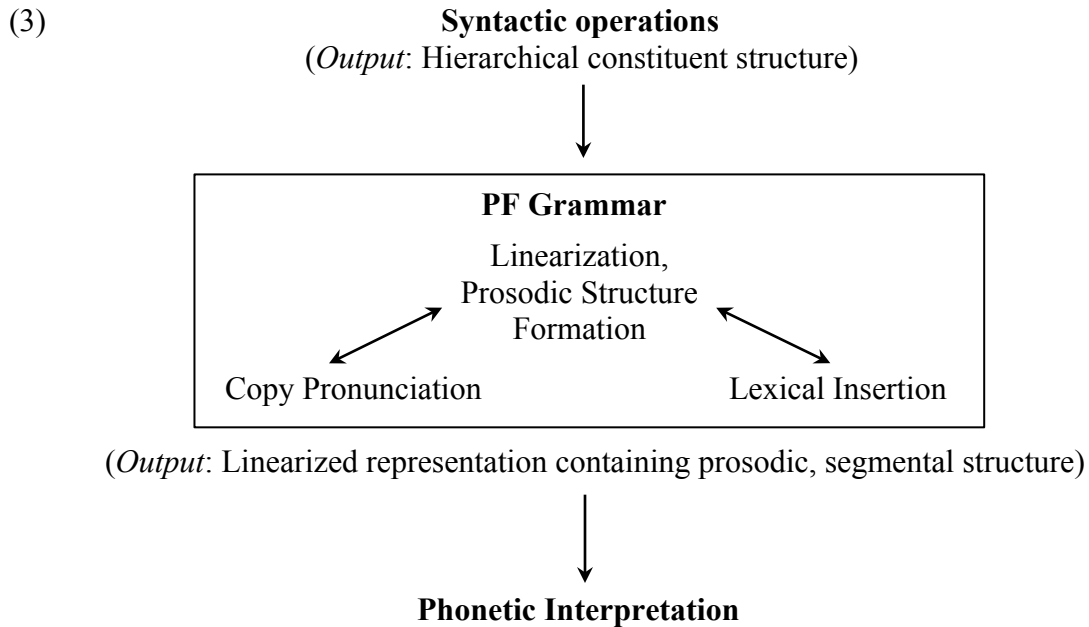
structure to the utterance, and the Conceptual-Intentional system (a.k.a Logical Form; LF), which assigns a semantic representation.

I will additionally assume the principle of Single Output Syntax (Bobaljik 1995, 2000; Brody 1995; Groat and O’Neil 1996; Pesetsky 1998), which proposes that PF and LF interpret an identical representation produced by the syntax, transferred to both interfaces at Spell-Out. In other words, there are no syntactic operations that apply to uniquely affect the structure interpreted by only LF or only PF. However, both modules are presumed to allow a restricted set of language-specific interpretational mechanisms that can create an indirect correspondence between their input syntactic representations and their interpreted outputs (pronunciation at PF, semantic interpretation at LF). In other words, this architecture of the grammar permits certain 'mismatches' in sound-meaning correspondenc, which will be reviewed in more detail in section 1.2.3.

Following previous works, I assume that after syntactic structures undergo Spell-Out, the PF grammar performs the following operations: [1] *Lexical Insertion* - the insertion of the segmental and autosegmental exponents of syntactic terminals, [2] *Linearization* - the organization of phonological segments into a linear order, and [3] *Prosodic Structure Formation* - the creation of a hierarchical prosodic constituent structure. Identifying how these processes interact has been a central question within a broad range of theories and frameworks, including Lexical Phonology (Mohanan and Mohanan 1984; Kiparsky 1985; Mohanan 1986; Hargus and Kaisse 1993 and works therein), Prosodic Phonology (Selkirk 1981; Nespor and Vogel 1986; Zec and Inkelas 1990; Elfner 2012; Clemens 2014), Distributed Morphology (Halle and Marantz 1993; Embick and Noyer 2001; Embick 2010; Kramer 2010), Stratal Optimality Theory (Kiparsky 2000, 2008;

Bermúdez-Otero 1999, 2012), Optimal Interleaving (Wolf 2008, 2011, 2015), and certain works within Minimalist syntax (Pesetsky 1998; Zubizarreta 1998; Bošković 2001; Nunes 2005; Bošković and Nunes 2007; Kandybowicz 2009, 2015), among many others.

In Chapters 2 and 3, I argue for the organization of the PF grammar shown in (3). The unidirectional arrows indicate the sequence of events within the PF branch, while the bi-directional arrows indicate patterns of interaction between components of the phonological grammar. The key claim of the present study is that the pronunciation of movement copies can be determined by constraints on prosodic organization.



While early works on linearization proposed a universal linearization mechanism, such as the Linear Correspondence Axiom (Kayne 1994), insensitive to external factors such as phonological restrictions, a substantial body of work has shown that the mapping from structure to linear order can be influenced by well-formedness conditions defined on PF representations. For instance, López (2009), Elfner (2010), Clemens (2014), and

Bennett et al. (2016) argue that word order depends on the interaction of syntactic and phonological conditions. In other words, linearization and the creation of prosodic structure take place simultaneously, rather than sequentially. I argue in the following chapters that restrictions on complementizer order in Bangla provide evidence for this type of parallel interaction. This crucially contrasts with theories in which linearization takes place independently of prosodic structure formation, and serialist theories of the PF branch like that of Embick and Noyer (2001) in which the building of prosodic domains happens after linearization and lexical insertion.

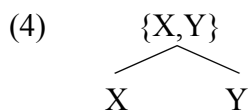
A separate question addressed in the dissertation involves the nature of the objects manipulated by the syntactic derivation. A traditional interpretation of the Y-model holds that PF interpretability considerations cannot drive syntactic operations (Zwicky and Pullum 1986; Pullum and Zwicky 1989). Similarly, a key claim of works in Distributed Morphology (Halle and Marantz 1993; Embick and Noyer 2001) is that syntax manipulates structures with formal features but no phonological content, and that the segmental exponents of syntactic features are inserted only after syntactic structures are transferred to PF, a principle known as Late Insertion. A key prediction of such approaches is that phonological properties should not be able to condition the application of syntactic operations.

This prediction has previously been challenged in several works. For instance, Zubizarreta (1998) proposes that movement in syntax may be triggered in order to satisfy conditions on the prosodic realization of focus, while Richards (2010, 2016) argues that *wh*-movement takes place in order to minimize the number of "active" prosodic boundaries that intervene between *wh*-words and [+*wh*] complementizers. A crucial

implication of these analyses is that some information about PF structure must be visible to the syntactic component. In Chapter 5, I argue that information about prosodic deficiency, being phonetically null or dependent on linear adjacency with the exponents of other features, triggers the syntactic head-bundling operation Coalescence, providing further support for the view that some phonological features are accessible to syntax, contra the strongest claims of Late Insertion.

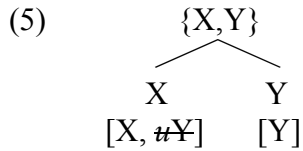
1.2.2 The Minimalist Program and head movement

In foundational works of the Minimalist Program, Chomsky (1993, 1995, 2000) proposes significant theoretical departures from the theory of Government and Binding, seeking to reduce the permitted types of syntactic operations to a minimum. The Minimalist Program takes a derivational approach to the building of syntactic structures; Each derivation begins with a selection of lexical items, the Numeration, which are then combined into a hierarchical structure. Chomsky proposes that the fundamental structure-building operation is Merge, which under minimal additional stipulations constructs a single syntactic object $\{X, Y\}$ from two objects X and Y .

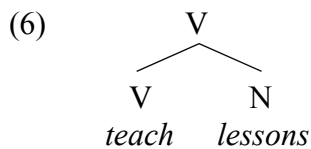


A major goal of Minimalist research is a theory of how the application of Merge is constrained, and how the outputs of Merge are interpreted. For instance, Merge is constrained by properties of selection; Individual lexical items can be restricted in what

they can combine with (Chomsky 1965; Grimshaw 1979; Pesetsky 1982), and some items within a derivation must be Merged before others. Here, I assume that the application of syntactic operations depends on the *formal features* of lexical items. Concretely, I will adopt the proposal that all heads contain an interpretable feature and an uninterpretable feature that selects for a property of its complement, and that Merge allows uninterpretable features to be checked (Julien 2002; Adger 2003; Di Sciullo and Isac 2008). X is Merged with Y in order to check an uninterpretable [uY] feature on X.

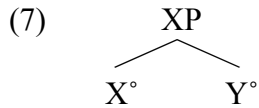


There are additional constraints on the properties of the objects created by Merge. Specifically, when two items are combined by Merge, the newly formed object appears to inherit properties of only one of its daughter constituents. As an informal illustration, the concatenation of the verb *teach* with the noun *lessons*, *teach lessons*, has the distribution of a verb, not a noun.

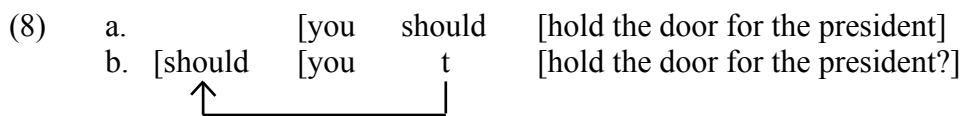


We can say that a property of V *projects* to the higher node formed by Merge. I will refer to features that can project as *category features*, and to projecting features as the *labels* of newly formed objects. The item X that projects its features is the *head* (notationally

represented as X°), and all nodes that inherit its label are *phrasal projections* or *phrases* of X (represented as XP).



A large body of research has shown that many cases of cross-linguistic word order variation, as well as within-language differences in word order across clause types, can be accounted for if heads are displaced within syntactic structures, an operation known as *head movement* (Koopman 1983; Travis 1984; Baker 1988; Pollock 1989). To illustrate with an English example in (8), declarative clauses and yes/no questions differ in the relative placement of subjects and auxiliaries, such that subjects precede auxiliaries in declaratives (8a) while auxiliaries precede subjects in yes/no questions (8b). Such patterns can be accounted for by positing a base position of auxiliary heads below subjects, and the movement of auxiliaries in yes/no questions to a higher head position above the subject.

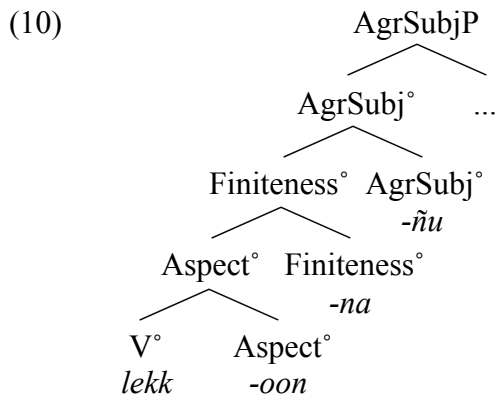


Head movement is also proposed to feed the creation of morphologically complex words (see esp. Baker 1988; Julien 2002), and higher head-movement paths are often correlated with a greater number of affixes. Wolof, for instance, shows evidence for the movement of finite verbs in declarative clauses from within VP to a high position within

the clause (Martinović 2015). When this happens, morphemes that indicate aspect, clause type, and subject agreement are realized as suffixes on the verb.

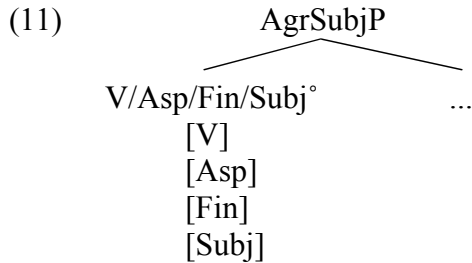
- (9) Xale yi lekk-oon-na-ñu ceeb bi
 child DEF.PL eat-PERF-CLAUSETYP-3PL.SUB cake DEF.SG
 'The children ate the rice (a long time ago).'
- (Martinović 2015)

Traditionally, the concatenation of morphemes fed by head movement is accounted for by proposing that head movement results in an adjunction structure in which both the moved head and attracting head are dominated by a head-level projection, and that successive steps of head movement produce additional branching structure within the complex head (Travis 1984; Baker 1988; Matushansky 2006). A Wolof form like *lekk-oon-na-ñu* is potentially derived by movement of V° through the heads of AspectP, FinitenessP, and a subject agreement phrase.



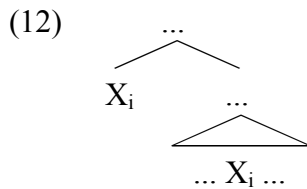
Head adjunction will be discussed in greater detail in Chapter 5. To preview the analysis, I present a number of conceptual problems raised by adjunction structures within Minimalism. I will argue for an alternative theory of head bundling in which head movement always produces a syntactic configuration with a single terminal node that

contains features of both the attracting and attracted heads. In other words, the head corresponding to *lekk-oon-na-ñu* has the syntactic representation in (11).



1.2.3 The Copy Theory of Movement

A key proposal in Chomsky (1995) is the reconception of movement as the result of Merge extending the tree with an item already present in the derivation (a.k.a. Internal Merge: Chomsky 2001), creating a copy of the existing object. Movement *chains* therefore consist of a series of copies (identified by subscript indices in this paper). The primary conceptual benefit of such an approach is the maintenance of the claim that syntactic operations apply only to lexical items present in the Numeration and to their combinations (Chomsky 1995's Inclusiveness Condition); There is no need to stipulate the existence of objects created during the derivation, such as traces (Chomsky 1973) employed within Government and Binding.



In the cases considered by Chomsky and many subsequent Minimalist works, there is an assumed preference for all but the highest copy within the chain to be left unpronounced when the structure is interpreted at the PF interface. This produces the effect of displacement, as shown in (13). Nunes (2004) proposes that the preference to pronounce only the highest copy of a chain is motivated by interpretational pressures. Because the highest copy has checked the most features during the derivation, it should be the most informative with respect to its semantic interpretation.

(13) [which son]_i does Lucille prefer [~~which son~~_i]?

Numerous subsequent works have argued that under some circumstances, however, languages can pronounce lower copies or multiple copies of a chain (Franks 1998; Bošković 2001; Bobaljik 2002; Bošković 2002; An 2007; Bošković and Nunes 2007; Kandybowicz 2007; Stjepanović 2007; a.o.). Collectively, they propose that lower copy and multiple copy pronunciation are motivated by well-formedness conditions defined on PF, in other words, phonological constraints. Furthermore, because copy pronunciation must take place at the PF interface, it should not be surprising that PF restrictions can come into play. Consider a common attested pattern in languages with multiple *wh*-movement, such as Serbo-Croatian, Russian, Bulgarian, and Romanian (Bošković 2001, 2002; Bošković and Nunes 2007). As illustrated in the Romanian examples below, all *wh*-words in these languages typically front to a clause-initial position, and cannot be left in their first-merged positions (14). However, if a clause contains two phonologically identical *wh*-words that would be adjacent if fronted, one of them must be "left behind" in a lower position (15).

(14) a. Cine ce precede?
 who what precedes

b. *Cine precede ce?
 who precedes what
 'Who precedes what?'

(15) a. Ce precede ce?
 what precedes what

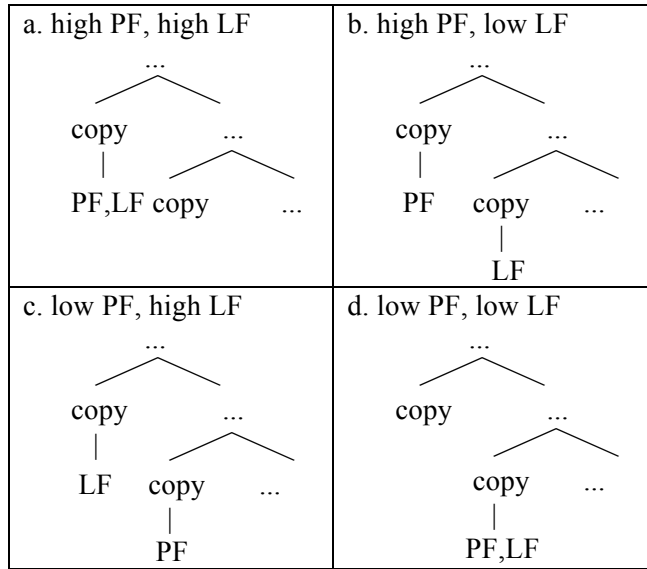
b. *Ce ce precede
 what what precedes
 'what precedes what?'

(Bošković and Nunes 2007)

Bošković and Nunes propose that all *wh*-words are copied in the edge of the clause during the syntactic derivation, and that lower copies are unpronounced by default: [cine_k ce_i precede ~~cine_k~~ ee_i]. However, if the pronunciation of the highest copy would violate a constraint against adjacent identical *wh*-words, a lower copy is pronounced: [ce_k ee_i precede ce_i]. Other PF conditions proposed to trigger lower or multiple copy pronunciation include restrictions on sentential stress placement (Stjepanović 2007), constraints on the marking of prosodic edges (Kandybowicz 2009; An 2007), and requirements for functional morphemes to be affixed (Franks 1998; Bošković 2001; Bobaljik 2002).

Bobaljik (2002) observes that if both high and low copies can be available for pronunciation by PF, and different copies can be privileged for interpretation at LF, the following four-way typology is predicted (table adapted from Bobaljik 2002, ex. 3).

(16) *Privileged copies at LF and PF*

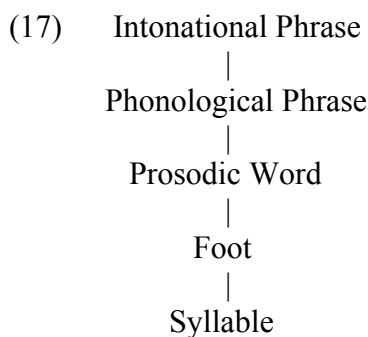


Crucially, there are two types of "mismatch" cases, shown in (16b) and (16c). If PF interprets a low copy while LF interprets a high one, the item will be pronounced in a lower position than would be expected based on its semantic interpretation. On the other hand, if PF interprets a high copy while LF interprets a lower one, its phonological exponents will be pronounced in a higher position than expected based on its semantic interpretation.

Although this interpretation of the Copy Theory permits such mismatches between syntactic structure and word order, it maintains an important prediction that surface word orders must still correspond with some syntactic structure. This is because an object cannot be pronounced in some position at PF if there is no corresponding copy produced by the syntactic derivation. For instance, if the phonologically motivated "postposing" of an object is due to lower copy pronunciation, one should be able to find evidence based on semantic interpretation or overt featural composition that it has a copy in the corresponding position. This prediction will become crucial in the analysis of Bangla.

1.2.4 Prosodic Phonology and syntax-prosody mapping

We now turn to the question of what representation is created when syntactic structures undergo Spell-Out at PF. Specifically, what are the units of representation that are produced by the PF grammar? This dissertation adopts the main tenets of Prosodic Phonology (Selkirk 1981, 2011; Nespor and Vogel 1986; among many others). The principle claim of the theory is that utterances are organized in a hierarchically organized set of prosodic constituents, whose organization corresponds closely (but not always exactly) to syntactic constituency. The set of prosodic constituents is known as the Prosodic Hierarchy, shown in (17). Prosodic constituents form the domains for certain phonological restrictions at the segmental level, as well as domains for the phonetic interpretation of pitch and intonation.



The Prosodic Structure Hypothesis additionally assumes that the phonological grammar contains a procedure that determines how syntactic structure is mapped onto a prosodic representation. This dissertation adopts the Match Theory (Selkirk 2009, 2011) of syntax-prosody mapping assumed in most current research. Within Match theory, the creation of a prosodic constituent structure is modeled in an Optimality-Theoretic

grammar, where the input is a syntactic constituent structure and the output is a prosodic representation. Match Theory proposes that the creation of prosodic representations is driven by a universal set of constraints that call for a direct correspondence between syntactic and prosodic constituents. This includes constraints of the following types, based on the schema of Elfner (2012).

- (18) MATCH(α , π)
For any constituent α in the syntactic representation that dominates one or more terminal nodes, assign a violation mark if there is no corresponding prosodic constituent π that exhaustively dominates the phonological exponents of α .
- (19) MATCH(π , α)
For any prosodic constituent π , assign a violation mark if there is no syntactic constituent α such that π exhaustively dominates the phonological exponents of α .

A dominant claim within the literature is that the universal inventory of MATCH constraints only calls for three types of correspondence between syntactic and prosodic constituent types. This includes the mapping of clauses to intonational phrases, lexical phrases to phonological phrases, and heads to prosodic words (Selkirk 2009; Itô and Mester 2013; Sabbagh 2014; Clemens 2014). For any given syntactic constituent structure, the corresponding output prosodic representation is determined by interaction between MATCH constraints and conflicting well-formedness constraints on prosodic structure. Languages can permit mismatches between syntactic and prosodic constituent structure, in violation of MATCH constraints, in order to prevent the violation of other markedness constraints on prosodic organization.

To illustrate a syntax-prosody mismatch within Match theory, Selkirk (2011) discusses the case of Xitsonga (Bantu). Syllables in Xitsonga carry either high (H) or low (L) tones, and surface tone structure depends on the distribution of lexical H tones and

phonological phrase (PPh) boundaries. If a word contains a lexical H tone, the tone spreads to all syllables to the right, but does not cross a PPh boundary. Based on this diagnostic for phonological phrasing, the prosodic structure assigned to VPs that consist of verbs and NP direct objects depends on whether the NP contains internal branching structure. Unmodified nouns are grouped with the verb in a single PPh, as indicated by the fact that high tones spread from the verb to the noun (20). However, verb high tones do not spread to object nouns that are followed by modifiers, suggesting that nouns with modifiers are grouped into a separate PPh (21).¹

- (20) vá-súsá [n-gúlú:ve]
'they are removing a pig'

Syntactic constituency: V [N]_{NP}

Prosodic constituency: (PPh vá-súsá n-gúlú:ve)

- (21) vá-súsá [n-guluve y!á vo:n!á]
'they are removing their pig'

Syntactic constituency: V [N Mod]_{NP}

Prosodic constituency: vá-súsá (PPh n-gulu:ve t!á vo:n!á) (Kisseberth 1994)

The fact that unmodified nouns are not mapped to distinct phonological phrases violates MATCH PHRASE, a constraint that requires XPs in syntax to correspond to a PPh in prosodic representation. However, this non-correspondence allows for the satisfaction of a common crosslinguistic preference for prosodic constituents to dominate at least two instances of the prosodic category one step down in the Prosodic Hierarchy. This is implemented within the grammar in the form of a constraint BINARYMINIMUM (Zec and

¹ A highly similar pattern is discussed for Kinyambo by Bickmore (1990). Additional deviations from expected prosodic phrasing due to binarity requirements are discussed by Zec and Inkelas (1990) and Elfner (2012).

Inkelas 1990; Selkirk 2011). The patterns are phonological phrasing in Xitsonga are generated by the constraint ranking BINMIN >> MATCH PHRASE.

(22) a. *Prosodic phrasing of unmodified postverbal objects*

[Clause [VP verb [NP noun]]]	BINMIN	MATCH PHRASE
a. {IntP (PPh verb (PPh noun)) }	*!	
☞ b. {IntP (PPh verb noun) }		*

b. *Prosodic phrasing of modified postverbal objects*

[Clause [VP verb [NP noun adj]]]	BINMIN	MATCH PHRASE
☞ a. {IntP (PPh verb (PPh noun adj)) }		
b. {IntP (PPh verb noun adj) }		*!

In the analysis of Bangla complementizer order in Chapter 3, I propose that the same grammar that produces prosodic representations has access to movement copies created during the syntactic derivation. The decision of which copies to pronounce depends on the interaction of prosodic markedness constraints with syntactic preferences on linearization, implemented as violable constraints like HIGHESTCOPY. This accounts for the potential influence of prosodic constraints on the mapping from syntactic structure to surface word order.

1.2.5 The role of phonological defectivity in syntax

While syntactic operations are generally characterized as being driven by purely formal syntactic features, this thesis examines the role of various types of phonological "defectivity" in triggering the application of syntactic processes, and how this possibility is to be modeled.

First, some syntactic operations appear to be triggered in order to provide phonological support for affix-like morphemes. A particularly well-known case is the analysis of *do*-support in English (Chomsky 1965; Lasnik 1981). In declarative affirmative clauses, tense is realized as an affix on the main verb. In negative clauses, however, tense morphology is realized on an auxiliary *do*, which precedes negation (24). *Do*-support also applies in questions, in which *do* and tense suffixes are realized in a position preceding the subject (25).

(23) Lindsay cares about the wetlands

(24) a. Lindsay does not care about the wetlands
b. *Lindsay cares not about the wetlands

(25) a. Does Lindsay care about the wetlands?
b. *Cares Lindsay about the wetlands?

Standardly, *do*-support receives an explanation like the following. In English, tense inflection is always realized as a suffix, either on main verbs or on auxiliaries like *do* or *have*. Head movement of main verbs in English is restricted: They cannot precede negation, and cannot move to positions preceding subjects (24b, 25b). However, tense morphology must be realized above negation and above subjects in questions. The only way for this requirement to be met is for a dummy auxiliary *do* to be inserted in order to carry the affixal tense morphology. Lasnik (1981) proposes that *do*-support occurs in order to satisfy a requirement for tense, which is obligatorily affixal, to be realized as the phonological dependent of another head. This is formalized as the STRAY AFFIX FILTER.

(26) STRAY AFFIX FILTER: A morphologically realized affix must be a syntactic dependent of a morphologically realized category, at surface structure. (Lasnik 1981)

The notion that the STRAY AFFIX FILTER is a well-formedness condition on surface structure is supported by the fact that languages can use either Merge or movement to prevent violations of the condition. This can be illustrated by comparing the English examples above with their equivalents in French. The crucial observation about the following examples is that the present tense morphology, orthographic *-sent*, is realized in the same positions as it is in English. Tense is realized above negation (we can consider *pas* to be the instantiation of NegP, while treating *ne* as a clitic that attaches to the verb), and above subject pronouns in questions. Unlike in English, however, tense is uniformly realized on the main verb, rather than an auxiliary.

- (27) a. Ils construisent des maisons
 they build INDEF.PL houses
 'They build houses'
- b. Ils ne construisent pas des maisons
 they NE build not INDEF.PL houses
 'They don't build houses'
- c. Construisent-ils des maisons
 build-they INDEF.PL houses
 'Do they build houses?'

Because French permits verb movement to relatively high positions, the Stray Affix Filter with respect to affixal tense is satisfied by head movement. On the other hand, English requires the auxiliary *do* to be Merged in order to support the affixal tense morpheme.

If we are correct that these processes affecting word order take place in order to avoid an unlicensed affix, two general analyses are possible. The first possibility is that some information about a morpheme's phonological realization is present in the syntax, and

able to trigger syntactic processes. Alternatively, if phonological information is present only after syntactic structures are transferred to PF, this implies that these movement operations occur after syntax. Indeed, a variety of postsyntactic operations affecting word order have been proposed in many works of Distributed Morphology (Halle and Marantz 1993; Embick and Noyer 2001). Similarly, several works have proposed that head movement applies uniquely on the PF branch, rather than in syntax (Chomsky 2001; Boeckx and Stjepanović 2001; Platzack 2013).

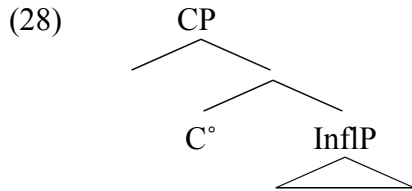
On the other hand, head movement has been shown to have semantic effects, particularly related to scope and the licensing of negative polarity items (Lechner 2006; Matushansky 2006; Roberts 2010; Hartman 2011), indicating that not all head movement can take place at PF. If operations like head movement are indeed triggered by requirements on phonological well-formedness, then some information about the phonological form of lexical items must be available to the syntactic module. These issues will be discussed in further detail in chapter 5.

1.3 Empirical background

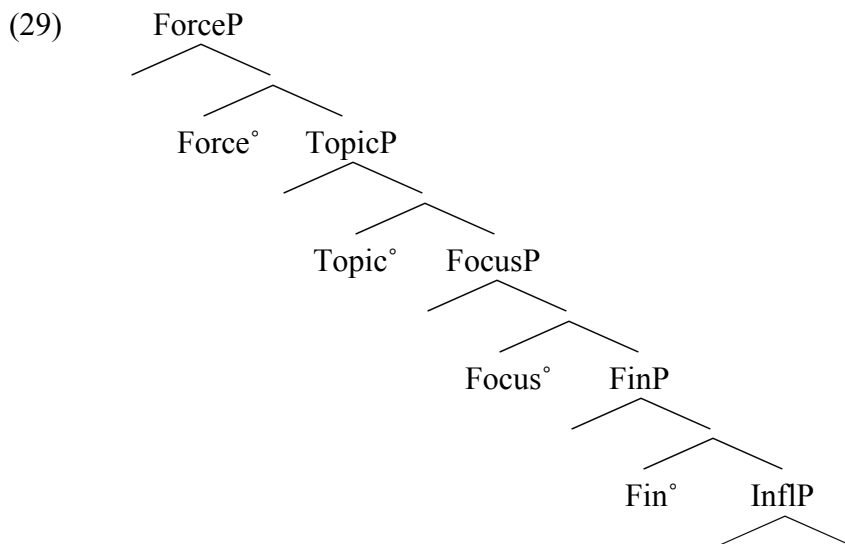
1.3.1 The clausal left periphery and the Cartographic Program

This dissertation's main empirical focus is on the structure of the complementizer domain. Following Bresnan (1972), research during the Government and Binding period largely assumed the existence of a single projection above the inflectional domain of the clause, the Complementizer Phrase (CP). The head of this projection C° was argued to

host overt complementizers (e.g. English *that*, *for*), with the specifier of CP being the target of *wh*- and focus-related movement.



Following Rizzi (1997), a variety of evidence has emerged to suggest that the traditional CP contains additional internal structure. This so-called Cartographic Approach proposes that rather than a single projection, the left edge of the clause includes a series of distinct functional projections. These functional heads, collectively referred to as the *extended left periphery*, perform the various functions of complementizer-like elements, generally related to clause typing and the encoding of information structure. While the large body of research within the approach has given rise to many proposed structures, we will consider for illustrative purposes the 'core' structure of the analysis of Benincà and Poletto (2004).



This expanded inventory of functional projections has proven instrumental in the analysis of several empirical generalizations. First, it allows for an account of restrictions on the relative orderings of different types of discourse-marked phrases in the left periphery. As shown in the following examples from Benincà and Poletto (2004; 54-55), while Italian allows both topics and foci to be fronted to the left edge of the clause, topics must precede focus. Such patterns can be taken to result from the placement of TopicP above FocusP.

- (30) A Gianni, domani, QUESTO gli dovremmo dire
to Gianni, tomorrow this 3.DAT should-1PL tell.
'Tomorrow we should tell THIS to Gianni.'
- (31) *A GIANNI, un libro di poesie, lo regalerete
TO GIANNI, a book of poems, 3.ACC give-2SG

The expanded functional domain also accounts for ordering restrictions between individual complementizers and other left-peripheral phrases. For example, Rizzi (1997) discusses several differences in placement between *che*, which introduces finite embedded clauses, and *di*, which introduces non-finite embedded clauses. Consider their possible distribution relative to fronted topics; *che* must precede topics, while *di* follows them.

- (32) Credo (che) il tuo libro, (*che) loro lo apprezzerebbero molto
I.believe that your book that they it would appreciate a.lot
'I believe that your book, they would appreciate it a lot.' (Rizzi 1997)
- (33) Credo (*di) il tuo libro, (di) apprezzarlo molto
I.believe of your book of to.appreciate.it a.lot
'I believe to appreciate your book a lot.' (Rizzi 1997)

While these restrictions do not receive an obvious account if one assumes only a single C° head, they are straightforwardly explained if *che* occupies a relatively high position (Force), while *di* is in a lower head below TopicP. More generally, the existence of the low Fin(iteness) complementizer position has allowed for an analysis of modal particles whose distribution does not naturally fit in the InflP domain (Roussou 2000; Roberts 2004; Aboh 2006; Morin 2006).

Further evidence for the expanded functional structure is found in languages that appear to simultaneously realize multiple left-peripheral heads. The following example from Aboh's (2006) analysis of Gungbe (Gbe language; Ghana and Nigeria) shows the required orderings of the declarative subordinator (Force), topic marker (Topic), focus marker (Focus), and deontic modal particle (Fin).

- (34) Ùn dɔ̌ dɔ̌ Àsí bá yà làn wɛ é ní xɔ ná mì
 1SG say that Asiba TOP meat FOC 3SG DEON buy for 1SG
 'I said that, as for Asiba, she should buy me some MEAT.' (Aboh 2006)

Beyond the empirical investigations into the details of clause structure, the Cartographic Program makes several strong claims about the permitted space of cross-linguistic variation. First, it proposes that the inventory of functional categories is universal, and that their corresponding functional projections are rigidly ordered across languages (Cinque 1999). Second, it proposes a one-to-one mapping of features to heads of syntactic structure, such that each feature is realized on a distinct syntactic head within the hierarchy of functional projections (Cinque and Rizzi 2010). Crucially, the "one feature, one head" requirement holds on items as they are first Merged, since head

movement permits the creation of featurally complex heads. In chapter 5, I argue that the syntax can also create complex heads in the absence of movement.

1.3.2 Head movement in the left periphery

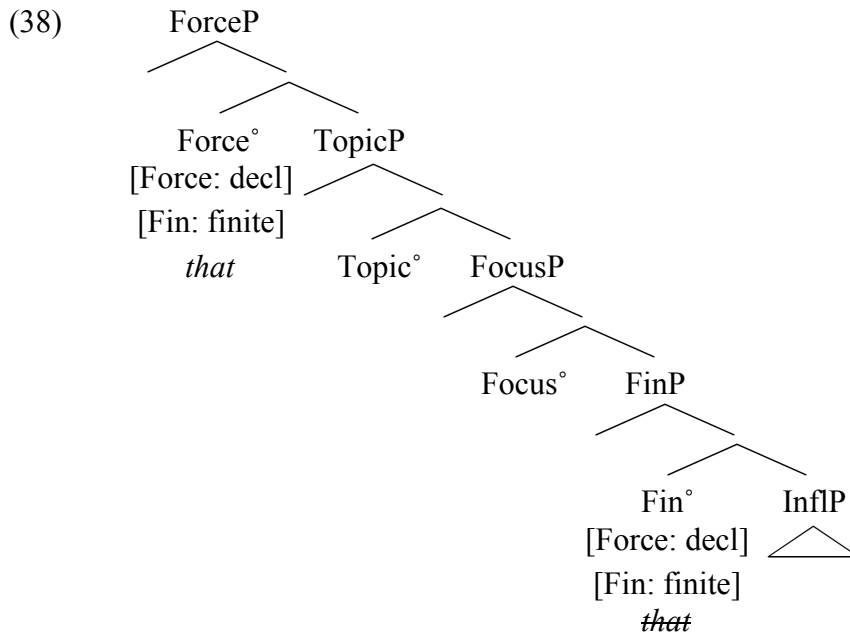
While such cases have not been as thoroughly investigated as the head movement of verbs through the InflP domain, there is evidence to suggest that complementizers also undergo head movement within the extended left periphery (Watanabe 1993; Poletto 2000; Grewendorf and Poletto 2011). The first argument in favor of this is based on the observation that some complementizers reflect semantic properties of multiple left-peripheral features. For instance, Rizzi (1997) observes that English *that* has multiple semantic specifications: *that* appears only in declarative clauses and only in finite clauses. If clause type is a property specified in Force° and finiteness is specified in Fin°, *that* displays semantic properties of two left-peripheral heads.

- (35) Buster wondered [**that*/if he should join the army]
- (36) George would like [**that*/for Oscar to leave his house]

However, it appears that *that* is pronounced only in Force°, rather than Fin°, as it obligatorily precedes frame-setting adverbials, as well as focused items that trigger subject-verb inversion, which presumably occur in FocusP.

- (37) a. We know [*that for all intents and purposes*, George-Oscar is the best man for the job]
- b. The president believes [*that never in his life* would he make a mistake]

This pattern can be accounted for if *that*-like complementizers are first Merged in Fin° before moving to Force° (Rizzi 1997; Shlonsky and Rizzi 2007), as shown below.



More compelling empirical evidence for head movement of complementizers is presented in Grewendorf and Poletto's (2011) study of complementizers in Cimbrian, a Germanic language spoken in Northern Italy. Specifically, they show that certain complementizers with relatively high surface positions in Force° preclude verb movement to Fin° , suggesting that these complementizers originate in the lower position before moving to Force° .

A host of phenomena in Cimbrian suggest that the presence of a certain class of complementizers (including *az* 'if/that,' *bal* 'when/if,' and the relative complementizer *bo*) appears to block verb movement into a low left-peripheral position. Here, I will briefly present their discussion of negation and subject clitics. In main clauses with negation, the finite verb obligatorily precedes the negative marker *net* 'not,' and cannot follow

negation. In embedded clauses with an *az*-type complementizer, however, the opposite pattern holds; finite verbs must follow *net*. Under the assumption that *net* occupies a fixed position like NegP, this suggests that verbs generally move to a position above NegP, and that this movement is blocked if an *az* complementizer is present.

- (39) a. dar is net khent
 he is not come
 'He has not come'
- b. *dar net is khent
 he not is come
- (40) a. dar has geböllt [azz-e net vortgea]
 he has wanted that-I not away-go
- b. *dar hat geböllt [azz-e vortgea net]
 he has wanted that-I away-go not

Similar conclusions are supported by considering the distribution of subject clitics. In main clauses where the first position item is a non-subject, no overt subject can be realized, and instead a subject clitic pronoun follows the verb.

- (41) a. Gestarn hatt-ar gisekk in has
 yesterday has-he seen a hare
 'Yesterday, he has seen a hare.'
- b. *Gestarn ar hatt gisekk in has
 yesterday he has seen a hare

In non-subject-initial embedded clauses with an *az*-type complementizer, however, subject clitics are not permitted.

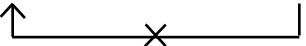
- (42) *I boas [az gestarn hatt-ar-z-en gett]
 'I know that yesterday has-he-it-him given

There is substantial evidence that in verb-second languages like Cimbrian, verbs move to Finiteness° in declarative main clauses (the analysis of V2 will be returned to in greater detail in chapters 4 and 5). Additionally, there is evidence that subject agreement takes place through a low complementizer position, either in Finiteness° or a similar projection (Poletto 2000; Aboh 2006; Branigan 2011). The data appear to indicate then, that the presence of an *az*-type complementizer prevents verb-movement to Fin. On the other hand, *az*-type complementizers are obligatorily clause-initial, and precede both topics and foci, suggesting that their surface position is in ForceP.

- (43) a. Dar libar [bo dar-r IN GIANNI has get]
 the book that part-he the Gianni has given
 'the book that he has given TO GIANNI.'

Grewendorf and Poletto argue that the apparent surface position of *az*-type complementizers in Force° and their effects on verb movement to Fin° can be accounted for as follows: In clauses without an *az*-type complementizer, the verb raises past NegP to Fin°, where subject agreement takes place. In clauses with an *az*-type complementizer, the complementizer is first Merged in Fin°. This prevents verb movement to Fin°, resulting in its low position relative to negation and the impossibility of subject agreement. Later in the derivation, the complementizer is copied and pronounced in Force°.

- (44) [ForceP ... [TopicP ... [FocusP ... [FinP V° [InflP ... [NegP ... [... V° ...]]]]]]]

- (45) [ForceP *az* [TopicP ... [FocusP ... [FinP ~~*az*~~ [InflP ... [NegP ... [... V° ...]]]]]]]
- 

As additional evidence for head movement in the left periphery, we can consider blocking effects on movement. This is illustrated in the Béarnais dialect of Gascon, which is characterized by the use of exclamative particles that appear in both main and embedded clauses (Bouzet 1932; Campos 1992; Pusch 2002; Morin 2006). The three particles (declarative *que*, interrogative *e*, and exclamative *be*) typically follow preverbal subjects and fronted topics. However, they can appear clause-initially if no phrase precedes the main verb. All Gascon examples are from Morin (2006).

- (46) a. Maria **que** parla gascon
 Maria DECL speaks Gascon
 'Maria speaks Gascon'
- b. **E** parla gascon Maria
 Q speaks Gascon Maria
 'Does Maria speak Gascon?'
- c. **Be** m'agrada la toa pelha
 BE me-pleases the your dress
 'How I like your dress!'

However, the distribution of exclamative particles in embedded clauses depends on the presence of complementizers or overt topics. Consider the distribution of *e* with respect to the complementizer *se* 'if', which appears in embedded interrogative clauses. Unlike in main clauses, it is not possible for an embedded clause to contain only the particle *e*, regardless of whether or not there is a preverbal constituent. The complementizer *se* appears in all interrogative embedded clauses.

- (47) Que m' demandi [se drom lo gat]
 DECL me-ask if sleeps the cat
 'I wonder if the cat is sleeping.'

- (48) *Que vau véder [las arhagas e son maduras]
 DECL I.go see the strawberries if are ripe

E is licensed uniquely within embedded clauses like (49), where *se* is in clause-initial position, and *e* follows an intervening topic phrase. The omission of *e* is marginal (49b), and it is not possible for *se* and *e* to co-occur without an intervening topic (49c).

- (49) a. Que 'm demandi [se lo gat e drom]
 DECL me ask if the cat Q sleeps
 'I wonder if the cat sleeps'
- b. ?Que 'm demandi [se lo gat drom]
 DECL me ask if the cat sleeps
- c. *Que 'm demandi [se e drom lo gat]
 DECL me ask if Q sleeps the cat

Morin notes that this distribution of *e* in embedded clauses supports an analysis in which *e* is the pronunciation of a *Fin*[°] head with an interrogative specification, and *se* realizes an interrogative *Force*[°] head. The fact that embedded exclamative particles are realized only in the presence of a topic suggests that there is a default movement chain from *Fin*[°] to *Force*[°] within embedded clauses. However, in the presence of a *Topic*[°] head that triggers phrasal movement, *Fin*-to-*Force* head movement is blocked; this forces the pronunciation of the lower exclamative particle, and *se* is Merged directly in *Force*[°].²

To conclude, the Cartographic Approach to the left periphery allows for explanations of a variety of empirical phenomena involving focus, topicalization, and complementizer ordering. However, the claim that this series of functional projections is universal, and that all heads introduce exactly one category feature (Cinque and Rizzi 2010) remain

² Under this analysis, the pattern appears to reflect a preference within the grammar for Internal Merge over External Merge, i.e. 'Move over Merge'. For additional discussion, see Motut (2010), Shima (2000), Boeckx and Grohmann (2007), Chomsky (2013).

controversial (Craenenbroeck 2009 and works therein). In chapter 4, I present its empirical difficulties in accounting for languages where available functional structure appears to be substantially restricted. In particular, I consider problems in the analysis of verb second effects, for which a brief summary is given below.

1.3.3 Verb second effects

Informally stated, the verb-second restriction requires the main verb or highest tensed auxiliary of a clause to be preceded by exactly one phrase at the left edge of the utterance. Although though there are some language-specific exceptions, the first position in V2 clauses can be occupied by constituents of a variety of grammatical functions or phrasal categories. Consider the examples from Dutch, as repeated from Haegeman (1996). Although a variety of arguments can appear in first position (50), it is generally not possible for multiple phrases to precede the verb simultaneously (51).

- (50) a. *subject first*
Marie **zal** morgen dit boek kopen
Marie will tomorrow this book buy
'Marie will buy this book tomorrow.'
- b. *object first*
Dit boek **zal** Marie morgen kopen
this book will Marie tomorrow buy
'Marie will buy this book tomorrow.'
- c. *adjunct first*
Morgen **zal** Marie dit boek kopen
tomorrow will Marie this book buy
'Marie will buy this book tomorrow'

- d. *wh-word first*
Welk boek **zal** Marie morgen kopen
which book will Marie tomorrow buy
'Which book will Marie buy tomorrow?' (Haegeman 1996)
- (51) a. *Morgen dat boek **zal** Marie kopen
tomorrow that book will Marie buy
- b. *Morgen ze **zal** dat boek kopen
tomorrow she will that book buy (Haegeman 1996)

In addition, first-position elements can carry a variety of information-structure functions, with some language-specific differences. Non-subject constituents in first position are generally interpreted as topics or foci (Holmberg 2015), and V2 languages appear to consistently require *wh*-movement to first position (Richards 2016). Although V2 is most consistently attested within the Germanic language family, V2 patterns are also observed in Breton and historic Brythonic Celtic languages (Stephens 1982; Willis 1998), as well as a number of Romance languages, including Rhaetoromance dialects (Poletto 2000), Old French (Foulet 1928; Dupuis 1989; Adams 1987), and Old Italian (Benincà 1983). Although they are rarely described outside of the Indo-European languages, V2 requirements have additionally been proposed for the Nakh-Dagestanian language Ingush (Nichols 2011) and the Tupi language Karitiâna (Storto 1999).

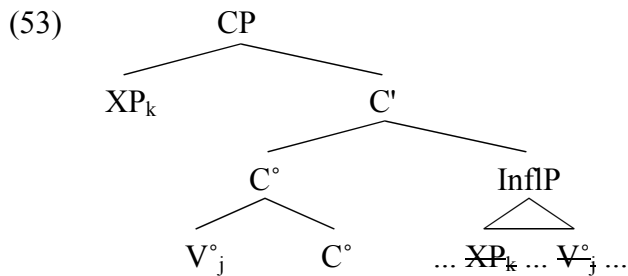
There is substantial evidence that V2 patterns require verb movement to a head within the complementizer domain (den Besten 1983; Travis 1984; Fanselow 2004; Roberts 2004, 2012; Haegeman and Cranenbroeck 2007; among many others). Consider, for instance, the complementary distribution between V2 and overt complementizers in German embedded clauses. In embedded clauses with an overt complementizer *dass*, the verb appears in a clause-final position, whereas verb-second order is required in

complementizer-less clauses. Furthermore, it is not possible for clauses with *dass* to show verb-second order.

- (52) a. Er sagte [dass er morgen komme]
 He said that he tomorrow comes
- b. Er sagte [er komme morgen]
 He said he comes tomorrow
 'He said that he is coming tomorrow.'
- c. *Er sagte [dass er komme morgen]
 He said that he comes tomorrow

(Holmberg 2015, after den Besten 1983)

Traditional analyses of V2 claim that V2 clauses have two main properties: verb movement to the C° head, and the movement of exactly one phrase to a higher specifier position (den Besten 1983; Travis 1984; Holmberg 1986; Vikner 1995; Fanselow 2004). This structure is given in (53).



However, the "classic" analysis faces several difficulties, chiefly in accounting for V2 languages that allow restricted types of deviations (V1, V3), and languages that permit V2 to co-occur with overt complementizers. Furthermore, there are few successful approaches to deriving V2 within a cartographic theory that assumes an extended inventory of projections. These issues form the main discussion of chapter 4.

1.4 Organization of the dissertation

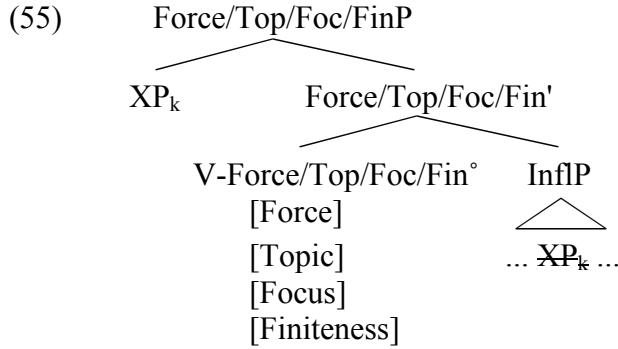
The remainder of the dissertation is organized as follows. Chapters 2 and 3 present a syntactic and prosodic study of the embedded left periphery of Bangla, aiming to account for the non-initial placement of the complementizer *je* in preverbal embedded clauses. By examining the placement of *je* relative to embedded topics and foci in different clause types, I argue that in all embedded clauses, the complementizer has a movement chain in multiple left-peripheral heads, separated by topics and foci.

(54) [ForceP *je*_i [TopicP (XP) [FocusP (XP) [FinP *je*_i [InfP ...

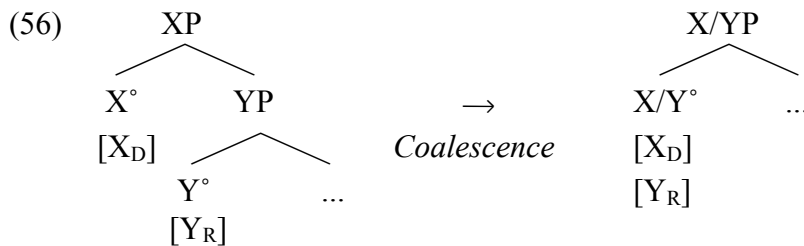
A description and analysis of embedded clause prosody reveals that *je* is obligatorily non-initial when its embedded clause corresponds to an intonational phrase in prosodic representation. I propose that non-initial placement of the complementizer results from the pronunciation of the lower copy in order to prevent the violation of a prosodic constraint against *je* in IntP-initial position.

Chapter 4 turns to the problem of deriving verb-second restrictions, with a special focus on relaxed V2 languages that allow principled deviations from V2 order. It discusses the challenges that such patterns pose to previous theories of analyzing V2 in the left periphery, including the Bottleneck Effect and Stacked Head analyses. I propose that the typology of relaxed V2 systems supports an analysis of V2 as the result of several parameter settings. In particular, I argue in favor of an approach that permits category features to vary in whether they are realized on separate heads or if they are bundled into a single, featurally complex head (i.e. Feature Scattering - Giorgi and Pianesi 1996). To

preview the analysis, I claim that strict V2 restrictions result from the bundling of all left-peripheral features into a single head, whose projection requires one specifier. V2 restrictions are loosened, however, as fewer category features are bundled together.



Chapter 5 proposes that the bundling of category features and various types of affixation should be analyzed as the result of a single syntactic operation, Coalescence, that combines adjacent heads into single complex heads. I argue that Coalescence applies uniquely in contexts where the lower head is either affixal or phonologically null, indicating that the operation serves to eliminate structures that would be deficient for interpretation at the PF interface. The bundling of category features that are phonologically null accounts for bundling effects attributed to Feature Scattering, while the bundling of affixal heads accounts for effects attributed to Morphological Merger.



I propose an implementation of Coalescence within a Minimalist grammar, showing that attested variation in the strictness of verb-second effects results from differences in the distribution of deficient category features. Additionally, I argue that Coalescence provides a superior theory of head-adjunction than previous approaches.

Chapter 6 summarizes the claims and contributions of the dissertation, and closes with discussion of its implications for future research at the syntax-phonology interface.

Chapter 2: Bangla complementizer order and copy pronunciation

2.1 Introduction: The Bangla *je* puzzle

This chapter examines the placement of the finite complementizer *je* in Bangla, whose distribution has long proved challenging for syntactic analyses. The crux of the problem is that possible orderings of *je* within an embedded clause depend on the position of the embedded clause relative to the main verb. Consider the basic pattern below, as presented by Bhattacharya (2001). While Bangla shows default SOV order in both main and embedded clauses (Dasgupta 1980; Sengupta 1990; Rahman 2010), discourse-neutral embedded clauses headed by *je* are postverbal.¹ In postverbal embedded clauses, *je* can only be pronounced in a clause-initial position. The pronunciation of *je* is optional in the examples discussed here; what is of interest is the restrictions that are observed when the complementizer is overt.

- (1) a. Jon jane [je ma oSudh khey-eche]
 b. *Jon jane [ma je oSudh khey-eche]
 c. *Jon jane [ma oSudh je khey-eche]
 John knows that mother that medicine that eat-PERF
 'John knows that mother took medicine.'

When the embedded clause is *preverbal*, either sentence-initial or following the subject, *je* cannot be clause-initial, and only surfaces after at least one other phrase (Dasgupta

¹ As noted by Biberauer et al. (2014) and Biberauer and Sheehan (2012), there appears to be a universal restriction against head-initial clauses embedded under head-final verbs, perhaps as a reflex of the Final-over-Final Constraint.

1980; Bhattacharya 2001; Simpson and Bhattacharya 2003; Bayer and Dasgupta *to appear*).

- (2) a. *Jon [je ma oSudh khey-eche] jane
 b. Jon [ma je oSudh khey-eche] jane
 c. Jon [ma oSudh je khey-eche] jane
 John that mother that medicine that eat-PERF knows
 'John knows that mother took medicine.'
- (3) a. *[je ma oSudh khey-eche] Jon jane
 b. [mother je oSudh khey-eche] Jon jane
 c. [mother oSudh je khey-eche] Jon jane
 that mother that medicine that eat-PERF John knows
 'John knows that mother took medicine.'

In the remainder of this chapter, I present a novel account of this asymmetry in the distribution of Bangla *je*. I present data on embedded topicalization and focus to show that both initial and non-initial complementizer orders are derived in the extended CP domain (Rizzi 1997; Benincà and Poletto 2004; among many others). Furthermore, I argue that non-initial complementizer orders are derived through lower copy spell-out of the complementizer (Franks 1998; Pesetsky 1998; Bošković 2001; Bobaljik 2002). I claim that both preverbal and postverbal embedded clauses follow the same derivation in which *je* is first merged in Fin(iteness)[°] and copied in Force[°].

- (4) [ForceP (*je*) [TopicP(s) (XP_{top}) [FocusP (XP_{foc}) [FinitenessP (*je*) [InflP ...

The *je*-initial order of postverbal embedded clauses results from the default pronunciation of the complementizer's highest copy in Force[°]; Word order in preverbal clauses is derived through pronunciation of *je*'s lower copy in Fin[°], paired with movement of at

least one other phrase to TopicP or FocusP. I additionally claim that *je*'s movement chain is an instance of long head movement (Lema and Rivero 1991; Rivero 1991; Borsley et al. 1996), in which movement from Fin° to Force° skips over the structurally intervening Topic° and Focus° heads. Lastly, I argue in favor for this approach over an alternative analysis of complementizer lowering via Local Dislocation (Embick and Noyer 2001; Kramer 2010) or Prosodic Inversion (Halpern 1992).

2.2 Preliminaries on Bangla clause structure

The proper syntactic analysis of embedded clause placement in Bangla and its Indo-Aryan relatives has proven controversial, particularly in the context of the general head-final nature of these languages². In Bangla, the debate has largely been framed in terms of identifying the base position of embedded clauses. On one hand, the strict head-final interpretation of Bangla phrase structure holds that embedded CP are first merged in the preverbal object position, with other orders derived by left or right extraposition (Bayer 1996). This contrasts with the 'antisymmetric' view, in which the post-verbal CP is in its base position, and preverbal orders are derived through raising (Simpson and Bhattacharya 2003).

- (5) *The head-final analysis* (Bayer 1996)
Base order: S [CP...] V
Derived orders: S t_k V [CP...]
[CP...] S t_k V

² See Bayer (1996) and Simpson and Bhattacharya (2003) for extended discussion of this issue in Bangla. Similar considerations of Hindi-Urdu are found in Bhatt and Dayal (2007) and Manetta (2012).

- (6) *The anti-symmetric analysis* (Simpson and Bhattacharya 2003)
 Base order: S V [CP...]
 Derived orders: S [CP ...]_k V t_k
 [CP ...]_k S V t_k

While this dissertation does not primarily address the debate, the analysis assumes the anti-symmetric analysis of Simpson and Bhattacharya, arguing that it accounts for correlations between embedded clause positions and their interpretations and for differences in their prosodic realization.

The placement of embedded clauses is restricted by their discourse interpretations. In neutral contexts or broad focus, embedded clauses with *je* are obligatorily postverbal. On the other hand, embedded clauses can precede matrix verbs only under restricted discourse interpretations. Sentence-medial embedded clauses, which follow the main clause subject but precede the main verb, obligatorily bear emphatic or corrective focus. Sentence-initial embedded clauses, which precede main clause subjects, are necessarily topicalized. A clear reflex of this restriction is the fact that focus is disallowed on constituents within sentence-initial CPs.

- (7) *Embedded CP position and interpretation*
 Postverbal CP: informationally neutral. (initial *je*)
 Medial CP: emphatic or corrective focus. (non-initial *je*)
 Sentence-initial CP: topicalized information. (non-initial *je*)

As a broader generalization, Bangla exhibits a discourse-configurational tendency to place topics in initial positions, and focus in medial positions (Choudhury 2010; Rahman 2010; Syed 2013).

We consider the placement of topics within main clauses, and Simpson and Bhattacharya's argument that a high topic position drives the movement of discourse-

given phrases to a sentence-initial position. The initial observation behind this claim is that *wh*-phrases typically appear in a post-subject position. If *wh*-movement is obligatory in Bangla, as argued in greater detail by the authors, this differs from languages like English where *wh*-movement targets the left edge of the clause.

- (8) ora [ke aS-be] Sun-eche
 they who come-FUT hear-PERF
 'Who have they heard will come?' (Bayer 1996)

Simpson and Bhattacharya note that subjects that precede *wh*-words are obligatorily topicalized, as revealed by the fact that they must be definite or specific. While Bangla has no overt definite determiners, the definiteness of nominal phrases is indicated by the orderings of numerals and classifiers relative to nouns (Bhattacharya 1999). When numeral-classifier sequences precede the noun ([Num-CL] NP), only an indefinite reading is available, whereas nouns that precede the numeral and classifier ([NP [Num-CL]]) are obligatorily definite. Based on this criterion, only definite nominals can precede *wh*-words.

- (9) chele du-to [kon boi-ta] poŕlo?
 boy two-CL which book-CL read
 'which books did the two boys read?'
 (10) *du-to chele [kon boi-ta] poŕlo?
 Two-CL boy which book-CL read
 (intended reading: 'which books did two boys read?')
 (Simpson and Bhattacharya 2003)

Furthermore, when a non-*wh* subject is quantified and thus incompatible with a topic reading, it must occur to the right of the matrix *wh*-phrase.

- (11) [ka-ke] kew vot daey-ni
 who-DAT anyone vote gave-NEG
 'Who did no one vote for?'
- (12) * kew [ka-ke] vot daey-ni
 anyone who-DAT vote gave-NEG
 (intended reading: 'who did no one vote for?') (Simpson and Bhattacharya 2003)

On the basis of these facts, Simpson and Bhattacharya propose the existence of a topic projection above *wh*-phrases, accessible only to definite nominals or other eligible topics. Their proposed structure is given in (13).

- (13) [Topic [_{whP} wh_k [Subject_(QP/nontopic) ... t_k ...]]]

This ordering of constituents at the left edge of the clause receives a straightforward adaptation in the Cartographic model of the extended clausal periphery (Rizzi 1997; Benincà and Poletto 2004; a.o.), which splits the traditional CP into a series of functional projections that encode various discourse properties. Minimally, this consists of two complementizer projections, ForceP and FinitenessP (abbreviated as FinP), separated by TopicP and FocusP. Within this basic structure, I propose that pre-subject topics identified by Simpson and Bhattacharya move to TopicP, with *wh*-words in FocusP.

- (14) [ForceP ... [TopicP (Topic) [FocusP (wh) [FinP ... [IP ...

In the section that follows, I show that this inventory of left-peripheral positions is also available in embedded clauses (cf. Rizzi 1997; Bianchi 1999; Ledgeway 2005; Roussou 2000; Krapova and Karastaneva 2002; Roberts 2004; Aboh 2006; Demonte and Fernández-Soriano 2009; a. o.) and that the focus position is also available to contrastive focus. Furthermore, these projections are crucially ordered with respect to *je*; when the

CP is postverbal, topic and focus immediately follow *je*, whereas both precede *je* in preverbal CPs.

2.3 Topicalization and focus in embedded clauses

We now consider the possible orderings of *je* relative to fronted topics and foci within both postverbal and preverbal embedded clauses. Based on the attested patterns, I argue that the differences in the position of *je* depend on which complementizer head it is pronounced in. Specifically, *je* surfaces in Force° in postverbal embedded clauses, but Fin° in preverbal embedded clauses.

2.3.1 *Postverbal embedded clauses*

We first turn our attention to postverbal embedded clauses, where *je* is obligatorily clause-initial. Recall that indefinite and quantified DPs in a simple matrix clause cannot move past a *wh*-phrase into a high topic projection. This particular diagnostic is unfortunately unavailable for embedded clauses with *je*, since *je* as a declarative complementizer is incompatible with embedded clauses containing [+*wh*]-phrases (Bayer 2001). However, topic movement can nonetheless be identified by examining the possible placement of object DPs relative to subjects. In both main and embedded clauses, the neutral word order for transitive sentences is SOV. However, OSV word orders are also available, as given in the pair below.

- (15) Jon jane [(je) ma oSudh khey-eche]
 John knows [that mother medicine eat-PERF]
 'John knows that mother took medicine.'
- (16) Jon jane [(je) oSudh ma khey-eche]
 John knows [that medicine mother eat-PERF]
 'John knows that mother took medicine.'

Numerous studies have established that relatively free word order of this type is nonetheless constrained by restrictions related to information structure. For instance, placement of objects in pre-subject positions is commonly restricted to definite or specific DPs (Mahajan 1990; Moltmann 1990; Diesing 1992; de Hoop 1992; Choi 1999), and indefinites with contrastive focus (Moltmann 1990; Choi 1999); In addition to the arguments of Simpson and Bhattacharya (2003), Rahman (2010) similarly identifies sentence-initial positions as restricted to topics. Furthermore, he shows that contrastively focused objects are preferably placed in medial positions (non clause-initial, not verb-adjacent), while non-focused objects prefer verb-adjacency.

Let us hypothesize that OSV word orders in Bangla are the result of either topicalization or contrastive focus of the object, which raises the object above the subject's base position. If this is correct, we predict that objects that are possible topics (definite or specific) can freely precede subjects, either with or without focal prominence. On the other hand, objects that are ineligible topics, such as quantified phrases or indefinites, can only be fronted if they are clearly contrastively focused. Both of these predictions are borne out.

We first turn our attention to the patterning of definite object DPs. As expected, definite objects (here, *chatro du-to-ke* 'the two students-ACC') can appear in the preverbal object position (17), or be fronted to the left of subjects in the absence of a focus.

- (17) John bol-lo [je dadubhai chatro du-to-ke dEkh-eche]
 John say-pst that grandfather student 2-CL-ACC see-PERF
 'John said that grandfather saw the two students'
- (18) John bol-lo [je chatro du-to-ke dadubhai dEkh-eche]
 John say-pst that student 2-CL-ACC grandfather see-PERF
 'John said that grandfather saw the two students'

We compare this to the patterning of quantified DP objects, specifically those that are obligatorily non-specific.³ Within postverbal embedded clauses, quantified objects are most naturally placed after the subject, in what appears to be the base word order (19). Fronting of a quantified object (with a non-specific reading) to the left of the subject results in a loss of grammaticality under an intended non-focused reading (20).

- (19) Jon bol-lo [je dadubhai kau-ke dEkh-e-ni]
 John say- PST that grandfather anyone-ACC see-PERF-NEG
 'John said that grandfather didn't see anyone'
- (20) # Jon bol-lo [je kau-ke dadubhai dEkh-e-ni]
 John say-PST that anyone-ACC grandfather see-PERF-NEG

The same pattern is observed with indefinite DPs. Recall that nominal phrases with [[Num-Cl] NP] order are obligatorily indefinite, and thus incompatible with topic readings. This provides evidence for the existence of a high TopicP above the regular

³ The restriction is not one against all quantified expressions. For example, nouns quantified by *kichu* 'some' can front before subjects in non-focused readings (anonymous personal communication).

- (i) [kichu oSudh] ma kal rat-e khey-eche
 some medicine mother last night-LOC eat-PERF
 'Mother took some medicine last night.'

For speakers that admit such examples, this would appear to reflect a "specificity effect" well-documented in Germanic-style scrambling (de Hoop 1992, Diesing 1994, Moltmann 1990), whereby quantified phrases that are interpreted as specific front more liberally than non-specific quantified phrases.

subject position in embedded clauses (the following data are based on those of Simpson and Bhattacharya 2003).

- (21) Jon bol-lo [je dadubhai du-to chatro-ke dEkh-eche]
 John say-PST that grandfather 2-CL student-ACC see-PERF
 'John said that grandfather saw two students'

- (22) # Jon bol-lo [je du-to chatro-ke dadubhai dEkh-eche]
 John say-PST that 2-CL student-ACC grandfather see-PERF

However, the word order in (20) is acceptable if the fronted quantifier phrase is contrastively focused (i.e. understood to exclude some contextually defined set of possible alternatives) and bears focal prominence.⁴ In all subsequent examples, focal prominence will be indicated with capitalization.

- (23) Jon bol-lo [je KAU-KE dadubhai dEkh-e-ni]
 John said that anyone-acc grandfather see-PERF-NEG
 'John said that grandfather didn't see ANYONE.'

- (24) Jon bol-lo [je DU-TO CHATRO-KE dadubhai dEkh-eche]
 John say-pst that 2-CL student-ACC grandfather see-PERF
 'John said that grandfather saw TWO STUDENTS.'

The acceptability of non-specific DPs in this position under contrastive focus indicates either that contrastive focus is for some reason permitted to front to TopicP, or that it can front to a distinct FocusP position above the subject position. In the next section, I present data to support the latter hypothesis.

In summary, we have initial evidence that postverbal embedded clauses, like main clauses, have a topic (and possible contrastive focus) projections above the non-topic subject position. Furthermore, these positions must follow an overtly-realized *je*. The fact

⁴ There is some inter-speaker variation in the acceptance of sentences with clause-initial contrastive focus on objects, with some speakers finding such examples marginal.

that in postverbal embedded clauses *je* is obligatorily initial, preceding fronted topics and foci, suggests that it instantiates the highest complementizer head Force° , above both TopicP and FocusP. The relevant part of the clause structure is given below in (25). The structural position of non-topic subjects, which we can conclude is below FocusP, will be discussed in more detail in Section 2.4.2.⁵

(25) *Postverbal embedded clause*

V [ForceP (*je*) [TopicP(s) (XP_{top}) [FocusP (XP_{foc}) [FinP [IP ...

Taking this representation as a starting point, I will present evidence that *je* in preverbal embedded clauses is pronounced not in Force° , but in the Fin° complementizer head.

2.3.2 Preverbal embedded clauses

In this section, we extend the same diagnostics to preverbal embedded clauses, where *je* is obligatorily non-initial. Previous descriptions of the pattern have noted that phrases that precede non-initial *je* are typically accompanied by a special discourse interpretation: Dasgupta (1980) analyzes non-initial *je* as a focus marker; Bhattacharya (2003) treats preverbal *je* as a marker of contrast; Bayer and Dasgupta (*to appear*) analyze *je* as a

⁵ With respect to movement to the left periphery, the present data considers only the patterning of subjects and objects. Adverbs, for instance, are more freely admitted in pre-subject positions without any clear requirement of definiteness or being non-quantified (anonymous, personal communication).

- (i) [kOkhono-i je Ram e-kOtha bolte pare na] Rebeka janto
 [never-emp that Ram this-talk spak.inf can.3 neg Rebecca knew
 'Rebecca knew that Ram can not ever say this.'

Rather than call into question the proposed restrictions on object fronting, these facts suggest that adverbs are somehow less restricted in their placement than subjects or objects. This generalization is also reported in the experimental study by Rahman (2010), who shows that Bangla *wh*-adjuncts and adjuncts with contrastive focus display greater freedom of placement than their subject and object counterparts.

complementizer that simultaneously marks emphatic topicalization. I will present new evidence that these previous descriptions are largely on the right track, but in need of some refinement. I show that phrases preceding *je* can be either topicalized or contrastively focused, with restrictions on the orderings of topics and foci. However, these interpretational constraints are obligatorily applied only to fronted objects, but not subjects.

I first consider the interpretational restrictions of fronted objects that precede *je*. We will see that objects in this position must be either topicalized or contrastively focused, suggesting that object fronting targets Topic and Focus projections above non-initial *je*. Non-focused definite DP objects can freely occur to the left of *je* (26), or remain in a position below *je*, as long as *je* is not initial within the clause (27).

- (26) John [chatro du-to -ke je dadubhai dEkh-eche] bol-lo
 John student 2-CL -ACC that grandfather see-PERF say- PST
 'John said that grandfather saw the two students'
- (27) John [dadubhai je chatro du-to -ke dEkh-eche] bol-lo
 John grandfather that student 2-CL-ACC see-PERF say-PST
 'John said that grandfather saw the two students'

On the other hand, quantified or indefinite object DPs are dispreferred to the left of *je* under a neutral reading. However, these word orders are possible if the indefinite is contrastively focused.

- (28) # John [du-to chatro-ke je dadubhai dEkh-eche] bol-lo
 John 2-CL student-ACC that grandfather see-PERF say-PST
- (29) # John [kau-ke je dadubhai dEkh-e-ni] bol-lo
 John anyone-ACC that grandfather see-PERF-NEG say-PST

- (30) John [DU-TO CHATRO-KE je dadubhai dEkh-eche]bol-lo
 John 2-CL student-ACC that grandfather see-PERF say-PST
 'John said that grandfather saw TWO STUDENTS.'

The patterning of definite and indefinite objects before *je* parallels what is observed in the pre-subject position of postverbal embedded clauses, providing evidence that objects that precede *je* in preverbal clauses must occupy either a topic or focus position, based on differences in the patterning of definite and non-definite objects.

The permitted word orders in sentence-initial embedded clauses, where the embedded clause precedes the matrix subject, are similar to those of sentence-medial clauses. The complementizer cannot be clause-initial, and can be preceded by more than one topicalized phrase. The crucial difference is that focus is unavailable within the fronted clause.

- (31) [kal rate oSudh je dadubhai khey-eche] Jon bol-lo
 last night medicine that grandfather eat-PERF] John say-PST
- (32) * [DADUBHAI je oSudh khey-eche] Jon bol-lo
 [grandfather that medicine eat-PERF] John say-PST

This restriction seems to be due to the fact that sentence-initial embedded clauses are themselves topicalized, precluding the occurrence of focus within the clause.

We now turn back to sentence-medial embedded clauses, and the observation by Bhattacharya (2001) that the topic and focus positions can be simultaneously filled, but with several restrictions. Topics are crucially ordered before focused phrases, and it is not possible for non-topics to precede focus.

- (33) John [chatro du-to-ke DADUBHAI je dEkh-eche] bol-lo
 John student 2-CL-ACC GRANDFATHER that see-PERF say-PST
 'John said that GRANDFATHER saw the two students'
- (34) # John [du-to chatro-ke DADUBHAI je dEkh-eche] bol-lo
 John 2-CL student-ACC GRANDFATHER that see-PERF say-PST

As additionally noted by Simpson and Bhattacharya, only one contrastively focused phrase is allowed, though it can be preceded by multiple topics.

- (35) John [Meri Borders-e kal HÆMLET je kin-eche] jane
 John Mary Borders-loc yesterday HAMLET that buy-perf knew
 'John knew that it was HAMLET that Mary bought yesterday at Borders'
 (Simpson and Bhattacharya 2003)

A highly similar ordering restriction is observed in Italian main clauses, which places ordering restrictions on leftward-moved phrases (Benincà and Poletto 2004). When both topics and focus are moved, topics must precede focus. While multiple topics are permitted, only a single focused constituent can be fronted. This suggests that the restrictions observed in Bangla and Italian are due to universal properties of the clausal left periphery.

Within the structure of the extended left periphery, we now have strong evidence that non-initial *je* in preverbal CPs instantiates the Fin head, below both TopicP and FocusP. TopicP and FocusP are strictly ordered in Bangla, which additionally allows for multiple TopicPs.

- (36) *Preverbal embedded clause*
 [ForceP [TopicP(s) (XP_{top}) [FocusP (XP_{foc}) [FinP (*je*) [IP ...]]]]] ... V

At this point, we have developed a structural account of variation in the placement of *je*; clause-initial *je* in postverbal clauses occurs in Force°, while non-initial *je* in preverbal clauses is in Fin°.

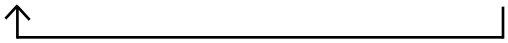
Before turning back to properties of the complementizer, it should be noted that the extended CP structure allows for natural account for variation in the placement of embedded clauses. Assuming that postverbal embedded clauses are in their base position, sentence-medial embedded clause placement is derived by movement of the embedded clause to FocusP, below the subject in TopicP. Due to the dispreference for focus within sentence-initial embedded clauses, this clause placement appears to be the result of movement of the embedded clause to TopicP.

(37) *Postverbal clause placement*

[ForceP [TopP [FocP [FinP [IP XP_{subj} ... [VP V [ForceP ...]]]]]]]

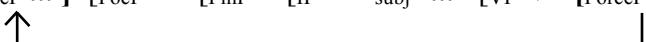
(38) *Sentence-medial clause placement*

[ForceP [TopP XP_{subj} [FocP [ForceP ...] [FinP [IP ~~XP_{subj}~~ ... [VP V ~~[ForceP ...]~~]]]]]]



(39) *Sentence-initial clause placement*

[ForceP [TopP [ForceP ...] [FocP [FinP [IP XP_{subj} ... [VP V ~~[ForceP ...]~~]]]]]]



2.4 The syntax of two *jes*

It appears then, that the complementizer *je* occurs in different positions in the left periphery depending on the position of its embedded clause within the matrix clause. In this section, I argue that the distribution of *je* can be accounted for without having to propose that initial and non-initial *je* are simply different morphemes. Specifically, we

will see that surface variation in the placement of *je* receives a principled explanation as the result of variation in copy pronunciation.

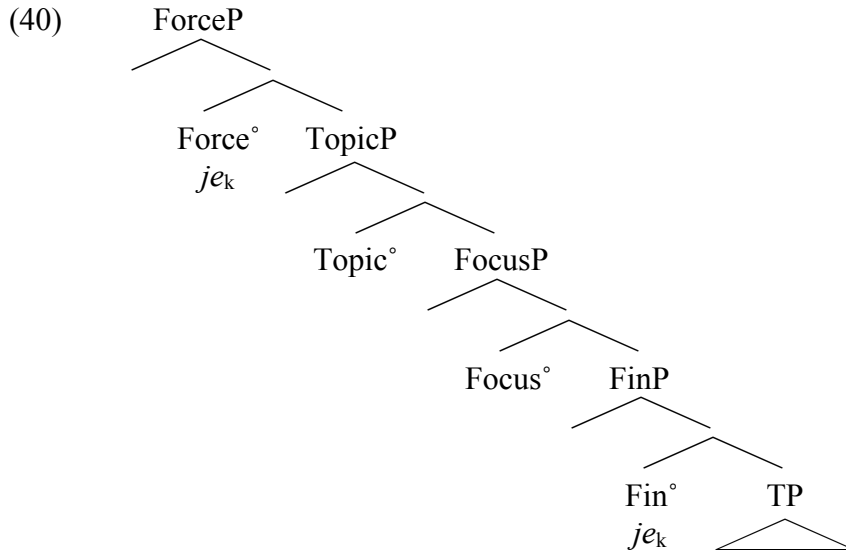
2.4.1 Copy pronunciation and *je* placement

Recall that as proposed by Rizzi, the two complementizer heads, Fin° and Force° , account for various functions performed by complementizers. I assume that Force° primarily encodes clause type properties (declarative, interrogative, etc.), which can be selected by matrix verbs. Fin° determines inflectional properties of the embedded clause, minimally whether the clause is finite or non-finite. While the functions of Force° and Fin° are instantiated with separate morphemes in some languages (Roussou 2000; Roberts 2004; Aboh 2006), it is possible for complementizers to bear properties of both; English *that* is specified as both declarative and finite, as is Bangla *je*.

I argue that the variable positions of *je* are best accounted for using the mechanism of lower copy pronunciation (also referred to as lower copy spell-out), proposed by Franks (1998) and Pesetsky (1998) and further developed by Bobaljik (2002), Bošković (2002) and Bošković and Nunes (2007). The model assumes the Copy Theory of Movement (Chomsky 1993), in which the operation Move creates a copy of a previously merged element. I propose that all embedded clauses with *je* have the base structure in (40), where *je* is first merged in Fin° and a copy is merged in Force° .⁶ This accounts for the fact that regardless of its position, an embedded clause with overt *je* has identical

⁶ For an argument from southern Italian dialects that complementizers leave copies in multiple left-peripheral heads, see Ledgeway (2005). Branigan (2011) argues for subject agreement on complementizers in Germanic languages as evidence for Fin-to-Force movement.

semantic restrictions; *je* appears only in declarative clauses, a Force specification, and occurs only in finite clauses, a Finiteness restriction.



At some point in the derivation, presumably spell-out of the CP phase, this syntactic structure is transferred to the PF grammar, which determines which copy of *je* is pronounced.⁷ Here, I follow numerous analyses in proposing that the determination of copy pronunciation results from the interplay between syntactic and prosodically-oriented requirements. While only the highest copy of any movement chain is pronounced by default, presumably since it has checked the most uninterpretable features (Nunes 1995), the pronunciation of a lower copy or of multiple copies can take place to prevent the violation of PF constraints, including requirements for cliticization or affixation (Franks 1998; Bošković 2001; Bobaljik 2002), avoidance of adjacent phonologically identical words (Bošković 2002; Bošković and Nunes 2007), constraints on sentential stress

⁷ This work leaves aside the unresolved though important question of which head delimits the 'CP phase' in a theory that assumes the existence of multiple complementizer heads. For some discussion, see Roberts (2012) and (Manetta 2011), whose account does not assume the existence of multiple complementizer heads.

placement (Stjepanović 2007), or requirements on the marking of prosodic edges (An 2007; Kandybowicz 2009). Viewed as a type of constraint interaction, lower copy pronunciation takes place when pronunciation of the highest copy would result in the violation of a more highly ranked well-formedness condition. It will be argued in chapter 3 that the pronunciation of *je*'s highest copy in Force° is prevented when it would place the complementizer at an intonational phrase edge.

In Bangla, default pronunciation of the highest copy in Force° produces the *je*-initial order of postverbal embedded clauses. Two operations are necessary to create non-initial orderings of *je*: the lower copy of *je* is pronounced in Fin°, and at least one XP must be moved to a position higher than Fin°. A critical advantage of a lower copy spell-out account is that it explains the fact that *je*'s formal properties (+finite, +declarative) are independent of its surface position; the complementizer follows the same movement chain in all embedded clauses, and is uniformly specified for properties of both Force° and Fin°. Furthermore, it readily accounts for the fact that *je* is not strictly confined to second position, since multiple TopicPs are permitted and TopicP and FocusP can be simultaneously filled.

One might alternatively consider that *je* has separate merge sites, with post-verbal *je* Merged directly in Force°, and pre-verbal *je* Merged in Fin°. While this would account for surface word orders, the approach comes with the non-trivial task of explaining why *je* is only Merged in Force° in postverbal embedded clauses and only in Fin° in preverbal ones. An additional difficulty is the fact that regardless of its surface position, *je* apparently bears semantic specifications of both Force° and Fin° (being both finite and declarative).

The existence of this head movement chain within the left periphery finds further support in the patterning of *jodi* 'if', which introduces the precondition of a conditional statement. Unlike *je*, *jodi* appears to freely occur in either a clause-initial position or a post-subject position (Chacón 2014; David 2015). Crucially, these positions appear to correspond to those in which *je* is realized, depending on clause position. While it is not yet clear why *jodi* allows for variation in its position, it suggests that individual complementizers can be pronounced in different positions without effects on their interpretation.

- (41) (jodi) Sita (jodi) bharot-e Sofor kor-be tobe taj mohol dekh-be
 if Sita if India-LOC travel do-FUT then Taj Mahal see-FUT
 If Sita travels to India, she will see the Taj Mahal.' (David 2015)

It is crucial to this proposal that movement of *je* from Fin° to Force° can take place without leaving intermediate copies in intervening TopicP(s) . If *je* were to leave a copy in each structurally intervening head, one might expect that in preverbal embedded clauses *je* would simply be pronounced in its next highest copy. Specifically, we would not expect *je* to be pronounced after more than one phrase, as it is in (31), (33), and (35). Following Borsley et al. (1996) and Roberts (2000, 2010), I propose that head movement takes place through feature agreement, and need not take place through all structurally adjacent heads. Thus, it appears that in Bangla, a Probe-Goal relation (Chomsky 2000) is not established between Force° and Topic° or Topic° and Focus° (the next section presents some evidence for copying in the Focus° head).

The possibility for preverbal *je* to be pronounced after multiple topics and foci also excludes an alternative account that appeals to the mechanism of Local Dislocation in

Distributed Morphology (Halle and Marantz 1993; Embick and Noyer 2001; Embick 2003; Kramer 2010). Local Dislocation is conceived of as a postsyntactic PF operation that applies to immediately adjacent morphological terminals, creating a complex head that potentially alters their base ordering.

$$(42) \quad X * Y \rightarrow [Y - X] \text{ or } [X - Y]$$

To extend a similar analysis to Bangla, one might propose that in preverbal embedded clauses, Local Dislocation applies to *je* and an adjacent phrase, assuming that some phrases can pattern like heads due to phase impenetrability (Kramer 2010):

$$(43) \quad [_{CP} je * XP \dots] \rightarrow [_{CP} XP - je \dots]$$

The problem with this approach, and a similar mechanism of Prosodic Inversion (Halpern 1992), is that it cannot straightforwardly account for "non-local" reorderings where more than one phrase precedes *je* within its CP. To account for patterns where *je* is preceded by both a topic and focus, it would be necessary for both the topic and focus to form a single constituent, an improbable representation. Such orders, however, are readily predicted to be available by lower copy pronunciation.

2.4.2 Subjects and non-initial *je*

Having presented the general structure of the analysis, we will turn to the unique patterning of subjects that precede *je* in preverbal embedded clauses. Thus far, we have observed that object DPs can only precede *je* with certain restrictions on their

interpretation; they must either be topicalized or focused. While one could expect the same information structure restrictions to hold for subjects preceding *je*, this is not the case. In addition to definite subjects, indefinites and quantified phrases are freely admitted preceding *je*, even in the absence of focus intonation. If positions preceding *je* are uniquely available to topics or focus, the grammaticality of (45)-(47) is unexpected.

- (44) John [chatro du-to je eshe-che] bol-lo
 John student 2-CL that come-PERF say-PST
 'John said that the two students came'
- (45) John [du-to chatro je eshe-che] bol-lo
 John 2-CL student that come-PERF say-PST
 'John said that two students came'
- (46) John [kew je ase-ni] bol-lo
 John [anyone that come-NEG] say-PST
 'John said that no one came'
- (47) [kew je ase-ni] John bol-lo
 [anyone that come-NEG] John say-PST
 'John said that no one came'

What is clear from these examples is that subjects that precede *je* in preverbal embedded clauses are not subject to the same discourse restrictions as objects. This pattern presents a clear challenge to analyses of *je*-second orders as the result of topic or focus features, as proposed by Bhattacharya (2001) and Bayer and Dasgupta (*to appear*).

This particular subject-object asymmetry is attested in many second position phenomena. In verb-second languages, first-position subjects are typically unrestricted in their discourse interpretation, while first-position objects are compatible with only a subset of possible readings. For example, sentence-initial objects in Swedish are restricted to topics (Holmberg 2015); definite DPs are easily fronted (48), while

quantified DP objects cannot appear initially (49). Subjects do not follow this restriction, as seen by the acceptability of quantified or indefinite subjects in sentences uttered with broad focus (50).

(48) Den filmen får du bara inte missa
 That film must you just not miss
 'You simply mustn't miss that film.' (Holmberg 2015)

(49) *? Allt åt Johan
 Everything ate Johan (Holmberg 2015)

(50) Allt är stängt
 Everything is closed
 'Everything is closed'

Similar asymmetries between first-position subjects and objects are observed in Kashmiri (Bhatt 1999) and German (Travis 1984; Fanselow 2004; Mohr 2009; Fanselow and Lenertová 2010). Given that verb-second effects are widely claimed to arise in the CP domain (den Besten 1983; Fanselow 2004; Roberts 2004, among others), this subject-object asymmetry in Bangla is likely due to the same structural property.

The fact that subjects do not need to be topicalized or focused before *je* suggests that they occupy a position in the high clausal periphery other than TopicP or FocusP, one that does not impose any particular discourse interpretation. In the absence of further diagnostics for their position, I will tentatively claim that subjects fill the specifier of FinP, as represented in (51).

(51) [ForceP (*je*) [TopicP (XP_{top}) [FocusP (XP_{foc}) [FinP (XP_{subj}) (*je*) [IP ...

The analysis of subjects in a low left-peripheral position is additionally supported by languages in which subjects precede certain complementizers. For example, consider the

subject doubling construction observed in certain Italian dialects which permit [COMP subject COMP] orders in embedded clauses.

(52) *Turin Piedmontese*

A	venta	che	gnun	ch'a	fasa	bordel
It	needs	that	nobody	that-CL	do-SUBJUNC	noise

'It is necessary that nobody make noise.' (Poletto 2000)

(53) *Castellazzo Bormida*

l=ε	miɛi	ke	vujautʃ	k=i=m=la	dagi
it=is	better	that	you	that=you=me=it	give

It is better that you give it to me' (Manzini 2010)

Crucially, Poletto (2000) argues that the position between the two complementizers is a genuine subject position since it permits quantifier subjects like *nobody*, whereas quantifiers in this language cannot be placed in the left periphery by left-dislocation or topicalization. Such structures would appear to reflect a structure like (51), with the only difference being that both the high and low copies of the complementizer are pronounced in these languages, for reasons yet to be understood.

Turning back to Bangla, however, the analysis in which *je* has copies only in Fin° and Force° predicts that [Focus Subject *je* ...] word orders should be possible in preverbal CPs. Such examples, however, are ungrammatical.

(54) *John [DU-TO CHATRO-KE dadubhai je dEkh-eche]bol-lo
 John 2-CL STUDENT- ACC grandfather that see-PERF say-PST

Recall that previous analyses of *je* as a focus marker have followed from the fact that if a preverbal embedded clause contains a fronted focused phrase, *je* is placed immediately after it. I propose that this restriction follows from a property of the focus projection. Namely, movement of phrases to Spec,FocusP takes place only if a copy of *je* is merged

in Focus°. Thus, the representation of an embedded clause with preverbal focus is given in (55).

(55) [ForceP (*je*) [TopicP (XP_{top}) [FocusP (XP_{foc}) (*je*) [FinP (XP_{subj}) (*je*) [IP ...

This elaborated structure remains compatible with the lower copy spell-out proposal. In the event that *je* can not be pronounced in Force°, the second-highest copy is pronounced. This takes place in Focus° if the projection is filled; otherwise, *je* is pronounced in Fin°.

2.5 Conclusion

This chapter has presented the puzzling distribution of the complementizer *je* in Bangla, and argued that variation in the placement of *je* within embedded clauses follows from the pronunciation of different links in a uniform movement chain. The question remains as to what condition forces the pronunciation of *je*'s lower copy only in preverbal embedded clauses, but not postverbal ones. In the next chapter, I present the prosodic properties of Bangla *je* and embedded clauses and show that lower copy pronunciation occurs uniquely when embedded clauses are prosodified as intonational phrases, taking place to prevent the alignment of *je* with an intonational phrase boundary.

Chapter 3: Prosodic constraints on Bangla complementizer order

3.1 Introduction

This chapter proposes that the pronunciation of a lower copy of the Bangla complementizer *je* is driven by a restriction on prosodic organization in the language. It first develops a description and analysis of the prosodic structure of Bangla embedded clauses and *je*, and argues that lower copy spell-out takes place exclusively when the embedded clause is prosodified as a distinct intonational phrase. Furthermore, I argue that the requirement for *je* to be non-initial in these cases does not follow from the complementizer's status as an 'obligatory clitic,' contra Chacón (2014) and Bayer and Dasgupta (*to appear*). I propose a view of the PF grammar in which the creation of prosodic structure and the pronunciation of movement copies are determined simultaneously, modeling the interaction in an Optimality-Theoretic analysis (Prince and Smolensky 1993). The chapter concludes with a comparison of the proposal with previous analyses of Bangla *je*.

3.2 Prosodic properties of *je* and embedded clauses

To address how the Bangla pattern is influenced by prosodic requirements, there are two main sets of questions to be answered. We first consider the prosodic status of postverbal and preverbal embedded clauses; I present a model of intonational prosody in Bangla and show that preverbal clauses are demarcated by stronger prosodic boundaries than

postverbal ones. Only preverbal clauses are intonational phrases, while postverbal clauses have the status of recursive phonological phrases.

We then consider the prosodic properties of *je*. Does *je* have the properties of a prosodic clitic, or is it prosodically independent? Furthermore, does *je*'s prosodic status depend on whether or not it is initial within the embedded clause? I show that *je* is crucially not a prosodic enclitic when it is initial within a postverbal embedded clause, arguing against analyses of non-initial placement of *je* as the result of its specification as an obligatory enclitic. Rather, I propose that it follows from a more general ban against prosodically weak elements at intonational phrase boundaries.

3.2.1 Subjects and data collection

The presented data consist of recordings of three native speakers (2 female, 1 male) of Kolkata Standard Bangla living in the United States, made between March and May of 2014. The recordings were obtained through a reading task where speakers were presented with a list of pre-constructed sentences in Romanized script. These included several simple sentences with no embedded clauses, as well as sentences with embedded clauses in postverbal, clause-medial, and clause-initial positions, both with and without *je*. The basic inventory of names and verbs are based on those of the study in Khan (2008).

They were asked to read at a neutral speech rate with the intonation that would be most natural for the written sentence. Where necessary, contrastive focus was marked through bolded text and indicated to the speakers. Three tokens of each utterance were

recorded, with occasional repetitions due to speaker disfluencies or misreadings. Each speaker was recorded in an indoor room at the University of Southern California, using a built-in microphone on a MacBook Pro laptop computer. All recordings, pitch analysis, and prosodic segmentation were done in Praat (Boersma and Weenink 2011).

The informants in the present study are speakers of Kolkata Standard Bangla, rather than the Bangladeshi Standard Bangla that was the primary basis of Khan's (2008) analysis. However, unless otherwise noted, no differences in the realization of tones or in prosodic structure have been observed with respect to the relevant data.

3.2.2 The intonational prosody of Bangla

The intonational phonology of Bangla is relatively well-researched, having been documented by numerous researchers (Hayes and Lahiri 1991; Selkirk 2007; Khan 2008, 2010, 2014; Féry 2010). In this section, I propose a model of syntax-prosody mapping of Bangla prosody within Match Theory, focusing on phrasing at the level of the phonological phrase and the intonational phrase.

The principle claim of Match Theory (Selkirk 2009, 2011) is that the mapping from syntactic to prosodic structure is principally driven by a universal set of violable constraints that call for a direct correspondence between syntactic and prosodic constituency. Crucially, these constraints can be violated to satisfy prosodic markedness constraints, allowing for mismatches between syntactic and prosodic structure, and restricted cross-linguistic variation in phrasing. Each MATCH constraint has two arguments, a syntactic constituent and a prosodic category. A universal set of MATCH

constraints accounts for the strong tendency for direct syntax-prosody correspondence at the levels of words, phrases, and clauses. Here, we will consider two proposed constraints on phonological phrases (PPhs) and intonational phrases (IntPs). *MATCH*(LexP, PPh), calls for the correspondence of lexical maximal projections (e.g. NP, AdjP, VP) to PPhs (Selkirk 1986; Selkirk 1996; Varis 2012; cf. Elfner 2012), while *MATCH*(ForceP, IntP) requires clauses to correspond to IntPs. Here, I will adopt the constraint schema of Elfner (2012) in which correspondence requires a relation of *exhaustive dominance*. A prosodic constituent α *exhaustively dominates* a set of terminal nodes β if and only if α dominates all and only the terminal nodes in β .

- (1) *MATCH*(LexP, PPh)
For any lexical maximal projection (LexP) in the syntactic representation that exhaustively dominates one or more terminal nodes α , assign a violation mark if there is no phonological phrase (PPh) in the corresponding phonological representation that exhaustively dominates the phonological exponents of α .
- (2) *MATCH*(ForceP, IntP)
For any Force Phrase in the syntactic representation that exhaustively dominates one or more terminal nodes α , assign a violation mark if there is no intonational phrase (IntP) in the corresponding phonological representation that exhaustively dominates the phonological exponents of α .

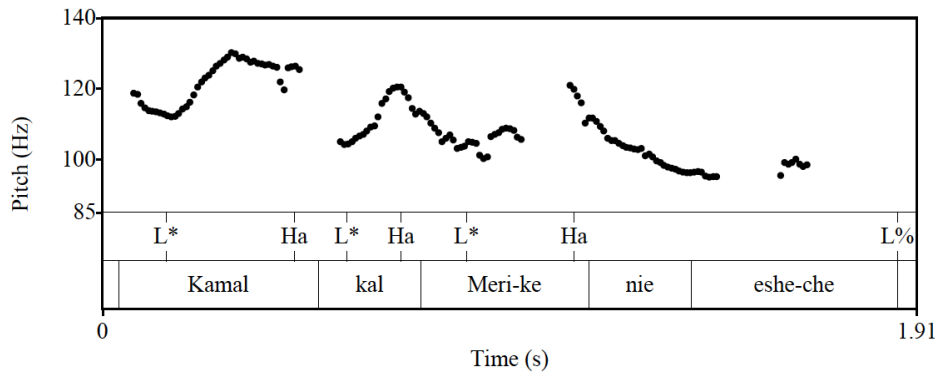
We will see that these two constraints are sufficient to derive much of the attested prosodic phrasing in Bangla.

In Bangla, the two prosodic constituent types are most clearly distinguished by their tonal realizations, which I annotate using a version of the Tones and Break Indices model (Silverman et al. 1992; Beckman and Hirschberg 1994), based largely on Khan (2008, 2010). Each phonological phrase (PPh), referred to in some works as the Accentual Phrase (Jun 2005; Khan 2008, 2010), is associated with a pitch accent on its first stressed

syllable (T*) and a boundary accent at its right edge (Ta). All tones are specified as either high (H) or low (L). While there is some dialectal variation in the default pitch specifications on PPhs, the dominant pattern observed in standard dialects is a low pitch accent followed by a high boundary tone (L*...Ha). This contour also characterizes the vast majority of the data elicited for the present study.

The typical realization of Bangla PPhs is shown in the example below, where the L*...Ha contour tone is identifiable on PPhs corresponding to the nominal constituents (DP/NP) *Kamal*, *kal*, and *Meri-ke*. Note as well the general downtrend in pitch prominence that affects PPhs, such that each Ha pitch peak within the utterance is lower than the previous one.

- (3) Kamal kal Meri-ke nie eshe-che
 Kamal yesterday Mary-ACC taken come-PERF
 'Kamal brought Mary yesterday'

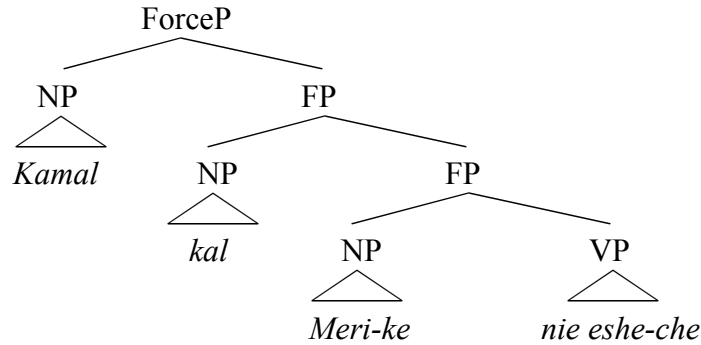


The proposed syntactic structure for the above sentence is given in (4)¹, followed by the prosodic phrasing expected if MATCH(LexP,PPh) is always satisfied in Bangla. Putting aside the pitch characteristics of the verb phrase *nie eshe-che*, which shows an

¹ As we are not directly concerned with the syntactic position of the adverb and direct object, the phrases that dominate are labeled as generic Functional Projections (FP).

intonational phrase boundary tone, the attested prosodic phrasing in the pitch track above corresponds with the prosodic structure predicted by the satisfaction of MATCH(LexP, PPh).

(4) a. *Syntactic structure*



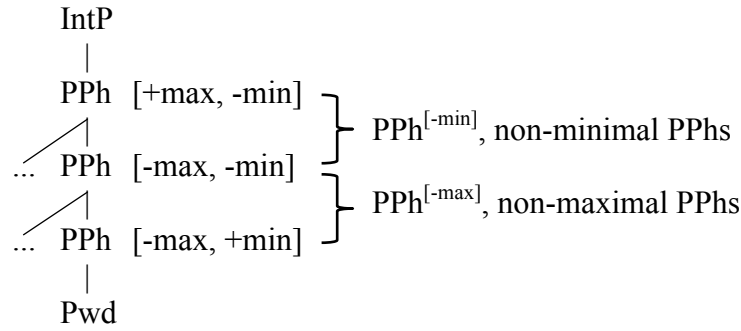
b. *Prosodic representation predicted by MATCH(LexP, PPh):*
 (PPh Kamal) (PPh kal) (PPh Meri-ke) (PPh nie eshe-che)

In the absence of evidence to the contrary, it will be maintained in the remainder of the analysis that simplex lexical phrases correspond directly to PPhs (first argued by Hayes and Lahiri 1991). In other words, MATCH(LexP,PPh) is always satisfied in Bangla.²

Recent studies in syntax-prosody correspondence have argued for widespread recursion of prosodic categories (Wagner 2005; Selkirk 2011; Elfner 2012; Elordieta 2015) of the kind predicted by Match constraints. Furthermore, phonological processes and aspects of phonetic interpretation can apply specifically within subparts of recursive prosodic domains (Itô and Mester 2009, 2013; Elfner 2010a; Elordieta 2015; Hsu 2015). In particular, Itô and Mester (2009, 2013) propose that the following natural classes of constituent types within a recursive PPh structure can be targeted by domain-specific processes:

² As discussed in greater detail by Hayes and Lahiri (1991) and Khan (2008), the organization of PPhs can significantly vary due to speech rate or the presence of focus. In the present analysis, I will focus on phrasing attested at a relatively careful speech rate.

(5) *Projections of PPh*

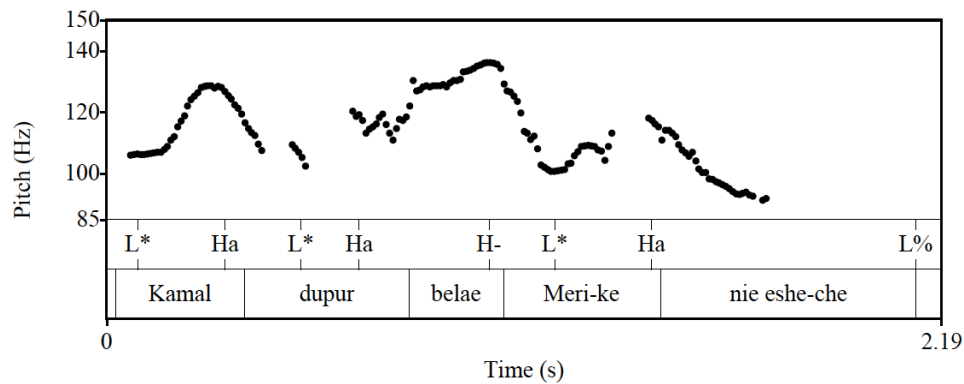


Here, I present evidence for PPh recursion in Bangla, showing that recursive PPhs differ in their pitch realization from nonrecursive ones. Specifically, I will argue that the prosodic constituents labeled as intermediate phrases by Khan (2008) correspond to non-minimal PPhs, i.e. any PPh that dominates another PPh.

Khan (2008) first notes that somewhat larger constituents pattern differently from the simplex ones discussed. For example, phrases that correspond to post-positional phrases and complex NPs exhibit a larger variety of boundary tones than items with less syntactic branching. For example, while PPhs corresponding to simplex NPs generally permit only a high boundary tone at their right edges, these phrases permit a wider variety of boundary tones, including a high tone (H-), low tone (L-), rising contour (LH-), and falling contour (HL-). Furthermore, high tones associated with these constituents can violate the downstep trend generally observed with successive PPhs.

For example, consider the following utterance, which differs from the previous one in that it contains a complex adverbial, *dupur belae* 'early afternoon.' Here, the high tone realized on the adverbial is noticeably upstepped from the one on the preceding subject, unlike the Ha boundary tones previously discussed.

- (6) Kamal dupur bela-e Meri-ke nie eshe-che
 Kamal early.afternoon time-LOC Mary-ACC taken come-PERF
 'Kamal brought Mary in the early afternoon'



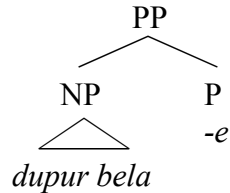
These items are analyzed by Khan as instantiations of a separate prosodic constituent above the PPh, the intermediate phrase. However, several authors have noted that the existence of intermediate categories between the Phonological Phrase and Intonational Phrase is difficult to account for given a constituent-structure based mapping from syntactic to prosodic structure (Selkirk and Tateishi 1988; Itô and Mester 2013). Indeed, although Khan does not aim to propose a formal account for their syntax-prosody mapping, intermediate phrase status is assigned to a large, non-uniform set of syntactic constituents: "The intermediate phrase is a grouping of [PPhs] ... often corresponding to a small phrase (e.g. postpositional phrase, topic, adverbial) and occasionally to a clause (e.g. relative clause, if-clause, because-clause)" (Khan 2008; 139-140).

Here, I propose that the patterning of these items is straightforwardly accounted for by assuming that Phonological Phrasing in Bangla can be recursive, and that the phonetic correlates of PPhs depend on their position within a recursive structure. Under the assumption that Bangla uniformly maps lexical phrases to PPhs to satisfy MATCH(LexP,

PPh), several proposed "intermediate phrase" types should in fact correspond to PPhs that dominate another PPh.

To illustrate, consider the complex adverbial from the previous example, *dupur belae* 'early.afternoon time-LOC'. In its syntactic representation, the sequence is plausibly analyzed as a postpositional phrase PP headed by the locative marker *e* that dominates an NP whose head *bela* 'time' is modified by *dupur* 'early.afternoon.' Abstracting away from the syntax of noun-noun modification, the complement of the postposition, *dupur bela* corresponds to an NP. If both NP and PP are treated as lexical phrases, the prosodic structure that satisfies MATCH(LexP, PPh) is a recursive PPh structure. This correspondence is shown in (7).

(7) a. *Syntactic structure*



b. *Prosodic representation predicted by MATCH(LexP, PPh)*
 (PPh-non-min (PPh-min dupur bela) e)

The same reasoning can be applied to two other types of constituents identified by Khan to show "intermediate phrase" status, modified NPs and possessive NPs.

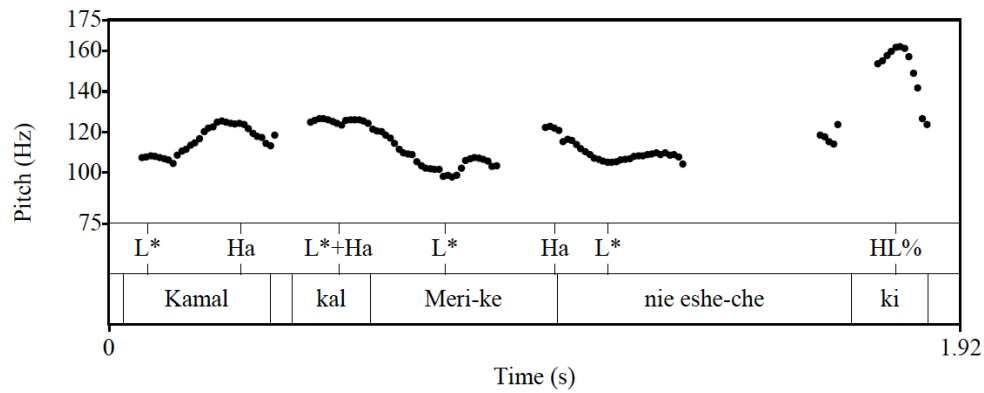
(8) *Recursive PPh structures predicted by MATCH(LexP, PPh)*

Postpositional phrases:	$[[NP] P]_{PP}$	\rightarrow	$(_{PPh} (_{PPh} NP) P)$
Modified NPs:	$[AdjP [NP]]_{NP}$	\rightarrow	$(_{PPh} AdjP (_{PPh} NP))$
Possessive NPs:	$[NP [NP]]_{NP}$	\rightarrow	$(_{PPh} (_{PPh} NP) (_{PPh} NP))$

Rather than attribute the special tonal characteristics of "larger" nominals to the existence of a separate prosodic category like the intermediate phrase, I propose that these properties are the phonetic realization of the right edge of a non-minimal PPh. This allows an account for the attested distinctions in the realization of different phrase types in Bangla, while maintaining a single syntax-prosody mapping constraint.

The largest prosodic constituent is the intonational phrase (IntP), whose boundaries typically correspond to main clauses or full utterances. IntPs do not bear a pitch accent, and are associated with a boundary tone realized at their right edge, labeled T%. A crucial property of Bangla is that boundary tones belonging to different prosodic levels do not co-occur. When multiple right boundaries are aligned with each other, the boundary tone of the highest-level category overrides all other tone specifications. Intonational phrases bear a larger variety of boundary tones than PPhs (both minimal and non-minimal). They also differ crucially from PPhs in that there is a closer correspondence between individual boundary tones and discourse interpretations (Hayes and Lahiri 1991, Khan 2008). This is illustrated in the following example, which contains the sharp falling contour (HL%) associated with yes/no questions.

- (9) Kamal kal Meri-ke nie eshe-che ki
 Kamal yesterday Mary-ACC taken come-PERF Q
 'Did Kamal bring Mary yesterday?'



Five distinct tones are identified by Khan (2008, 2014): The low tone (L%) appears at the end of declarative clauses, the high tone (H%) appears as a continuation rise or as an interrogative marker, a rising tone (LH%) is used in *wh*-questions, and the falling contour (HL%) indicates yes/no questions. There is, however, a boundary tone contour associated only with IntPs, a fall and rise (HLH%), described as having a function like that of a continuation rise. Here, we will mostly be concerned with the H% and HLH% boundary tones.

Lastly, IntP boundary tones and those of non-minimal PPhs differ crucially in how local their effects on nearby tones are. While boundary tones of non-minimal PPhs affect only the final syllables of their domains (described by Khan as the *intermediate phrase boundary tone locality constraint*), IntP boundary tones can override expected pitch accents and boundary tones of several preceding PPhs.

A summary of the prosodic constituent types in Bangla that are relevant to the current analysis and their boundary tone correspondence is given below.

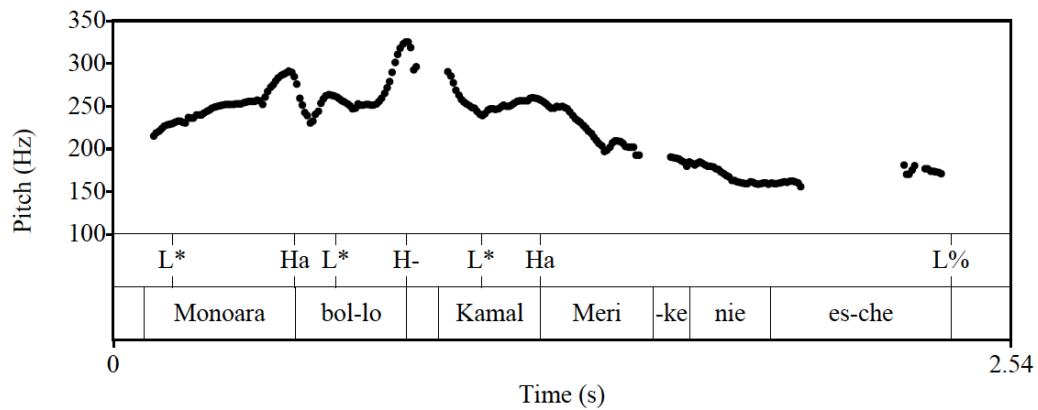
(10) *Summary of prosodic constituent types in Bangla*

<i>Prosodic constituent</i>	<i>Boundary tone inventory</i>	<i>Corresponding syntactic category</i>
Minimal PPh	Ha	Simplex lexical XPs
Non-minimal PPh	H-, L-, LH-, HL-	Complex lexical XPs
IntP	H%, L%, LH%, HL%, HLH%	Clauses

3.2.3 *Postverbal embedded clauses*

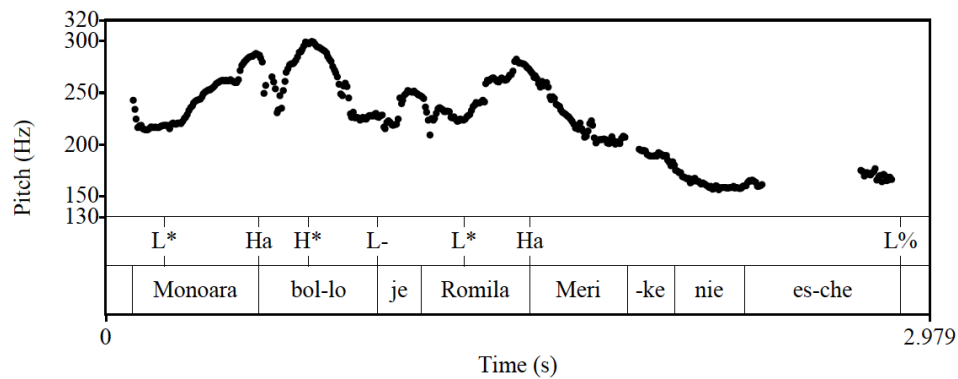
We begin by considering the waveform and pitch track in (11), which contains a postverbal embedded clause in a neutral reading. Several PPhs are readily identified by their standard L*...Ha pitch contour where their pitch peak is clearly aligned with the end of the phrase, *Monoara*, *Kamal*, and *Meri-ke*. Crucially, the main verb *bol-lo* bears a rising H- contour that deviates from expected PPh^{min} downstep, suggesting the presence of a non-minimal PPh boundary at the embedded clause break.

- (11) Monoara bol-lo [Kamal Meri-ke nie es-che]
 Monoara say-PST Kamal Mary-ACC taken come-PERF
 'Monoara said that Kamal brought Mary'



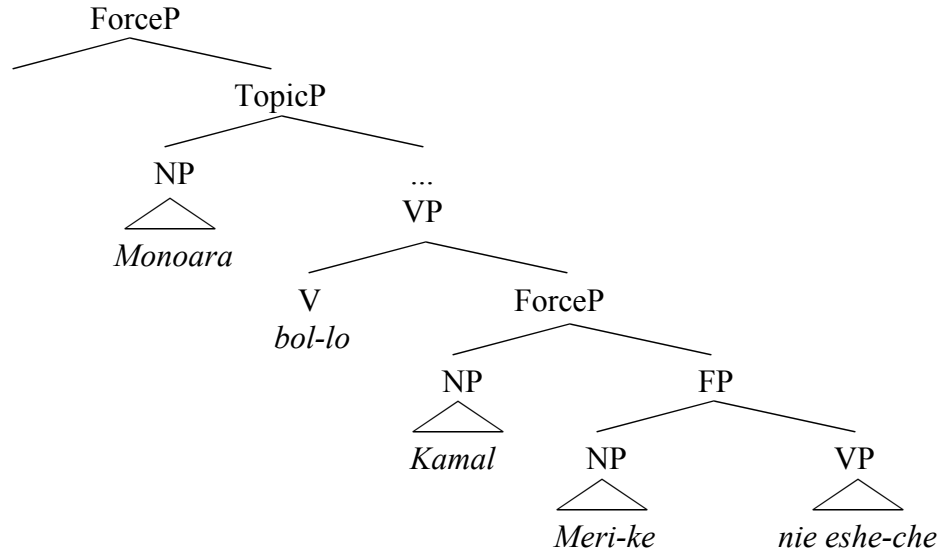
Most known boundary tones associated with $\text{PPh}^{\text{Non-min}}$ boundaries (H-, LH-, L-) are in fact attested at the embedded clause breaks. In the following example, the main verb bears a low boundary tone L-, typically preceded by a high pitch accent H*.

- (12) Monoara bol-lo [je Romila Meri-ke nie es-che]
 Monoara say-PST that Romila Mary-ACC taken come-PERF
 'Monoara said that Romila brought Mary'



What aspect of the syntactic representation triggers the realization of these boundary tones on verbs preceding postverbal embedded clauses? While we have previously shown that these tones occur on the right edge of a non-minimal PPh, these are not predicted to occur on the main verb according to the analysis developed so far. Consider the proposed syntactic representation in (13) for the sentence in (11), and the prosodic structure predicted by $\text{MATCH}(\text{LexP}, \text{PPh})$, $\text{MATCH}(\text{ForceP}, \text{IntP})$. Here, no right boundary is aligned with the main verb, which only precedes the left edge of an IntP corresponding to the embedded clause.

(13) a. *Syntactic structure*



b. *Prosodic structure predicted by MATCH(LexP, PPh), MATCH(ForceP, IntP):*
 $\{\text{IntP}(\text{PPh Kamal})(\text{PPh bol-lo} \{\text{IntP}(\text{PPh Kamal})(\text{PPh Meri-ke})(\text{PPh nie eshe-che})\})\}$

To account for the appearance of a PPh non-min boundary tone on the main verb, two new claims are made. First, I propose that postverbal embedded clauses are "demoted" to PPhs, in violation of MATCH(ForceP, IntP). Since they necessarily dominate PPhs associated with phrases within the embedded clause, these thus correspond to non-minimal PPhs, as shown in (14).

(14) $\{\text{IntP}(\text{PPh Kamal})(\text{PPh bol-lo}(\text{PPh-nonmin}(\text{PPh Kamal})(\text{PPh Meri-ke})(\text{PPh nie eshe-che})))\}$

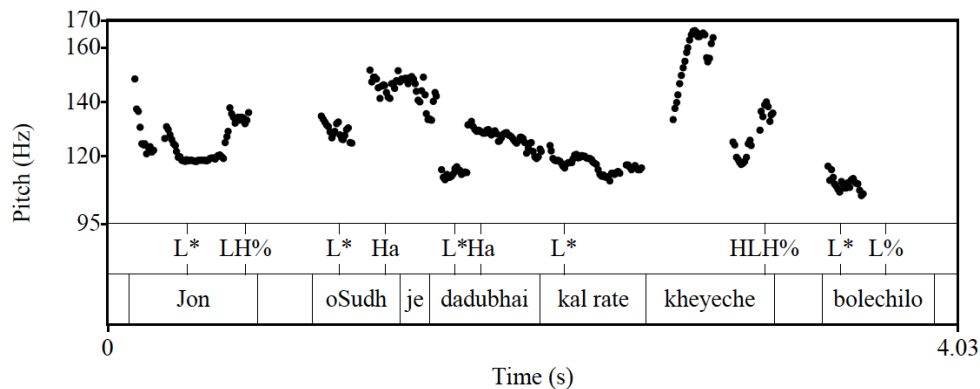
Second, I propose that in addition to a boundary tone at their right edge, non-minimal PPhs can trigger the appearance of a boundary tone on material immediately preceding their left edge. While unexpected, this proposal additionally accounts for data in Khan (2008) showing identical tonal patterns realized on verbs that precede objects modified by relative clauses, which are straightforwardly predicted to correspond to non-minimal PPhs. In Section 3.2.5, I propose that the violation of MATCH(ForceP, IntP) takes place in

order to prevent the violation of a separate restriction on prosodic organization, LAYEREDNESS.

3.2.4 Preverbal embedded clauses

We now turn to the prosodic phrasing of preverbal embedded clauses. First, consider the sentence-medial embedded clause given below. Unlike postverbal ones, medial embedded clauses are identified as separate intonational phrases by several diagnostics. The most salient distinction is the presence of a fall and rise contour realized at the end of the embedded clause. Crucially, the HLH% contour boundary tone is uniquely associated with IntP boundaries (Khan 2008). In this particular example, the boundary tone also contains the pitch peak of the utterance.

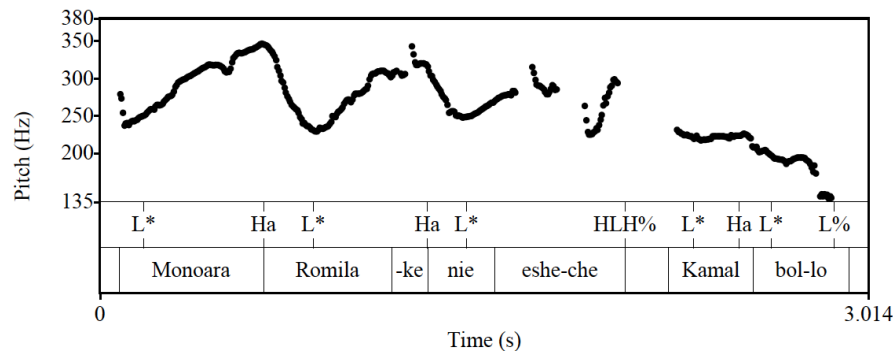
- (15) John [oSudh je dadubhai kal rate khey-eche] bol-echi-lo
 John medicine that grandfather last.night eat-PERF] say-PERF-PST
 'John said that grandfather took medicine last night'



A similar patterning is observed for sentence-initial embedded clauses. In the following example, the end of the embedded clause is again aligned with a HLH% fall and rise contour tone. It is also clearer in this example that pitch movement on all

following material is noticeably compressed. This pitch compression is uniformly observed following preverbal embedded clauses.³

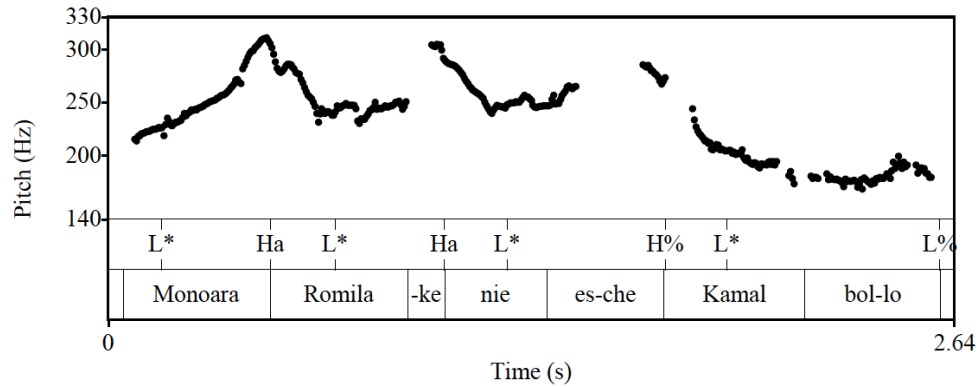
- (16) [Monoara Romila-ke nie es-che] Kamal bol-lo
 Monoara Romila-ACC taken come-PERF Kamal say-PST
 'Kamal said that Monoara brought Romila'



The fall and rise contour tone is not always attested at the ends of preverbal embedded clauses, however. In some instances, the end of a preverbal embedded clause is aligned with a high tone preceded by a relatively gentle rise (H%).

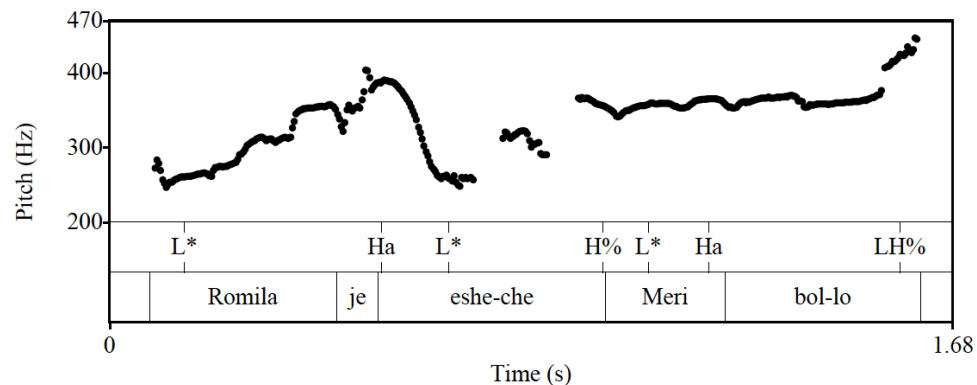
³ This compression (and possibly suppression) of pitch movement following preverbal embedded clauses resembles the compression that follows focused phrases in Bangla (Hayes and Lahiri 1991; Selkirk 2007; Khan 2008). In some instances, this seems to reflect the fact that preverbal embedded clauses themselves are frequently interpreted as focused. However, since preverbal embedded clauses can receive topic interpretations, it may reflect a more general requirement for IntP boundary tones like HLH% to be separated by as few tones as possible from the end of the utterance (Selkirk 2007).

- (17) [Monoara Romila-ke nie es-che] Kamal bol-lo
 Monoara Romila-ACC taken come-PERF Kamal say-PST
 'Kamal said that Monoara brought Romila'



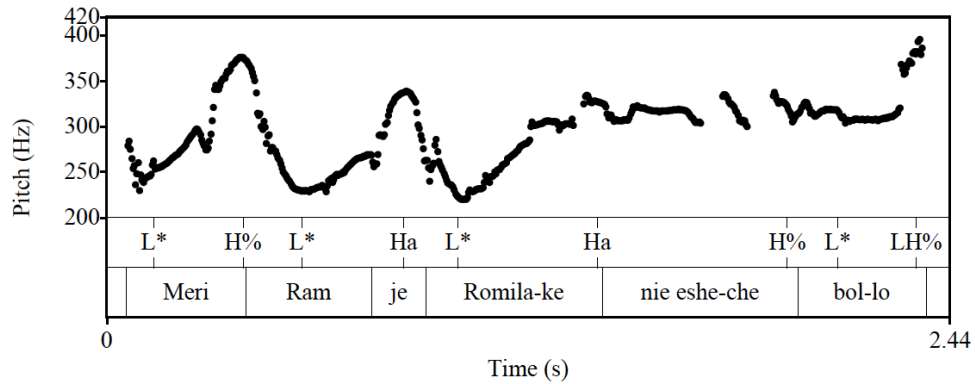
An additional prosodic distinction between preverbal and postverbal embedded clauses is that preverbal embedded clauses also allow for a type of intonational contour that reflects a corrective semantic interpretation, at least for certain speakers. The pattern is illustrated below for a sentence-initial embedded clause. As in the previous example, the end of the embedded clause is aligned with a H% high tone. However, there is an apparent absence of pitch reset in material that follows, and the utterance ends with a rising contour (LH%).

- (18) [Romila je eshe-che] Meri bol-lo
 Romila that come-PERF Mary say-PST
 'Mary said that Romila came'



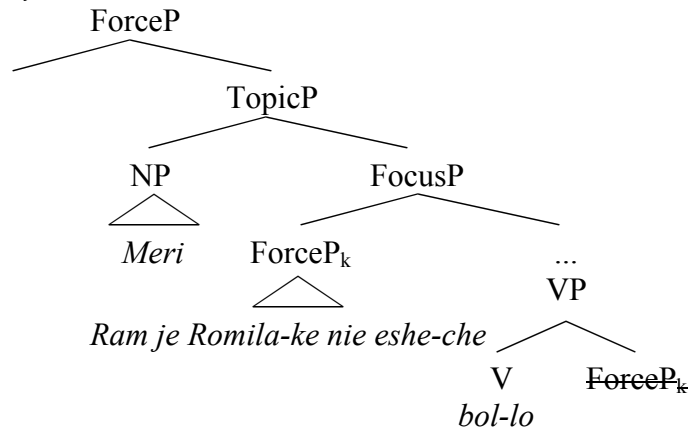
This pattern is illustrated below for a sentence-medial embedded clause. Here, the high tone at the end of the embedded clause is preceded by a longer pitch plateau.

- (19) Meri [Ram je Romila-ke nie eshe-che] bol-lo
 Mary Ram that Romila-acc taken come-PERF say-PST
 'Mary said that Ram brought Romila.'



Because preverbal embedded clauses uniformly are phrased as distinct IntPs, their prosodic representation satisfies MATCH(ForceP, IntP). The proposed syntactic structure and prosodic representation for (19), which contains a sentence-medial embedded clause, is given below.

- (20) a. *Syntactic structure*



- b. *Prosodic structure predicted by MATCH(LexP, PPh), MATCH(ForceP, IntP):*
 $\{\text{IntP (PPh Meri)} \{\text{IntP (PPh Ram) je (PPh Romila-ke) (PPh nie eshe-che)}\} (\text{PPh bol-lo})\}$

3.2.5 Syntax-prosody mapping of embedded clauses

The analysis of postverbal embedded clauses as non-minimal PPhs and preverbal embedded clauses as IntPs confirms and formalizes the intuitions reported by Simpson and Bhattacharya (2003) and Bayer and Dasgupta (*to appear*) that preverbal embedded clauses are separated by larger prosodic breaks than postverbal ones. But how can this difference between postverbal and preverbal embedded clauses in terms of their prosodic constituency be accounted for within Match Theory? In the absence of conflicting constraints, one would expect all embedded clauses to map to a single type of prosodic constituent. Given that all embedded clauses are of the same syntactic constituent type (ForceP), it would be expected for all embedded clauses to map to IntPs due to a constraint like MATCH(ForceP, IntP), independently needed for main clauses.

However, the mapping of postverbal embedded clauses to a non-minimal PPh satisfies a general principle on prosodic organization, LAYEREDNESS (Selkirk 1996), which states that no prosodic constituent dominates another constituent that is of a higher type within the Prosodic Hierarchy.

- (21) LAYEREDNESS
No PCat_i dominates PCat_j, where $i < j$ on the Prosodic Hierarchy (i.e. no PCat dominates a bigger PCat)

If we maintain the claim that postverbal embedded clauses are complements of the main verb, a syntax-prosody mapping that satisfies both MATCH(ForceP, IntP) and MATCH(LexP, PPh) would result in a LAYEREDNESS violation. This is because the PPh associated with VP dominates an IntP associated with the embedded clause, (PPh {IntP ...}).

- a. [ForceP ... [InflP XP_{Subj} [VP V [ForceP ...]]]]
- b. {IntP (P_{Ph} Subj) (P_{Ph} V {IntP })} *violates LAYEREDNESS*

(23) MATCH(PPh, LexP)
Assign a violation mark for each prosodic phrase in the phonological representation that does not exhaustively dominate the phonological exponents of a lexical maximal projection in the syntactic representation.

- | $[\text{VP } \text{V} [\text{ForceP } \dots]]$ | LAYEREDNESS | MATCH
(PPh, LexP) | MATCH
(ForceP, IntP) |
|--|-------------|----------------------|-------------------------|
| $(\text{V } \{ \dots \}_{\text{IntP}})_{\text{PPh}}$ | *! | | |
| $\text{EPP} (\text{V } (\dots)_{\text{PPh}})_{\text{PPh}}$ | | * | * |

(25) *Syntax-prosody mapping of initial embedded clause, satisfying MATCH(ForceP,IntP) and MATCH(LexP,PPh)*

- a. [ForceP ... [TopicP [ForceP ...] ... [InflP XP_{Subj} [VP V [~~ForceP~~ ...]]]]]
- b. {IntP {IntP } (P_{PH} Subj) (P_{PH} V) }

(26) *Syntax-prosody mapping of medial embedded clause, satisfying MATCH(ForceP,IntP) and MATCH(LexP,PPh)*

- a. [ForceP ... [TopicP XP_{Subj} [FocP [ForceP ...] [VP V [~~ForceP~~ ...]]]]
- b. {IntP (PPh Subj) {IntP } (PPh V) }

The difference in the prosodic size of embedded clauses according to their position within the clause is thus straightforwardly explained as a means to avoid violation of a principle of prosodic structure organization. The avoidance of LAYEREDNESS violations may also provide a principled explanation for why "normal" embedded clauses and restrictive relative clauses are seemingly never mapped to Intonational Phrases across languages.

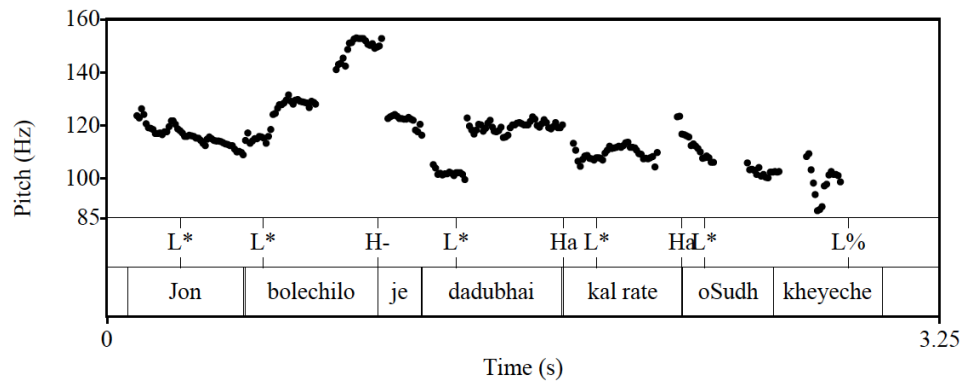
3.3 The prosodic representation of *je*

At this point, constraints on the distribution of *je* can be summarized as follows: *je* is clause-initial except when its embedded clause forms an Intonational Phrase. In this section, I consider the prosodic status of the complementizer itself, and argue that the markedness condition that prevents it from surfacing IntP-initially is one within the STRONGSTART constraint family (Elfner 2010b, 2012; Selkirk 2011). In addition, I show that the restriction against IntP-initial *je* cannot be due to a requirement for *je* to be an enclitic to a preceding item, as previously suggested by Chacón (2014) and Bayer and Dasgupta (*to appear*), who have proposed that *je* is uniformly a prosodic enclitic.

3.3.1 *je* in postverbal embedded clauses

We first look at the prosodification of *je* in postverbal embedded clauses, where the complementizer must be clause-initial. Consider the typical realization of *je* in a postverbal clause preceded by a H- PPh^{non-min} boundary tone. Here, the complementizer's pitch realization falls in between that of the preceding high tone and the low pitch accent of the PPh that follows. This argues conclusively against the enclisis of *je* to the main verb, as one would expect its associated boundary tone to extend through the complementizer.

- (27) John bol-echi-lo [je dadubhai kal rate oSudh khey-eche]
 John say-PERF-PST that grandfather last.night medicine eat-PERF
 'John had said that grandfather took medicine last night.'



Given that *je* is obligatorily initial within a postverbal embedded clause and that it is preceded by a PPh^{non-min} boundary, we can admit several hypothetical representations of the prosodic phrasing of *je*, following the classification of Selkirk (1996). Potentially, *je* is a proclitic to a PPh, either to a minimal PPh (28) or the non-minimal PPh corresponding to the embedded clause (29). One might also consider the possibility that it is an independent PPh (30).

$$(28) \quad PPh^{min} \text{ proclitic} \\ \left(\begin{array}{c} \left(\begin{array}{c} je \\ XP \end{array} \right)_{PPhmin} \end{array} \right)_{PPhmax}$$

$$(30) \quad \text{Independent } PPh \text{ (nonclitic)} \\ \left(\begin{array}{c} \left(\begin{array}{c} je \\ XP \end{array} \right)_{PPhmin} \end{array} \right)_{PPhnon-min}$$

$$(29) \quad PPh^{non-min} \text{ proclitic} \\ \left(\begin{array}{c} \left(\begin{array}{c} je \\ XP \end{array} \right)_{PPhmin} \end{array} \right)_{PPhnon-min}$$

We can rule out the representation of *je* as an independent PPh by considering its Prosodic Word (PWd) status. While the PWd plays a minimal role in the Bangla intonational system, PWd organization is relevant to restrictions on stress and vowel length. Here, I will focus on its relation to vowel lengthening, as described by Fitzpatrick-Cole (1991, 1994). Although vowel length in Bangla is not phonemic, unaffixed monosyllabic words are uniformly realized with long vowels (31a). The same monosyllabic stems are not lengthened if followed by a lexical affix (31b), yet are lengthened before postlexical affixes such as focus markers (31c).

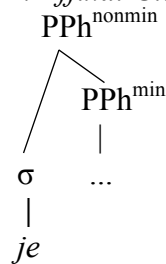
- (31) a. /rag/ → [ra:g] 'anger'
 b. /rag-i/ → [ragi] 'anger-ADJ'
 c. /rag-i/ → [ra:gi] 'anger-FOC' (Fitzpatrick-Cole 1991; 157)

To account for these patterns, Fitzpatrick-Cole argues that Bangla requires each PWd to be minimally bimoraic. Vowel lengthening thus applies to any PWd that contains only one vowel. Lexical affixes are adjoined within the stem's PWd, thus satisfying the minimal word requirement without the need for lengthening. Because postlexical affixes are adjoined outside of the PWd, lengthening applies normally to monosyllabic stems.

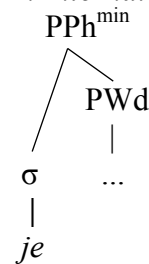
Based on this criterion, the complementizer *je* does not form its own PWd, as it is always realized with a short vowel that never undergoes lengthening. Furthermore, *je* has no effect on the realization of adjacent monosyllabic lexical words, which uniformly surface bimoraically, indicating that *je* is not phrased with PWds of adjacent lexical items. The fact that *je* is not a PWd crucially rules out a representation where *je* forms an independent PPh, as this would violate HEADEDNESS, which appears to be an inviolable principle of prosodic organization (Selkirk 1981, 1984, 1996; Nespor and Vogel 1986).

I will therefore analyze *je* as a syllable that is undominated by a PWd, a representation consistent with the expectation that small function words do not form PWds (Selkirk 1996). It remains indeterminate as to whether clause-initial *je* is dominated by the minimal PPh of an adjacent word (33), or if it is directly dominated by the non-minimal PPh that corresponds to the embedded clause (32). It should be noted, however, that the PPh internal clitic structure is dispreferred given the proposed inventory of MATCH constraints; The structure incurs a violation of MATCH(LexP, PPh) because the lexical phrase following *je* is not exhaustively dominated by a PPh.

(32) *PPh Affixal Clitic*



(33) *PPh Internal Clitic*



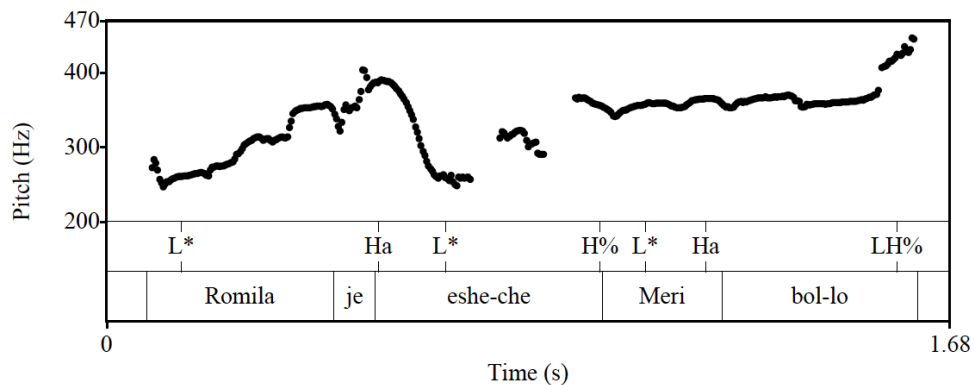
The somewhat indeterminate prosodic status of *je* in postverbal embedded clauses is unproblematic for the analysis that follows. The crucial conclusions of this section are that *je* is not a prosodic enclitic in postverbal clauses, and that it is not dominated by a

PWd node.

3.3.2 *je* in preverbal embedded clauses

In preverbal embedded clauses where *je* is non-initial, the pitch behavior of the complementizer suggests that it is parsed as a type of enclitic, contained within a PPh that also dominates its preceding syntactic phrase. Initial evidence for this is seen in the pitch behavior of non-initial *je*, which is quite systematically aligned with a PPh pitch peak. Consider the pitch track in (18), repeated below as (34), where the non-initial complementizer bears a higher pitch than the final syllable of its preceding word, *Romila*. The fact that *je* is aligned with a pitch peak indicates clearly that the two words share a single PPh, and that *je* is at its right edge.

- (34) [Romila *je* eshe-che] Meri bol-lo
 Romila that come-PERF Mary say-PST
 'Mary said that Romila came'



Assuming that the pitch peak realized on *je* corresponds to a high PPh boundary tone, this is compatible with two possible clitic configurations, illustrated below with hypothetical structures for an XP-*je* sequence. *Je* is either an internal clitic phrased with

its preceding word in a single PPh^{min} (35) or an affixal clitic within a recursive PPh structure (36).

(35) *Internal clitic*
 ()_{PPh}
 XP *je*

(36) *Affixal clitic*
 (()_{PPh})_{PPh}
 XP *je*

A segmental diagnostic for prosodic phrasing, /r/-assimilation (Hayes and Lahiri 1991), argues in favor of an affixal clitic analysis. In colloquial registers, /r/ is optionally assimilated by some speakers to any following coronal consonant within the same PPh, regardless of whether they are separated by a morpheme or word boundary. Crucially, /r/-assimilation cannot apply if the two consonants are separated by a PPh boundary.

(37) bərʃa ~ bərʃʃa 'rainy season'
 bərɖi ~ bərɖɖi 'elder sister'
 kər-tʃʰe ~ kərʃ-tʃʰe 'do-3PERS.PRES'
 kər-lo ~ kol-lo 'do-3PERS.FUT' (Hayes and Lahiri 1991)

Palato-alveolar affricates are also susceptible to /r/ assimilation. Consequently, if *je* ([dʒe]) is contained within the same PPh as a preceding word, /r/ assimilation is expected to be possible. In this context, however, /r/-assimilation is blocked.

(38) [r dʒ] (*[dʒdʒ])
 | |
 Jon [kukur je dadubhai-ke kamr-eche] bol-lo
 John dog that grandfather-ACC bite-PRES.PERF say-PST
 'John said that a dog bit grandfather.'

(39) [r dʒ] (*[dʒdʒ])
 | |
 [Jon khabar je khey-eche] ami jani
 John food that eat-PRES.PERF 1.PERS know
 'I know that John ate food.'

The impossibility of /r/-assimilation with *je* thus leads us to posit an affixal enclitic structure when *je* is non-initial within its embedded clause, as in (40).

- (40) *Prosodic structure of non-initial je in preverbal embedded clauses*
 $\{ \text{IntP} \quad \dots ((\text{XP})_{\text{PPh}} \text{ je })_{\text{PPh}} \dots \} \quad \dots \quad \text{V}$

3.4 Syntax-prosody interaction in phrasing and copy pronunciation

This section extends the Optimality-Theoretic analysis of syntax-prosody mapping to account for both the prosodic phrasing of initial and non-initial *je*, and the effects of prosodic restrictions on copy pronunciation. The analysis assumes that the phrasing of function words depends on the interaction of MATCH constraints with other markedness constraints on prosodic organization.

3.4.1 Constraints on prosodic organization and STRONGSTART

We first consider the phrasing of *je* in preverbal embedded clauses, where it surfaces as an affixal enclitic to a preceding phrase (the derivation of lower copy spell-out will be returned to later in this section). Assuming only the direct syntax-prosody correspondence predicted by MATCH(ForceP, IntP) and MATCH(LexP, PPh), an instance of *je* that is not initial within its embedded clause is predicted to be sandwiched between two PPhs in a free clitic structure: $[\text{ForceP} \dots \text{XP} [\text{FinP } \text{je} [\text{XP} \dots]]] \rightarrow \{ (\text{PPh } \text{XP}) \text{ je } (\text{PPh } \text{XP}) \dots \}$. However, since *je* surfaces as an affixal enclitic in this context, this representation must be ruled out by a separate markedness constraint. One such constraint violated by

free clitic representations is EQUALSISTERS (Myrberg 2013), which requires prosodic sister nodes to be instances of identical prosodic categories. Here, I will consider an indexed version of EQUALSISTERS that is evaluated among nodes immediately dominated by an Intonational Phrase, defined below.⁴ As long as EQUALSISTERS(IntP) outranks the prosody-syntax correspondence constraint MATCH(PPh, LexP), *je* will be phrased within some PPh.⁵

(41) EQUALSISTERS(IntP)
Assign a violation mark if the immediate daughter nodes of an IntP are not instances of the same prosodic category.

(42) EQUALSISTERS(INTP) >> MATCH(PPh, LexP)

[ForceP ... XP [FinP <i>je</i> [XP ...]]]	EQUAL SISTERS (INTP)	MATCH (PPh, LexP)
{(PPh XP) <i>je</i> (PPh XP) ...} <i>free clitic</i>	*!	
☞ {((PPh XP) <i>je</i>) (PPh XP) ...} <i>affixal enclitic</i>		*
☞ {((PPh XP) (PPh <i>je</i> (PPh XP) ...} <i>affixal proclitic</i>		*

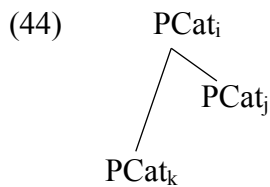
While this constraint ranking properly predicts a recursive, affixal clitic structure, it does not determine whether function words like *je* are phrased as enclitics or proclitics. Following Selkirk (2011) and Elfner (2012), I propose that the preference for enclisis is derived by a STRONGSTART constraint.

⁴ As defined by Myrberg, EQUALSISTERS makes no reference to specific categories of mother or daughter nodes. For the present analysis, it is necessary to propose an IntP-specific version of this constraint in order to permit prosodic representations where *je* is an affixal enclitic within a PPh, as argued in Section 3.3.2.

⁵ For presentational simplicity, I will not consider candidates where *je* is dominated by a minimal prosodic word associated with an adjacent XP, which additionally violate MATCH(LexP, PPh).

- (43) **STRONGSTART**
Assign a violation mark for any prosodic constituent whose leftmost daughter constituent is lower in the Prosodic Hierarchy than its sister constituent immediately to the right: * ($\pi_n \pi_{n+1} \dots$

In its general form, **STRONGSTART** amounts to a restriction against proclitic structures. Schematically, **STRONGSTART** is violated by any prosodic representation like (44), where $i \geq j$ and $j > k$ in the Prosodic Hierarchy.⁶



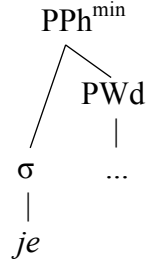
Following Elfner (2012), I assume that **STRONGSTART** is in fact a family of constraints, where individual **STRONGSTART** constraints are indexed to a prosodic category κ . **STRONGSTART**(κ) is violated for each prosodic structure in which an instance of κ is the leftmost immediate daughter of its mother node, and the immediately following sister node of κ is a larger prosodic category.

- (45) **STRONGSTART**(κ)
Assign a violation mark for every prosodic constituent whose leftmost daughter constituent is of type κ and is lower in the Prosodic Hierarchy than its sister constituent immediately to the right.

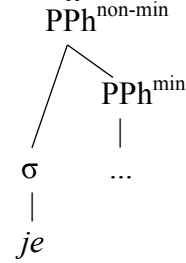
⁶ **STRONGSTART** differs in several important respects from constraints of the form **Align-L**($\text{PCat}_i, \text{PCat}_{i-1}$), which have previously been used to disprefer proclitics in the Alignment theory of syntax-prosody correspondence (Selkirk 1986, 1996). **STRONGSTART** does not evaluate differences in category size between prosodic constituents and their leftmost daughters, and instead depends crucially on the relative sizes of the two leftmost constituents in some domain.

Given this constraint schema, any proclitic representation of *je* violates $\text{STRONGSTART}(\sigma)$ because *je*, a syllable not dominated by a PWd, has a sister constituent immediately to its right that is either a PWd or PPh.

(46) *PPh Internal clitic*



(47) *PPh Affixal clitic*



The addition of $\text{STRONGSTART}(\sigma)$ to the constraint set derives the selection of the affixal enclitic representation.

(48)

[XP [_{FinP} <i>je</i> [XP ...]]] V	EQUAL SISTERS (INTP)	MATCH (PPh, LEXp)	STRONG START (σ)
{(PPh XP) <i>je</i> (PPh XP) ...} <i>free clitic</i>	*!		
☞ {((PPh XP) <i>je</i>) (PPh XP) ...} <i>affixal enclitic</i>		*	
{(PPh XP) (PPh <i>je</i> (PPh XP) ...} <i>affixal proclitic</i>		*	*

While $\text{STRONGSTART}(\sigma)$ is not crucially ranked relative to EQUALSISTERS or $\text{MATCH}(\text{PPh}, \text{LEXp})$, it is ranked above other markedness constraints that would prefer proclisis in this context, such as WEAKSTART (Sabbagh 2014) or a hypothetical STRONGEND . However, these rankings are not crucial to the main analysis, and will be omitted in the remainder of the chapter.

3.4.2 HIGHESTCOPY and lower copy pronunciation

We now turn to the question of deriving lower copy pronunciation in preverbal embedded clauses. Here, I propose that the input syntactic structure to the component of PF that creates a prosodic representation includes movement copies. In addition, we consider a larger candidate set, where *je* can be spelled out in either Force° or Fin°, generating either initial or non-initial complementizer orders. The task of the grammar is to disprefer any possible parse of *je* in IntP-initial position over one where *je* is spelled out in its lower copy and phrased as an affixal enclitic.

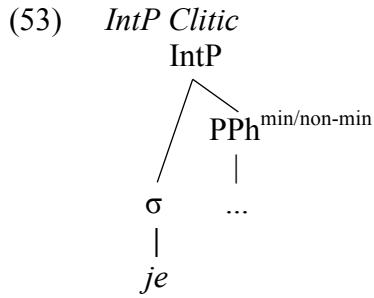
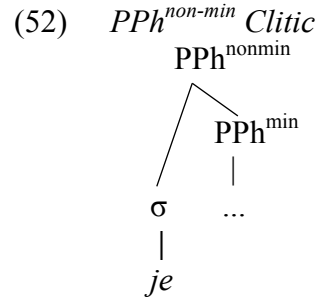
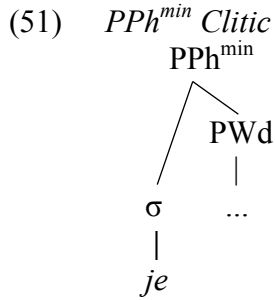
- (49) *Input syntactic structure of preverbal embedded clause with je*
[ForceP *je* [Topic/FocusP XP [FinP *je* ...]]] ... V

The potential for phonological constraints to determine copy pronunciation is implemented in an Optimality-Theoretic grammar by allowing GEN, the component that defines possible outputs, to both access movement chains and to generate output candidates with different copies pronounced. I propose that the preference to pronounce only the highest copy of a movement chain, the 'unmarked' option, is implemented in the grammar by a constraint HIGHESTCOPY.

- (50) HIGHESTCOPY
Assign a violation mark if the highest copy of a movement chain is not pronounced.

Assuming that *je* is a syllable undominated by a PWd, as argued in Section 3.3, we can consider several hypothetical phrasings of *je* in the initial position of a preverbal

embedded clause, varying in the smallest prosodic constituent that dominates *je*'s syllable node.



Crucially, each of these representations violates $STRONGSTART(\sigma)$ in its current formulation, as the syllable that dominates *je* is has a sister node that is of a greater prosodic category, either a PWd or PPh. Because every possible phrasing of *je* in its highest copy would violate this constraint, the ranking of $STRONGSTART(\sigma)$ over $HIGHESTCOPY$ prefers the pronunciation of a lower copy.

(54)

$[_{ForceP} je [_{XP} [_{FinP} je \dots]]] V$	$STRONGSTART(\sigma)$	$HIGHESTCOPY$
$\{_{IntP} je (PPh XP) \dots \}$ <i>higher copy, IntP clitic</i>	*!	
$\{_{IntP} (PPh je (PPh XP)) \dots \}$ <i>higher copy, PPh^{non-min} proclitic</i>	*!	
$\{_{IntP} (PPh je XP) \dots \}$ <i>higher copy, PPh^{min} proclitic</i>	*!	
$\{_{IntP} (PPh (PPh XP) je) \dots \}$ <i>lower copy, PPh^{non-min} enclitic</i>		*

Further evidence that $\text{STRONGSTART}(\sigma)$ is the relevant markedness constraint driving lower copy pronunciation comes from the fact that bisyllabic complementizers like *jodi* 'if,' substantial enough to form independent PWds, are able to surface in utterance-initial positions (Section 2.4.1).

However, the current constraint ranking creates the problematic prediction that lower copy spell-out should also apply in a postverbal embedded clause that corresponds to a non-minimal phonological phrase.

(55)

V [ForceP <i>je</i> [XP [FinP <i>je</i> ...]]]	$\text{STRONGSTART}(\sigma)$	HIGHESTCOPY
(PPh <i>je</i> (PPh XP) ...) <i>higher copy, PP^{non-min} proclitic</i>	*!	
(PPh (PPh <i>je</i> XP) ...) <i>higher copy, PP^{min} proclitic</i>	*!	
☛ (PPh (PPh (PPh XP) <i>je</i>)) ...) <i>lower copy, affixal enclitic</i>		*

The root of the problem is that the evaluation of $\text{STRONGSTART}(\sigma)$ is indifferent to any additional prosodic structure outside of the configurations in (51)-(53). The emergent generalization is that a violation of STRONGSTART is repaired by lower copy spell-out when the violating syllable is aligned with the edge of an IntP, while STRONGSTART violations at a PPh boundary are insufficient to trigger this repair.⁷

To account for this asymmetry, I propose that STRONGSTART constraints are indexed to an additional prosodic constituent, such that the constraints are sensitive to larger prosodic boundaries that the STRONGSTART -violating structures are aligned with.

⁷ This resembles implicational cutoff patterns in which markedness restrictions on syllable onsets and codas are enforced only at prosodic boundaries above a certain level (Flack 2009; Hsu and Jesney 2016). From a syntax-phonology interface perspective, An (2007) argues that English does not permit both the Comp head and Spec,CP to be phonetically null if the clause is parsed as an IntP, while relaxing the restriction for smaller phrase types.

- (56) **STRONGSTART(κ/π)**
Assign a violation mark for every prosodic constituent whose leftmost daughter constituent is of type κ and is lower in the Prosodic Hierarchy than its sister constituent immediately to the right, where κ is at the left edge of a prosodic constituent π .

The relevant notion of 'left edge' is defined as follows:

- (57) A prosodic constituent κ is at the left edge of prosodic constituent π iff.
- π dominates κ , and
 - no prosodic constituent that both dominates κ and is dominated by π has a leftmost daughter constituent that does not contain κ .

Given this expanded constraint schema, we can define two separate constraints, **STRONGSTART(σ /INTP)** and **STRONGSTART(σ /PPh)**. The ranking **STRONGSTART(σ /INTP)** >> **HIGHESTCOPY** >> **STRONGSTART(σ /PPh)** now accounts the fact that lower copy pronunciation applies in preverbal embedded clauses phrased as IntPs, but not in postverbal embedded clauses phrased as non-minimal PPhs. In the previous part of the analysis, the preference for enclisis over proclisis within PPhs is now attributed to **STRONGSTART(σ /PPh)**.

- (58) *Postverbal embedded clause: Lower copy pronunciation does not apply.*

V [_{ForceP} <i>je</i> [XP [_{FinP} <i>je</i> ...]]]	STRONGSTART (σ /IntP)	HIGHEST COPY	STRONGSTART (σ /PPh)
\mathbb{E}^{PPh} (PPh <i>je</i> (PPh XP) ...) <i>free clitic</i>			*
\mathbb{E}^{PPh} (PPh (PPh <i>je</i> (PPh XP)) ...) <i>affixal proclitic</i>			*
\mathbb{E}^{PPh} (PPh (PPh <i>je</i> XP) ...) <i>internal proclitic</i>			*
(PPh (PPh (PPh XP) <i>je</i>)) ...) <i>lower copy, affixal enclitic</i>		*!	

(59) *Preverbal embedded clause: Lower copy pronunciation applies.*

$[_{\text{ForceP}} je [_{\text{XP}} [_{\text{FinP}} je \dots]]] V$	STRONGSTART (σ/IntP)	HIGHEST COPY	STRONGSTART (σ/PPh)
$\{_{\text{IP}} je (_{\text{PPh}} \text{XP}) \dots \}$ <i>free clitic</i>	*!		
$\{_{\text{IP}} (_{\text{PPh}} je (_{\text{PPh}} \text{XP})) \dots \}$ <i>affixal proclitic</i>	*!		*
$\{_{\text{IP}} (_{\text{PPh}} je \text{XP}) \dots \}$ <i>internal proclitic</i>	*!		*
$\{_{\text{IP}} (_{\text{PPh}} (_{\text{PPh}} \text{XP}) je)) \dots \}$ <i>lower copy, affixal enclitic</i>		*	

Thus far, we have assumed that at least one phrase occurs in the specifier of the embedded TopicP or FocusP. Suppose, however that the syntactic derivation creates a preverbal embedded clause in which no constituents have moved to TopicP or FocusP. Assuming that string-vacuous movement (i.e. movement that could have no effect on word order) is possible, pronouncing either the higher or lower copy of *je* would leave the complementizer in the clause-initial position. Because all possible prosodic representations with both options of copy pronunciation violate STRONGSTART(σ/IntP), selection of the optimal output is determined by lower-ranked constraints. Given the current ranking of constraints, a free clitic structure created by pronunciation of the higher copy is selected as the optimal output. This is an unwanted result, however, as *je* is not able to surface clause-initially in this context.

(60) *Empty TopicP and FocusP: string-vacuous higher copy pronunciation predicted*

$[_{\text{ForceP}} je_1 [_{\emptyset} [_{\text{FinP}} je_2 \dots \text{XP}]]] \text{ V}$	STRONGSTART (σ /IntP)	HIGHEST COPY	STRONGSTART (σ /PPh)
$\bullet \{_{\text{IP}} je_1 (\text{PPh XP}) \dots \}$ <i>free clitic, higher copy pronounced</i>	*		
$\{_{\text{IP}} (\text{PPh } je_1 (\text{PPh XP})) \dots \}$ <i>affixal proclitic, higher copy pronounced</i>	*		*!
$\{_{\text{IP}} (\text{PPh } je_1 \text{ XP}) \dots \}$ <i>internal proclitic, higher copy pronounced</i>	*		*!
$\{_{\text{IP}} je_2 (\text{PPh XP}) \dots \}$ <i>free clitic, lower copy pronounced</i>	*	*!	
$\{_{\text{IP}} (\text{PPh } je_2 (\text{PPh XP})) \dots \}$ <i>affixal proclitic, lower copy pronounced</i>	*	*!	*
$\{_{\text{IP}} (\text{PPh } je_2 \text{ XP}) \dots \}$ <i>internal proclitic, lower copy pronounced</i>	*	*!	*

We are thus led to the conclusion that *je* must be left unpronounced if a STRONGSTART(σ /IntP) violation can not be avoided by pronouncing a lower copy, an apparent instance of prosodically-motivated non-pronunciation (Zec and Inkelas 1990, Selkirk 2002, McCarthy 2012). The preference for objects in the syntactic input to be given a phonological realization can be implemented in the OT grammar in the form of a REALIZE MORPHEME constraint (Samek-Lodovici 1993; Gnanadesikan 1996; Rose 1997; Walker 1998; Henderson 2012; among others).

(61) REALIZE MORPHEME
A morpheme must have some phonological exponent in the output. (Walker 1998)

The realization of *je* in preverbal clauses requires REALIZE MORPHEME to be ranked below STRONGSTART(σ /IntP) and above HIGHESTCOPY. This ensures that lower copy

pronunciation is preferred over non-realization as a means to avoid violations of STRONGSTART(σ /IntP), as shown in (62). The obligatory non-realization of *je* occurs uniquely in situations where STRONGSTART(σ /IntP) violations cannot be avoided by lower copy pronunciation because no overt material intervenes between copies of *je* (63).

(62) *Preverbal embedded with overt TopicP or FocusP: lower copy of je pronounced*

[ForceP <i>je</i> [XP [FinP <i>je</i> ...]]] V	SSTART (σ /IntP)	REALIZE- MORPH	HIGHEST COPY	SSTART (σ /PPh)
{IP <i>je</i> (PPh XP) ... } <i>free clitic</i>	*!			
{IP (PPh <i>je</i> (PPh XP)) ... } <i>affixal proclitic</i>	*!			*
{IP (PPh <i>je</i> XP) ... } <i>internal proclitic</i>	*!			*
☞ {IP (PPh (PPh XP) <i>je</i>) ... } <i>lower copy, affixal enclitic</i>			*	
{IP (PPh XP) ... } <i>no copy pronounced</i>		*!		

(63) *Preverbal clause with empty TopicP and FocusP: je is unpronounced*

[ForceP <i>je</i> ₁ [∅ [FinP <i>je</i> ₂ ... XP]]] V	SSTART (σ /IntP)	REALIZE- MORPH	HIGHEST COPY	SSTART (σ /PPh)
{IP <i>je</i> ₁ (PPh XP) ... } <i>free clitic, higher copy pronounced</i>	*!			
{IP (PPh <i>je</i> ₁ (PPh XP)) ... } <i>affixal proclitic, higher copy pronounced</i>	*!			*!
{IP (PPh <i>je</i> ₁ XP) ... } <i>internal proclitic, higher copy pronounced</i>	*!			*!
{IP <i>je</i> ₂ (PPh XP) ... } <i>free clitic, lower copy pronounced</i>	*!		*!	
{IP (PPh <i>je</i> ₂ (PPh XP)) ... } <i>affixal proclitic, lower copy pronounced</i>	*!		*!	*
{IP (PPh <i>je</i> ₂ XP) ... } <i>internal proclitic, lower copy pronounced</i>	*!		*!	*
☞ {IP (PPh XP) ... } <i>no copy pronounced</i>		*		

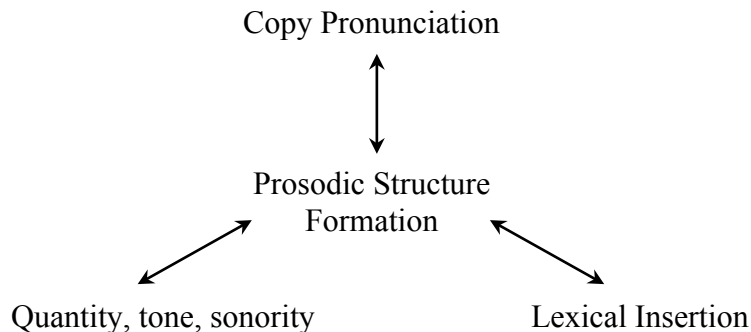
To conclude this section, I have presented a model of the PF grammar where word order is determined by the interaction of rankable syntactic and phonological well-formedness conditions. While this model of syntax-phonology interaction is fundamentally quite similar to the one proposed by López (2009) and Elfner (2010, 2012), the displacements that can be phonologically conditioned in the present account are restricted by the availability of copies.

3.4.3 The architecture of the PF grammar

The present proposal has several implications for the structure of the PF grammar. I have argued that prosodic structure formation and the determination of surface word order take place in parallel. The grammar determines the pronunciation of a movement chain by evaluating multiple output candidates that differ in the (non)pronunciation of movement copies and in their prosodic organization. The surface linearization of a syntactic representation and its corresponding prosodic structure are determined simultaneously, rather than serially. The proposal builds on previous works arguing that prosodic structure formation plays a crucial role in the realization of morpho-syntactic structure. For instance, parallel interaction prosodic structure formation and lexical insertion is revealed by cases where contextual allomorphy or morpheme realization are determined by prosodic context (Zec and Inkelas 1990; Selkirk 2002; McCarthy 2012; Henderson 2012). Together with the present study, this provides evidence against the view that prosodic structure creation happens after linearization and lexical insertion have taken place (Nespor and Vogel 1986, p. 302; Embick and Noyer 2010, p. 566).

There appear to be limits, however, to interactions between the subparts of the PF module. In addition to linearization and morpheme realization, there is also evidence for parallel interaction between prosodic structure (at least at the level of the foot) and segment-level features of tone, sonority, and syllable weight/quantity (see Blumenfeld 2006 for an overview). It appears, however, that the phonological conditions that influence word order and morpheme realization appear to be limited to constraints on prosodic organization (Zec and Inkelas 1990, Selkirk 2002), the realization of prosodic edges (An 2007; Kandybowicz 2009), and co-occurrence restrictions on morphologically or phonologically identical elements (Selkirk 2002; Bošković and Nunes 2007; Richards 2010). Rather than allowing full interaction between prosodic structure formation, copy pronunciation, lexical insertion, and segmental processes, I propose that prosodic structure formation mediates between these processes, which do not directly interact.

(64) *Interaction among components of the PF grammar*



There are challenges, however, for the implementation of this type of indirect interaction in an OT grammar. Because all constraints should in principle be able to interact, there is no way to prevent the selection of outputs to be determined by direct interaction between constraints on copy pronunciation, lexical insertion, and markedness constraints on

segments (a similar 'too-many-solutions' problem is discussed by Blumenfeld 2006). A satisfactory solution to this problem will have to await a more comprehensive understanding of the interactions that are possible between these various processes.

3.5 Alternative accounts of *je* placement

In this section, I consider two recent competing approaches to deriving the Bangla pattern, as proposed by Chacón (2014) and Bayer and Dasgupta (*to appear*). I argue that the present analysis has several empirical and theoretical advantages to these alternatives. It will be shown that neither of the alternative proposals can satisfactorily account for the placement of *je* after more than one phrase in preverbal embedded clauses, or for the full range of patterns involving topicalization and focus in embedded clauses.

3.5.1 The verbal clitic analysis

To account for the non-initial ordering of *je* within pre-verbal embedded clauses, Chacón (2014) suggests that *je* is a verbal clitic that cliticizes to its selecting main verb by a postsyntactic operation of Morphological Merger (Halle and Marantz 1993). Schematically, the operation is shown in (65). The approach is similar to the analysis of the English null complementizer given by Pesetsky (1991) and Bošković and Lasnik (2003), also applied to Tagalog *-ng* by Richards (1999).

(65) [VP V + *je* [CP ~~*je*~~ ...]]

To derive non-initial complementizer order, Chacón proposes that if linear adjacency is unavailable between the complementizer and its selecting verb, *je* is reordered as a last resort with respect to some phrase within its CP.

There are several empirical issues, both prosodic and syntactic, with this approach. It was shown in section 3.3.1 that the complementizer is precisely not a prosodic clitic when it follows the main verb, which is unexpected if this is the preferred context for cliticization. Furthermore, although it is preferred to maintain adjacency between the main verb and an embedded clause, it is possible but somewhat marked to separate post-verbal CPs from their selecting verbs by a dative PP or adverbial. In these contexts, *je* nonetheless remains initial within its clause despite the lack of linear adjacency between *je* and the main verb.

- (66) ?John bol-lo meri-ke [(je) chatro du-to es-che]
 John say-PST Mary-acc that student 2-CL come-PERF
 'John said to Mary that the two students came.'
- (67) ?John bol-lo rege-giye [(je) chatro du-to es-che]
 John say-PST angrily that student 2-CL come-PERF
 'John said angrily that the two students came.'

Crucially, this is not predicted to be possible if Morphological Merger requires linear adjacency. Such orderings are in fact impossible for the English null complementizer and the Tagalog clitic *-ng*. In these languages, embedded CPs separated from the main verb by an adverbial modifier can only be realized with the complementizer's full form.

- (68) *English*
 Michael acknowledged reluctantly [(that/*Ø) he had made a huge mistake]

- (69) *Tagalog*
 Hindi niya sinabi nang masaya [(na/*-ng) kinain niya ang tambakol]
 Not he said happily COMP ate he T mackerel
 'He didn't say happily that he ate the mackerel' (Richards 1999)

The verbal clitic approach faces additional difficulty in accounting for the possibility for preverbal *je* to be preceded by more than one phrase within the clause. If cliticization to a non-verb takes place as a Last Resort, it is not obvious why dislocation can apply across multiple phrases or why these phrases must be topicalized or focused if they are object DPs. The possibility is more straightforwardly accounted for using the proposed lower copy spell-out mechanism, since the two complementizer heads can be separated by any number of intervening phrases.

3.5.2 Emphatic topicalization

In a forthcoming paper, Josef Bayer and Probal Dasgupta argue that the preverbal placement of *je* is the reflex of a process termed *emphatic topicalization* (ET), a set of movements that applies to phrases which bear emphasis and contrastivity, but not information-structure focality. The analysis is in part motivated by the existence of a very similar, though non-identical pattern in Bavarian (Bayer 1984; Grewendorf 2015). While the proposal covers some main relevant data and relates the patterning of *je* to that of other emphatic particles in Bangla, it has important shortcomings in accounting for the full range of non-initial *je* orders; by proposing a highly limited number of projections in the clausal periphery, their analysis does not account for the possible occurrence of multiple topicalized phrases before *je*. Furthermore, not all instances of non-initial *je* can

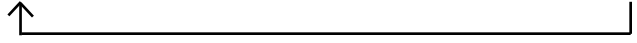
be reduced to emphatic topicalization: only objects, but not subjects, that precede *je* have this discourse restriction; *je* is also obligatorily non-initial in sentential subject clauses, which have no apparent relation to emphatic topicalization.

According to Bayer and Dasgupta, emphatic topicalization in Bangla follows a derivation that involves two crucial movements; movement of an XP to Spec,CP (70) , and movement of a CP to the specifier of a functional projection above VP, call it PrtP (71). It is assumed that the base position for embedded clauses in both languages is postverbal; the two movement operations place the embedded clause in a preverbal position, and ensure that the complementizer is preceded by one phrase.

(70) [PrtP [Prt [VP [V [CP XP [C *je* [VP ... ~~XP~~ ...]]]]]



(71) [PrtP [CP XP [C *je* [VP ... ~~XP~~ ...]]] [Prt [VP [V [~~CP~~ ...]]]]



While this analysis creates essentially the same constituent structure as what I have proposed, it differs with respect to the nature of the positions targeted by movement, and to the availability of certain projections. The authors posit the existence of only one complementizer head, C°, and do not assume the uniform availability of higher TopicP and FocusP projections in embedded clauses.

Contra my own analysis, Bayer and Dasgupta argue that preverbal *je* functions simultaneously as both a complementizer and an emphatic particle. The authors note the existence of a separate morpheme *je*, which functions as an exclamatory emphatic

particle in main clauses, primarily used to indicate frustration. In my own analysis, any relation between the complementizer *je* and this main clause particle is incidental.

- (72) ami toma-ke kOto -bar je bol-lam
 I you-OBJ how.many-times *je* tell-PST
 ‘I told you this so many times!’

Bayer and Dasgupta propose that the different patterns of postverbal and preverbal *je* are the result of a difference in their featural composition. Postverbal *je* is purely a complementizer with no featural specification aside from its category label (73), whereas preverbal *je* is additionally endowed with an emphatic topicalization feature [*iEmp*] (74), presumably the feature shared with the main clause particle.

- (73) *je* [C]

- (74) *je* [C, *iEmp*]

In the case that the complementizer *je* is merged during the derivation, the embedded clause is terminated, assuring initial complementizer order. Selection of *je* [C, *iEmp*] drives the movement of some XP, bearing an uninterpretable [*uEmp*] feature, to its specifier.

At this point, it needs to be explained why *je*[C] can only be postverbal and *je*[C, *iEmp*] must be preverbal. Let us first consider why emphatic *je*'s CP must be raised to a preverbal position. The authors propose that the [*Emp*] feature cannot be interpretable in an embedded clause, and must be raised into a left peripheral projection of the main clause. The authors note a similarity with *wh*-scope facts; embedded *wh*-words in Bangla can only take main clause scope if the embedded clause raises to a preverbal position. They thus propose that emphasis, like wide *wh*-scope, is interpretable exclusively if the

embedded clause is raised to a left-peripheral main clause projection that encodes illocutionary force.

The analysis runs into some difficulty in explaining why *je*[C] must be postverbal, and cannot be fronted. The authors propose that the cause is prosodic, namely that *je* is an enclitic that requires a host. They argue that this requirement is satisfied when the CP remains postverbal, as *je* cliticizes in this context to the main verb. However, fronting of the CP creates larger prosodic boundaries around the embedded clause, as I have also claimed; this in turn would prevent clause-initial *je* from cliticizing onto a host. In other words, if *je* is at the upper edge of its clause, it needs to remain in the base postverbal position in order for it to have access to a clitic host. The issue with this analysis is that it is not motivated by actual prosodic data. As I have shown in Section 3.3.1, *je* is precisely not a prosodic enclitic when it is postverbal, as it immediately follows an intermediate phrase boundary. If this is the correct prosodic analysis, then a requirement for clitic-hood cannot be what prevents an initial-*je* CP from fronting. This misconception, however, does not pose a major issue for the authors' account. As an alternative explanation, it is sufficient to say that there is no motivation for the pure complementizer *je*[C] to raise because it bears no information structure features that need to be checked higher in the main clause.

The more serious problem for Bayer and Dasgupta's analysis is its inability to account for sentences like (75), where more than one phrase precedes *je* in a preverbal embedded clause. Furthermore, it is unclear why these additional phrases must be given information topics, and not emphatic ones.

- (75) John [chatro du-to-ke DADUBHAI je dekh-eche] bol-lo
 John student 2-CL-ACC GRANDFATHERthat see-PERF say-PST
 'John said that GRANDFATHER saw the two students'

In the emphatic topicalization account, once movement within the embedded clause to Spec,CP has taken place to check *je*'s [*i*Emp] feature, there is nothing to allow topicalization above this position. Bayer and Dasgupta leave this question unresolved, simply stipulating that additional TopicPs can be formed above an emphatic topic, but not a plain complementizer, due to "principles of information packaging." The issue is less problematic for the analysis of Bavarian, which disallows the presence of more than one constituent before non-initial complementizers. However, this difference between Bangla and Bavarian suggests that there is a language-specific factor at play, and that general constraints on information structure do not provide an adequate explanation of the Bangla data.

As compared with my own account, the Bayer and Dasgupta proposal adheres more closely to the notion of "what you see is what you get," since *je* always occupies a single position in C°. This follows in part from different assumptions regarding the clausal periphery. For one, the authors deny (footnote 45) the existence of ForceP in embedded clauses, arguing that illocutionary force is to be distinguished from clause typing and that illocutionary force exists only in main clauses. While this distinction may well be a valid one, it does not necessarily entail the non-existence of a clause-typing complementizer position in embedded clauses. TopicPs are licensed above the CP projection in restricted, but unexplained circumstances; they can be present when *je* is both a complementizer and emphatic particle, but not when *je* is only a complementizer.

In the account that I have developed, the possibility for *je* to be preceded by multiple topics is accounted for by positing the existence of an articulated clause structure in all embedded clauses. All embedded clauses can contain Focus and Topic phrases; however, their placement relative to the complementizer is dependent on which copy of *je* is pronounced. While topic and focus fronting can take place in postverbal clauses, the obligatory pronunciation of *je* in Force ensures the complementizer-initial order. In preverbal embedded clauses, the placement of topics and foci before *je* follows from its pronunciation in Fin°, below the high TopicP(s) and FocusP.

Another important aspect of the data not approached by Bayer and Dasgupta's analysis is the subject/object asymmetry with respect to the interpretation of phrases that precede preverbal *je*. Recall that while objects that precede *je* must be either topicalized or focused, subjects are apparently unrestricted in their interpretation. Non-focused quantified DPs can precede *je* in preverbal embedded clauses only if they are subjects.

- (76) * Jon [kau-ke je dadubhai dekh-e-ni] bol-lo
 John anyone-ACC that grandfather see-PERF-NEG say-PST
 Intended reading: 'John said that grandfather didn't see anyone.'
- (77) Jon [kew je ase-ni] bol-lo
 John [anyone that come-NEG] say-PST
 'John said that no one came'

The fact that subjects are not subject to the same interpretational restrictions minimally suggests that emphatic topicalization does not explain all instances of non-initial *je*. The subject/object asymmetry with respect to discourse interpretation in initial position is an important generalization, as it clearly links the Bangla pattern to verb-second phenomena.

There is preliminary evidence as well that this asymmetry is operative in Slavic second-position cliticization (Diesing and Zec 2011).

There are other reasons to believe that non-initial *je* orders can not be fully explained as the result of emphatic topicalization. For instance, consider sentential subject clauses, which share the same requirement that *je* be non-initial.

- (78) [Ram je boka] eta birokti-kor
Ram that stupid that(DEM) annoyance-ADJ
'That Ram is stupid is annoying'

It should be noted that this construction in Bangla differs from sentential subjects in languages like English. In Bangla, the sentence-initial clause is obligatorily followed by a resumptive pronoun *eta*, which itself appears to occupy a subject position. The crucial point is that there is no clear reason why a discourse-driven operation like emphatic topicalization must take place within Bangla sentential subjects, as Bayer and Dasgupta's analysis would suggest. However, the requirement that *je* be non-initial would still be the expected result of a prohibition against *je* at the left edge of an intonational phrase.

Looking beyond Bangla, it is also difficult to extend the emphatic topicalization analysis to non-initial complementizer orders in embedded clauses that apparently remain in their base postverbal positions, as attested in Bulgarian (Rudin 1982; Krapova and Karastaneva 2002) and Occitan (Sauzet 1989; Oliviéri and Faure 2013). If the discourse-related features that drive fronting to the left of complementizers are interpretable only in the main clause, cases like (79) and (80) are unexpected.

- (79) *Bulgarian*
 Mislja [tvojata sestra će vidjah]
 I.think your sister that I.saw
 'As for your sister, I think that I saw her.' (Rudin 1982)

- (80) *Occitan*
 Sabi [ton paire que vindrà]
 I.know your father that will.come
 'I know that your father will come.' (Sauzet 1989)

On the other hand, if we assume the existence of an extended clausal periphery in all embedded clauses, both language-internal and cross-linguistic variation in the placement of complementizers could receive a promising explanation in terms of the featural makeup of left-peripheral functional heads and their interaction with various prosodic constraints.

To conclude, I have argued that Bayer and Dasgupta's proposal does not adequately account for several important generalizations about the non-initial *je* pattern, specifically the subject-object asymmetry in the interpretation of fronted phrases and the possibility of multiple topicalizations above preverbal *je*. While they could be correct that a discourse factor like emphatic topicalization explains portions of the derivations involved, the proposed mechanism is unable to account for the same range of attested facts as the proposed lower copy spell-out analysis.

3.6 Conclusion

In this and the previous chapters, I have provided an account for the distribution of the Bangla complementizer *je*, arguing that non-initial orderings are derived by lower copy pronunciation, which applies to prevent the realization of the complementizer at an

intonational phrase edge. Furthermore, I have argued that the analysis in terms of lower copy pronunciation provides the strongest explanatory account versus prior approaches. The data and analysis contribute to a growing body of evidence that the well-formedness of certain word orders depends crucially on restrictions on prosodic organization, indicating that linearization and prosodic structure formation are determined simultaneously within the PF grammar.

Chapter 4: Verb second and its deviations: Bundling in the left periphery

4.1 Introduction

In the analysis of Bangla complementizer order in the previous chapters, I discussed several empirical advantages of adopting the extended left peripheral structure developed within the Cartographic Program. This chapter takes a broader cross-linguistic view, and argues that positing a universal inventory of left-peripheral projections has undesirable consequences in other cases. I focus on the problem of accounting for verb-second effects, in which the instantiation of left-peripheral positions appears to be substantially restricted. I argue that variation in the number of functional category features that are realized on individual heads, i.e. Feature Scattering (Giorgi & Pianesi 1996), is vital to accounting for attested cross-linguistic differences. This sets the stage for Chapter 5, which develops the proposal that this bundling process is the result of an operation called Coalescence that takes place in the syntax.

4.1.1 Cartography and the problem of restricted instantiation

As discussed in Chapter 1, certain patterns of complementary distribution between V2 and overt complementizers suggest that V2 effects involve movement of the verb to a position within the complementizer domain (den Besten 1983; Travis 1984; Fanselow 2004; Roberts 2004; Haegeman and Cranenbroeck 2007; Roberts 2012; among many others). Furthermore, V2 generally interacts with the packaging of information structure,

as certain items in first position are obligatorily topic- or focus-marked (Fanselow 2004; Mohr 2009; Jouitteau 2010; Holmberg 2015). To illustrate, consider the interpretational restrictions on first-position objects in German, as described by Mohr (2009). Objects can be licensed in first position only if they are interpreted as given information topics (1a), or contrastively focused (1b); Objects that are neither topicalized nor focused are not accepted (1c). Notice that the restrictions are identical to those that apply to objects that precede *je* in preverbal embedded clauses in Bangla, as discussed in Chapters 2 and 3. For presentational clarity, the verbs relevant to the second-position requirement are shown in bold text in the remainder of the chapter.

- (1) a. Diesen minister **hat** die Presse schon lange kritisiert
 This-ACC minister has the press already long criticized
 'This minister has long been criticized by the press.'
- b. Einen MINISTER **hat** die Presse schon lange kritisiert,
 A minister has the press already long criticized
 (aber nicht denKanzler)
 (but not the chancellor)
 'The press has already criticized a minister for a long time, not the chancellor.'
- c. *Einen Minister **hat** die Presse schon lange kritisiert
 A minister has the press already long criticized
 (as broad focus) (Mohr 2009)

It appears natural to pursue an analysis in which the features driving movement to first positions in such examples are the same ones associated with TopicP and FocusP in theories that assume an extended left periphery. However, this raises the question of why in most V2 languages, these positions cannot be simultaneously filled. If it is assumed that the full inventory of left-peripheral projections is universally present in all languages, strict V2 must amount to a requirement that phrasal movement target exactly one position

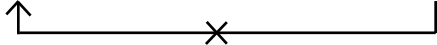
above the landing site of the verb. However, this comes with the challenging task of explaining [1] why is only one position available before the second-position element, and [2] which functional projection(s) do the first-position and second-position items occupy?

I first review the previously proposed Bottleneck Effect and Stacked Head approaches to V2, and show that they are generally unable to account for a variety of "relaxed" V2 systems that allow V3 or V4 in some contexts. I argue for an account of variation in terms of the Feature Scattering Hypothesis (Giorgi and Pianesi 1996), whose core claim is that functional categories can be realized as distinct heads, or bundled with other categories. Finally, I propose that variation in bundling interacts with several other parameter settings to determine the strictness of V2 effects.

4.1.2 V2 as a movement restriction: The Bottleneck Effect

One way of deriving second-position restrictions within an expanded left periphery proposes that while left-peripheral positions are universally present, fronting in some languages is restricted to exactly one left-peripheral position due to a "Bottleneck Effect" (Haegeman 1996; Roberts 2004; Cardinaletti 2010). The proposal claims that in languages with strict second-position restrictions, all left-peripheral fronting passes through Spec, FinP, perhaps due to a general EPP property of the Fin° head (Roberts 2004). Once one phrase has moved through FinP, all further movement through this position is blocked, thereby restricting fronting to one constituent. This blocking has been proposed to be an effect of Relativized Minimality (Rizzi 1990); whatever phrase is attracted to Spec, FinP contains features that are sufficiently general to be the closest goal

for any attractor in a higher projection, blocking all movement across FinP (Roberts 2004).

- (2) a. $[_{\text{FinP}} \text{ XP}_i \text{ V-Fin } [\dots t_i \dots \text{XP}_j \dots]]$
 b. $*[_{\text{FP}} \text{ XP}_j \text{ } [_{\text{FinP}} \text{ XP}_i \text{ V-Fin } [\dots t_i \dots t_j \dots]]]$
- 

The Bottleneck Effect approach posits that V2 requirements are a restriction on possible movement. As such, it does not need to propose variation in the available inventory of functional projections, keeping intact a key tenet of the Cartographic Approach.

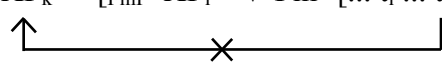
Exceptions to V2 in which more than one phrase precedes the verb can nonetheless be admitted within the Bottleneck Effect Hypothesis, if certain XPs can be first-Merged (a.k.a. base-generated) in the left-periphery and not placed there by movement. Consider for example the construction common to non-English Germanic languages known as Contrastive Left-Dislocation (Thr  nsson 1979), in which an XP appears in an utterance-initial position with contrastive topicalization or focus (3). A related construction, Hanging Topic Left-Dislocation, permits DPs with nominative case in first-position to correspond with a resumptive pronoun whose case is determined by the structure of the V2 clause (4). Crucially, these XPs appear to be invisible with respect to the second-position requirement. If left-dislocated constituents are base-generated in the left periphery, as argued by several authors (Anagnostopoulou 1997; Zaenen 1997; Wiltschko

1997; Frey 2004), this exception to V2 is unproblematic because the Bottleneck Effect is a restriction on movement.¹

- (3) Den Peter, den **habe** ich gesehen
 3.ACC Peter, him have I seen
 'I saw Peter.' (Ott 2014)

- (4) Dieser Frosch, den **hat** die Prinzessin gestern geküßt.
 this.NOM frog 3.ACC has the princess yesterday kissed
 'This frog, the princess kissed it yesterday.' (Boeckx and Grohmann 2004)

In a similar vein, Poletto (2002) suggests that the left periphery can be further divided into two domains. Specifier positions of FocusP and below can only be filled by movement, and are thus subject to the bottleneck restriction. Positions above FocusP can be filled by first-Merged phrases, making them "invisible" to the verb-second restriction that holds below FocusP.

- (5) [ForceP (XP) ... [TopicP (XP) ...] * [FocusP XP_k [FinP XP_i V-Fin [... t_i ... t_k ...]]]

Base-generation possible *Bottleneck Effect restriction holds*

4.2 The problem of relaxed V2

Although certain relaxed V2 patterns can be reconciled with the Bottleneck Effect Hypothesis, in this section I discuss two common types of V3 that cannot be adequately accounted for by the approach. These are patterns in which subjects appear in a preverbal position in addition to another phrase [XP Subject V ...], and patterns in which topics co-

¹ It remains controversial, however, whether Contrastive Left-Dislocation and related constructions, Clitic Left-Dislocation, and Hanging Topic Left-Dislocation are derived by base-generation in the left periphery, movement, or ellipsis (Alexiadou 2005; Ott 2014).

occur with either a focus or *wh*-phrase that precedes the verb [Topic Focus/Wh V ...]. I argue that these cases can not be attributed to base-generation in the left periphery, indicating that Bottleneck Effect analyses of V2 as a movement restriction are on the wrong track.

4.2.1 [XP Subject V] V3

Canonical cases of V2 exhibit a property known as subject inversion: While subjects can precede the main verb, if the first position phrase is a non-subject, the subject obligatorily follows the verb, as illustrated below for Yiddish (Diesing 1990). Subject inversion in the presence of a non-subject XP in first position is generally taken to be a clear diagnostic for V2 requirements.

- (6)
- a. Max **shikt** avek dos bukh
 Max sends away the book
 'Max sends away the book.'
 - b. Dos bukh **hot** Max geleyent
 The book has Max read
 'Max has read the book.'
 - c. Vuhin **geyt** ir
 where go you
 'Where are you going?' (Diesing 1990)

Subject inversion, however, is not obligatory in all languages that generally show V2 order. We first consider the case of Old English. Like other Germanic languages, Old English had a general V2 requirement within main clauses (van Kemenade 1987; Pintzuk

1993; Kroch et al. 1995; Trips 2002; a.o.). As shown in the following examples, the first position could be occupied by a variety of phrasal constituents.

- (7) a. Hismynster **ys** Hwiterne on Sanctus Martines naman gehalgod
his minster is Hwitern on Saint Martin's name consecrated
'His mynster, Whitern, is consecrated in Saint Martin's name.'
- b. Þæt hus **hæfdon** Romane to ðæm anum tacne geworht ...
that house had Romans to the one sign made
'The Romans had made that house to their sole sign...'
- c. On his dagum **sende** Gregorius us fulluht
On this day sends Gregorius us Christianity
'On this day, Gregorius sends us Christianity.' (Trips 2002)

Of particular interest is the fact that Old English allowed certain exceptions to V2 not attested in other Germanic languages. As noted in particular by Haeberli (2002a,b), a type of V3 order is permitted in which a full DP subject immediately precedes the main verb. In the corpus examined by Haeberli (2002b), [XP Subject V ...] orders were found to occur in 28.7% of main clauses in which the first XP is neither the subject nor an operator that triggers strict V2 (i.e. a *wh*-phrase).

- (8) a. ...& fela ðinga swagerad man **sceal** don
and many things so.wise man must do
'...and such a wise man must do many things.'
- b. Sumum monnum God **seleð** ægðer ge good ge yfel gemenged, ...
Some persons God gives both good and bad mixed
'God gives some people both good and bad things.' (Haeberli 2002b)

Based on their distribution, Bech (1998), Westergaard (2005), and Hinterhölzl and Petrova (2010) propose that [XP Subject V] orders are possible (though not apparently obligatory) only for subjects that are given information topics. Such V3 orders, however,

are not attested for non-subjects in the immediately preverbal position, indicating that grammatical subjecthood is crucial to this position.² Similar exceptions to V2 have also been noted for historic varieties of other West Germanic languages, including Old Saxon and Middle Low German (Petrova 2012; Walkden 2015).

Similar patternings of subjects in V3 structures in contemporary Germanic languages are documented for Cimbrian (Bidese 2008; Grewendorf and Poletto 2011; Bidese, Cognola, and Padovan 2012; Bidese, Tomaselli, and Padovan 2016) and French Flemish (Ryckbeoer 2004; Haegeman and Greco 2016). In Cimbrian, a heritage Germanic language spoken in the Italian town of Lusérna, subjects appear obligatorily in a preverbal position; The subject-inversion pattern of 'classic' V2 is in fact reported as ungrammatical in declarative clauses.

- (9) a. Haüt dar nano **iz** gerift atz Lusérn
 today the grandfather is around in Lusérn
 'Today the grandfather is in Lusérn'
- b. Gestern dar puce **hott** gisekk in has
 Yesterday the boy has seen a hare
- c. *Gestern **hott** dar puce gisekk in has
 Yesterday has the boy seen a hare
 'Yesterday the boy saw a hare' (Bidese et al. 2016)

² Subject-second V3 order in Old English is generally discussed alongside the fact that subject and object pronouns also appear in a preverbal position (Pintzuk 1991; Cardinaletti and Roberts 1991; Kroch and Taylor 1997; Haeberli 2002a; Trips 2002).

- (a) Ða hie **gefengon** micle herehyð, ...
 then they took much plunder
 'Then they took much plunder ...' (ChronA, :894.20.1027)

- (b) Ðe biscepes & lered men heom **cursed** œure
 the bishops and learned men them cursed always
 'The bishops and learned men always cursed them. (ChronE, ChronE_[Plummer]:1137.54.4063)

However, this pattern is not as clearly problematic for the Bottleneck Effect Hypothesis, as these pronouns are potentially clitics to the finite verb and thus not relevant to the bottleneck restriction (Cardinaletti and Roberts 1991).

As in Old English, the placement of subjects is sensitive to information structure. In contrast with definite DP subjects, subject quantifiers like *niamat* 'nobody' can follow the second-position verb.

- (10) 'Z hat niamat telefonaart
 It has nobody telephoned
 'Nobody has telephoned.' (Grewendorf and Poletto 2011)

[XP Subject V] orders are also common in the variety of Flemish spoken in northern France (Vanacker 1977; Marteel 1992; Ryckeboer 2004; Saelens 2014; Haegeman and Greco 2016). In contrast to standard Dutch, which shows typical subject inversion in V2, both full DP subjects and subject pronouns can appear in the preverbal position, following a non-subject phrase. While adverbials are most commonly accepted in first position, direct and indirect objects are acceptable as well, at least for some speakers.

- (11) a. Morren 't **komt** ten langen leste schooen were
 tomorrow it comes at long last nice weather
 'Tomorrow it will finally be good weather.'
- b. Alle vuuf voet den triek **is** veg
 each five foot the electricity is gone
 'The electricity is down every so often' (Ryckeboer 2004)

- (12) De nieuwe wagens we **makten** he
 the new cars we made PART
 'We made the new cars.' (Haegeman and Greco 2016)

More significantly, the absence of subject inversion appears to be the least marked word order in declaratives; In clauses that begin with a non-subject XP, the subject precedes

the verb in 85.4% and 89.4% of tokens in the corpora of Saelens (2014) and Vanacker (1977), respectively.

This pattern of exceptional V3 reveals a tendency for subjects, particularly those that are also given information topics, to move to a position above the main verb. While the pattern has been taken to suggest that verb movement targets a position below the complementizer domain like AgrSubjP (Haeberli 2002a), if we take V2 to uniformly require verb movement to a complementizer-domain head (Vikner and Schwartz 1996; Roberts 2004; Haegeman and Craenenbroeck 2007; Poletto 2013; Cognola 2013, a.o.), this suggests that subjects occupy Spec, FinP or a specialized subject position in its vicinity, as independently argued by Poletto (2000), Aboh (2006), and Ledgeway (2010). Under this view, [XP Subject V ...] V3 reflects the structure in (13).

$$(13) \quad [_{FP} (XP_{top/foc}) [_{SubjP} (XP_{subj}) [_{FinP} \quad V^{\circ} [_{InflP} \quad \dots \quad \bar{V}^{\circ}$$

Given the above structure, the subject exception to V2 is difficult to handle in a Bottleneck Effect approach to V2. If subject DPs move to FinP, one expects the movement of any other phrase above the subject to be blocked. One might admit the possibility that the first phrase in these V3 examples is a topic that is base-generated in the left periphery. However, it would remain unexplained as to why this sort of base-generation is possible only when the main verb is preceded by a subject.

4.2.2 [Topic Focus/Wh V] V3

In addition, there are several V2 languages that permit V3 orders where the main verb is preceded by both topicalized and focused phrases. The Nakh-Dagestanian language Ingush, as described by Nichols (2011), exhibits a V2 pattern quite similar to the German pattern. In main clauses, the verb or highest tensed auxiliary generally follows exactly one phrase.

- (14) Xii **mol**=ii wa?
 water drink=Q 2S.ERG
 'Would you like a drink of water?'
 (15) Muusaa **vy** hwuona telefon jettazh
 Musa V.PROG 2S.DAT telephone strike.CVsim
 'Musa's calling you / Musa's on the phone for you'
 (16) Cwa mealxara **jar** hwo, Tawaibat, ...
 some sad J.be.PST 2S Tawaibat
 'You're so sad, Taiwaibat, ...'

In Ingush, phrases in the preverbal position can be interpreted either as topicalized or focused. Crucially, if a main clause includes both a topic and a focus, both phrases precede the main verb in the order [Topic Focus V]. Both information focus and *wh*-words are analyzed as types of foci by Nichols.

- (17) a. Jurta jistie joaqqā sag **ull** cymogazh jolazh
 Town.GEN nearby J.old person lie.PRS sick.CVsim J.PROG.CVsim
 (topic) (focus)
 'In the next town an old woman is sick'
 b. Mista xudar myshta **duora**?
 sour porridge how D.make.IMPF
 (topic) (focus)
 'How did they make sour porridge?' (Nichols 2011)

While such data is troubling for the Bottleneck Effect Hypothesis in its original form, it conforms to Poletto's proposal that projections above TopicP permit base-generated phrases. However, it raises the issue of explaining why the co-occurrence of topics and foci is prevented in V2 languages like Modern German.

More problematic cases are found in languages where this type of V3 is possible only when the immediately preverbal phrase is a *wh*-phrase. Consider for instance the Badiotto variety of Rhaetoromance as discussed by Poletto (2002). In declarative sentences, the second-position verb is preceded by a focused phrase, and it is not possible for left-dislocated elements to precede the focused phrase. However, if the verb is preceded by a *wh*-phrase it is possible for left-dislocation to target the clause-initial position.

- (18) a. *De Giani, CUN PIERO **a-i** bel baié
of Giani WITH PIERO have-I already spoken
- b. De Giani, con che **bai-la** pa?
of Giani with whom speak-she INTERR.PRT
'With whom did you talk about John?' (Poletto 2002)

Similarly, while Yiddish is generally V2, it permits the optional topicalization of exactly one phrase before *wh*-words (Diesing 2005).

- (19) mit di kinder vos **tut** men?
with the children what does one
'What does one do with the children?' (Diesing 2005)

Minimally, the fact that certain types of pre-verbal phrases are permitted only when they co-occur with *wh*-words indicates that it would be overly simplistic to claim that items in the topic field are uniformly exempt from the bottleneck restriction. This would require

the apparent stipulation that the base-generation of topics is in some instances possible only if *wh*-movement has already taken place.

Perhaps the most curious case of this type is found in Kashmiri, which we will consider in greater detail. Kashmiri is relatively unique among Indo-Aryan languages in that it has a robust V2 requirement in main clauses (Bhatt 1999).

- (20) a. rameshan **dyut** raath laRk-as kalam
 Ramesh gave yesterday boy pen
 'It was Ramesh who gave a pen to the boy yesterday.'
- b. laRk-as **dyut** rameshan raath kalam
 boy gave Ramesh yesterday pen
 'It was a boy to whom Ramesh gave a pen yesterday.'
- c. *tem raath **dyut** akh laRk-as kalam
 he yesterday gave one boy pen (Bhatt 1999)

The language additionally places an interpretational restriction on non-subjects fronted to first position, requiring them to be focused, not topicalized. Quantified objects that are ineligible topics are freely fronted to first position; Furthermore, only phrases in first position can be suffixed by the focus-sensitive particles *-ti* and *-yioot*, which resemble *even* and *only* respectively.

- (21) a. sooruyikeNh **khyav** rameshan
 everything ate Ramesh
 'Ramesh ate everything'
- b. huun-ti **chu** behna broNh panin jaay goD saaf karaan
 dog-even is seat before self's place first clean do-perf
 'Even the dog cleans his place before sitting.' (Bhatt 1999)

One type of V3 order is admitted under a fairly restricted circumstance. As typical of V2 languages, *wh*-phrases move to an immediately preverbal position in interrogative main

clauses. However, if the clause includes a topicalized phrase, it is preferably placed in a clause-initial position preceding the *wh*-phrase, yielding [XP_{top} *Wh* V ...] orders. This pattern is particularly unexpected due to the fact that topics do not front to first-position in declarative V2 main clauses (Bhatt 1999, Manetta 2011).³

- (22) a. tse kyaa **dyutnay** Rameshan
 you what gave Ramesh
 'As for you, what is it that Ramesh gave?
- b. ?kyaa **dyutnay** Rameshan tse
 what gave Ramesh you (Bhatt 1999)

If the *wh*-word is placed into a left-peripheral FocusP or InterrogativeP (Rizzi 2001) by movement from the lower part of the clause, as commonly assumed, the clause-initial topic must be placed above the *wh*-phrase by base-generation. Although the proposal by Poletto (2002) permits base-generation above FocusP, it would have to be stipulated that base-generated topics are permitted only when followed by a *wh*-phrase, a rather unusual restriction. Furthermore, Holmberg (2015) notes that a base-generation analysis of initial topics is unlikely, as the fact that they are case-marked suggests that they are first Merged lower in the clause, rather than directly in the left periphery.

³ My analysis of Kashmiri interrogatives is based on the convergent descriptions of Bhatt and Manetta. However, there appears to be additional variation across speakers with respect to word order in interrogatives. Koul and Wali (2015) observe that *wh*-phrases can stay in situ for some speakers, and speakers vary in whether they permit multiple *wh*-movement to the preverbal position (p.c. Constantin Freitag)

4.2.3 V>3 and multiple bottlenecks

In a recent corpus study, Wolfe (*to appear*) identifies substantial word order variation within main clauses of medieval Romance languages, many of which have previously been described as exhibiting relaxed V2 restrictions (Benincà 1983, 2006; Adams 1987; Roberts 1993; Vance 1997; Franco 2009, a.o.). Several generalizations are revealed in this reproduced summary table. First, V2 is the most common word order in all of the languages considered. There is variation however, in the types and statistical frequency of permitted non-V2 orders. For instance, while it is highly rare for more than two items to precede the verb (V>3) in Old French, Old Spanish, and Old Venetian, such orders, at least for V4, are more common in Old Occitan and Old Sicilian. There is also a range of variation with respect to the acceptability of verb-initial (V1) orders, from being unattested in Old French to consisting of 24.37% of the Old Venetian corpus.

(23) Verb placement in Medieval Romance Main Clauses (Source: Wolfe, *to appear*)

	Old French		Old Occitan		Old Sicilian		Old Venetian		Old Spanish	
	N	%	N	%	N	%	N	%	N	%
V1	0	0.00	48	7.52	52	8.21	154	24.37	11	2.29
V2	475	75.16	340	53.29	318	50.24	371	58.70	436	90.83
V3	155	24.53	188	29.47	189	29.86	103	16.30	32	6.67
V4	2	0.32	50	7.84	61	9.64	4	0.63	1	0.21
V5	0	0.00	8	1.25	11	1.74	0	0.00	0	0.00
V6	0	0.00	4	0.63	1	0.16	0	0.00	0	0.00
V7	0	0.00	0	0.00	1	0.16	0	0.00	0	0.00
Total	632	100	638	100	633	100	632	100	480	100

What is clearly revealed by Wolfe's corpus and the previously discussed examples is the generalization that there is a continuum of structural restrictions on verb placement, of which strict V2 appears to be at one extreme. However, as languages permit an increasing

number of deviations from linear V2, there is likely a tipping point at which such languages would not be described by researchers as having any sort of V2 requirement.

The availability of V4 structures has important implications for the Bottleneck Effect Hypothesis. Wolfe notes that attested V4 orders consist of sequences of a frame-setting adverbial, a topic, and a focus preceding the verb [Frame-setter Topic Focus V], as exemplified in this following example from 12th-century Sicilian. The same analysis is given for V4 orders in Old Italian (Florentine) by Poletto (2014).

(24) *Old Sicilian*

[tamen poy di la morti loru] [li ossa loru] [pir virtuti divina] **operannu**
 then after of the death their the bones their by virtue divine perform.3PL
 miraculi
 miracles
 'Then after their death, their bones perform miracles through divine virtue.'
 (Wolfe, *to appear*)

(25) *Old Italian*

[e per volontà de le Virtudi] [tutta questa roba] [tra' poveri] **dispense**
 and by will of the virtues all this stuff among poor-PL distribute.3SG.PST
 'And according to the will of the virtues, distributed all these goods among the
 poor.'
 (Poletto 2014)

As noted by Wolfe, such data appear to be compatible with the proposed bottleneck in FinP, as long as both the frame-setting adverbial and the following topic are base-generated in the left periphery. A base-generation approach to frame-setting adverbs is plausible, given that they are adjunct-like in nature and independent of argument structure within the clause.

However, this analysis raises the important question of why such V4 orders are not available, or substantially more marginal, in other Old Romance languages or the stricter modern day Germanic languages. To address this issue of variation, Poletto (2002,

2013), Walkden (2015), and Wolfe (2015, *to appear*) propose that languages can vary in the height of the bottleneck restriction. Specifically, they propose that the locus of the bottleneck can be either in FinP or ForceP.

- (26) *FinP bottleneck*

$$[\text{FrameP} (\text{XP}_{\text{Frame-setter}}) [\text{ForceP} \dots [\text{TopicP} (\text{XP}_{\text{Top}}) [\text{FocusP} \text{XP}_{\text{Foc}} [\text{Fin} \text{XP}_{\text{Fin}} \text{V} [\text{InflP} \dots \text{V}]]]]]]]$$
- (27) *ForceP bottleneck*

$$[\text{FrameP} (\text{XP}_{\text{Frame-setter}}) [\text{ForceP} \text{XP}_{\text{Top/Foc}} \text{V} [\dots \text{V}]]]$$

A language with a ForceP bottleneck shows stricter V2 restrictions, since fewer positions are available for base-generated constituents. This structure is argued to account for languages with relatively strict patterns, like Modern German and Modern Dutch. Languages with a bottleneck in FinP permit more relaxed V2 patterns, such as those of Old Romance, due to the availability of more positions where base-generation is possible.

While the proposal does allow for a means to account for cross-linguistic variation in the strictness of V2 requirements, the ForceP bottleneck structure presents a number of theoretical problems. For instance, how can we explain how phrases in Spec, ForceP can be interpreted as topics, foci, or *wh*-elements? Within the Cartographic Approach, we expect such items to be attracted only by the left-peripheral Topic° and Focus° heads. One possible analysis is to say that these items first move through TopicP or FocusP before landing in Spec, ForceP. This movement path is illustrated in (28), where a focused XP moves first to Spec, FocusP, then to Spec, ForceP. However, this type of two-step movement would violateriterial Freezing (Rizzi 2006, 2010), the generalization that items moved to a position that licenses some discourse property cannot undergo further movement.

(28) [ForceP XP_{Foc} V° [TopicP ... [FocusP ~~XP_{Foc}~~ [Fin V° [InflP ... V° ... XP_{foc}]]]]]

An alternative analysis that avoids this issue is to claim that in languages with a ForceP bottleneck, Force° inherits certain features of the lower heads, allowing topics and foci to move directly to Spec, ForceP. However, this approach requires additional claims about feature inheritance within the left periphery.

In addition, there are additional empirical limitations to the types of variation that can be accounted for by varying the height of the bottleneck. This can be illustrated by comparing Standard Dutch to West Flemish with respect to the availability of frame-setting adverbials (Haegeman and Greco 2016). Standard Dutch prohibits frame-setting adverbials to precede V2 declarative clauses, whereas this option is available in West Flemish dialects.

- (29) a. *StD/√WF
 Voor da-j dat weet, dat kind is weg me je geld
 Before that-you that know that child is away with your money
 'Before you know, the child is off with your money.'
- b. *StD/√WF
 Als mijn tekst klaar is, ik zal je hem opsturen
 When my text ready is I will you him send
 'When my text is ready, I will send it to you.' (Haegeman and Greco 2016)

To account for the dialectal difference as variation in the height of the bottleneck restriction, one could propose that the bottleneck is in a higher position in Standard Dutch than in West Flemish, high enough to prevent anything from being Merged in Spec, FrameP. Potentially, then, Standard Dutch has a bottleneck in FrameP or higher. However, this would again raise the question of why the interpretation of first-position items in Standard Dutch is not restricted to frame-setting functions.

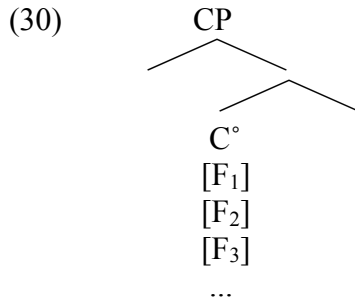
Lastly, it should be noted that this approach to the Bottleneck Effect predicts certain entailment relations in the possible movement types to the left periphery. For instance, if subjects move to a dedicated position in the preverbal field (as in Old English, Cimbrian, French Flemish), this indicates that the bottleneck is in a low position like Fin°. We predict, then, that all positions above TopicP should be able to be simultaneously filled, permitting for instance the V4 patterns discussed for Old Sicilian and Old Italian. In the absence of more detailed data to test this prediction, however, this issue will have to be left for further research.

Thus far, I have presented an overview of various relaxed V2 patterns, and shown that they pose numerous challenges for the Bottleneck Effect Hypothesis. In particular, the existence of highly relaxed V2 languages must be taken to indicate that numerous phrases can be base-generated in the left periphery for some languages. This, however, requires a revised analysis of more strict V2 systems. More significantly, the approach fails to account for patterns of dependence, in which the availability of a high left-peripheral projection depends on movements that have occurred in a lower projection.

4.2.4 The Stacked Head Hypothesis

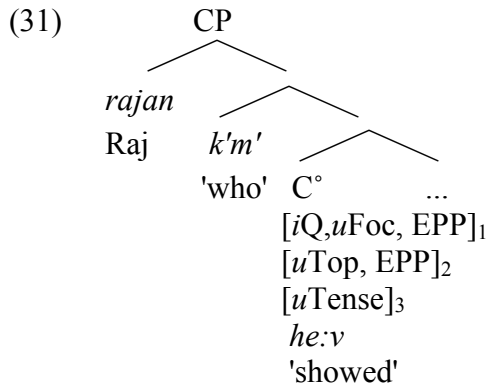
Some of the aforementioned difficulties of capturing relaxed second-position patterns within the Cartographic Program motivated the 'stacked head' theory separately proposed by Lahne (2009) and Manetta (2011). Significantly, this approach denies the cartographic assumption that separate left-peripheral features occur in separate heads. The main claim

is that rather than a series of functional projections, there is only one C° head that contains a 'stack' of features.

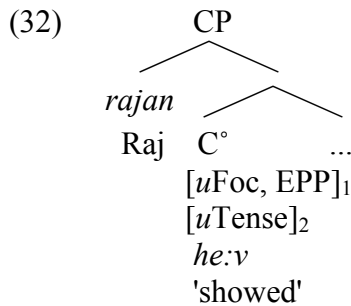


The features in the stack are crucially ordered such that features at the top of the stack must be checked before those lower down. The theory further assumes the availability of multiple specifiers (Chomsky 1995) for the unique CP projection. Consequently, the relative ordering of phrases moved to the left periphery reflects the order in which individual features of C° are checked. The approach is argued to account for the descriptive generalizations about word order in the left periphery, while obviating the question in cartography of which functional head determines the complementizer-domain phase in the sense of Chomsky (2000, et seq.) an issue that remains largely unresolved (but see Roberts 2012 for one approach to FinP as the phase).

Consider the derivation of the V3 example in Kashmiri as given by Manetta (2011) with slightly adapted notation. What is crucial is that two sets of features contain an EPP feature. The first set $[iQ, uFoc, EPP]$ triggers movement of the *wh*-word. The second set $[uTop, EPP]_2$ then triggers movement of the topic.



As this is the only deviation from V2 in Kashmiri, this is the only possible stacking of features that has more than one EPP feature. The standard V2 patterns are derived by selecting a head with only one EPP feature that is associated with $[uFoc]$.



Although the question is not considered in detail by Lahne or Manetta, the stacked head approach creates a way to account for cross-linguistic variation; The number and types of constituents that can front to the left periphery depend simply on the distribution of EPP features within the C° head. A strict second-position requirement is predicted where the single C° head is restricted to bearing one EPP feature. As more feature stacks with more than one EPP features are admitted, second position requirements become increasingly relaxed. This allows for a straightforward way to account for the continuum of $V > 2$ patterns.

However, the theory is not without substantial complications. If we assume a direct mapping from the above structures to word order in terms of the Linear Correspondence Axiom (Kayne 1994), we predict all fronted left-peripheral phrases to precede a unique complementizer head. Complementizers are not expected to precede fronted items, and the occurrence of multiple complementizer heads in distinct portions of the periphery is unexpected (Roberts 2004 on Welsh; Aboh 2006 on Saramaccan; Demonte and Fernández-Soriano 2009 on Spanish). Examples of these patterns are given below.

(33) *Colloquial Spanish*

Dijo [**que** a ese tío **que** no podía ni ver-lo]
 said [that to that guy that NEG could even see-CL]
 'S/he said that s/he could not stand that guy.'

(Demonte and Fernández-Soriano 2009)

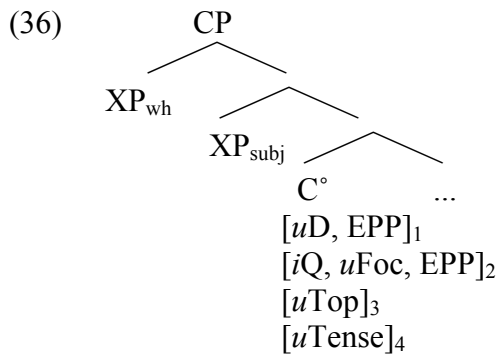
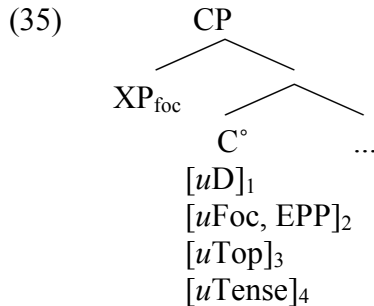
(34) *Saramaccan*

Mi táki [**táa** dí bakúba **dé** Amato bóí en]
 1.SG say that DET banana TOP Amato cook 3SG
 'I said that, as for that banana, Amato cooked it.' (Aboh 2006)

To account for these cases, Lahne and Manetta propose that the appearance of such heads is the result of post-syntactic operations. Complementizer-initial word orders with left-peripheral topics or foci require a postsyntactic reordering of the C° head so that it precedes the fronted phrases. The apparent realization of multiple complementizer heads is proposed to result from the postsyntactic insertion of morpho-phonological markers. This is incompatible, for instance, with the theory developed in this dissertation, since these positions do not correspond to any copies present in the syntactic structure.

Putting aside this issue of theoretical incompatibility, a more serious empirical concern is that there is no way to straightforwardly account for attested patterns of *dependence* between different types of fronting. Recall that in Kashmiri and San

Leonardo di Badia Rhaetoromance, topicalization or left-dislocation are available only if they are followed by a moved *wh*-word. However, within stacked head theory in its current form, there are no inherent constraints on the possible distribution of EPP features within a single language. One can predict, for instance, the existence of a language that permits exactly two patterns. In declaratives, the first position is focused, and strict V2 is observed. In interrogatives however, the first-position *wh*-word must be followed by a subject.



Thus, while a stacked head approach provides an account of second-position patterns and deviations from them, it must appeal to mechanisms outside of the proper syntactic derivation in order to explain patterns that involve complementizer-initial orders and the simultaneous realization of more than one C-domain head. The approach comes with a substantial theoretical cost; By permitting reordering and morpheme-insertion within a postsyntactic module, the predictive power of a system of constrained syntactic

operations is greatly weakened. Furthermore, the proposal appears to overgenerate possible exceptions to verb second.

To summarize the discussion so far, the existence of various relaxed V2 systems poses significant challenges to the Bottleneck Effect and Stacked Head theories. The Bottleneck Effect Hypothesis is overly restrictive in the permitted types of relaxed V2 patterns, while the Stacked Head approach overgenerates possible exceptions and is difficult to reconcile with other patterns that are accounted for within the Cartographic Program.

4.3 V2 as variation in head bundling

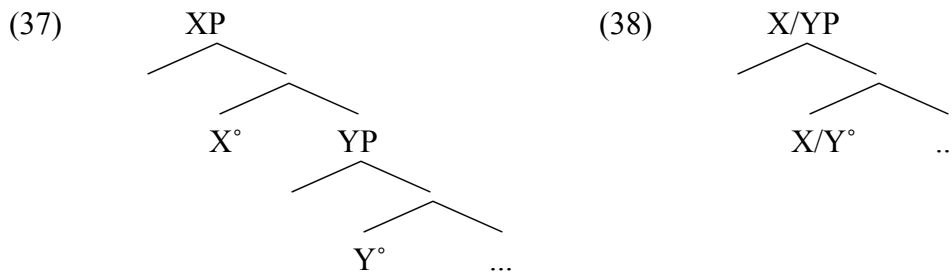
What is clear from the variety of relaxed V2 patterns is that analyses of V2 as the result of a restriction on movement, as proposed in all instantiations of the Bottleneck Effect Hypothesis, or a uniform restriction on the number of heads in the left periphery, as in Stacked Head Theory, are empirically inadequate. If this is the case, it indicates that alternative parameters are necessary to account for variation in the strictness of V2 requirements.

The existence of a wide range of relaxed V2 patterns indicate that V2 does not arise from a uniform restriction on possible movement or the number of heads in the left periphery, but from the confluence of multiple parameter settings. In this section, I argue that the aforementioned variation in the strictness of V2 systems is the result of variation in the number of left-peripheral projections, as predicted by the Feature Scattering

Hypothesis. Lastly, I consider several additional parameters that can result in relaxed V2 patterns, including the number of permitted specifiers, and the height of verb movement.

4.3.1 The Feature Scattering Hypothesis

The Feature Scattering Hypothesis (Giorgi and Pianesi 1996; Bianchi 1999) proposes that languages can permit certain category features to head their own projections or allow them to be bundled on single heads. In the following schematic example, the features X and Y can either head their own phrases (37) or be grouped together in a single X/YP (38). In the remainder of the work, I will refer to features that share a head as being *bundled*.



Proposed by Giorgi & Pianesi to account for variation in the realization of Tense, Aspect, and Mood, this general approach is adopted in Poletto's (2000) account of cross-linguistic variation in the realization of subject positions in the IP domain, and given some application to the realization of complementizers by Bianchi (1999). While not couched in the same terms, the approach to variation that allows some functional heads to be bundled has also been proposed for Infl/Agr° heads (Iatridou 1990; Speas 1991; Bobaljik 1995; Thráinsson 1996; Bobaljik and Thráinsson 1998; Ouhalla 1991) and for

Voice° and Causative° heads (Pylkkänen 2002). Although it predates the Stacked Head theory and much of the Cartographic Approach, it amounts in some respects to a middle ground between the two programs.

Although the Feature Scattering Hypothesis loosens the requirement for each feature to be realized on a distinct head, assumed in many Cartographic works (Cinque and Rizzi 2010), it is intended to be compatible with the claim that functional features are strictly ordered across languages. Possible variation in how multiple features can be realized on individual heads is substantially constrained by a universal ordering constraint (Giorgi & Pianesi 1996) on the checking of features, which presumably mirrors the feature-checking orders proposed in the Cartographic Program.

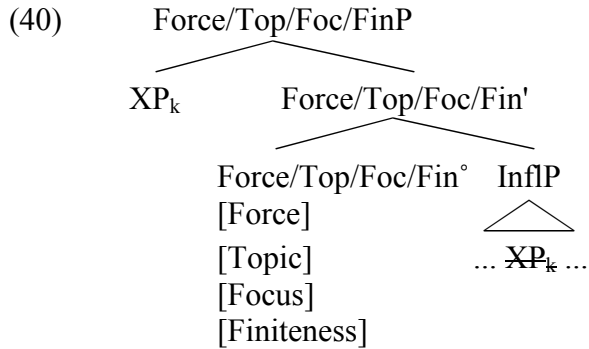
- (39) UNIVERSAL ORDERING CONSTRAINT: The features are ordered so that given $F_1 > F_2$, the checking of F_1 does not follow the checking of F_2 . (Giorgi and Pianesi 1996)

One consequence of the constraint in (39) is that category features bundled onto single heads must be those that would otherwise be structurally adjacent if realized as distinct heads (similar arguments are given by Caha (2013) for syncretism in case paradigms).

4.3.2 Bundled heads and relaxed V2

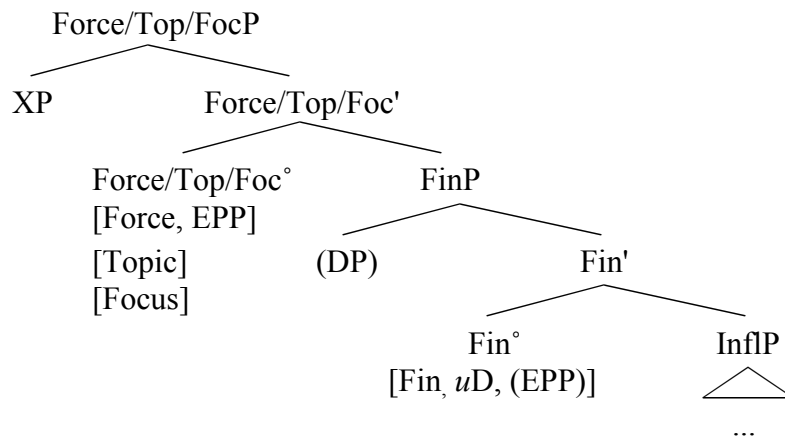
We now consider the application of the Feature Scattering Hypothesis to V2 and relaxed V2 patterns. I propose that the number of apparently realized projections in the left periphery varies in accordance with the number of bundled features. The strictest second position requirement emerges if all left-peripheral category features are bundled into a

single head that also attracts verb movement. If this head contains exactly one feature that triggers movement to its specifier (e.g. an EPP feature), regardless of how many category features it contains, this ensures that only one phrase precedes the second-position head.



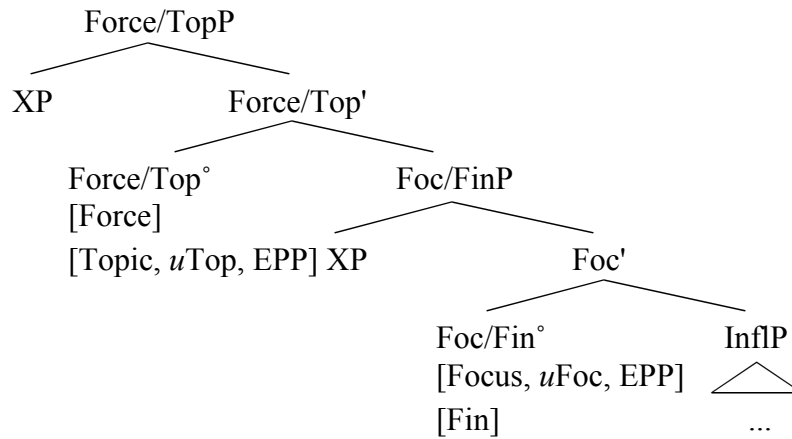
Second position restrictions become increasingly relaxed as the number of features in distinct projections increases. For example, the Old English-style V3 pattern is generated if subjects are attracted to the specifier of FinP (Aboh 2006), instantiated separately from the higher Force/Topic/FocusP that houses first position non-subjects. As long as the verb remains in Fin°, Subj°, or a bundled Fin/Subj° head, this allows the verb to be preceded by both a topicalized or focused phrase and the subject.

(41) *Old English V3*



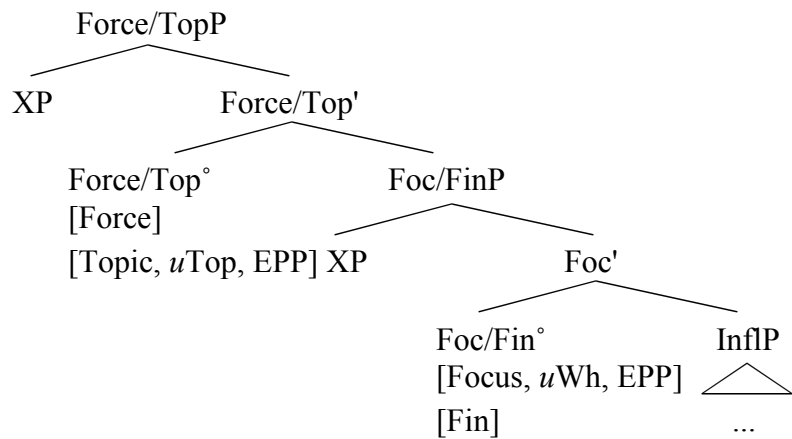
The case of Ingush, where the main verb can be simultaneously preceded by both a topic and focus, arises if Topic° is realized on its own, while all category features below Focus are bundled together.

(42) *Ingush V3*



A similar structure accounts for the [Topic Wh V] pattern of V3 attested in Kashmiri, Yiddish, and Badiotto, under the assumption that *wh*-phrases in these languages are attracted by [Focus].

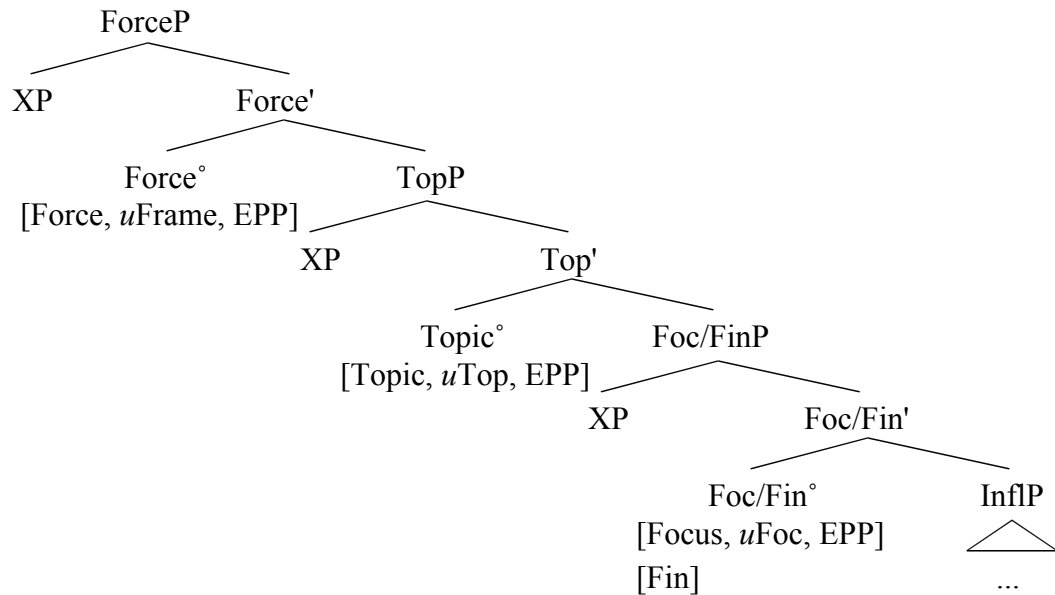
(43) *Kashmiri, Yiddish V3*



It remains to be explained, however, why in these languages V3 is permitted only in interrogative clauses with a preverbal *wh*-phrase, whereas non-interrogative clauses observe stricter V2. To account for this, I propose that bundling is sensitive to properties of [Focus]; A [Focus] feature associated with a [*uWh*] probe does not need to be bundled with features higher in the left periphery, whereas a non-interrogative [Focus] feature must undergo bundling. A fuller account of this restriction will be given in Chapter 5.

Further splitting of the [Force] and [Topic] features into separate heads gives a straightforward way to account for V4 patterns of the type discussed in Old Sicilian, [Frame-setter Topic Focus V], under the assumption that frame-setting adverbs occupy Spec, ForceP.⁴

(44) *Old Sicilian, Old Italian V4*

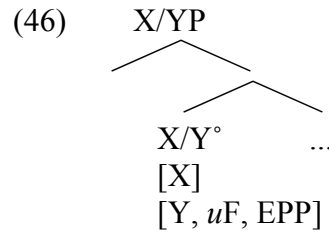
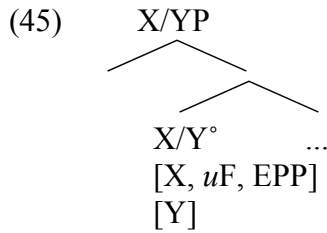


⁴ There are many proposals that hanging topics and scene-setting adverbials in fact occupy projections that are above and distinct from ForceP, sometimes known as the FrameP field (Poletto 2002; Benincà and Poletto 2004; Giorgi 2010; Wolfe 2015, a.o.). For presentational simplicity, I will make the simplifying assumption that these elements are in ForceP, a shorthand for a bundled Force/FrameP.

Although there have been proposals that the CP can be either "split," containing multiple functional projections, or "un-split," consisting of a single C° head, (Rizzi 1997; Poletto and Tomaselli 1999; Shlonsky and Rizzi 2007; Biberauer and Roberts 2015; Douglas 2015), the present system predicts that a language can instantiate any number of left-peripheral heads between one and the maximum number of left-peripheral features, whatever it turns out to be. Furthermore, the system does not predict many of the entailment relations among available positions required by the Bottleneck Effect Hypothesis, discussed in Section 4.2. Specifically, the availability of a low left-peripheral projection does not imply that all higher left-peripheral features can trigger movement or base-generation.

4.3.3 Variation in active features within bundled heads

I propose that a crucial consequence of adopting the Feature Scattering Hypothesis is the prediction that certain features, even if universally present, can appear to be inactive in a given language under certain circumstances. Consider the behavior of features that are bundled with other features on some head, and not associated with an EPP feature, and do not show overt agreement. Consider for example two bundled heads that contain category features X and Y. Each head contains one pair of features that triggers movement, [*u*F, EPP]. However, the EPP property is associated with X in (45) and Y in (46). In terms of surface word order, this will give the appearance of the first language having only head X° while the second has only Y°.



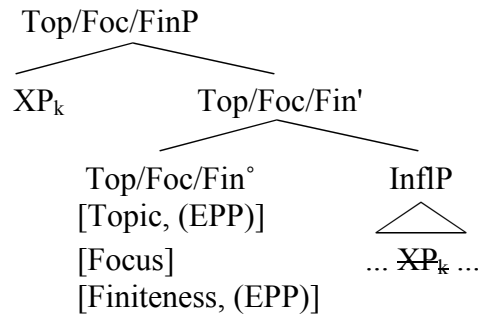
This possibility can explain, for instance, variation in the possible interpretations of first-position phrases in second position patterns. Consider the difference in interpretational restrictions on first-position elements in Swedish, Kashmiri, and German. Recall that in Kashmiri V2, objects fronted to first position are obligatorily focused, and cannot be topicalized. In contrast, Swedish V2 requires sentence-initial objects to be aboutness topics or contrastive topics (Holmberg 2015). Possible topics like definite object DPs can precede the second-position verb, but ineligible topics like bare quantified DPs can not; The restriction against non-topics in first position does not apply to subjects. Both the Swedish and Kashmiri patterns can be contrasted with German, which permits either focused or topicalized readings for first-position objects (1).

- (47)
- a. Den filmen får du bara inte missa
That film must you just not miss
'You simply mustn't miss that film.'
 - b. *? Allt åt Johan
Everything ate Johan
 - c. Allt är stängt
Everything is closed
'Everything is closed'
- (Holmberg 2015)

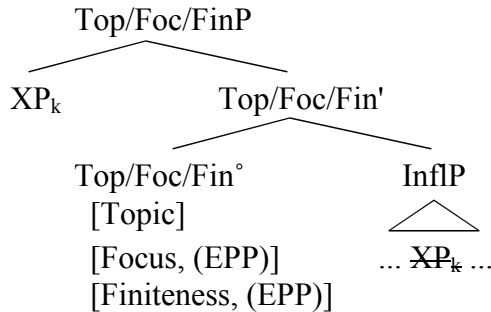
Given that there is only one available position preceding the verb in German, Swedish, and Kashmiri, we maintain that declarative clauses contain only a single head with multiple bundled features. The relevant difference between the three languages is in

which category feature(s) the EPP is associated with. Assuming still that subjects are attracted by a property of [Fin], whereas foci and topics are attracted by [Foc] and [Top] respectively, the three patterns can be analyzed as follows: Swedish permits a single EPP feature to be associated with either [Fin] or [Top], Kashmiri permits the EPP feature to be associated with either [Fin] or [Foc], while German allows the EPP to be associated with [Fin], [Top], or [Foc].

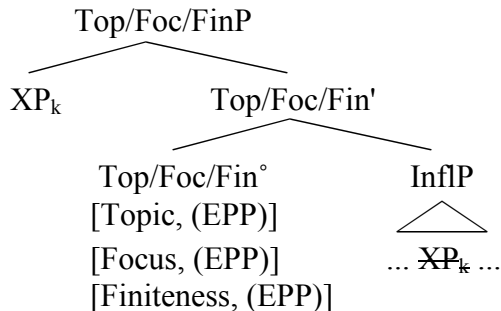
- (48) *Swedish*: [Fin] or [Top] has an EPP feature



- (49) *Kashmiri*: [Fin] or [Foc] has an EPP feature



- (50) *German*: [Fin], [Top] or [Foc] has an EPP feature



Much work remains to be done in understanding the factors that determine variation in the possible association of the EPP feature with discourse features within bundled heads. What is crucial is that the Feature Scattering approach allows for a straightforward way to account for why multiple discourse features can in some languages be associated with an apparently unique syntactic position.

In summary, adopting the Feature Scattering Hypothesis in the analysis of V2 allows us to maintain the key insights of the Cartographic approach with respect to the possible orderings of heads and the checking of features, while accounting for cross-linguistic variation in the number of realized positions. Furthermore, it allows for an appropriate amount of flexibility in the number of positions available for movement, relative to the overly restrictive Bottleneck Effect Hypothesis.

4.4 Additional ingredients of V2

Recall that the idealized, "strict" V2 system arises under conditions where [1] all left-peripheral category features are bundled on one head, [2] the bundled head attracts exactly one specifier, and [3] verb movement is triggered by some left-peripheral feature. So far, we have discussed deviations from V2 that appear to reflect the presence of more unbundled heads. Here, I briefly discuss other deviations from V2 that result from parameters [2] and [3]: variation in the number of specifiers permitted in left-peripheral projections and variation in the target of verb movement.

4.4.1 Single versus multiple specifiers

Pesetsky (2000) argues against theories of uniform restrictions on the internal structure of XPs in syntax, and proposes that individual heads can vary in the number of specifiers that they permit or require. Heads are individually specified in whether they attract exactly one phrase, multiple phrases, or none at all.

Under this view, even if all category features in the left periphery are bundled into a single head, V3 or V4 orders can occur if this projection permits multiple specifiers. This appears to be the case in San Leonardo di Badia Rhaetoromance (a.k.a. Northern Ladin), a relaxed V2 language that permits multiple topics to front in declarative main clauses, creating a certain type of V3 (Casalicchio and Cognola 2015). Subjects and indirect objects can both precede the verb and are not apparently restricted in their ordering, which suggests that the subject here does not occupy a dedicated position as it does in Old English, Cimbrian, and French Flemish.⁵

- (51) a. Luca ala mama ti-à-l cumprè n liber
 Luca to.the mother 3DAT-has-3NOM bought a book
- b. ala mama Luca ti-à-l cumprè n liber
 to.the mother Luca 3DAT-has-3NOM bought a book
 "Luca bought a book for his mother" (Casalicchio & Cognola 2015)

It appears then that the language allows its [Topic] feature to be associated with multiple EPP features [Topic, EPP*]. Crucially, it is not the case that the bundled complementizer

⁵ Crucially, while indirect objects and direct objects can be simultaneously fronted, topicalized subjects and direct objects cannot co-occur in the preverbal position. Casalicchio and Cognola argue that this is due to a ban on the co-occurrence of certain types of case features within a single projection, potentially a type of Distinctness restriction (Richards 2010).

projection allows multiple specifiers generally. For instance, it is not possible for both a topic and focus to be fronted before the verb.

- (52) *La mama LA ORDÖRA l' a la cumprè
The mother the fruit 3.ACC-has-3.NOM bought

4.4.2 The targets of verb movement

There is evidence that some cases of V1 are the result of verb-movement to a high left-peripheral position with no specifier. This possibility seems to be most clearly exemplified by Early Old French, which while generally V2 (Foulet 1928; Dupuis 1989; Roberts 1993; Vance 1997; Labelle 2007) permitted both V2 and V1 orders in declarative main clauses (Labelle and Hirschbühler 2012).⁶

- (53) **Cunuit** Brendans a l'air pluius que li tens ert mult
annüus
knew Brendan from the air rainy that the weather was very
worrisome
'Brendan knew from the wet wind that the weather was worrisome.'
(1120; Brendan, 56:675)

Labelle (2007) argues that V1 orders are derived by verb-movement to a higher landing position than in V2 clauses, rather than simply having an empty specifier. This analysis is supported by the placement of object clitics (Labelle 2007). In V2 clauses, object clitics appear in an immediately preverbal position (54). In V1 clauses, however, object clitics appear immediately following the verb (55).

⁶ The possibility of V1 orders appears to have been lost entirely in later Old French, as seen in the corpus data of Wolfe (*to appear*) discussed in section 4.2.3.

- (54) Et sa seror *li* **fist** il esposer
 And his sister him made he marry
 'and he had him marry his sister' (Labelle 2007)
- (55) **Vait** *s'en* Brandan vers le grant mer
 Go REFL-LOC Brendan towards the big sea
 'Brendan goes away towards the sea' (Labelle 2007)

Initially, the pattern resembles a classic Tobler-Mussafia effect (Tobler 1875; Mussafia 1886) in which object clitics are postposed (i.e. through lower copy pronunciation or Prosodic Inversion) in order to avoid appearing in a clause-initial position. However, Labelle (2007) presents evidence that early Old French had no restriction against Intonational Phrase-initial object clitics. In particular, object clitics can appear immediately after parentheticals, which are expected to produce intonational phrase breaks (56). Furthermore, they are permitted to occur following sentence-initial particles that are themselves phonologically reduced (57). Given that both the initial particle and object clitic appear to be phonologically clitic-like, we would not expect such examples to be acceptable if early Old French simply banned clitics in intonational phrase-initial position.

- (56) a. Jo, qui voldreie parler a tei, *le* **receverái**
 I, who would.like to.talk to you him will.receive
 'I, who would like to talk to you, will receive him.'
- b. Tout ainsi, fet il, *le* **ferons**
 Just so, says he, it will.do
 'We will do it just so, says he'
- (57) a. *N'i* **ad** castel, ki devant lui remaigne
 NEG-there have castle that before him stay
 'No castle could resist him.'

- b. *S'en* **volt** ostages, e vos l'en enveiez
 if-GEN want hostages, and you him-GEN send..
 'If he wants hostages, and if you send some to him ...'

Labelle thus argues that object clitics occur in a fixed position in the lower complementizer domain⁷. This position is above the landing site of the verb in V2 clauses; In V1 clauses, the verb moves to a higher complementizer head above the position of object clitics.

(58) V1: [FP V° [... Cl_{obj} [FinP V° [InflP ... V°]]]]

(59) V2: [FP (XP) [... Cl_{obj} [FinP V° [InflP ... V°]]]]

4.5 Conclusion

This section has discussed several types of relaxed V2 patterns, and the challenges that they pose for the Bottleneck Effect and Stacked Head approaches to V2. I have proposed that variation in the distribution of functional features among left-peripheral heads is essential to accounting for a variety of relaxed V2 patterns. Variation in the bundling of functional features, in concert with variation in the targets of verb movement and the number of specifiers permitted per projection, determines the "looseness" of V2 requirements in a given language. In the next chapter, I turn to the nature of the bundling operation involved, and its place within the grammar. I propose that rather than a type of variation that occurs in the lexicon, it should be understood as an operation of the narrow

⁷ For similar arguments that clitic-like items in the left periphery occupy a fixed position in a low complementizer head, see Roberts (1996) on Old English and Haegeman and Craenenbroeck (2007) on Belgian Flemish dialects.

syntax that is sensitive to PF well-formedness, and that this further allows a unified account of the effects of Feature Scattering with certain types of affixation.

Chapter 5: Coalescence

5.1 Introduction

This section considers the status of bundling operations within the architecture of the grammar, focusing in particular on Feature Scattering and Morphological Merger. While these mechanisms have been situated in the presyntactic lexicon and a postsyntactic module, respectively, I argue that both can be unified as a single operation that applies during the syntactic derivation, Coalescence. I propose that Coalescence is properly motivated and constrained by a phonological requirement. Specifically, it applies to eliminate heads that would be deficient for PF interpretation due to being either affixal or null in phonological representation. The proposal is illustrated in the analysis of V2 examples discussed in the previous chapter, as well as several cases of head movement.

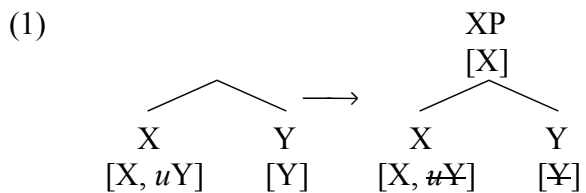
5.2 The place of bundling in the grammar

5.2.1 Feature Scattering: Bundling before syntax?

The basic claim of the Feature Scattering Hypothesis is that languages can vary in the distribution of category features across functional heads. Specifically, category features can either head their own projections or be bundled with other features. Crucially, since the featural composition of heads is determined before they enter the Numeration, this type of bundling takes place in the lexicon. Therefore, in order to account for the

generalization that features can only be bundled if they would otherwise be realized on adjacent heads, it is necessary to propose a metacondition on the sets of features that can be bundled, such as Giorgi and Pianesi's (1996) UNIVERSAL ORDERING CONSTRAINT on feature checking.

Let us contrast this with how the universal order of feature checking is accounted for within a strictly cartographic theory, in which each category feature is realized on a separate head. I will adopt the proposal based on several works (Julien 2002; Adger 2003; Di Sciullo and Isac 2008) that the order of feature checking reflects a type of category selection, by which heads select the category of their complements. In this approach, each head contains an interpretable category feature, and optionally an uninterpretable category feature. Merge is triggered in order to check uninterpretable category features present on a head, in the configuration in (1). Uninterpretable category features permit heads to select the categories of their complements. Consequently, the universal order of feature checking is encoded in the atoms of the syntactic derivation.

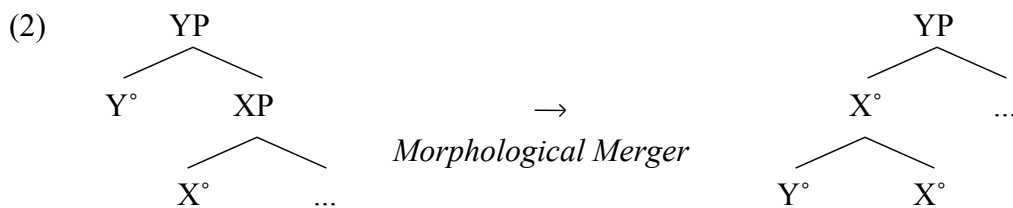


On the other hand, if some categories can be bundled onto single heads in the lexicon prior to numeration of the syntactic derivation, as one interpretation of the Feature Scattering Hypothesis might suggest, the restriction on the order of feature checking has to exist independently of lexical entries as a stipulated metacondition on bundling in the lexicon, such as the Universal Ordering Constraint. Restrictions on the order of feature

checking are thus duplicated both in the syntax and in the lexicon, a redundant specification in separate modules of the grammar.

5.2.2 Morphological Merger: Bundling after syntax?

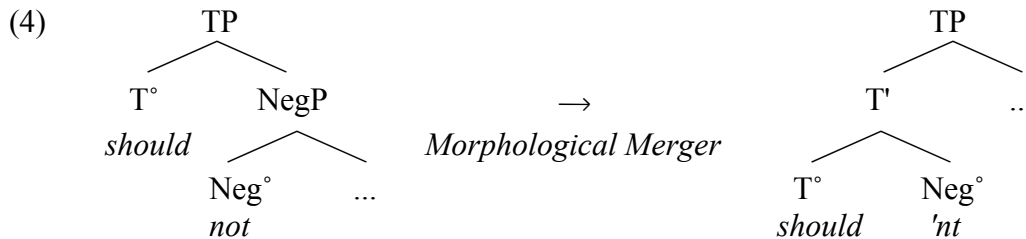
Much research on the interface between syntactic structures and their morphological exponence has proposed the necessity of an operation that converts structurally adjacent heads into a single complex head. Consider Morphological Merger (Marantz 1988; Halle and Marantz 1993), an operation proposed to account for mismatches between syntactic and phonological constituency created by affixation.



To illustrate the motivation for such an operation, consider the case of contractions in English (e.g. *should not* > *shouldn't*, *will have* > *will've*). While their syntactic distribution suggests that English negation morphemes instantiate the head of NegP (Pollock 1989), *n't* is clearly a phonological clitic of some kind, as it lacks a full vowel and cannot bear stress. In other words, while *shouldn't* does not correspond to a constituent in the syntactic representation, it does form one at some level of prosodic representation.

- (3)
- a. *Syntactic constituent structure*: [_{TP} should [_{NegP} not [...]]
 - b. *Phonological constituent structure*: (_{P_{wd}} shouldn't)

Marantz (1984, 1988) proposes that the mismatch in constituency is derived by an operation that alters the structural relations established by the narrow syntax, Morphological Merger, whose output is interpreted by the phonological grammar.

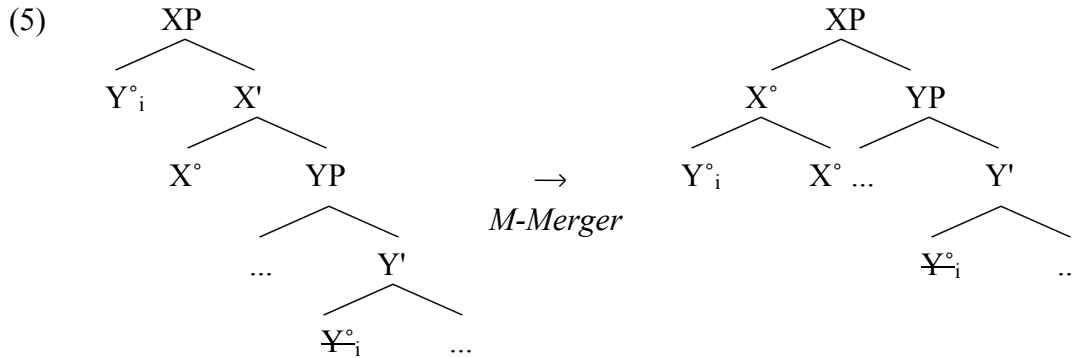


Morphological Merger is restricted to apply to heads that are adjacent at linearization (i.e. with no intervening specifier), replacing them with an affixal structure.¹ This locality restriction is referred to as *structural adjacency*. Subsequent work in the research tradition of Distributed Morphology (DM) regards Morphological Merger as a postsyntactic operation that applies on the PF branch of the grammar (Embick and Noyer 2001). Although the question is not generally directly addressed, the operation appears to be consistently driven by a need for prosodically weak elements to have a host.

Working from a somewhat different perspective, Matushansky (2006) proposes that a similar operation, *M-Merger*, is responsible for adjunction in head movement. In her proposal, traditional head movement takes place in two steps. First, a lower head is attracted to the specifier position of the highest head in the derivation. At this point, M-Merger applies to adjacent heads, combining them into a complex head. The complex head, but not its subparts, can undergo further head movement. In terms of the structural

¹ Here, we are concerned with *Local Dislocation* in the terminology of Embick and Noyer (2001), distinct from a proposed variety of Morphological Merger that does not require linear adjacency, *Lowering*, proposed to account for Affix Hopping in English.

conditions on its application and the structure that it produces, M-Merger is identical to Morphological Merger.



Matushansky argues that M-Merger should be analyzed as a morphological operation, rather than a syntactic one. The key motivation for this distinction is the fact that the movement of subparts of a complex head formed by head adjunction (a.k.a. excorporation) appears to be impossible (Baker 1988; Julien 2002). In other words, the internal structure of the complex head is opaque to later syntactic operations. Matushansky proposes that this opacity reflects the fact that M-Merged heads have undergone Spell-Out to PF. Crucially, this requires an architecture of the grammar in which syntactic and morphological operations are interleaved throughout the derivation. Later in the chapter, I will argue that the inaccessibility of subparts of the complex heads need not require an analysis of bundling as an operation that takes place after Spell-Out. Rather, this inaccessibility is accounted for if no head-internal branching structure is created when heads are bundled.

5.2.3 Bundling before and after syntax?

Thus far, we have reviewed various properties of Feature Scattering and Morphological Merger, which posit similar bundling mechanisms in the *presyntactic lexicon* and *postsyntactic morphology*, respectively. While it may turn out to be the case that similar operations can take place in various components of the grammar, as generally claimed in DM, the pursuit of a theory that minimizes the complexity of grammatical derivations should motivate a more unified analysis. Here, I will discuss structural similarities between Feature Scattering and Morphological Merger that suggest that both types of bundling can be attributed to a single operation that applies within a single component of the grammar.

First, consider the locality conditions that constrain bundling in both Feature Scattering and Morphological Merger. Under the Feature Scattering Hypothesis, category features can be bundled only if they would otherwise be realized on adjacent heads. Similarly, Morphological Merger applies to adjacent heads in an asymmetric c-command relation, with no intervening specifier. In this sense, the bundled heads permitted within the Feature Scattering Hypothesis are restricted by the same condition of structural adjacency as those proposed for Morphological Merger.

We can also note a similarity in the motivation for both types of bundling. In the case of Morphological Merger, it is clear that the bundling of adjacent heads takes place if one of them is realized as a morphological affix (a definition to be clarified in the next section), in order to satisfy a condition like the Stray Affix Filter (Lasnik 1981). While it may not be initially obvious to look at Feature Scattering in these terms, it nonetheless

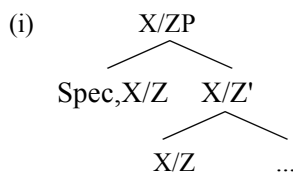
appears that category features that are bundled into featurally complex heads are those that have no independent phonological exponent. These categories either lack an audible head, or cannot attract another constituent in overt syntax, as either head movement or phrasal movement. In other words, bundled features are those that are phonologically null, another type of phonological deficiency.

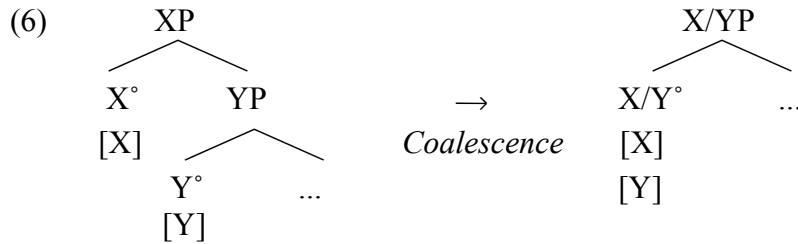
Given the identical structural constraints on bundling proposed for Feature Scattering and Morphological Merger, I argue in the remainder of the chapter that their effects can be unified as a single syntactic operation. In this proposal, all category features enter the derivation as distinct heads, but can be concatenated into complex heads as the result of a syntactic operation that I will call *Coalescence*.

5.3 Defining Coalescence

We first consider the structural definition of this bundling operation, which I will refer to as Coalescence to distinguish it from previously proposed types of bundling. I propose that Coalescence applies to structurally adjacent heads to create a single node that contains all features associated with the individual heads.²

² The output of Coalescence bears many similarities to Matching Projections in the theory of Haider (1988). Haider proposes that functional projections whose heads have no phonetic realization must be superimposed onto another projection within the same extended projection; the resulting Matching Projection carries features of both projections. My proposal differs from Haider's in when bundling is triggered: Unlike Haider's proposal, I propose that projections with null heads are licensed if they have an overt specifier, and that Coalescence also takes place if a lower head is affixal.





Departing from prior proposals on Morphological Merger and M-Merger, I do not assume the existence of internal branching structure within the newly formed head. Note that this collapses a distinction made in DM between Morphological Merger, a variant operation that alters the linear ordering between the heads (Local Dislocation), and Fusion, which collapses adjacent heads into a single terminal (Halle and Marantz 1993).³ Nonetheless, there are several motives for this move. One primary benefit of positing no internal structure in the complex head is that it directly accounts for the impossibility of excorporation from bundled heads, without having to assume that bundling triggers Spell-Out to PF, as required for Matushansky's M-Merger proposal. In Section 5.5, I show that the proposed representation avoids incompatibilities of traditional adjunction structures with considerations of Bare Phrase Structure (Chomsky 1994).

5.3.1 Dominance and Recession

Although Morphological Merger and M-Merger are assumed to take place when some head requires phonological support, no concrete mechanism or structural condition has

³ Fusion is argued to produce portmanteau forms, in which multiple morphemes are realized in a syncretic exponent.

been proposed to determine when bundling is triggered.⁴ Recall the suggestion made in the previous section that bundling uniformly depends on the presence of an element whose phonological realization is null or affixal. Here, I propose that Coalescence takes place when a category feature is 'deficient' in some way, such that it must be bundled with another feature. This is formalized as a distinction between *dominant* versus *recessive features*. I propose that all category features are specified as being either dominant or recessive, and that this distinction in a given language is determined by the criteria in (7). Although dominance and recession will be specified only on category features in this thesis, the possibility that other feature types can carry such distinctions is left open to future research. A more detailed discussion of these criteria is returned to in section 5.5.6.

- (7) A category feature [F] is *dominant* if:
- a. A head containing only [F] has a non-null exponent in its phonological representation.
- OR
- b. A head containing only [F] can trigger phrasal movement to its specifier.
- Otherwise, [F] is *recessive*.

In addition to the distinction between dominant and recessive category features, I propose a distinction between *dominant* versus *recessive heads*. While features are lexically specified as to whether they are dominant or recessive, the status of a head is determined by its featural composition. A head that contains at least one dominant feature is dominant (8), whereas a head that contains only recessive features is recessive (9). In all

⁴ Roberts (2005), discussing a proposed syntactic bundling operation Incorporation, similar to M-Merger, attributes it to an [affix] feature specified on items that must undergo bundling. In the analysis that follows, we will see that this is on the right track, with some elaboration.

following examples, dominance is indicated with subscript _D, recessiveness with subscript _R.

$$(8) \quad \begin{array}{l} X/Y^{\circ}_D \\ [X_D] \\ [Y_R] \end{array}$$

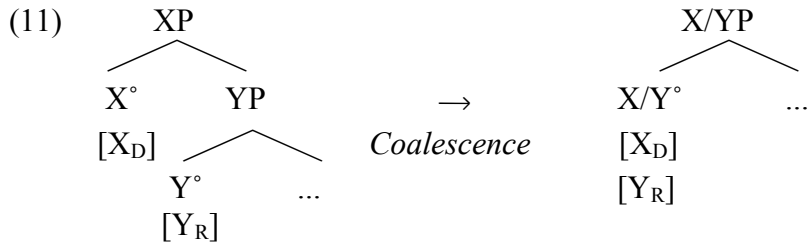
$$(9) \quad \begin{array}{l} X^{\circ}_R \\ [X_R] \end{array}$$

Following Chomsky (1993, 1995, 2000), I assume that the grammaticality of surface forms is determined not only by principles of the syntax proper, but by well-formedness requirements of the Conceptual-Intentional (LF) and Articulatory-Perceptual (PF) interfaces.⁵ I propose that recession amounts to a deficiency for interpretation at PF, and that Coalescence is motivated by a need to eliminate deficient features before syntactic structures are transferred to the PF interface. I will refer to this restriction as an inviolable Dominance Condition.

- (10) DOMINANCE CONDITION
At Spell-Out, all terminal nodes of the syntactic representation contain a dominant feature.

This is the motivation for Coalescence, which is restricted to apply in the configuration (11) where a dominant head c-commands a recessive one. Two important consequences of this restriction are that recessive heads cannot trigger Coalescence with lower adjacent heads, and pairs of dominant heads can not be bundled.

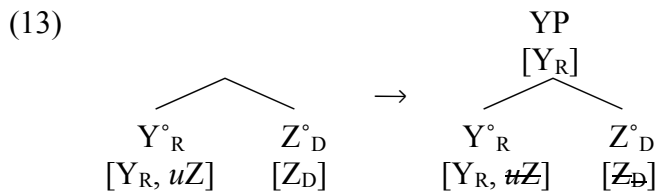
⁵ For instance, Chomsky (1993) proposes that overt movement takes place to check certain "strong" features, which would otherwise cause the derivation to crash at the PF interface. There is as of yet little consensus on whether crashes are induced by deficiencies for interpretation only at PF, only at LF, or at both interfaces (Lasnik 1999).



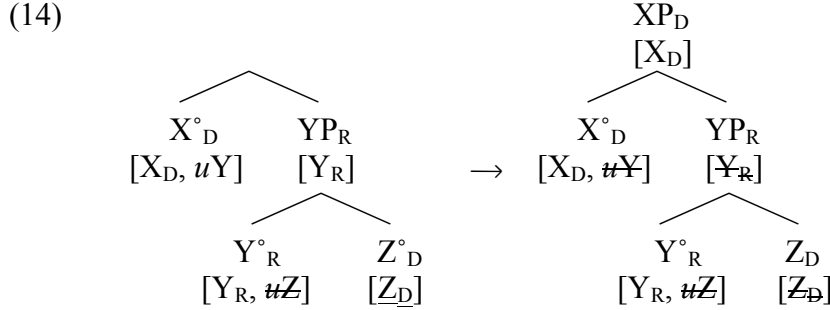
Here, I illustrate the derivation of a bundled X/Y° head. I will maintain the assumption that the universal order of projections and feature-checking is implemented through the distribution of c-selectional uninterpretable features. Crucially, I propose that the inventory of category features and their c-selectional properties are identical regardless of whether or not they are dominant.

- (12) *Numeration:*
 $\text{X} [\text{X}_\text{D}, u\text{Y}]$
 $\text{Y} [\text{Y}_\text{R}, u\text{Z}]$
 $\text{Z} [\text{Z}_\text{D}]$

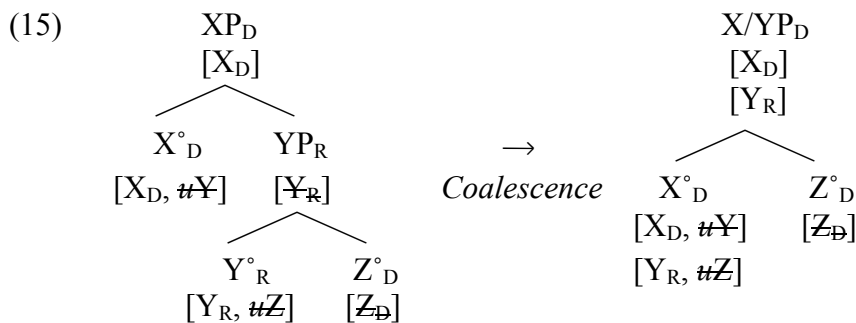
In the first step, we manipulate the Z° head and the Y° head. Z° is dominant, as it contains a dominant category feature. Since Y° contains only recessive category features, the head is recessive. The next step is identical to the derivation without a dominant/recessive distinction; Y° Merges with Z° to check the $[u\text{Z}]$ feature on Y° , and Y° projects its category feature onto the newly formed node.



We now introduce X° , whose category feature is dominant. Merge applies to check its $[uY]$ feature and creates a new phrase headed by X.

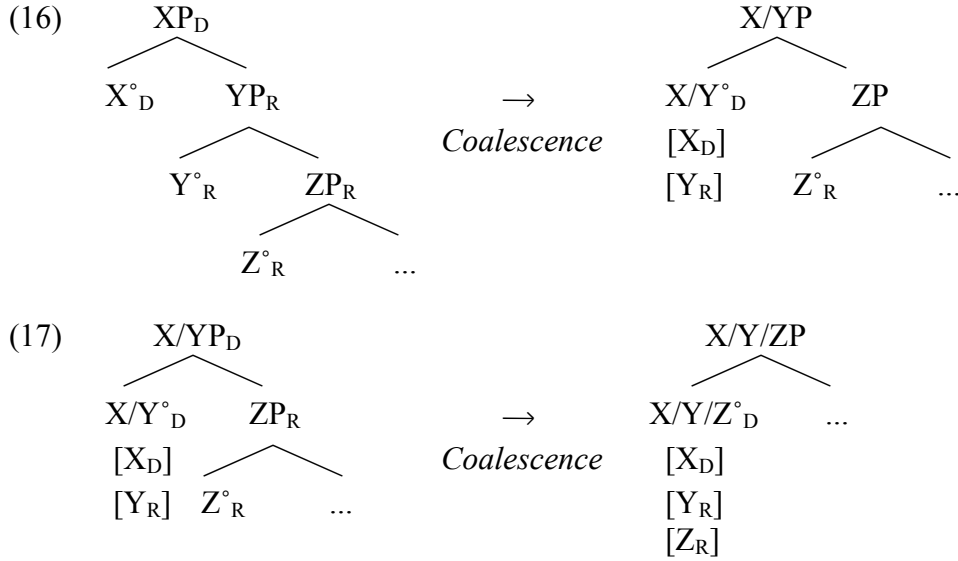


Because this step creates two heads in structural adjacency where the lower head is recessive, Coalescence creates a bundled head. Since the head formed by X and Y contains one dominant category feature ($[X_D]$), the head is dominant and no recessive heads remain in the workspace. At this point, the question arises of how the label of the highest node is to be determined, as the projecting head now contains multiple features. I will adopt the claim of Di Sciullo and Isac (2008) that all features of the projecting head project to the root node.



To generate more complex heads from more than two recessive heads, it is necessary for Coalescence to take place iteratively from the top down. At each step in (16) and (17), the topmost dominant head in the workspace undergoes Coalescence with the

immediately lower recessive head. For representational simplicity, checked features and features associated with non-head nodes will be omitted in the remainder of the chapter.

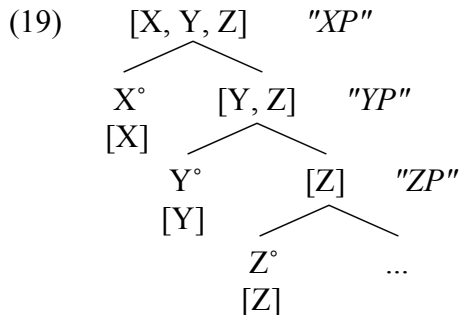


5.3.2 Labels of bundled heads

Although the possibility that phrasal nodes can have labels determined by multiple features is rarely considered within Minimalist analyses, it permits an explanation of certain properties of extended projections (van Riemsdijk 1988, 1998; Grimshaw 1991, 2000; Keine 2015). For concreteness, I adopt Keine's (2015) proposal of Category Percolation, which claims that all heads inherit the category features of all lower heads within the same extended projection.

- (18) CATEGORY PERCOLATION
 Given an extended projection $\Phi = \{\Pi_n > \Pi_{n-1} > \dots \Pi_1\}$, the categorial features of Π_m percolate to Π_{m+1} . (Keine 2015)

This is schematically represented in (19), for a structure in which the features [X], [Y], and [Z] are in the same extended projection.

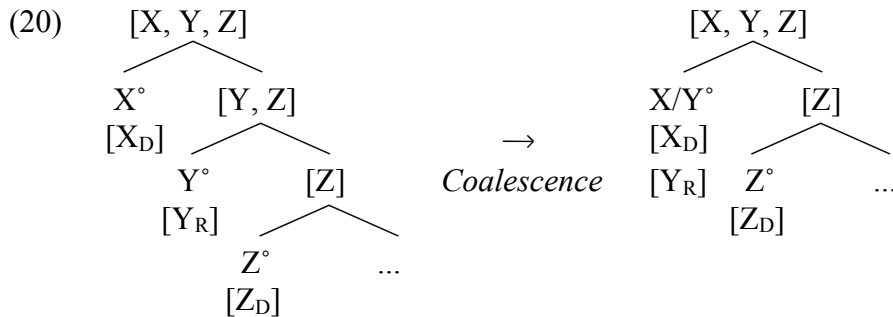


Category Percolation allows for an explanation of the generalization that items that select for a complement of a given size can also impose requirements on properties associated with lower heads within the complement constituent. For instance, Grimshaw (1991, 2000) notes that verbs like *request* can select CP complements that are inflected for subjunctive mood, a property of InflP: *we requested that he leave/?left a note*. Because category-selection is strictly local, one possible interpretation of this is that tense specifications on Infl° percolate to the higher C° head.⁶ Keine (2015) also shows that Category Percolation accounts for his observation that if a constituent is inaccessible to an agreement operation (A or A-bar), all larger constituents within the same extended projection are also inaccessible to the same type of agreement.

Crucially, if phrasal nodes contain all features of lower heads within the same extended projection, Coalescence will not create phrasal nodes whose labels are distinct from those that would exist if no bundling applied. This is shown in (20), in which the highest phrasal node contains category features [X, Y, Z]; The highest node contains the

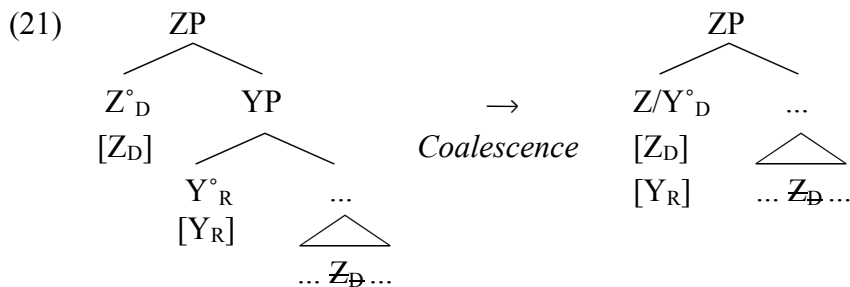
⁶ An alternative explanation, however, holds that verbs like *request* simply select for a CP headed by *that*_{subjunctive}, which in English happens to be homophonous with *that*_{indicative}, and that the subjunctive complementizer C-selects for a subjunctive InflP complement (Bruening 2009).

same features even if Coalescence applies to X° and Y° , because the set of features in "YP", $[Y, Z]$, is a subset of those contained in "XP", $[X, Y, Z]$.



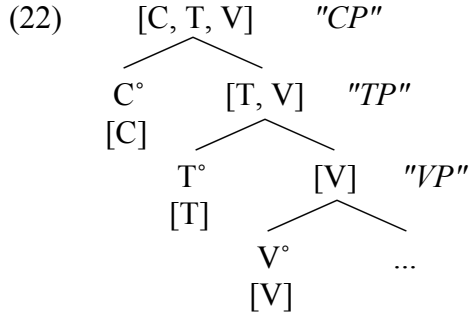
5.3.3 Coalescence and head movement

We now consider the integration of Coalescence within a theory of head movement and head adjunction. This is straightforward if we adopt Matushansky's proposal that head movement involves movement of a lower head into the specifier of its probe (2006). In contexts where the probe is a recessive head and the goal is dominant, this creates the structural environment in which Coalescence applies.

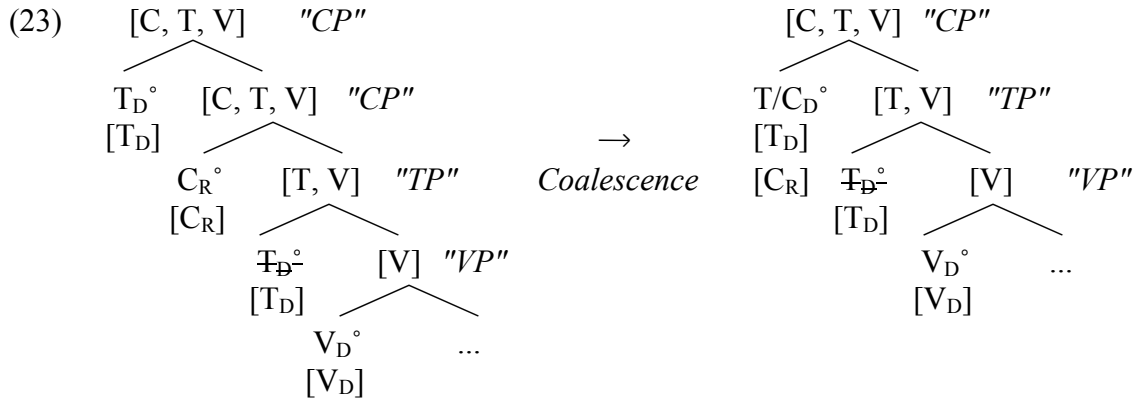


How is the label of the new root node determined after movement? Given the principle of Category Percolation, the label of a root node remains unchanged, as long as the moved object originates within the same extended projection as its attractor. To illustrate this

with a highly simplified V-T-C extended projection, the basic featural makeup of the CP projection is shown in (22), in which each phrasal node contains the features of all lower heads within the extended projection.



Note that if the T° head moves, and the labeling of the topmost phrasal node still respects Category Percolation, its label will be identical to that of the CP node prior to movement, because [T] is already contained within the CP node.

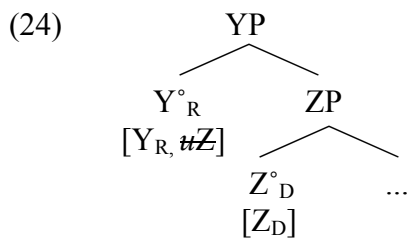


As long as head-movement takes place only within extended projections, Category Percolation ensures that neither head movement nor Coalescence can create new phrasal node labels that would not be present in the absence of either operation.

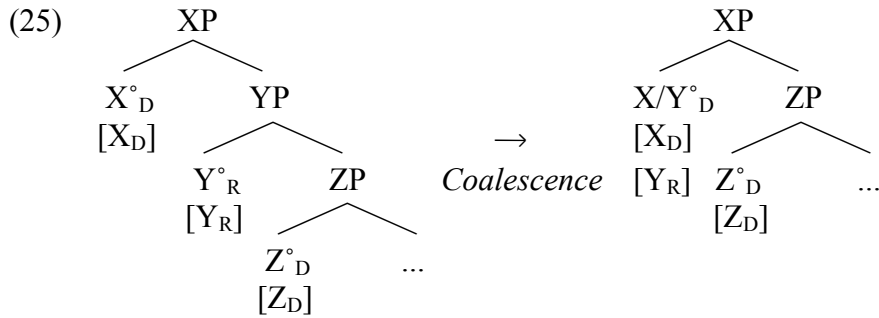
We now turn to the question of what motivates head movement. In the system developed thus far, this would have to be independent of the EPP property, given the

claim that recessive heads precisely lack this ability to attract phrasal movement. While Matushansky (2006) proposes that head movement simply takes place as a consequence of c-selection between a head and its complement, we nonetheless must appeal to an additional factor to explain why languages vary in the possible head-movement paths within extended projections. It has been proposed, however, that many instances of head-movement are apparently phonologically motivated, necessary to provide hosts for affixal functional heads (Baker 1988; Julien 2002; Harley 2004; Roberts 2005). This generalization is easily translated into the present proposal: The movement of a dominant head to the specifier of a recessive one enables the application of Coalescence, satisfying the Dominance Condition.

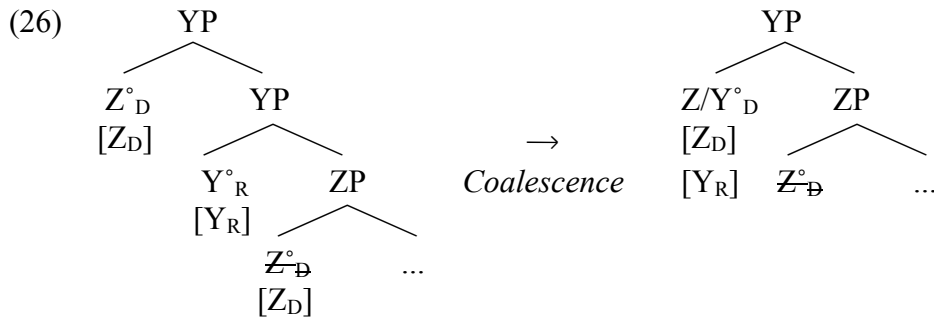
There are thus two ways for recessive heads to be eliminated during the derivation. They can be bundled via Coalescence with an Externally Merged dominant head, as discussed in previous sections, or they can be bundled with a dominant head that arrives via Internal Merge. The two options are illustrated below for a derivation in which a recessive head Y°_R has been Merged, in a structure like (24).



First, the structural adjacency necessary for Coalescence can be achieved if a dominant head is Externally Merged with YP.



Alternatively, suppose that Y°_R can trigger the movement of a lower, dominant head Z°_D to its specifier. Again, this provides the structural adjacency necessary for $[Y_R]$ to be bundled into a dominant head.



As we will see in the remainder of the chapter, languages often vary in the strategy used in the elimination of a given recessive head. While we cannot yet provide a deeper explanation for this variation, I propose that some recessive heads are *strong*, simply able to compel the head-movement of a dominant item (Julien 2002; Roberts 2005). Recessive heads that lack this property will only be bundled after another item has been Externally Merged.

I will leave it an open question as to whether dominant heads can also have a strong property that triggers head-movement. Matushansky (2006) suggests that this possibility

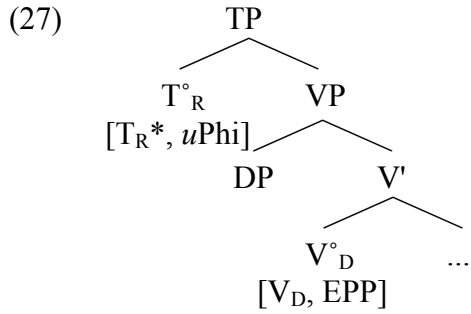
may account for cases of "long head movement" where head movement appears to skip over a potential intervener [$X_i^\circ \dots [Y^\circ \dots [X_i^\circ \dots]]$] (Rivero 1991; Borsley et al. 1996; Roberts 2010 and references therein), noting that the structure could be derived by successive cyclic movement of X° to Spec, YP but with no adjunction, allowing X° to continue moving. On the other hand, surface syntactic structures containing a configuration [$_{YP} X_D^\circ [Y_D^\circ [\dots X_D^\circ \dots]]$], where Y° clearly attracts a head X° and both heads are dominant (non-affixal) appear to be rare.⁷ This may indicate a deeper connection between strength and recessive features. This question, however, must be left to future empirical investigation.

To illustrate this system, head movement and head adjunction in Romance-style V-to-T head movement is accounted for as follows. I assume that T° is externally Merged upon the completion of the VP, which includes a dominant V° head and a subject in Spec, VP. In the first step, a recessive T° head with a probe for phi-features (i.e. person, number) is Merged.

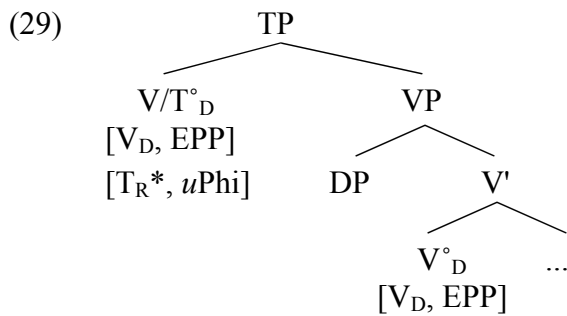
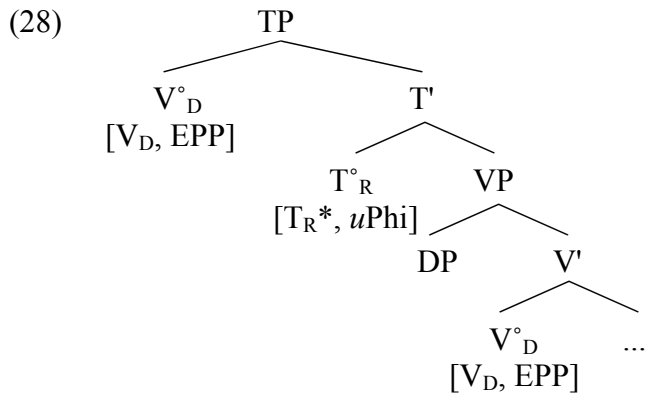
⁷ Vicente (2007) discusses a number of apparent cases of head movement with no adjunction. One possible case of this is the participle fronting construction observed in Slavic languages, found in a compound tense formed by a *be* auxiliary and a participle verb (Lema and Rivero 1989; Wilder and Ćavar 1994; Bošković 1995; Embick and Izvorski 1995; Migdalski 2006, a.o.). In clauses with an overt subject, the auxiliary precedes the participle. If no subject is present, however, the participle precedes the auxiliary, as shown in Migdalski's (2006) Bulgarian examples.

- (i) a. Az sŭm čel kniga-ta
 I be.AUX.PRES.1SG read.PART.F.SG book-the
- b. Čel sŭm kniga-ta
 read.PART.F.SG be.AUX.PRES.1SG book-the
 'I have read the book'

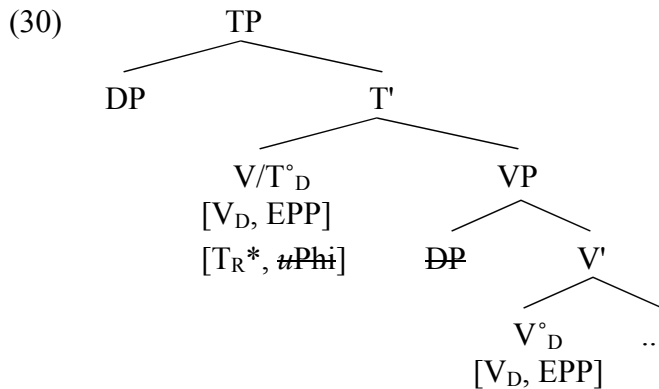
Given the strict complementary distribution between overt subjects and fronted participles, and that participles cannot raise above TP (Bošković 1995), it appears that subjects and fronted participles occupy the same position in TP (Migdalski 2006). Furthermore, because strict linear adjacency is required between fronted participles and the auxiliary (i.e.) nothing is pied-piped, participle fronting can then potentially be analyzed as a case of head-movement of V° to Spec, TP (Vicente 2007; Harizanov 2016).



Because the recessive head additionally has a strong feature (indicated by the asterisk), a copy of V°_D is Merged in Spec, TP (28). Because the dominant V°_D head now c-commands recessive T°_R , Coalescence applies to create a complex V/T° head (29).

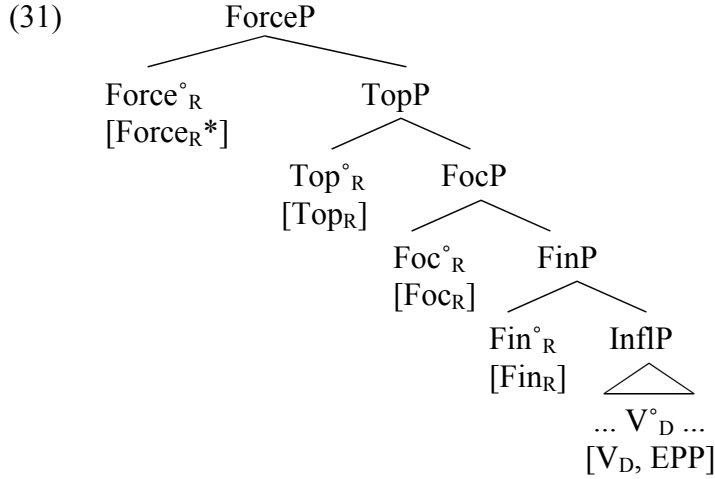


Here, I claim the bundling of V° and T° into a single head V/T° enables the $[u\text{Phi}]$ probe on $[T]$ to inherit the use of the EPP feature associated with $[V_D]$, thus triggering movement of the subject to Spec, TP.

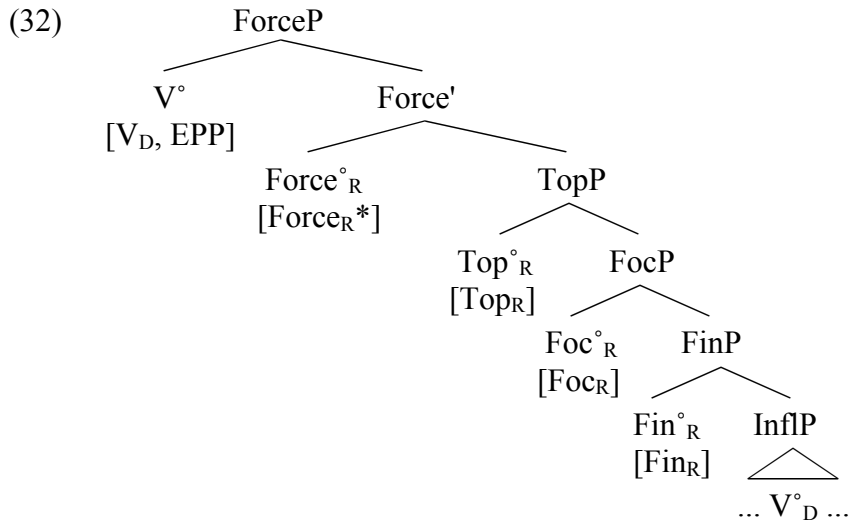


5.3.4 Coalescence by Internal or External Merge

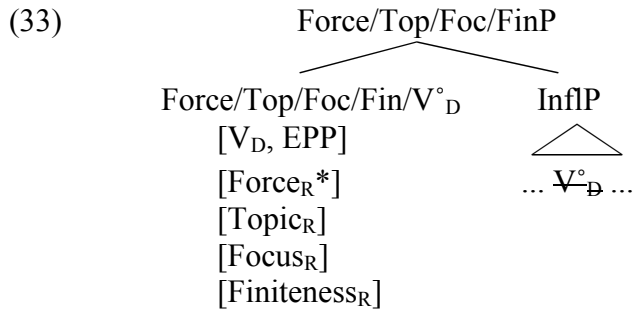
Languages do appear to vary in whether the elimination of recessive heads is fed by External Merge or Internal Merge. As an initial illustration, consider the role of head movement in V2 patterns. Since V2 crucially requires verb-movement to a left-peripheral position, the idealized strict V2 restriction is analyzed as follows. Suppose that all left-peripheral category features (including Force) are recessive, and a recessive head corresponding to each feature is Merged into the derivation.



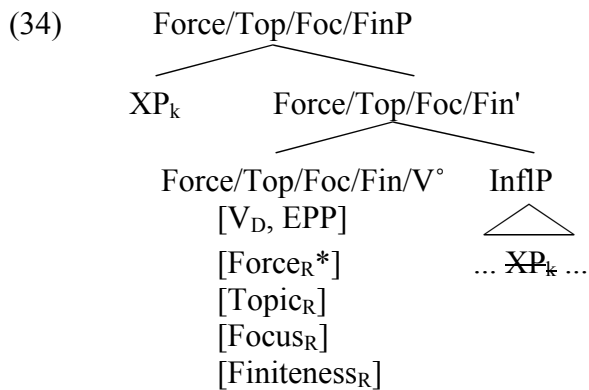
If the derivation were to end here, the structure would not be interpretable at PF, as it contains recessive heads. However, the recessive Force°_R head in this case is strong, triggering the movement of V°_D to Spec, ForceP.



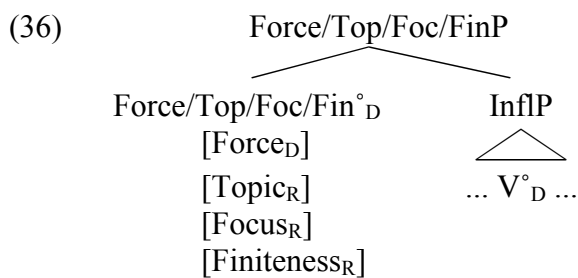
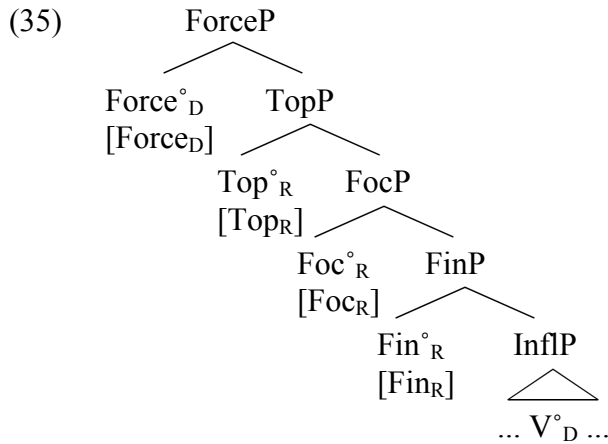
This produces the environment for Coalescence, which applies iteratively until all recessive features are bundled into the dominant head.



If Coalescence permits probes associated with recessive category features to use EPP features associated with the dominant head, this enables an explanation for why in V2 structures an additional XP must precede the verb. In this case, a probe associated with one of the left-peripheral features uses the verb's EPP property to trigger the movement of the object that it agrees with.



Suppose, however, that rather than introducing a strong recessive Force° head, a dominant Force° head is Externally Merged (35). This allows Coalescence to bundle all left-peripheral features into a single head, without the need for verb movement out of InflP (36).



The availability of both of these options accounts for 'asymmetric' V2 patterns like the one in German, in which embedded clauses with an overt complementizer and those with V2 are in complementary distribution.

- (37)
- a. Er sagte [dass er morgen komme]
He said that he tomorrow comes
 - b. Er sagte [er komme morgen]
He said he comes tomorrow
'He said that he is coming tomorrow.'
 - c. *Er sagte [dass er komme morgen]
He said that he comes tomorrow
- (Holmberg 2015 after den Besten 1983)

The alternation is accounted for if the overt complementizer is the phonological realization of a dominant Force° head directly Merged in the left periphery that does not have an EPP property. Verb movement into the left periphery does not take place simply

because there is no strong head to trigger it. In clauses without an overt complementizer, Force° is recessive and strong when Merged, and verb movement takes place to permit the application of Coalescence.

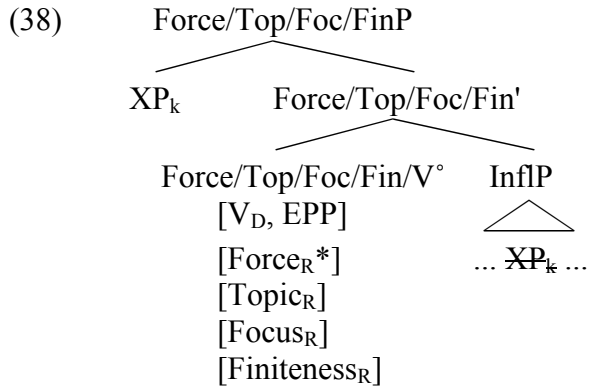
5.4 Coalescence case studies

This section presents several studies of variation in the realization of functional projections of the inflectional and complementizer domains. I first return to the typology of relaxed V2 cases discussed in the previous chapter, and show that V2 requirements are increasingly relaxed as the number of dominant left-peripheral heads increases. We then consider two instances in which languages permit a given head to have both dominant and recessive variants, the Kashmiri V2/V3 alternation and the realization of sentential negation in English. Lastly, within-language variation in the realization of the Catalan past perfect and the instantiation of the Wolof left periphery are attributed to differences in the distribution of dominant features and strong recessive features across functional heads.

5.4.1 Relaxed V2

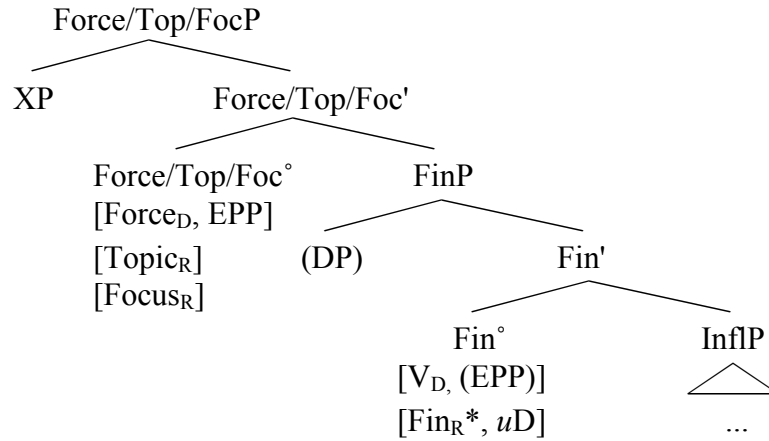
At this point, we can revisit the analysis of relaxed V2 proposed in chapter 4 within the framework of Coalescence. Recall that an idealized, strict V2 arises in a situation where all left-peripheral features are bundled into a single head that attracts one specifier. The bundling of all left-peripheral categories on one head takes place if all left-peripheral

category features are recessive, and verb movement is compelled by a strong, recessive Force° head.



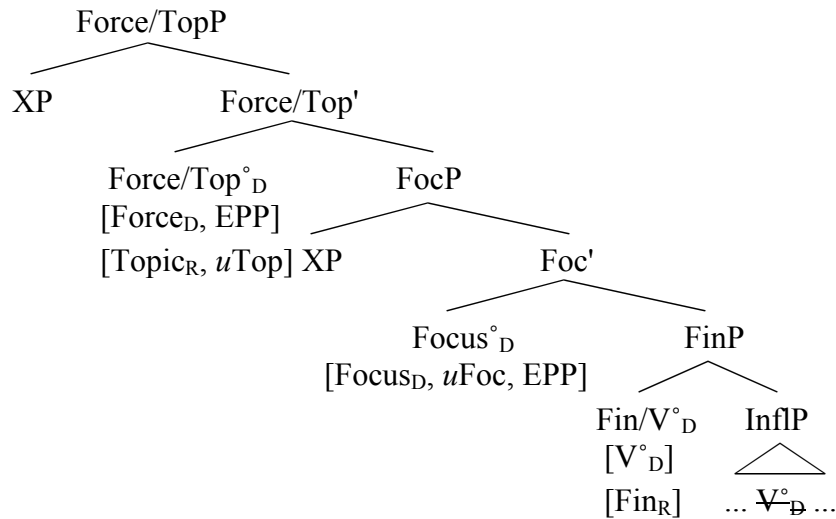
As the number of dominant category features increases, fewer applications of Coalescence take place, leaving a greater number of independent heads in the left periphery. We first consider languages like Old English and Cimbrian, which permit preverbal subjects to co-occur with one other phrase: [XP Subject V ...]. Because preverbal subjects occupy a low left-peripheral position, it appears that Fin° is the highest head that attracts the verb. The pattern is thus accounted for if [Finiteness_R*] is strong, attracting verb movement. Furthermore, Force° is dominant when first Merged, permitting all higher left-peripheral features to be bundled into a single head.

(39) *Old English/Cimbrian V3*



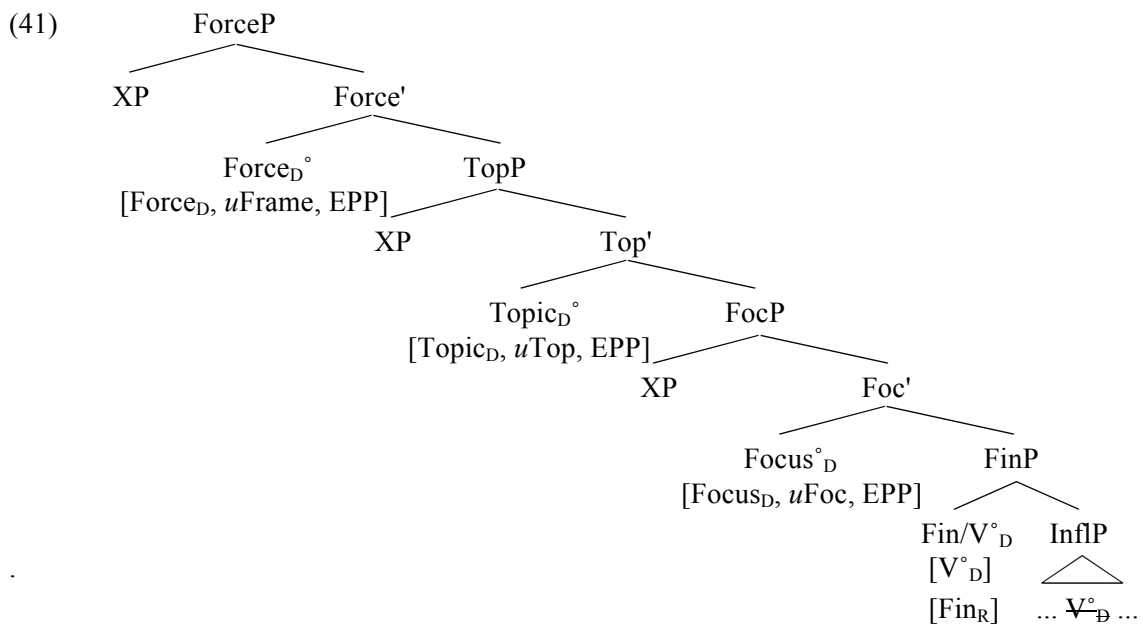
The Ingush pattern in which topics and foci can simultaneously precede the verb crucially requires the [Topic] and [Focus] features to be realized on separate dominant heads. This occurs if [Focus_D] is dominant, as it prevents Coalescence from applying between the Topic° and Focus° heads, and if a [*u*Top] probe is associated with a dominant head above FocusP.

(40) *Ingush V3*



There is an alternative derivation of this pattern in which Focus[°] is Merged as a strong recessive head that attracts the verb. In the absence of a clear diagnostic to favor one derivation over the other, however, I will simply assume a relatively uniform verb-movement path across V2 structures in which the verb moves only as far as FinP.

The presence of an additional dominant feature on [Topic_D] permits the generation of V4 patterns of the sort attested in Old Sicilian and Old Italian.



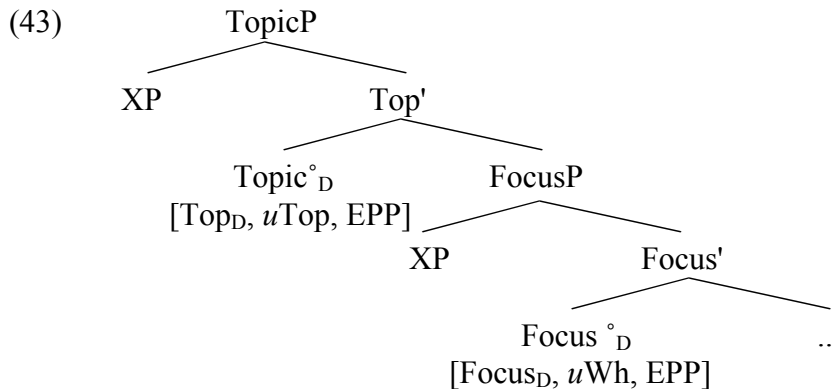
5.4.2 Kashmiri V2/V3

Further support for the distinction between dominant and recessive heads is found in individual languages that contain both dominant and recessive variants of the same category feature. Here, I argue that the Kashmiri V2/V3 alternation reflects precisely this possibility.

Recall that in Kashmiri V2, phrases in first positions are typically interpreted as foci, not topics. However, if a *wh*-phrase is fronted, a topic is optionally permitted in first position. Under the assumption that foci and *wh*-phrases occupy the same position in the left periphery, we can propose that Kashmiri allows the Focus head to contain either a dominant or recessive category feature. Specifically, the category feature [Focus] is dominant only if it has a [*uWh*] probe, otherwise, it is recessive. In contrast, languages like Ingush, where V3 is available in both declaratives and interrogatives, [Focus] is always dominant regardless of its other properties.

Consider how the derivation proceeds if the Numeration contains the dominant [*uWh*] Focus head. Since both Topic° and Focus° are dominant as Merged, Coalescence can not apply, leaving [Topic] and [Focus] realized in separate projections. Because both heads contain an EPP feature, this creates the V3 word order in interrogative clauses.

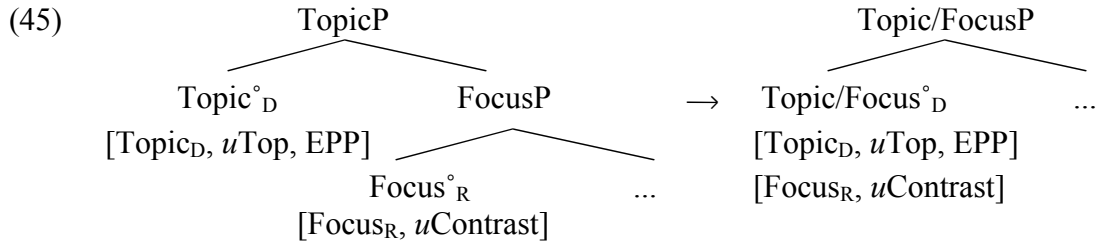
- (42) Numeration for V3
 [Focus_R°, *uWh*]
 [Topic_D, *uTop*, EPP]



On the other hand, suppose that a recessive Focus head with a [*uContrast*] probe is selected instead. Coalescence now applies once the dominant Topic° head is Merged.

This bundles the [Topic] and [Focus] features into a single projection, leaving only one position available for movement.

- (44) Numeration for V2
 [Focus_R, *u*Contrast]
 [Topic_D, *u*Top, EPP]



An important question that arises in this analysis, however, is why only a focused constituent can be attracted to first position, despite the fact that [Topic_D] is associated with an EPP feature. There does not as of yet appear to be an elegant solution to the problem. However, one possible way to account for this is to propose that multiple probes within a head differ in the priority with which they can be associated with the EPP (Lahne 2010; Georgi and Müller 2010; Manetta 2011; Martinovic 2015). In the case of Kashmiri, the checking of [*u*Contrast] takes precedence over the checking of [*u*Top].

Nonetheless, the Coalescence analysis of the Kashmiri V2/V3 alternation allows for an explanation of the intuition that the realization of the high topic position *depends* on the presence of a *wh*-phrase. Capturing this particular relationship between the availability of topicalization and *wh*-movement in the Bottleneck Effect or Stacked Head approaches requires stipulation about when base-generation is possible, or possible combinations of features within the C head, respectively. On the other hand, this type of interaction is predicted in the present theory by the possible distribution of dominance and recession.

5.4.3 English negative contraction

English negation is another case where a head has both dominant and recessive varieties. English has a 'full' negative morpheme (orthographic *not*) and an affixal form (orthographic *n't*). In many contexts, the two forms appear to be in free variation, with the affixal form apparently derived by optional phonological reduction.

- (46) a. Michael did not make a mistake.
b. Michael didn't make a mistake.

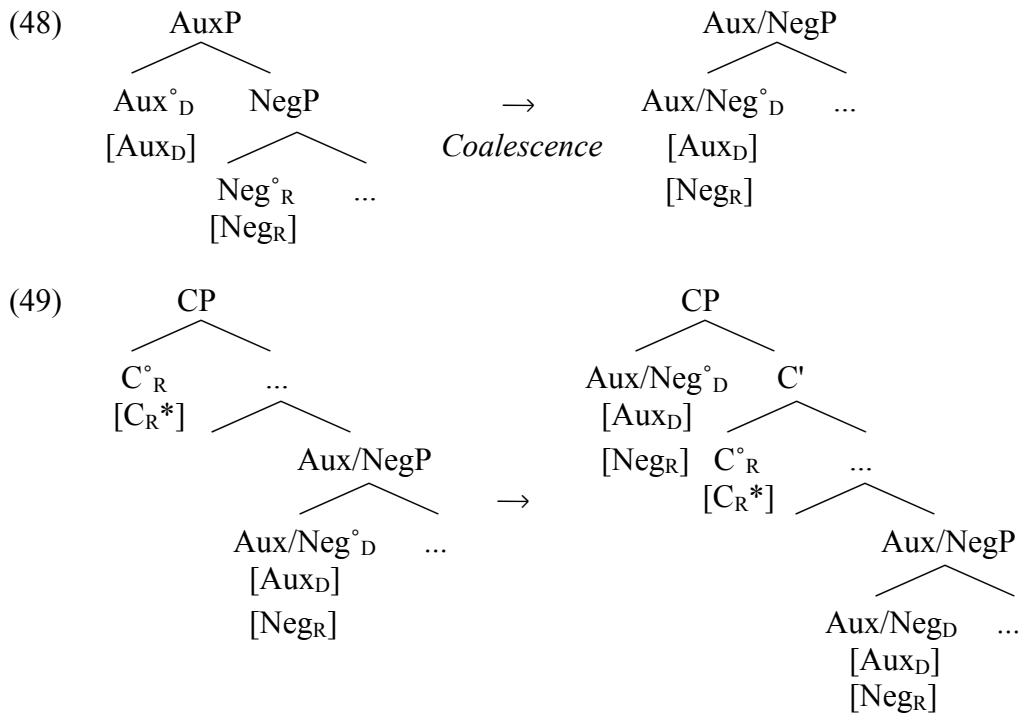
As noted by Zwicky and Pullum (1983) however, the distribution of the two forms is constrained by syntactic factors, and the use of a particular form is obligatory in certain contexts. For example, consider the case of negative inversion. In English, auxiliary verbs raise to a pre-subject position in interrogative contexts. If the negation morpheme raises along with the auxiliary, use of the affixal form is obligatory (47a). This gives the effect of contraction feeding raising. On the hand, only the full form is possible if the negative remains in a post-subject position (47b). Under an approach where the affixal form is derived by an operation that applies after the syntactic derivation, the obligatory use of the affixal negative when it raises with the auxiliary is perhaps unexpected.

- (47) a. Didn't Lindsay host the gala? (cf. *Did not Lindsay host the gala?)
b. Did Lindsay not host the gala? (cf. *Did Lindsay n't host the gala?)

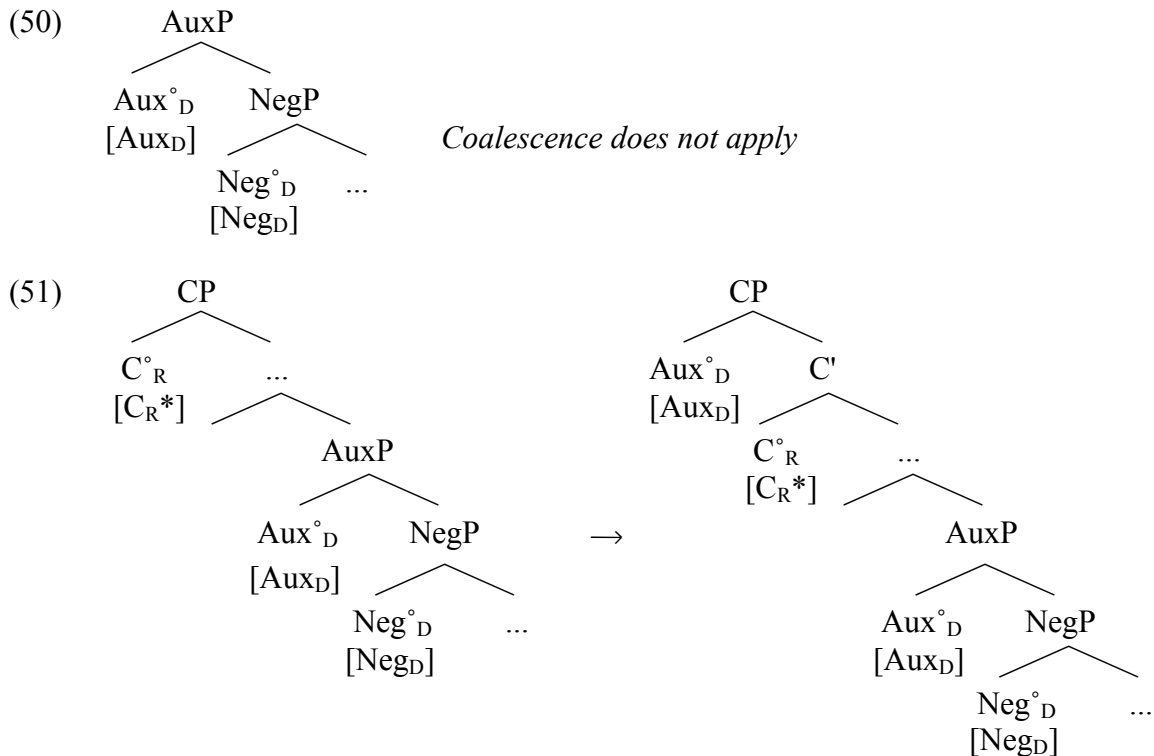
Matushansky (2006) makes the key observation that the different distribution of the full and affixal forms is explained if the affixal form is derived by a cliticization process that takes place during the derivation. Specifically, she proposes that affixation by M-

Merger optionally applies to Neg° and Aux° as soon as the items are merged into the derivation, and that M-Merged Neg° corresponds to *n't*. If Aux° and Neg° are M-Merged prior to movement, both negation and the auxiliary undergo movement together when Aux° is attracted to C° . If M-Merger does not apply, the auxiliary raises alone.

This analysis has a straightforward equivalent in terms of Coalescence. The different distribution of the full and affixal forms is accounted for if the full form enters the derivation with a dominant category feature $[\text{Neg}_D]$, while the affixal form begins with a recessive feature $[\text{Neg}_R]$. Let us assume that an Auxiliary head then merges with NegP . The recessive affixal head must undergo Coalescence with the auxiliary before the auxiliary raises (48). Thus, when Aux is subsequently attracted to an interrogative complementizer position (simplified here as CP), the affixal negative must be copied as well (49). I will assume that the lower copy is left unpronounced at PF.



On the other hand, the dominant Neg° head that corresponds to the full form does not undergo Coalescence when the auxiliary is Merged. In inversion contexts, the interrogative complementizer head thus attracts only Aux_D° , leaving Neg_D° in its first-Merged position (51).



It should be noted that there are some additional constraints on the distribution of contracted negation. Specifically, negative contraction is not possible after non-verbal elements, non-finite verbs or auxiliaries, as shown in the following examples (based on Zwicky and Pullum's ex. 11, 14).

- (52)
- a. Buster doesn't try {*n't/not} to pay attention; he just can't help it.
 - b. For him {*n't/not} to use an alliance-approved assistant is the last straw.
 - c. Should you have {*n't/not} held the door for the man in the pricy suit?

Rather than a constraint on the possible clitic hosts for *n't*, the unavailability of *n't* in the above examples indicates that contraction is sensitive to the contrast between sentential negation and constituent negation, (Klima 1964). Among other differences in their syntactic distribution, sentential negation occurs only immediately following a tensed auxiliary or *do*, whereas constituent negation immediately precedes negated phrases. From this, we can conclude that sentential [Neg] is always recessive, whereas constituent [Neg] is always dominant.

It is important to observe that negative contraction differs in crucial ways from the phenomena known as Auxiliary Reduction (Zwicky 1970; Anderson 2008), which affects English auxiliary forms *is*, *has*, *would*, *had*, *have*, *am*, *are*, and *will*. First, reduced auxiliaries do not form syntactic units with their hosts in the manner of contracted negation. For instance, reduced auxiliaries do not pattern as if they raise with elements that they are affixed to.

- (53) a. Who's going to Phoenix?
 b. *Who's do you think ~~who's~~ going to Phoenix?

Furthermore, whereas contracted negation only follows tensed auxiliaries, reduced auxiliaries *is*, *has*, *would*, *had*, are generally unrestricted by the category or phrase structure status of the items that they precede: *no touching's allowed by the guards / the role that he auditioned for's been given to someone else*.⁸ Given that Coalescence has been defined as a process that applies between heads, these cases can not be analyzed as the result of Coalescence.

⁸ The reduced forms of *will*, *have*, *are*, and *am* are substantially more restricted, appearing only after pronouns and *wh*-words.

Lastly, although reduced auxiliaries can follow contracted negation (e.g. *shouldn't've*), contracted negation cannot follow reduced auxiliaries (**he'sn't/he isn't*). The fact that auxiliary reduction appears to bleed contracted negation suggests that the process does not take place during the syntactic derivation, but rather applies after syntactic structure has been transferred to the PF branch. Another important implication of this observation is that an affixal representation of a morpheme in surface phonology does not unambiguously indicate that its corresponding syntactic feature is recessive, as defined in this thesis.

5.4.4 The Catalan perfect

In the previous section, I argued that recessive heads can be eliminated either by External Merge or Internal Merge of a dominant item, and that this accounts for the 'asymmetric' V2 alternation where overt complementizers and V2 are in complementary distribution. Here, I present another case in which a language permits variation in whether recessive heads are eliminated by External Merge or movement: the realization of the past perfect in Catalan.

As described by Oltra-Massuet (2013), some dialects of Catalan express the past perfect either in a synthetic form, in which the subject and tense and aspect morphemes are realized as suffixes to a lexical verb, and an analytic form, in which subject agreement is realized on an auxiliary verb, *anar* 'to go'.⁹

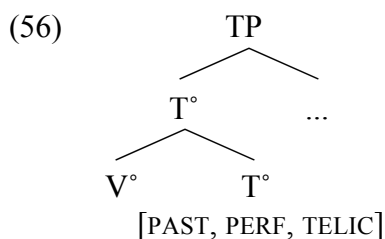
⁹ Interestingly, Catalan differs from other Romance languages in using *anar* 'to go' as an auxiliary for past tense, rather than a form of 'to have.'

(54) purific-ares
purify-2SG.PST.PERF
'you purified'

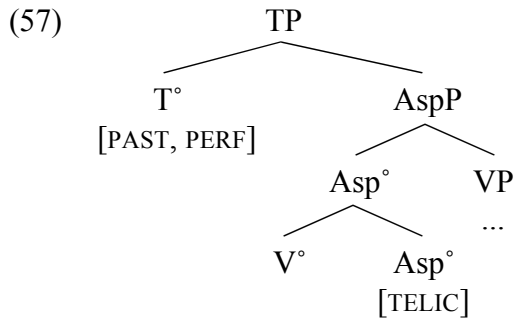
(55) vas purificar
AUX.2SG purify
'you purified'

An unusual and important property about the alternation is that there is no apparent semantic difference between the two ways of forming the past perfect. In the words of Oltra-Massuet, "these forms do not express different lexical or truth-conditional semantics, nor do they show different morpho-syntactic functions, and individual speakers use some subset of them without distinction." However, it is clarified that both within and across speakers, variation depends on the lexical items and conjugations used; speakers do not probabilistically use both forms for any given verb and conjugation pair.

Oltra-Massuet proposes that the form of the syncretic past perfect is derived by head-movement of the verb through Aspect° and Tense° heads. Abstracting away from the distinction between V and little *v*, not relevant to the present analysis, she proposes the following structures. In synthetic forms like *purificares*, the verb moves to a Tense° head that carries specifications for past tense, perfective aspect, and telicity.

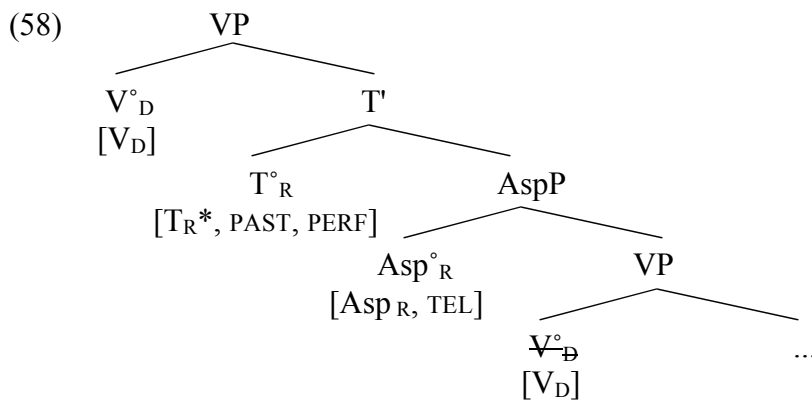


In the analytic past perfect, Oltra-Massuet proposes that [+PAST, +PERF] are associated with T°, while the [+TELIC] feature is contained in a separate Aspect° head. Furthermore, verb movement stops at Aspect°, and the V-Asp° head is pronounced as the participle.

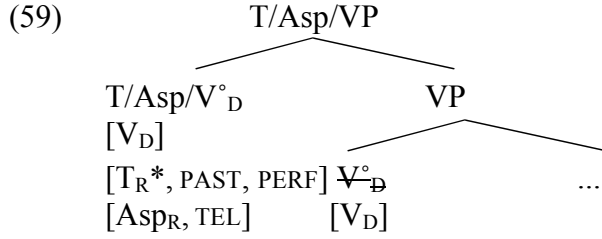


However, because T° is obligatorily a suffix, it is proposed that the realization of this structure triggers *go*-support, the insertion of an *anar* auxiliary verb that supports the inflection of both tense and subjecthood.

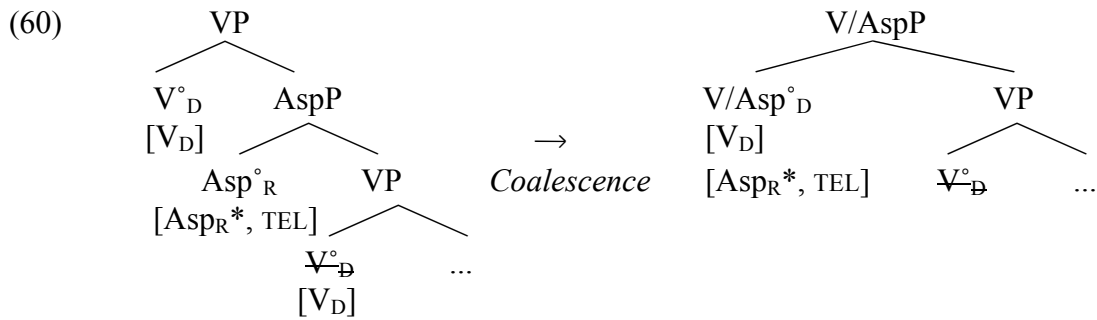
There is a clear parallel between the Catalan pattern and the approach developed here for V2 and overt complementizer alternations. Again, the distinction between the synthetic and analytic forms does not result from a difference in the distribution of dominance; It has to be the case that T° and Asp° are always recessive, since their phonological exponents are realized as affixes. However, the target of verb movement differs. I propose that in the derivation for the syncretic form, V° raises to T° , and is then bundled with the recessive T° and Asp° heads.¹⁰



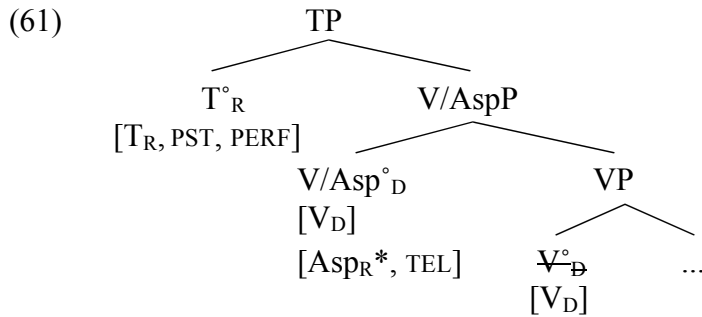
¹⁰ We do not exclude the possibility that V° moves first through $AspP$ before raising to TP . However, this does not bear crucially for the purposes of this discussion, since the two possible derivations will result in the same bundled head structure.



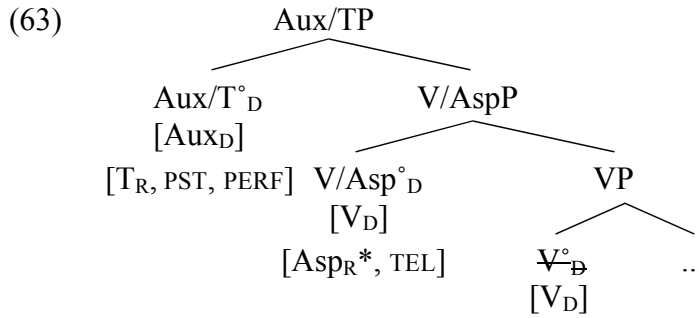
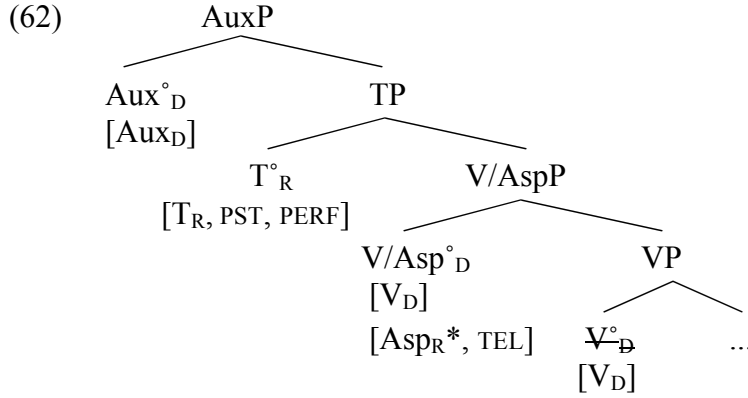
Suppose that in these dialects of Catalan, it is also possible for verb movement to proceed only as far as Spec, AspP. At this point, Coalescence bundles V° and Asp° .



At the next step of this derivation, the recessive T°_R head is Merged. However, because T°_R , the recessive head can only be eliminated if a dominant item is externally Merged.



I propose that the need to eliminate the recessive T° head can be satisfied in Catalan via External Merge of the dominant auxiliary head that corresponds to *anar*. I will remain agnostic as to the categorial status of the auxiliary, labeling it simply as [Aux]. After the auxiliary enters the derivation, Coalescence bundles Aux°_D and T°_R .



Catalan thus permits two strategies for eliminating the recessive T°_R head: It can be eliminated either by being bundled with a dominant verb that moves to its specifier, or by being bundled with a dominant auxiliary directly merged above it.

5.4.5 Wolof C/T° bundling

Lastly, we consider a case of word order variation in Wolof, in which clause types differ in the amount of functional structure permitted in the C-T domain. Again, we will see that the distinction can be accounted for as variation in the distribution of dominant features.

Wolof requires the presence of a complementizer element in all finite clauses, whose form varies according to clause type (Dunigan 1994). Martinović (2015, 2016) notes that

the language appears to have two clause types that differ in the amount of functional structure that they instantiate. In particular, they differ with respect to the placement of verbs relative to the complementizer element. In one type of clause termed *V-raising*, the verb occurs immediately following the subject, and is immediately followed by the complementizer suffix. V-raising is the pattern of neutral declaratives (affirmative and negative), and sentences characterized as verb or predicate focus.¹¹

- (64) Xale yi lekk-oon-**na**-ñu ceeb bi
 child DEF.PL eat- PERF-C-3PL.SUB cake DEF.SG
 'the children ate the rice (a long time ago).'
- (Martinović 2015)

This pattern contrasts with *wh*-questions and exhaustive identification focus, which show what Martinović terms the *N-raising* pattern. In these sentences, the complementizer element is realized following a clause-initial *wh*-word or focused item. When a non-subject has been extracted, subjects obligatorily appear after the complementizer. Main verbs follow the subject, and do not show a complementizer suffix.

- (65) Lan **la** xale yi lekk
 what CWH child DEF.PL ate
 'What did the children eat?'
- (Martinović 2016)

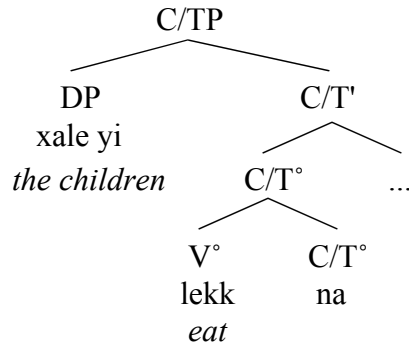
- (66) Musaa **la** xale yi gis
 Moussa CWH child DEF.PL see
 'It is the child that Moussa saw.'
- (Martinović 2015)

On the basis of these differences, Martinović proposes that V-raising structures involve a bundled complementizer and tense head C/T° , while in N-raising structures, C° and T° are realized as separate positions. Intriguingly, the pattern bears some similarities to the

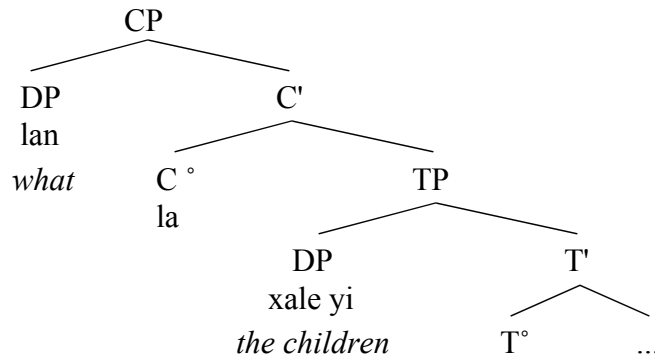
¹¹ Predicate focus structures differ from neutral declaratives by requiring a *do*-auxiliary to precede the complementizer suffix, rather than the main verb. For the purposes of this discussion, I will restrict attention to neutral declaratives.

Kashmiri V2/V3 alternation. Informally stated, the presence of a *wh*-phrase in the left periphery of Kashmiri requires the realization of a higher topic position. In Wolof, however, foci and *wh*-phrases appear to license a lower subject or tense position.

(67) *V-raising: C° and T° are bundled*

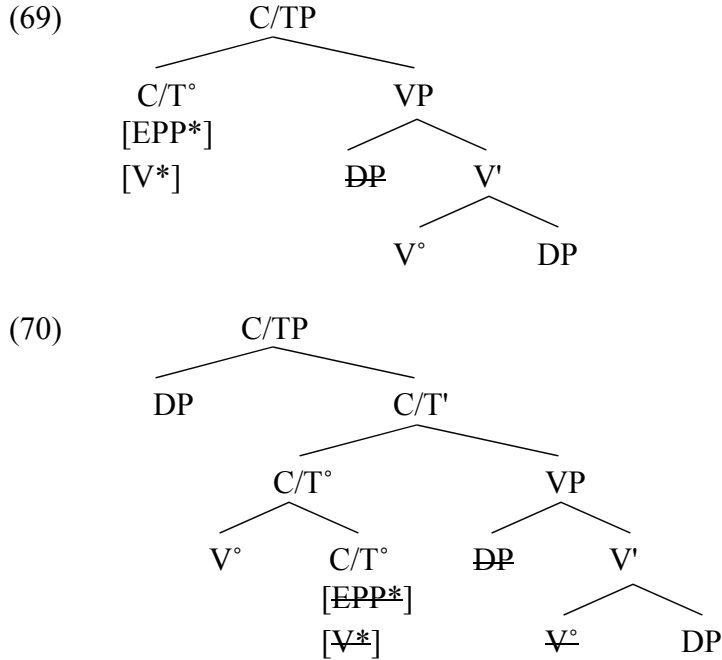


(68) *N-raising: C° and T° are distinct*

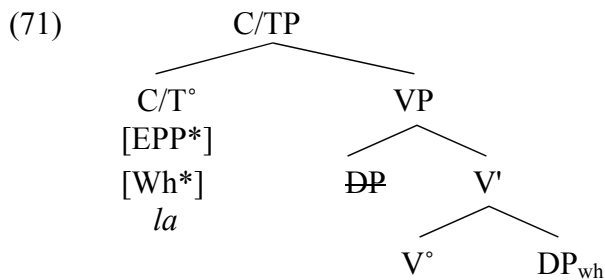


Martinović takes a distinct approach to bundling, which proposes that functional features of the complementizer and tense domains enter the derivation in a single head, in which probes associated with the different features are hierarchically arranged, not unlike the Stacked Head approach of Manetta and Lahne. However, this head can be compelled to split if its probes cannot be satisfied - a possibility that explains the N-raising pattern. In essence, her analysis is as follows: In V-raising sentences, the bundled head enters the derivation with two probes, one that triggers movement of the subject [EPP*] and one

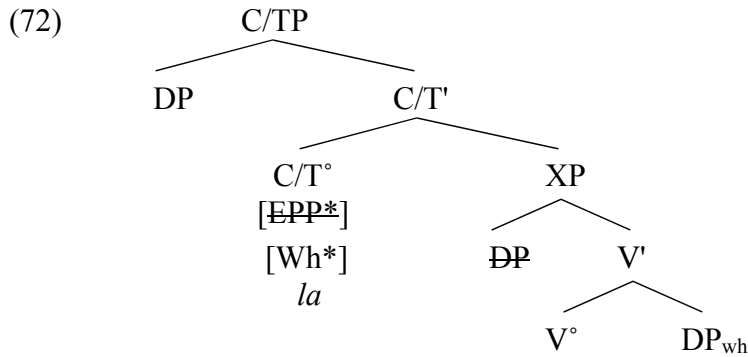
that triggers verb movement [V*]. In this case, both head movement and phrasal movement are able to proceed, creating the final representation in (70).¹²



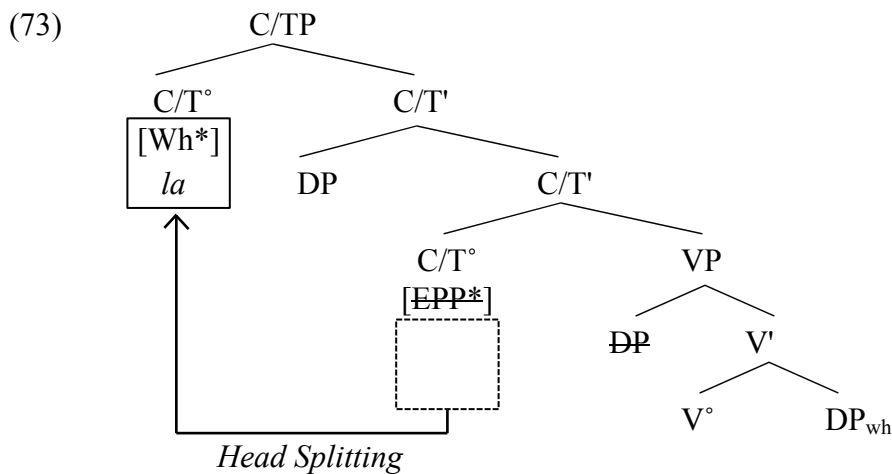
In N-raising structures, the C/T° head includes both the subject probe [EPP*] and an additional probe for a *wh*-phrase or exhaustive focus. In the first step, the [EPP*] probe compels the subject to move to its specifier, as in V-raising (72).



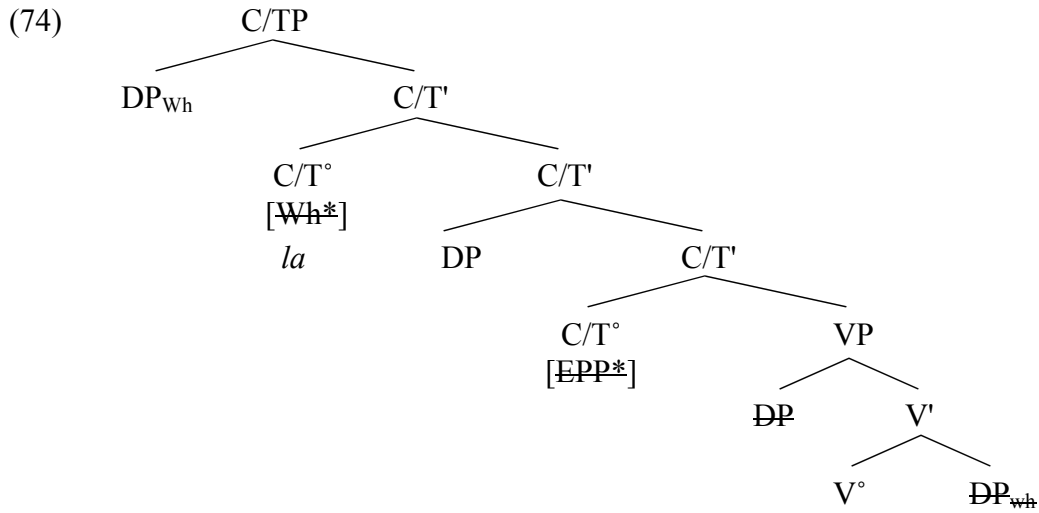
¹² Martinović's analysis takes EPP movement to take place prior to verb movement, in which case verb movement does not extend the tree. However, this ordering of operations does not seem to be crucial to the analysis.



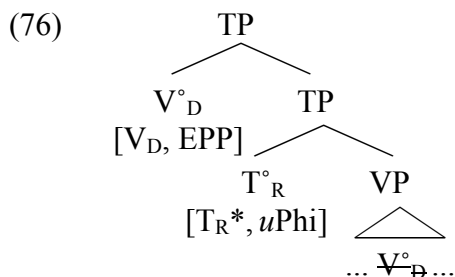
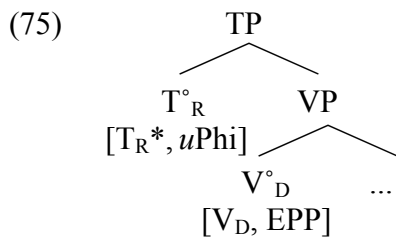
At this point, the [Wh*] probe must be checked. However, due to a ban on multiple specifiers within the C/T projection, movement of the *wh*-phrase across the subject is impossible. Thus, the requirement for [Wh*] to be checked compels a head splitting operation, in which a portion of the C/T° head containing its unchecked features is split off and Merged again at the root (73). This then permits movement of the *wh*-word, yielding the final word order (74).¹³



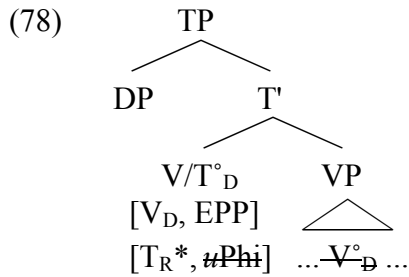
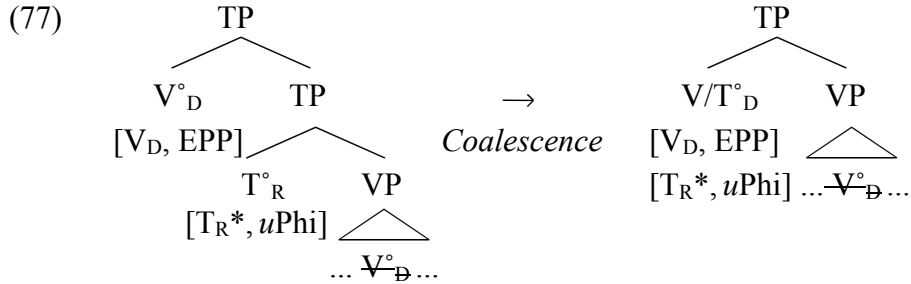
¹³ Martinović does not propose a probe for verb-movement in N-raising structures. However, surface word order does not seem to provide a way to determine whether or not the verb raises to the lower C/T° head, as subjects are presumed to move from Spec, VP to Spec, TP.



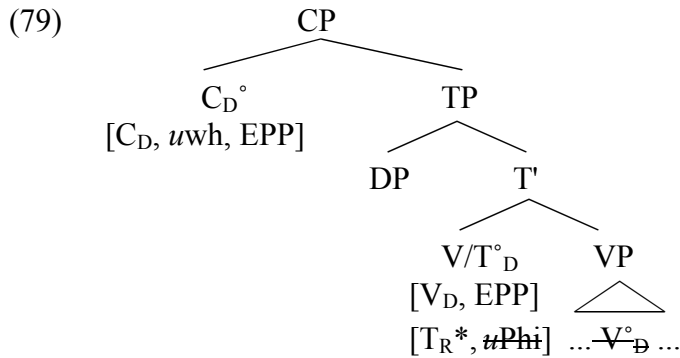
We will discuss at the end of the section the relative merits of head-splitting vs. head-bundling. I will first show, however, how the Wolof alternation can be accounted for in terms of Coalescence. Rather than beginning the derivation in a bundled state, the C° and T° heads are separately Merged into the derivation. We first consider the derivation of an N-raising *wh*-question structure, in which verb movement only moves as high as Tense°. The relevant portion of the derivation begins when the recessive Tense° head is Merged (75). In the next step, the dominant verb moves to Spec, TP (76).

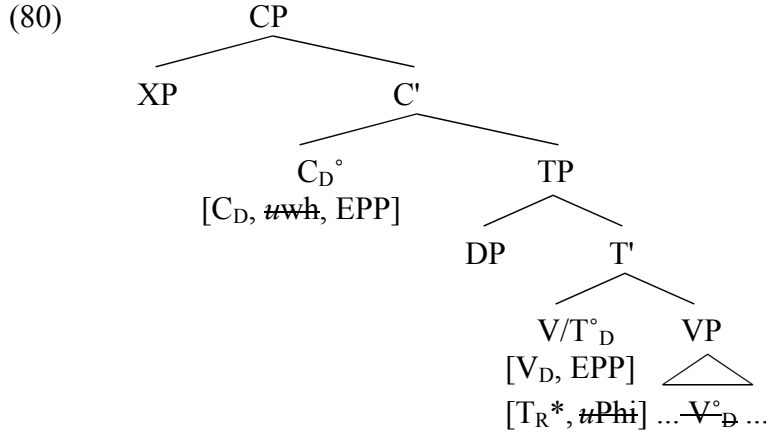


Coalescence then applies to create a bundled V/T° head (77). In the next step, the [*uD*] probe of the tense head and EPP feature of V° trigger movement of the subject to Spec, TP (78).

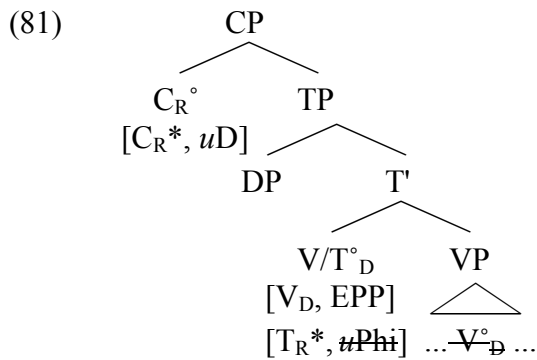


This is the point at which complementizer heads enter the derivation. I propose that the distinguishing property of N-raising clauses is that they contain a C° head that is both dominant when first Merged, and endowed with an EPP feature. No verb movement is required to eliminate a recessive head, and the derivation ends after the probes on C° have triggered movement to Spec, CP (80).

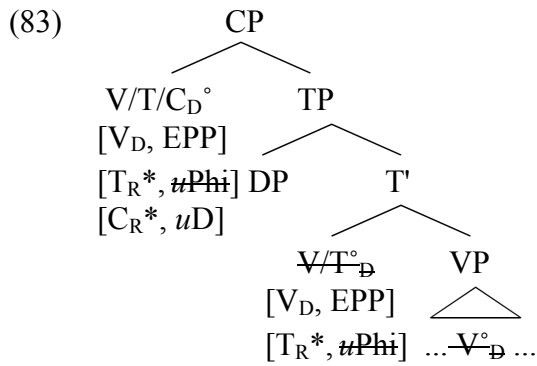
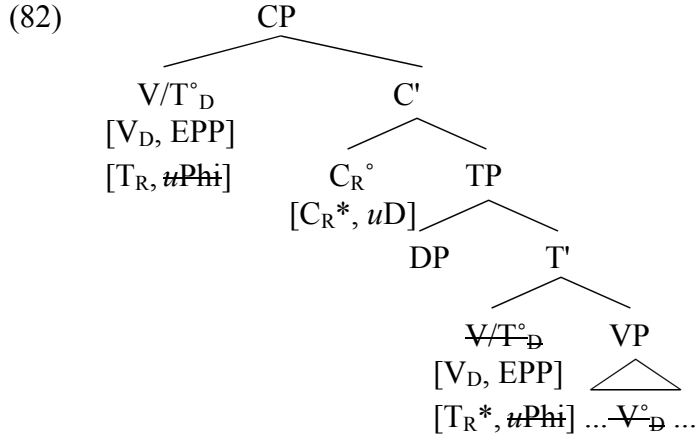




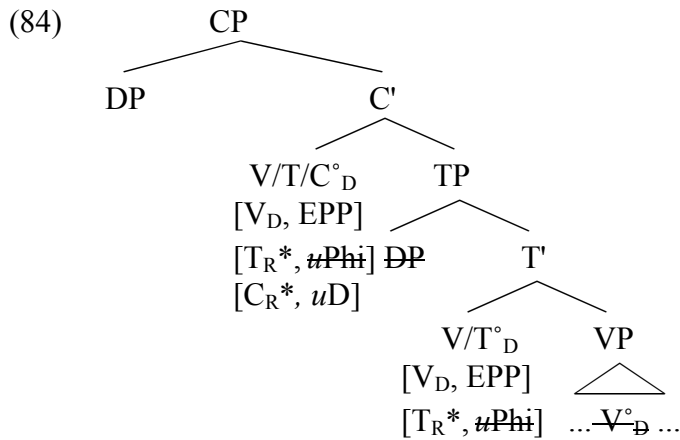
We now turn to the derivation of V-raising clauses. Here, I will suppose that the derivation proceeds identically through TP, picking up at (78). In this case, however, I propose that the C° head is recessive and strong, and further endowed with a $[\mu D]$ feature, to be justified shortly.



After the bundled V/T_D° head moves to Spec, CP (82), Coalescence bundles the topmost heads (83).



If the derivation were to stop at this point, we would incorrectly predict that only verb-initial orders are possible. To allow subjects to raise to the specifier, the bundled head requires a relevant probe, in this case the $[uD]$ probe on C° .



On what basis should we prefer a splitting approach, in which extended projections begin bundled and split during the derivation, or a bundling approach in which all heads are Merged separately and bundled during the derivation? Choosing between the two options likely depends on whether bundling or splitting can receive more plausible functional motivations. Crucially, not all of the case studies in this chapter in which functional heads are realized on separate heads can be accounted for as the result of head-splitting motivated by feature checking, particularly the alternations in English negation and the Catalan past perfect. This is particularly true of the alternation between the synthetic and analytic forms of the Catalan past perfect. Because the two options do not differ in their semantic functions, there would appear to be no purely syntactic motivation for tense features to split off in order to generate the analytic form. On the other hand, the synthetic and analytic forms straightforwardly reflect two strategies (External Merge and Internal Merge) used to eliminate the recessive Tense° head, whose realization is obligatorily affixal.

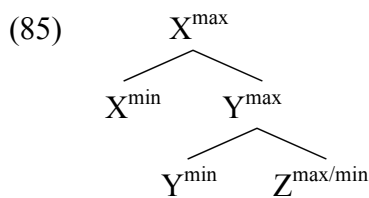
5.5 Complex heads as minimal projections

In Section 5.3, it was proposed that Coalescence leaves no internal branching structure within the complex head, accounting for the inability for later syntactic operations to affect subparts of bundled heads. This section discusses additional theoretical benefits and implications of this proposal. First, I show that the elimination of branching structure within complex heads obviates persistent concerns about head-movement in Minimalist Syntax, particularly within the considerations of Bare Phrase Structure. Lastly, I consider

implications of the proposal for the identification of copy chains, and for the determination of affix ordering.

5.5.1 Coalescence and Phrase Structure Uniformity

The non-existence of internal branching structure within heads created by Coalescence provides a solution to conceptual problems raised by traditional head-adjunction structures within Minimalism, specifically given the proposal of Bare Phrase Structure (Chomsky 1994). The key claim of the proposal is that the phrase structure status of a syntactic object (head vs. phrasal) is determined uniquely by its position within the syntactic tree. Specifically, an object whose label does not project is a maximal projection (notationally represented as XP or X^{\max}), while an object whose label is not identical to that of a node that it dominates is a minimal projection (X° or X^{\min}). An object with both properties is simultaneously maximal and minimal. The three options are schematized in (85).

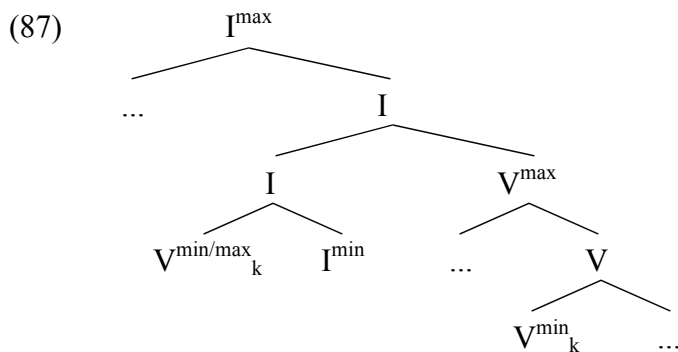


In this system, a head that does not project is both a minimal and maximal projection. Intermediate projections that are neither minimal nor maximal, corresponding to the X' levels in X-bar Theory, are proposed to be inaccessible to syntactic operations and thus cannot undergo movement.

In order to rule out movement structures deemed to be impossible, such as head-to-specifier movement or XP adjunction to heads, Chomsky posits a uniformity condition on movement chains, which I will refer to as the Phrase Structure Uniformity Condition to distinguish it from Nunes' Featural Uniformity Condition.

- (86) PHRASE STRUCTURE UNIFORMITY CONDITION
A chain is uniform with respect to phrase structure status

Chomsky observes that the traditional structure associated with head movement violates the Phrase Structure Uniformity Condition. To illustrate, consider the structure that is the predicted result of V° -to- Infl° head movement, where V° adjoins to I° .

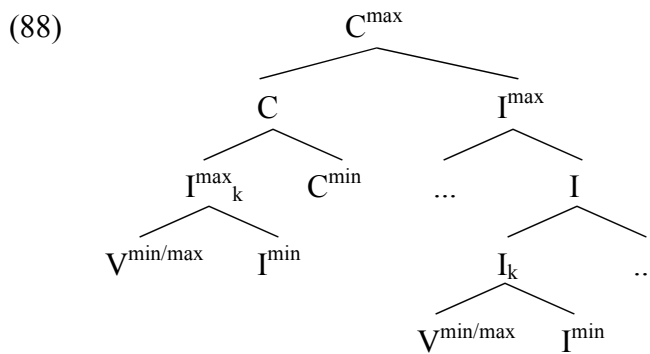


The problem noted by Chomsky is that the two copies of V in this structure differ in their phrase structure status. Because the higher copy of V does not project, it is both minimal and maximal, whereas the lower copy is minimal, since it projects. On these grounds, the adjunction structure violates the Phrase Structure Uniformity Condition. While Chomsky suggests that word-like items may simply be immune from this condition, this is a stipulation that should be avoided if possible.¹⁴ Additional issues arise from the fact that

¹⁴ In subsequent work, Chomsky (2001) argues that head movement is an operation that takes place in PF, not within the narrow syntax, based on the additional consideration that many instances of head movement

the moved and adjoined head does not c-command its lower copy, a suspect property that would distinguish head movement from phrasal movement (Matushansky 2006). Head movement would further differ from phrasal movement because it fails to extend the tree, unlike other forms of Merge (Chomsky 1995).

As noted by Harley (2013), successive-cyclic head movement proves even more problematic for the Phrase Structure Uniformity Condition. Consider the representation that results from movement and adjunction of the complex V-T head created in (87) to a higher complementizer head.

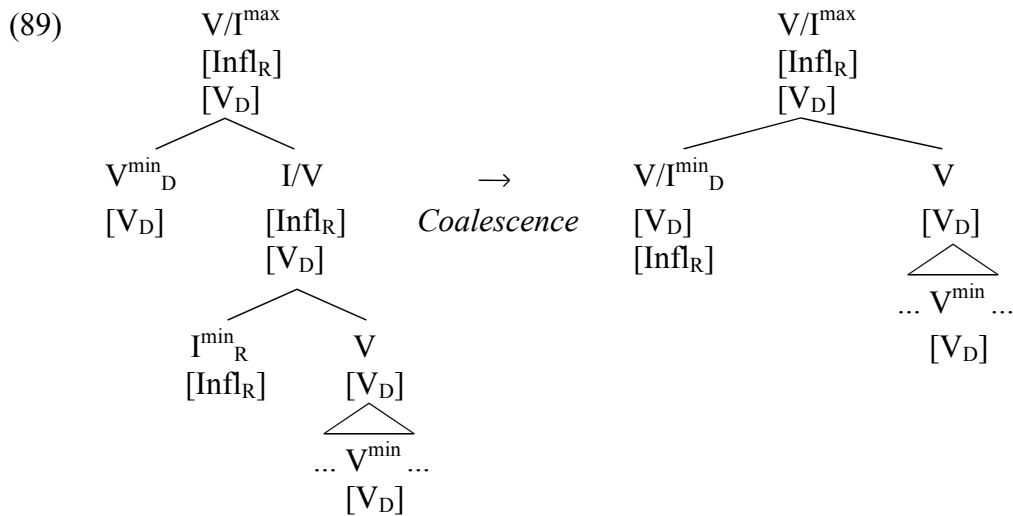


The more serious problem raised by this case is that the lower copy in this structure is neither minimal nor maximal. Since intermediate projections are proposed to be invisible to syntactic operations, movement of the complex head is predicted to be impossible.

We now consider how violations of the Phrase Structure Uniformity Condition and reference to intermediate projections are avoided in the Coalescence proposal put forth. This rests on two claims made in this chapter: First, that moved heads project their labels; Second, that complex heads formed by Coalescence include no internal branching

seem to lack semantic effects. However, there is substantial evidence of head-movement having effects on LF interpretation, (Lechner 2006; Matushansky 2006; Roberts 2010; Hartman 2011), suggesting that head movement must take place in syntax.

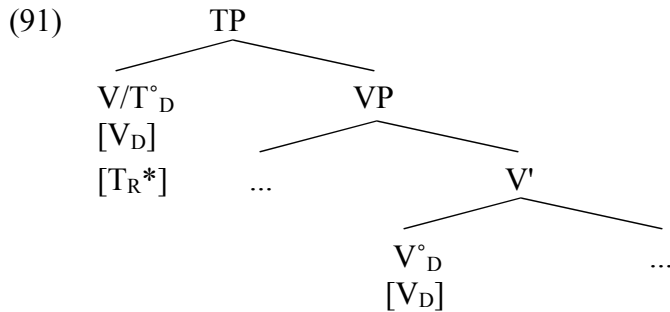
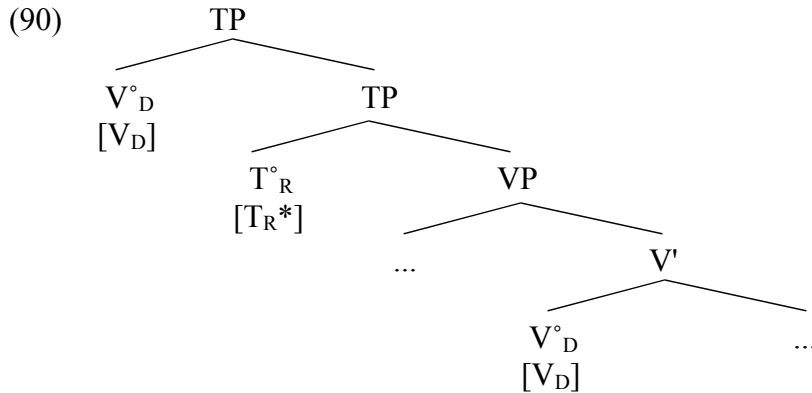
structure. Consider the derivation of a bundled V/Infl head. In the first step, the dominant V^{\min} moves up to Spec, Infl. The labeling of phrasal nodes at each step is determined by Category Percolation. Because the highest node contains the features of both [V] and [Infl], it is a maximal projection of both categories (I^{\max} and V^{\max}). After Coalescence applies, this featural specification remains unchanged. Crucially, however, the bundled head is now a minimal projection of both [V] and [Infl]. The two links of the verb's movement chain are thus minimal projections, in accordance with Phrase Structure Uniformity, and the bundled head c-commands the lower copy of the verb.



Later head movement of the complex head will similarly produce only minimal projections, and there is no need to posit movement of an intermediate-level projection. Coalescence and Category Percolation therefore provide a means to derive head movement within syntax in accordance with Minimalist considerations.

5.5.2 Coalescence and the identification of copy chains

The account of head adjunction in terms of Coalescence raises some questions about its compatibility with the Copy Theory of Movement assumed thus far within the dissertation. To illustrate, recall that V-to-T movement is analyzed as the result of two operations: Merge of a copy of V° in Spec, TP followed by Coalescence, which bundles T° and V° into a complex head. The two steps are shown in (90) and (91).



After the higher copy of the verb has been bundled with T, it is not clear that V/T° and V° should be treated as copies of a chain without additional stipulation about linearization. The problem is that V/T° is non-distinct from the lower copy of the verb in the sense that it contains more category features. If the two items that contain $[V_D]$ cannot be recognized as copies by the grammar, one might expect them to be pronounced

separately, in a case of multiple copy pronunciation (Nunes 1999, 2004; Dourado 2002; Kandybowicz 2007). It is crucial for the proposals of this dissertation, however, that the PF component be able to identify copy chains in order to determine their optimal pronunciation.

I propose that the identification of a movement chain does not require chain members to be *identical* in terms of features, but rather a subset relationship between the features contained in each chain link. This notion is essential to Roberts' (2010) proposal that head movement takes place only when a head enters an agreement relation with a goal that contains a proper subset of its formal features, a relation characterized as *defectivity*.

- (92) A goal G is defective iff G's formal features are a proper subset of those of G's probe P.

As an illustration, T° attracts V° in a given language if T° contains the features $[T, uV]$, while V° contains only its interpretable category feature $[V]$ (abstracting away from case and phi-features). In languages like English which lack V-to-T movement, Roberts proposes that T° lacks a $[uV]$ feature. Since V° has a $[V]$ feature but T° does not, it can not be a defective goal with respect to T° , making V-to-T movement impossible.

I propose that the identification of items in the derivation as copies depends not on featural identity, but on the relation of defectivity. Movement chains are thus recognized on the basis of (93).

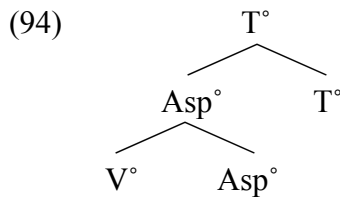
- (93) CHAIN RECOGNITION
 α and β form a movement chain iff α c-commands β and the formal features of β are a proper subset of those of α .

This method of chain identification permits the two copies of the verb in (91) to be identified as a chain, since the formal features of the lower verb V° are a subset of those in the bundled V/T° head. Thus, even though Coalescence has bundled a verb copy with a recessive T° head, it does not prevent the two verbs from being identified as a chain.

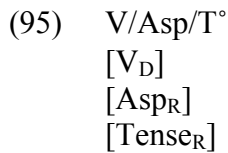
When the derivation is transferred to the interface, the PF grammar identifies two copies as belonging to a chain if the condition in (93) is met. It is important to note that while all heads transferred to the PF component must be dominant, they need not be pronounced in the output of the grammar. Rather, dominance simply reflects the eligibility of a head to be transferred to the PF interface. Whether or not a dominant head is pronounced in the final surface representation depends on the interaction of constraints on copy pronunciation, morpheme realization, and and prosodic structure organization, as argued in Chapter 3.

5.5.3 Coalescence and affix ordering

Here, I consider the implications of Coalescence with respect to theories of affix ordering, particularly in contrast with "classic" views of head adjunction that assume an internal branching structure. To illustrate, consider the standard analysis of the head adjunction structure formed by verb movement through the Aspect° and Tense° inflectional heads. The structure in (94) conforms with both the Right Hand Head Rule (Williams 1981), which places the projecting head at each level on the right, and the Mirror Principle (Baker 1985), which requires the hierarchical organization of morphemes to reflect the orderings of their corresponding heads within the clause.



On the other hand, the Coalescence approach to head-bundling produces a single terminal node that contains the features of each of the bundled heads. Because this structure makes no predictions as to the orderings of the morphological exponents of these features, it requires all constraints on ordering to be done after Spell-Out, within the PF branch.



If there are empirical advantages to the existence of branching structure, this would be a shortcoming of the Coalescence proposal put forth. However, I will present evidence from existing literature that affix ordering is determined by a variety of competing preferences (McCarthy and Prince 1993; Hyman 2003; Ussishkin 2007; Rice 2011), and that a satisfactory theory of affix ordering need not require featurally complex heads to be branching constituents.

Although complex heads in many languages do obey the Mirror Principle and Right Hand Head Rule, there are many attested exceptions to these principles. For instance, while there appears to be a general preference for suffixation across languages, certain affixes must be specified as prefixes, contra the Right Hand Head Rule. However, it is possible to maintain the proposal that complex heads do have internal branching structure in their syntactic representation, by positing that affixes are reordered in the postsyntactic

component. This is the approach used in DM, in which phonological restrictions such as constraints on the attachment direction of affixes can trigger the operation Local Dislocation, which alters the linear ordering of sister nodes prior to their pronunciation.



If Local Dislocation applies between sister nodes of complex heads from the bottom up, this V/Asp/T° head can be given the following orderings: [[V-Asp]-T], [[Asp-V]-T], [T-[V-Asp]], [T-[Asp-V]]. However, it is not possible to generate orders where the Mirror Principle ordering is violated among the affixes on a single side of the root (Harley 2013), in particular *[Asp-T-V], *[V-T-Asp]. To the extent that this generalization is true, this would support the existence of a branching head-adjunction structure within the syntax.

However, the Mirror Principle of affix ordering is also not without exceptions, and languages can place restrictions on the orderings of morphemes that contradict what is expected based on their scopal or derivational properties. The subsequent examples in this section are taken from Rice's (2011) overview of factors influencing affix ordering. A well-known Mirror Principle violation is described for Bantu languages by Hyman (2003) and Good (2003), in which derivational suffixes largely occur in a fixed 'CARP' order. Notably, this results in surface affix orderings that violate the Mirror Principle. In Chichewa, for example, both causativized applicatives and applicativized causatives occur with the same suffix order V-CAUS-APPL, creating a mismatch in scope and linear ordering for causativized applicatives.

(97) 'CARP' template: Verb stem - Causative - Applicative - Reciprocal - Passive

- (98) a. lil-**its-il** b. takas-**its-il**
 cry-CAUS-APPL stir.with-CAUS-APPL
 'cause to cry with' 'cause to stir with'
 [[cause cry] with] [[stir with] cause] (Hyman 2003)

Furthermore, Mirror-Principle preferences on affix ordering can be violated in favor of more apparently phonological restrictions. For instance, suffix order in Pulaar (a.k.a. Fula) generally follows a fixed 'TDNR' order in which more sonorous suffixes occur further from the root (Arnott 1970; Paster 2005, 2006). While this ordering typically obeys the Mirror Principle by default, and some ordering reversals are permitted to directly reflect semantic scope (Paster 2005, 2006), certain fixed orders do lead to Mirror Principle violations. For instance, the modal suffix *ir*, which introduces a manner/instrumental argument, and the repetitive aspect suffix *it* occur in a fixed order, even if repetitive aspect takes scope over the modal (99b).

- (99) a. o udd-**it-ir-ii** baafal ŋgal sawru wodndu
 3.SG close-REPET-MODAL-PST door the stick different
 'He closed the door again with a different stick'
- b. mi udd-**it-ir-ii** baafal ŋgal sawru
 3.SG close-REPET-MODAL-PST door the stick
 'I closed the door with a stick again.' (same stick) (Paster 2005)

Lastly, affix ordering and placement in some instances show sensitivity to prosodic properties of stems (Ussishkin 2007; McCarthy and Prince 1993). If prosodic structure is built on the PF branch, this indicates clearly that processes that affect affix ordering apply after syntactic structure undergoes Spell-Out.

The generalization that emerges is that affix ordering is determined by a number of competing functional preferences (cf. Manova and Aronoff 2010, Rice 2011 for an overview), including those based on parsimony with syntactic derivations or semantic scope, phonological well-formedness, or morpheme-specific restrictions. While the Mirror Principle and Right Hand Head Rule do appear to be functionally grounded preferences for affix linearization, they can be overridden by competing factors. This provides support for constraint-based theories of affix ordering, in which affix order is determined by the interaction of constraints grounded in both syntactic and phonological principles (Hyman 2003; Paster 2009; McPherson and Paster 2009; Caballero 2010, a.o.) similar to this thesis' proposal on copy pronunciation made in chapters 2 and 3. To conclude, there is no empirical necessity based on patterns of morphological exponence for internal branching structure for heads in their syntactic representation.

5.6 Coalescence and the architecture of the grammar

We now return to issues of how dominance and recession are defined, how these specifications are acquired, and the implications of the proposals for the structure of the grammar. First, consider the proposed criteria for distinguishing between dominant and recessive category features, repeated in (100).

- (100) A category feature [F] is *dominant* if:
- a. A head containing only [F] has a non-null exponent in its phonological representation.
- OR
- b. A head containing only [F] can trigger phrasal movement to its specifier.
- Otherwise, [F] is *recessive*.

Condition (100a) ensures that a category feature whose exponents are *obligatorily affixal* will be recessive, and thus subject to Coalescence. An obligatorily affixal item can be understood as one that requires linear adjacency to the exponents of a different feature, and is associated with some preference for left or right attachment (McCarthy & Prince 1993). Crucially, this is to be distinguished from items that are affixal in terms of their prosodic representation, but are free of such requirements of adjacency. As an example, the exponent of the declarative Force^o head in Bangla, *je*, does not form a PWd, and is directly dominated by the PPh headed by an adjacent item, in an affixal clitic structure. Nonetheless, its corresponding head is dominant because its realization does not depend on linear adjacency with the exponents of a particular morpheme.

The language learner can thus determine whether or not a category feature is dominant or recessive based on properties of its phonological exponent. Once a learner has identified a series of segments as being the exponents of a relevant syntactic feature, he needs only to determine whether or those segments systematically require linear adjacency with the exponents of a different feature. If so, the feature is identified as recessive, otherwise it is analyzed as dominant.

Because dominance and recession are proposed to drive an operation that applies within syntax, these properties must be present within lexical entries. This runs counter to the principle of Late Insertion in the form proposed by Halle and Marantz (1993), which states that all phonological information enters the derivation after syntactic structures are transferred to the PF interface. There are indeed many cases where Late Insertion seems to be a correct generalization. First, it accounts for the observation that syntax appears to be generally blind to phonological properties, particularly at the segmental level. More

importantly, it accounts for patterns in which morpheme realization is sensitive to some syntactic context, which are unexpected for traditional lexicalist theories in which morpheme insertion takes place prior to syntactic operations.

The present account can be reconciled with the above generalizations by proposing that lexical insertion takes place in multiple steps. A limited amount of information about phonological realization (e.g. dominance vs. recession) is supplied within lexical entries, which allows syntactic operations to build a hierarchical structure that serves as a "scaffold" for the full range of phonological properties (segmental and prosodic structure) introduced in the PF interface.

5.7 Conclusion

In this chapter, I have proposed that a variety of bundling processes that affect heads should be understood as the result of a single syntactic operation, Coalescence. Although Coalescence presents a non-trivial addition to the set of syntactic operations permitted in standard Minimalism, it reduces the need to specify separate bundling operations in both the lexicon and in the postsyntactic PF branch. In addition, it allows for a unified analysis of phenomena that received disparate analyses under previous theories.

Chapter 6: Conclusion

6.1 Overview of results

This dissertation has presented theoretical analyses of several cases of word order variation involving heads in the clausal left periphery and the inflectional domain. In particular, it has argued that an understanding of a variety of phonological properties is crucial to the analyses of these patterns.

In the first section of the work, I presented an empirical study of syntactic and prosodic properties of embedded clauses and the complementizer *je* in Bangla. I have argued that the ordering restrictions on *je* receive a straightforward account if [1] the complementizer head-moves through the expanded left periphery and [2] the pronunciation of its movement copies is determined by the interaction of violable syntactic and prosodic well-formedness constraints. The analysis integrates the insights of multiple theoretical frameworks, including the Copy Theory of Movement, the Cartographic Approach to syntactic structures, and Prosodic Phonology.

The second half of the dissertation focused on the analysis of "bundling" processes that affect heads in syntax. I have proposed that a variety of bundling effects are best attributed to an operation that applies during the syntactic derivation, Coalescence. Furthermore, the application of Coalescence is conditioned by a requirement to eliminate heads that would be affixal or null in their phonological representation, prior to the transfer of syntactic structures to the PF interface. A crucial implication of this approach is that a limited amount of phonological information, implemented as the distinction

between dominance and recession, is visible to the syntax. This allows for a unified account of apparent variation in the inventory of instantiated functional projections and head-adjunction structures, previously attributed to separate components of the grammar. Lastly, I have shown that Coalescence resolves longstanding problems that traditional head-adjunction structures have posed within Minimalist syntax.

6.2 Theoretical Implications

The dissertation concludes with a discussion of the primary theoretical implications of the presented analyses with respect to theories of syntax and the syntax-phonology interface.

6.2.1 Constraint interaction in copy linearization

On the basis of the analysis of Bangla complementizer order, I have argued that syntactic preferences on linearization can be violated in order to satisfy phonological requirements, and that this interaction within the PF component can be formalized as an Optimality-Theoretic grammar. While OT analyses of the influence of prosody on word order have been previously proposed (Samek-Lodovici 2005; Vogel 2006; Anttila et al. 2010; Elfner 2012; Clemens 2014; Bennett et al. 2016), the present model differs from these analyses by proposing that the PF grammar only manipulates word order by determining the pronunciation of movement copies. The model thus provides a more restrictive theory of possible phonologically-driven displacements. On the other hand, the lower copy pronunciation proposal allows for an account of "long-distance" displacements in which

the postposed item is separated from its expected position by more than two phrasal constituents. Such cases do not receive an explanation in terms of the operations of Distributed Morphology, typically assumed to require structural adjacency. The analysis further supports a view of the PF grammar in which linearization, prosodic structure formation, and morpheme insertion take place in parallel.

6.2.2 The effects of phonological defectivity on syntactic operations

In this dissertation, I have examined two stages of the derivation at which different types of phonological properties can influence word order. In Chapters 2 and 3, I presented Bangla data to argue that the optimal pronunciation of the complementizer *je*'s movement copies is determined in part by constraints on surface prosody. Lower copy pronunciation is argued to take place to prevent the violation of a STRONGSTART constraint at intonational phrase edges. Furthermore, prosodic data is used to argue against previous analyses of *je* as an "obligatory enclitic." This suggests also that similar reassessments may be possible for other analyses that stipulate the attachment directionality of prosodically weak items.

In chapter 5, I argued that a more abstract notion of defectivity, *recession*, triggers the head-bundling syntactic operation Coalescence. This allows a unified analysis of phenomena that were previously attributed to separate components of the grammar, Feature Scattering and Morphological Merger. Furthermore, Coalescence allows for a new account of head movement in syntax, avoiding the many problems posed by traditional head-adjunction models. This analysis, however, requires some information

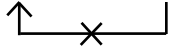
about phonological exponence to be accessible to syntactic operations, contra traditional interpretations of Late Insertion (Halle and Marantz 1993) and Phonology-Free Syntax (Zwicky and Pullum 1986; Pullum and Zwicky 1989). After all, if features related to semantic interpretations at LF are accessible to syntactic operations, there is no principled reason to prevent properties of phonological form from being accessible as well, since the output of syntax must be convergent at both the LF and PF interfaces (for similar arguments, see Roberts 2005).

6.2.3 Variation in the instantiation of functional projections


While research in the Cartographic Program has identified a growing number of functional projections needed to account for extensive cross-linguistic variation in the left periphery, it has proven difficult to reconcile the articulated structure with languages that restrictively instantiate left-peripheral positions. Coalescence provides a straightforward means to account for varying degrees of articulation both across and within languages, while maintaining the principle of "one head, one feature" on items in the numeration.

The application of a bundling operation like Coalescence leads to the elimination of many phonologically null projections from proposed syntactic representations. This in itself may have independent theoretical benefits. One area in which bundled projections may be crucial is in accounting for movement restrictions attributed to Spec-to-Spec Anti-Locality, a proposed constraint that prevents A-bar movement from displacing a constituent from a specifier position to the specifier of the projection that immediately dominates it (Erlewine 2014).

(1) $[_{CP} XP_k C^\circ [_{TP} XP_k T^\circ [\dots]]]$ *Violates anti-locality*



(2) $[_{CP} XP_k C^\circ [intervening material [_{TP} XP_k T^\circ [\dots]]]]$ *Satisfies anti-locality*



Generally, Spec-to-Spec Anti-Locality accounts for bans against movements that are "too short," typically cases of subject movement into CP (Erlewine 2014; Douglas 2015). Crucially, some of these restrictions may be impossible or more difficult to formulate in terms of Anti-Locality if all clauses contain a fully articulated Cartographic structure with many null functional projections. Of course, it remains open as to whether Anti-locality is the best characterization of these movement constraints. Nonetheless, it appears that the relevant generalization could be difficult to account for given a proliferation of phonologically null projections.

6.3 Directions for future research

While it is outside the goal of this work to provide a comprehensive account of the influence of prosodic requirements on word order, it provides new predictions to be tested. A major goal of future work is to determine the precise extent to which phonological restrictions can affect word order. It has been argued, for instance, that constraining prosodically motivated displacements to those that can be created by manipulating copy pronunciation may be overly restrictive if displacements that violate syntactic constraints on movement are systematically observed (Agbayani and Golston 2010; Agbayani et al. 2011, 2014; Bennett et al. 2016). In addition, the validity and

generalizability of the proposals in Chapters 2 and 3 should be tested within a broader study of the ordering and prosodic phrasing of complementizers, in particular within other languages that show variable complementizer order.

With respect to Coalescence, several questions remain open. While I have argued that Coalescence is motivated by a requirement to eliminate recessive heads from the final representation, no conclusion has been reached as to the specific points in this derivation at which this requirement holds. In a theory that assumes cyclic Spell-Out (Chomsky 2000, 2001, 2008, among many others), we expect recessive heads to be eliminated at the point at which they are spelled out. For instance, if phasal heads trigger the Spell-Out of their complements, we expect the highest head in this complement domain to be obligatorily dominant. Furthermore, it should not be possible for Coalescence to bundle a phasal head with the head of its complement. However, given the unresolved issues regarding what constitutes syntactic phasehood and the timing which with syntactic structures undergo Spell-Out, the verification of these predictions is left to future research.

Similarly, the analysis can potentially be extended to account for languages that compel certain projections to have an overtly realized head, or a filled specifier. For instance, An (2007) argues that in English, CPs whose left edges are aligned with an intonational phrase edge must contain an overt head or specifier. In a more complex case, Kandybowicz (2009) shows that subject extraction out of embedded clauses is possible only if the embedded TP is realized with an overt head or filled specifier. Martins (2004) argues that emphatic affirmative clauses in European Portuguese and Brazilian Portuguese require the overt realization of both a complementizer head and a Polarity

head, and that this can be satisfied by a variety of strategies, including verb movement and the direct Merge of a polarity-encoding adverbial. Potentially, such cases can be explained in terms of requirements for certain heads to be dominant. However, much work needs to be done in order to explain how such requirements come about.

It also remains an open question as to whether there are additional constraints on the distribution of dominance and recession across different syntactic categories. For instance, given the understanding that dominant heads are those that are either non-affixal or able to have a specifier, we might expect lexical heads to be universally dominant. In addition, we have yet to investigate whether suprasegmental properties like stress or prosodic phrasing can introduce additional constraints on the distribution of dominance and recession.

Lastly, if we are correct that the bundling of heads is performed during the syntactic derivation and triggered by requirements on PF well-formedness, we can wonder if other syntactic operations like movement or agreement can have prosodic motivations. Interestingly, Richards (2010, 2016) provides numerous arguments to suggest that certain requirements of prosodic prominence like stress placement and prosodic boundary marking, can trigger syntactic movement, suggesting as well that some lexical insertion takes place prior to spell-out at PF.

To conclude, the claims of this dissertation point the way to numerous avenues for further exploration, and it is my hope that the investigation of these issues will lead to a greater understanding of the organization of the language faculty.

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