

**Aspects of the morphology and phonology of phases**

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### **ABSTRACT**

This thesis offers evidence that phases (Chomsky 1995) induce word-internal cycles of morphological and phonological interpretation. Phases proposed in the syntactic literature are shown to have effects word-internally, therefore supporting a representational theory of morpho-phonology (e.g. Distributed Morphology (Halle & Marantz 1994)). It is argued that phases exist at the nP, aP, vP, vP, DP, and CP syntactic levels. These phases are shown to have differing behaviour with regards to the domain which is sent to PF upon merger of the phase head. DP, CP, and vP are argued to be complement spellout phases following Nissenbaum (2000). nP, aP, and vP, however, offer evidence that the head of a phase is interpreted at PF with its complement. A possible motivation for this difference in interpretation domain is discussed. It is in derivations where syntactic material spans one (or more) of these boundaries that cyclic domains may be found within words at PF. Phonological and morpho-syntactic patterns induced by word-internal phases are investigated.

Main stress patterns in Cupeño, Turkish, and Ojibwa are analysed. Turkish and Cupeño seemingly irregular main stress patterns are argued to be regular at the phase level. Main stress is assigned in these languages at the interpretation of the first phase. In other words, main stress is cyclic and immovable in these languages. Ojibwa main stress assignment is then shown to be insensitive to word-internal phase boundaries. Word internal phases are present in Ojibwa, as demonstrated by hiatus resolution strategies and footing patterns in the language (Piggott & Newell 2007). Main stress is assigned to the word, regardless of its internal cyclic domains – it is post-syntactic. These two patterns are argued to be the only possibilities for main stress assignment.

Some morpho-syntactic paradoxes are then investigated. It is argued that word internal phases, in combination with late adjunction (Lebeaux 1988), are responsible for bracketing paradoxes, the dichotomous (phrase/word) nature of particle verbs, and semantically vacuous double affixation. Languages discussed in this section are English, German, Breton, and Yiddish. It is concluded that structural paradoxes arise only when an adjunct is late adjoined into a previously interpreted morpho-syntactic structure.

None of the data presented here arise solely in the phonological, morphological, or syntactic component of language. The effects of syntactic phases on morpho-phonology argue for the necessity of an integrated approach to linguistic investigation.

## ABRÉGÉ

Cette thèse présente des données qui montrent que les phases (Chomsky 1995) provoquent des cycles d'interprétation morphologique et phonologique internes au mot. Les phases proposées dans la littérature syntaxique ont des effets internes aux mots, représentant ainsi une théorie morpho-phonologique (c.à.d. une morphologie distribuée (Halle & Marantz 1994)). On propose que les syntagmes existent aux niveaux syntaxiques nP, aP, vP, DP, et CP. Il est démontré que ces syntagmes se comportent différemment selon le domaine envoyé à PF au cours de la fusion du syntagme de tête. On montre que DP, CP, et vP sont des syntagmes compléments *spellout* d'après Nissenbaum (2000). Cependant, nP, aP, et vP montrent que la tête d'un syntagme est interprétée avec son complément à PF. Une raison possible de cette différence dans le domaine d'interprétation est proposée. C'est dans les dérivations où le matériel syntaxique s'étend sur une (ou plusieurs) de ces frontières que l'on peut trouver des domaines cycliques internes aux mots à PF. Les structures phonologiques et morpho-syntaxiques provoquées par les syntagmes internes aux mots sont explorées.

Les structures relatives au stress majeur en cupeño, turc, et ojibwa sont analysées. Il est proposé que les structures de stress majeur apparemment irrégulières en turc et en cupeño sont régulières au niveau du syntagme. Dans ces langues, le stress majeur est assigné au niveau de l'interprétation du premier syntagme. Autrement dit, dans ces langues le stress majeur est cyclique et fixe. On montre ensuite que l'assignement du stress majeur en ojibwa est insensible aux frontières des syntagmes internes aux mots. Les syntagmes internes aux mots sont présents en ojibwa, tel que démontré par les stratégies de résolution des hiatus et la structure des pieds dans la langue (Piggott & Newell 2007). Le stress majeur est assigné au mot, sans tenir compte de ses domaines cycliques internes — il est post-syntaxique. Il est proposé que ces deux types de structure sont les seules possibilités d'assignement du stress majeur.

Certains paradoxes morphosyntaxiques sont alors explorés. Il est proposé que les syntagmes intérieurs au mot, en combinaison avec adjonction tardive (Lebeaux 1988), sont responsables des paradoxes de mise en parenthèses, de la nature dichotomique (syntagme/mot) des verbes à particule, et de l'affixation double sémantiquement vide. Les langues considérées dans cette section sont l'anglais, l'allemand, le breton et le yiddish. La conclusion proposée est que les paradoxes structuraux se présentent seulement quand une adjonction est tardivement attachée à une structure morpho-syntaxique préalablement interprétée.

Aucune des données présentées ici ne se présente que dans la composante phonologique, morphologique, ou syntaxique de la langue. Les effets des syntagmes syntaxiques sur la morpho-phonologie soulignent la nécessité d'une approche intégrée de l'investigation linguistique.

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## **ASPECTS OF THE MORPHOLOGY AND PHONOLOGY OF PHASES**

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## CHAPTER 1.

### SITUATING THE THEORETICAL SPACE

**1. Introduction** This thesis aims to delineate (some of) the ways in which syntactic structures map onto Phonological Form at the word level, and subsequently to show that the conclusions derived from the study of Phonological Form (PF) have implications for the morpho-syntax of words. In recent work, Chomsky (2006:3-4) asserts that;<sup>1</sup>

If....speculations (that the SMT can be satisfied by optimization of language at the C-I interface alone) are on the right track, we would expect to find that conditions imposed by the C-I interface enter into principled explanation in a crucial way, while mapping to the S-M interface is an ancillary process. If so, we might discover that SMT is satisfied by phonological systems that violate otherwise valid principles of computational efficiency, while doing the best it can to satisfy the problem it faces: to map to the S-M interface syntactic objects generated by computations that are “well-designed” to satisfy C-I conditions. There is, I think, empirical evidence that something like that might be correct. But, again, the questions can only be answered by interactive research in many dimensions. Such questions are worth keeping in mind, even though they are at the periphery of current empirical study.

Although it may be the case that mapping to the S-M interface is prone to ‘imperfections’ – where imperfection here is defined as a representation that somehow imperfectly mirrors syntactic structure – it is impossible to define the boundaries within which these imperfections occur if we do not yet understand what a perfect mapping is. We should assume, as a starting point, that both interfaces result in optimal outputs.

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<sup>1</sup> C-I=Conceptual-Intensional, S-M=Sensory-Motor, SMT=Strong Minimalist Thesis

It is therefore crucial to any theory of the syntax-phonology interface that the expectations of what perfection would be are clearly laid out so that these predictions can be compared with actual attested outputs. It will therefore be the focus of this first chapter to situate the mindset of the reader in the framework(s) within which the arguments and evidence presented in the following chapters are evaluated. What will be argued for in this dissertation is that (often) Phonological Form does in fact mirror the syntactic derivation in ways that are ‘perfect’, in that the attested output mirrors the structure and derivational history of a construction. Where some apparent imperfections arise, it is argued that they have principled explanations, and are therefore optimal outputs. These imperfections arise in cases where there is evidence for cyclic domains within a word. These cyclic domains are considered to be identical to Chomsky’s phases (Chomsky 1999).

For example, consider the following Turkish verb. Stress in (1) falls on the penultimate syllable.

- (1)    gid-ecek-i-ti-m                      →    gidecéktim  
       go-fut-COP-past-1sg  
       ‘I will have gone’

Stress in Turkish generally falls on the ultimate syllable, and therefore the stress in the example above can be considered irregular. The reason for this irregularity, however, is argued in Ch. 2 to be due to the morpho-syntactic structure of the Turkish verb (following Kornfilt (1996) and contra Inkelas & Orgun (2003) and Kabak & Vogel (2001)). The irregularity follows from the fact that there is a phase edge immediately following the position of stress, and stress is consequently final within the phase delineated by this edge. Therefore, a

principled explanation for this irregularity can be found. This being the case, the stress in (1) cannot be considered irregular. It is data like the above that are the focus of this thesis. Many phonological and morphological phenomena have been erroneously hidden under the umbrella of irregularity, for the main reason that the conception of regularity has been based on the assumption that the Narrow Syntax has no effect on output at the word level. Under Minimalist assumptions, phonology is the interpretation of the narrow syntax, and it is therefore expected that the ‘regular’ outcome of PF interpretation should be one that mirrors the derivational history of the narrow syntax in a perfect way. The example in (1), as well as irregular stress in general in Turkish and Cupeño, hiatus resolution and footing in Ojibwa, and (some aspects of) English cyclic morpho-phonology will be re-examined, and will give evidence that what has previously been thought of as irregular (morpho-)phonology is in fact a perfect realization of the morpho-syntactic derivation, modulo principled phonological requirements.

There are therefore two questions we must ask. First, what do the theories of morpho-syntax and phonology that are promoted in this thesis predict should be the outcome of interpretation of syntactic structures at PF? And secondly, does PF output conform to these predictions? Much work has already been done to answer these questions, and they are becoming more and more often the subject of theoretical debate.

The theoretical framework I support in this thesis takes the notion of the phase<sup>2</sup> ((Chomsky 1995 and subsequent work) or Command Unit (Uriagereka

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<sup>2</sup> Also Barriers (Chomsky 1986); Phonological cycles (Kiparsky 1982 and other Lexicalist literature).

1999) and combines it with the principles of Distributed Morphology (Halle and Marantz 1993 and others). The output of this morpho-syntactic system is then interpreted on the phonological side in keeping with theories of Prosodic Phonology (Nespor and Vogel 1986 and others). The combination of the theories of phases and Distributed Morphology predicts that the word-level phonological cycle can be derived from the narrow syntactic structure, negating the need for or justification of a separate pre-syntactic morpho-phonological computational module. This being the case, we expect all three ‘modules’ within the Minimalist framework (Chomsky 1993), the Narrow Syntax(NS), Phonological Form(PF) and Logical Form(LF), to optimally display evidence of concurrent cyclic domains (contra Marušič 2005). I argue that PF phases within words are triggered by the same syntactic phase heads that have been proposed to explain NS and LF cycles in the syntactic literature. That this is true of many unrelated languages discussed in the following chapters offers evidence for this claim, and extends the long-standing investigation into the syntax-phonology interface at the word level (Chomsky and Halle 1968, Selkirk 1982, 1984, Marantz 2001, Marvin 2002, Pepperkamp 1997, Oltra-Massuet & Arregi 2005, Embick and Noyer 2001, among others including work in Lexical Phonology and Morphology (Pesetsky 1979, Mohanan 1986, Kiparsky 1982 etc.)).

This chapter aims to answer the first question posed above – what do we predict to be the perfect realization of Phonological Form? It is therefore organized as follows. Sections 1.1 and 1.2 introduce the morpho-syntactic theoretical frameworks espoused here – namely Distributed Morphology and

phases. Sections 1.3 and 1.4 discuss the phonological framework proposed to interpret the output of the narrow syntax, building on Prosodic Phonology and Grid Theory (Prince 1983 among others). Section 1.5 outlines some of the apparent imperfections found in the phonological system and indicates how these imperfections may be incorporated into a theory of phonology that takes as its initial premise that phonology mirrors syntactic derivations, while section 1.6 sums up the theoretical contributions of this work.

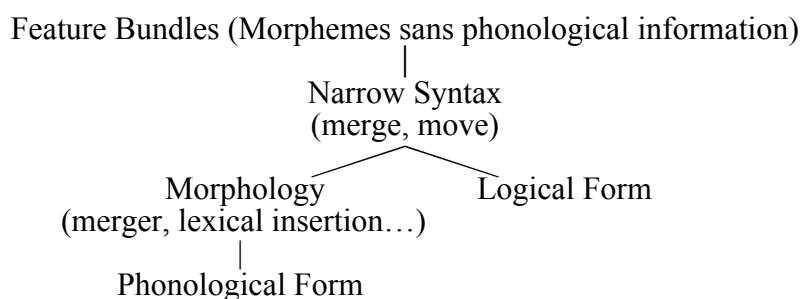
**1.1 Morpho-syntax** As this thesis takes the domain of ‘word’<sup>3</sup> as its focus, we will begin with a brief discussion of the hypothesis that syntax goes ‘all the way down’ (that morphology and syntax are indistinguishable within the narrow syntax) espoused most prominently within the framework of Distributed Morphology (Halle and Marantz 1993, 1994, Marantz 1997, 2001, Harley and Noyer 1999, 2000). Assuming this to be the case, we are led to the null hypothesis that any derivational operations available within the narrow syntax may apply equally to domains both smaller and larger than the word. One of the most relevant of these operations to the discussion herein is that of cyclic interpretation of syntactic structure at the interfaces, labeled phases in its most recent incarnation (Chomsky 1999, 2000, 2005). The following sections will be devoted to a brief discussion of Distributed Morphology.

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<sup>3</sup> It has been variously argued in the literature that the term ‘word’ is not easily definable in any sense that spans both the morpho-syntactic and phonological domains. Marantz (1997) asks ‘Djawanna do syntax with phonological words?’. I will assume a definition of word throughout that is purely phonological, as this is the only domain in which it may have a cohesive definition. A (phonological) word is defined herein as the domain of main prominence (e.g. stress) assignment.

**1.1.1 DM: There are no words in the syntax** The central tenet of Distributed Morphology is that the input to the narrow syntax consists of feature bundles that encode information at the level of the morpheme. These feature bundles are then operated upon within the derivational system – they are merged from the numeration, creating more complex syntactic objects, which then undergo movement and agreement operations and are ultimately sent to interpretation. At PF, morphological operations such as lowering, merger, and lexical insertion apply. This entails that morphology is realizational. Phonological information is not present in the narrow syntax, but is rather inserted into the nodes occupied by feature bundles after most morpho-syntactic derivational operations have applied. A schema of the DM-informed linguistic computational system can be seen below.

(2) DM Derivational System



One consequence of this proposal is that there is no entity that can be described as a word within the narrow syntax. The output of the narrow syntax is a derivational cascade consisting of morpheme-sized terminal nodes, which may or may not have undergone movement operations creating objects such as complex heads and traces (copies). It is only on the interpretive arm terminating



in phonological interpretation (PF) that the notion of word has any possible definition.

Words may be realizations of (relatively) small or large portions of the syntactic tree.<sup>4</sup> For example, in English (3a) the verbal/functional domain, which includes projections such as VP, *v*P, AspP, TP, and CP, is realized overtly as multiple words. In languages such as Ojibwa (3b) however, the tree encompassing the above projections is realized as a single word.<sup>5</sup>

- (3) a. [<sub>CP</sub>Why [<sub>C</sub>could [<sub>TP</sub>he [<sub>T</sub>have [<sub>AspP</sub>been [<sub>VP</sub>being [<sub>VP</sub>pushed]]]]]]]?  
 b. [<sub>CP</sub>nɪ[<sub>TP</sub>gi: [<sub>VP</sub>[<sub>AP</sub>ini] [<sub>VP</sub>a:gam-ose:]]]] → [nigi:inia:gamose:]  
 '1SG-PAST-away-snowshoe-walk'  
 'I walked there in snowshoes'

This being the case, we must therefore predict that syntactic operations targeting *v*P which have effects at PF, for example, will manifest themselves within words in languages like Ojibwa, while they will manifest themselves between words in languages like English. The focus in the following chapters will be on the effects of syntax within words, and therefore will not focus on examples like those in (3a). Rather, I focus on the question of whether there is evidence for the DM hypothesis that the input to the narrow syntax is smaller than the word – or morphemic. If it is the case that the lexical items numerated and merged into the narrow syntax are morphemes then we should see evidence for this at PF. Much evidence has already been offered to support this hypothesis (e.g. Marantz 1997, 2001, Halle & Marantz 1993, Embick and Noyer 2001, Harley and Noyer 2000, Bobaljik 1995, Bobaljik and Thrainsson 1998) focusing mainly on the insertion of

<sup>4</sup> A (not altogether) different theory of vocabulary insertion can also be found in Starke's (2006) Nanosyntax.

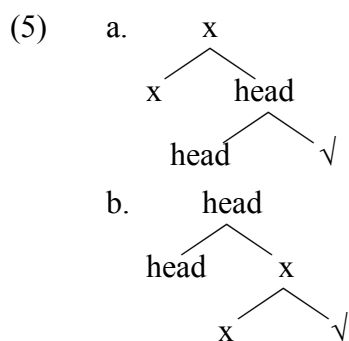
<sup>5</sup> See Chapter 3 for discussion of the spellout of person markers (e.g. 1SG in (3)) in C<sup>0</sup> in Ojibwa.

lexical items into terminal nodes. The work here expands upon the work of Marantz (2001) and Marvin (2002), focusing not on allomorphy and lexical insertion, but rather on cyclic interpretation at the interfaces. I investigate one syntactic operation, namely phase-by-phase interpretation, to determine whether phase edges have effects that are visible within words at the same syntactic positions that they have been argued to have effects in the phrasal syntax.

### **1.1.2 Bare roots and category-defining heads**

Before turning to a discussion of phases, one further proposal espoused by proponents of DM must be mentioned here, as it is crucial to all of the discussion that follows. DM holds that core lexical items (roots, or L-morphemes – see Harley and Noyer 2000, Marantz 2001) are category neutral. The category of a Root is determined derivationally within the narrow syntax. This proposal stems from data that give evidence that (i) roots may productively surface within words of multiple lexical categories (with restrictions that are not necessarily well understood) (4), and (ii) category-defining heads (or category features) being syntactic elements allows for the fact that some morphemes are phonologically and semantically closer to the root than others (Marantz 2001, Marvin 2002). Category-defining heads that are merged directly with a root morpheme (5a) are within the same cyclic interpretive domain as the root, while category-defining morphemes merged to non-root morphemes are not (5b), (to be discussed further below).

- (4) a hunt, a hunted girl, hunting for easter eggs



(5b) depicts the fact that in some cases morphemes (x) may merge to a root before a category-defining head has been merged. Morphemes merged at this point will select for certain roots, surface as phonologically and semantically ‘closer’ to the root morpheme, and may induce stem allomorphy. Morphemes that merge outside of the category-defining head will not have these properties (5a). Marantz offers the following Chichewa data as one example of these dichotomous behaviours.

- (6) a. Chimanga chi- ku- gul -idwa ku-msika.  
 corn AGR-PROG-buy-PASS at-market  
 ‘Corn is being bought at the market.’  
 [no idiomatic reading, and none possible with passive]
- b. Chimanga chi- ku- gul -ika ku-msika.  
 corn AGR-PROG-buy-STAT at-market  
 ‘Corn is cheap at the market.’  
 [idiomatic reading of ‘buy’ in the context of STAT] (Marantz: 2001)

Here the distinction between the stative and passive constructions stems from the level of affixation of the morphemes in question. The Passive morpheme attaches higher in the verbal domain (outside of applicative, causative, and category-defining (v) morphology), while the stative morpheme attaches directly to the root (and cannot attach outside the applicative, causative and category-defining morphology). The intuition here is that the stative morpheme is

merged lower than the category-defining head (which is phonologically null here), and is therefore interpreted concurrently with the root, allowing for the interpretive output to be idiomatic. The passive morpheme is, however, merged higher than the category-defining head, and is therefore not within the same interpretive domain as the root.

There is no strict modularity between morphology and syntax (e.g. (7)), and therefore no argument for a separate pre-syntactic morphological domain.

- (7)    a.     John **cried**.                      b.     **Did** John cry?  
        c.     John is **bigger**.                  d.     John is **more** intelligent.  
        e.     John **took a leap**.                f.     John **leapt**.                                (Marantz 2001)

These examples show that morphology and syntax perform the same compositional functions, and therefore “...proponents of Lexical Morphology and Phonology need to show why we should believe in Strict Modularity...the burden of proof is with them.” (Marantz 2001: 8)

Nevertheless, there are distinctions between morphemes that attach close to the root and those that attach farther away (the Level 1/Level 2 distinction in Lexical Phonology) and the proposal that category-defining heads mark this boundary syntactically offers a purely syntactic explanation for this phenomenon. Note that the exposition of that explanation is incomplete here. Why should root-attaching morphemes have the properties that they do (being interpreted within the phonological and semantic domain of the root), while the non-root-attaching morphemes do not? The remainder of the explanation must include a cyclic derivational device, such as the phase. In the following section we turn to the

notion of phase and see how it can be argued that this gives us the modular distinction seen above.

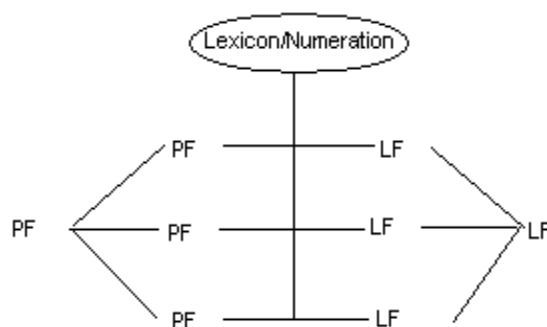
**1.1.3 DM summary** Let me reiterate the proposals of Distributed Morphology relevant to the analyses to follow. First, narrow syntactic operations take morphemes as their basic input – there is no pre-syntactic morphological module. This entails that syntactic operations known to apply within the Narrow Syntax are active within as well as across the domain traditionally thought of as the word. Secondly, the base step of the syntactic construction of words will always include the merger of some morpheme  $x$ , which may or may not be a category-defining head, with a category-less root morpheme( $\sqrt{\phantom{x}}$ ). In each derivation this category-less root morpheme will at some point be merged with a category-defining head, giving us items that fall under the categories noun, verb, adjective, adverb, and perhaps preposition.

These two fundamental assumptions of Distributed Morphology, along with the proposals introduced in the following section on phases, will lead us to some concrete predictions for a phonological module that perfectly mirrors syntactic structure.

**1.2 Phases: The domains of interpretation at the interfaces** Phases (Chomsky 1999, 2001, 2005) are the most recent in a long line of proposals about the cyclic nature of the narrow syntactic component of the linguistic computational system (see Boeckx & Grohmann 2005 for an overview of the

evolution of the phase). The central proposal underlying the notion of the phase is that the narrow syntax, where items from the lexicon undergo the operations Merge and Move (or remerger), sends outputs to the interface levels (LF and PF) at multiple points, as opposed to only once at the end of the derivation. Instead of the familiar T-shaped model of the derivational system (essentially as in (2), above), phases force us to look at the system as antenna-shaped (8). The convergences of LF and PF may also occur in stages, but here are depicted as occurring all at once at the end of the derivation.

(8) Derivation with phases



The literature on phases is substantial, and I will not defend particular previously proposed phases here, as this would take us too far afield of the matter at hand. What is to be undertaken here is a study of whether there is evidence for the proposed cyclic domains within the phonology of words. I will therefore limit the discussion here to what the proposed domains, or phases, are. These phases were originally considered to be only agentive  $\nu$ Ps<sup>6</sup> and CP (Chomsky 1999), but have subsequently been argued to be more numerous. Legate (2003) has argued

<sup>6</sup> In the following discussion  $\nu$ P=voice phrase.  $\nu$ P =the domain defined by a category-defining verbal head and the morpho-syntactic structure that it dominates. For the distinction between  $\nu$ P and vP see Pylkkänen 1999, 2000)

that unaccusative and passive  $\nu$ Ps constitute phases as well. It has also been suggested that the phase is triggered by certain category-defining functional heads, including  $\nu$ P and CP, but not necessarily limited to those two (see Matushansky 2004 for discussion of determining whether there are nominal phases, or DP phases). Subjects and adjuncts have also been proposed to be separate domains of interpretation, or spell-out domains (Uriagereka 1999).

Specifically, and importantly for the discussion in this thesis, Marantz (2001) has proposed that phases be defined as follows (where ‘little x’ = a category-defining head);

Derivationally, little x’s determine the edge of a cyclic domain (a “phase” in Chomsky’s recent terminology). Thus the combination of root and little x is shipped off to LF and PF for phonological and semantic interpretation,...

This notion of phase can be reconciled with the original proposal by defining a phase as being triggered by certain functional heads, namely category-defining heads, DP,  $\nu$ P, and CP (for argumentation on why TP is not a phase see Chomsky 1999, for argumentation that it is see Marušič 2005). Chomsky (1999:14) allows for the possibility that "Phases are [any] configurations of the form F-XP, where XP is a substantive root projection, its category determined by the functional element F that selects it." Therefore, according to the tenets of DM, substantive categories like nouns, verbs and adjectives qualify as phases, since they contain category-defining elements. Investigations into these ‘little xP’ phases can be seen in Marantz (2001), Marvin (2002), DiSciullo (2005), and Arad (2005), among others. CP and  $\nu$ P, while not strictly falling under the definition above, have been shown to be the landing points of successive-cyclic syntactic

movement and are therefore cyclic domains. Summarizing the discussion so far, the phases to be examined here are as follows;<sup>7</sup>

- (9) CP, DP, vP, vP, nP, aP

Now that the phases to be discussed have been laid out, the question becomes the following; what do we predict, based on the assumptions that these are the cyclic domains interpreted at the interfaces, to occur at PF?

### 1.2.1 Spellout domains : Distinctions among phases

This section

delineates exact spell-out domains resulting from the different phases listed in (9). There is a principled distinction between the phases listed above; where the interpretive behaviour of the CP, DP, and vP phases differs from that of the vP, nP and aP phases. It has been proposed (Chomsky 2001, Nissenbaum 2000) that when a phase is sent to the interfaces for interpretation it is the complement of the phase head ( $C^0$ ,  $D^0$ ,  $v^0$ ,  $v^0$ ,  $n^0$ ,  $a^0$ ), and crucially not the entire phase, that undergoes interpretation. The effects of the Phase Impenetrability Condition (PIC) can be derived from the proposal that the complements of phase heads undergo spellout.

- (10) Phase-Impenetrability Condition (Chomsky 2001)

In a phase  $\alpha$  with head H, the domain of H is not accessible to operations outside  $\alpha$ , only H and its edge are accessible to such operations.

Complement spellout domains can account for the fact that overt extraction out of the complement of a phase head is not possible.

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<sup>7</sup> Only a subset of the domains in (9) have been proposed to be landing sites for successive-cyclic movement, another proposed indicator of phase-hood. One might ask whether I am conflating two very different notions of phase here (my thanks to Jon Nissenbaum for bringing this to my attention). I contend that it is not the case that a landing site for movement is not a necessary property of phases, and discuss this further in the following sections.



That members of  $vP$ ,  $DP$  and  $CP$  are not prevented from undergoing further syntactic operations can be seen in (11).

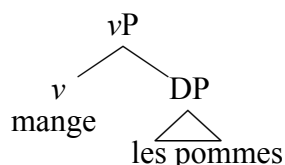
- (11) a. Il mange souvent les pommes.  
 b. He often eats apples.  
 c. What does Mary think that Jack stole?  
 d. Who did John take a picture of?

In (11a), in comparison to (11b), we can see that the verb in French can move out of the  $vP$  phase to a position in the higher functional structure, as the adverb *souvent* marks the edge of  $vP$  and surfaces to the right of the verb (Pollock 1989).

In (12c) we can see that the object of the embedded verb can move out of the embedded  $CP$  when not blocked by another *wh*-element. In (12d) we can see that the *WH*-word *Who* has moved successfully out of the  $DP$  headed by *picture*.

What these examples entail is that the  $vP$ ,  $DP$  and  $CP$  phases undergo derivations that include the steps in (12).

- (12) a. Merger of elements within  $vP$ : mange les pommes



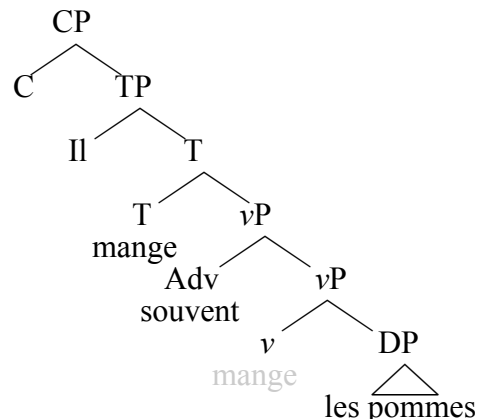
- b.  $vP$  phase interpretation: mange [*les pommes*]. [*les pommes*] undergoes PF and LF interpretation. The members of the complement of  $v$  are no longer visible for syntactic operations<sup>8</sup>

<sup>8</sup> The entire complement domain, of course, may still be targeted for movement.

(i) Quoi<sub>i</sub> mange-t-il souvent t<sub>i</sub>?

Also, the proposal that the complement domain is invisible for all further operations is not held in all of the literature cited here. Namely, Nissenbaum (2000) offers evidence that this is not the case, as adjuncts may target nodes in previously interpreted domains, and that post-spellout movement is possible, but is covert (only having effects at LF). The proposal regarding post-spellout adjunction is supported by evidence in Ch. 4 of this thesis. Even the proposal that the operation Move cannot be overt after interpretation – which is the operation relevant to the discussion of (12) – has been questioned in Fox and Pesetsky (2004).

- c. Merger and movement of elements within CP: *Il mange souvent [les pommes]*



- d. CP phase interpretation: [*Il mange souvent les pommes*]. [*Il mange souvent les pommes*] undergoes PF and LF interpretation. The members of the complement of CP are no longer visible for syntactic operations

The claim in (12b) that the elements within the interpreted domain are no longer visible to syntactic operations is argued in Nissenbaum (2000), among others, to not be the case, but will suffice for now. It does certainly seem to be the case that movement operations can no longer target elements in the interpreted domain.

### 1.2.2 Little xP domains

The question then becomes whether or not the vP, nP, and aP phases have the same properties with regards to interpretive domains as do the vP and CP domains. If the answer were yes, we would expect the head of a vP, aP or nP phase to be permitted to move away from its complement (as in 13a), and would expect that complements in these cases would be permitted to escape interpretation within the phase through movement (as in 13b). Neither of these expectations is supported by the data.<sup>9</sup>

- (13) a. \*ning<sub>i</sub> has been seen light-*t*. (c.f. Lightning has been seen)

<sup>9</sup> This is true for derivational morphemes, but may not be for inflectional morphemes. See the discussion of stress in Cupeño in Chapter 2.

b. \*light<sub>i</sub> has been seen *t*-ning.

Examples of movement out of a domain delineated by a category-defining head are always ungrammatical.<sup>10</sup> This has been formulated in the literature as the Lexical Integrity Principle, which states that words are syntactic atoms, and that no syntactic processes may target elements internal to a word. Within the Lexicalist framework this principle is argued to be due to the fact that words are created in a pre-syntactic morphological component, and that the input to syntax is therefore unanalyzable words. Within a theory such as Distributed Morphology, where words are created in the syntax, this is no longer a viable principle. What then leads to the fact that movement out of a word is impossible?<sup>11</sup>

First, under the assumptions here, a word cannot be defined over any domain that is not phonological, and therefore there can be no restrictions specific to the word domain within the Narrow Syntax. That said, the category-defining phase heads, under Phase Impenetrability, define domains out of which movement is impossible.<sup>12</sup>

(14) [<sub>a</sub>[<sub>v</sub>cat]<sub>y</sub>] = catty

Assuming that small phases have the same properties as the *v*P, DP, and CP phases above, after interpretation at the interfaces we would expect the complement of the phase head, here *cat*, to be inaccessible for further syntactic

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<sup>10</sup> It is therefore difficult to construct examples of possible violations. (16a) can be independently ruled out by the Head Movement Constraint (Travis 1984), and (16b) might be ruled out by a ban on monomorphemic *X*<sup>0</sup> movement to a specifier position. However, this movement is permitted within the Bare Phrase Structure framework (Chomsky 1995).

<sup>11</sup> That movement of morphemes out of a word is impossible has been challenged in the literature on separable particle verbs (Booij 1990, Johnson 1991, Zeller 1997, 1999 among others). This issue will be resumed in Ch. 4.

<sup>12</sup> Note here that we are discussing head movement. If argument XPs are merged internally to *x*Ps then XP movement out of these domains must be accommodated.

operations such as movement. What is not predicted here is that the phase head itself, here *a* – realized overtly as *y*, should also be inaccessible to narrow syntactic operations. It is here where an obvious distinction between the *v*P, DP, and CP phases on the one hand, and the *v*P, *a*P, and *n*P phases on the other hand, emerges.

### 1.2.3 Non-movement out of *x*P phases

I suggest here that the reason

we do not see movement out of ‘word’ domains is due to differences in the featural make-up of the two groups of phase heads. Movement is triggered by the necessity that features be checked in a local relation – where the relevant features are generally assumed to be agreement and case-related. As agreement and case are more often features of DPs than *n*Ps, *a*Ps, or *v*Ps, movement operations triggered by syntactic objects in a higher phase that target derivational morphemes are not expected to be common. In cases where heads are targeted for movement, the Head-Movement-Constraint (Travis 1984) independently rules out movement from within, or across, other heads. Either way, movement out of a complex head, or out of an *a*P, *n*P, or *v*P, can be ruled out independently of the eventual word-hood of their component parts.

This featural property can give an explanation for why interpretation of *x*P phases includes the head, while interpretation of *v*P, DP, and CP phases does not necessarily include the phase head. Simply, it is only when an element has remaining uninterpretable features at the point of interpretation that it will be necessary to target it for further checking and movement operations. We can

therefore assume that uninterpretable features cause non-interpretation of a morphological object at the interface.

Therefore we can conclude that xP phases do not have an uninterpreted edge, as no elements within these phases carry uninterpreted features which would trigger further movement operations. The explanation for the non-movement of category-defining heads is that, unlike the heads of vP, DP and CP, they undergo interpretation along with their complement. As phonological interpretation bleeds visibility for further syntactic operations, we do not expect the phase head to move overtly.<sup>13</sup> Evidence for this proposal comes from the behaviour of what have been called Level 1 affixes in the Lexicalist literature. Under present assumptions (Marantz 2001) these Level 1 affixes are those morphemes that merge directly with root morphemes. Interestingly, these morphemes always surface within the same phonological domain (phonological word) as the root morpheme which they dominate.

- (15) a. *hórmone~hormónal* (c.f. *hórmone~hórmoneless*)  
 b. [twɪŋklɪŋ] vs. [twɪŋkəlɪŋ]

In (15a) we have an illustration of the fact that root-attaching affixes (*al*), unlike affixes that attach outside of the category-defining head (*less*), may affect stress assignment in the domain that includes the root morpheme. Under

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<sup>13</sup> In this thesis I do not touch on the overt movement of complements out of xP phases. If there is no movement to the edge of an xP phase, we must assume that complements in xP phases are specifiers (merged at the edge) (i) rather than in complement position (ii).

i. [aP [a' [a Ø] [√proud] ] [of Mary] ]

ii. [aP [a Ø] [√' [√proud] [of Mary] ] ]

This permits extraction of xP phase objects, as in (iii).

iii. Who<sub>i</sub> are you proud of t<sub>i</sub>?

Thank you to Jon Nissenbaum for the above solution.

assumptions to be laid out in the following sections, this can only be the case under circumstances where the root and the category-defining head are interpreted within the same phonological domain.<sup>14</sup> In (15b) we have two words, both derived from the overt morphemes *twinkl* and *ing*.

Marvin (2002) examines in detail the distinction between these two derivations, which can be summarized as follows.

- (16) a. [[*twinkl*<sub>v</sub>]*ing*<sub>n</sub>]                      ‘a short moment’  
       b. [[[*twinkl*<sub>v</sub>]*Ø*<sub>v</sub>]*ing*<sub>n</sub>]                ‘the act of twinkling’

In (16a) we have a derivation consisting of the root *twinkl* and the category-defining nominal head. There are two pieces of evidence that these morphemes are interpreted within the same phase. First, at LF, because the semantics of the root and the category-defining head have not been previously interpreted, the combined meaning of the root and category-defining head may emerge as idiosyncratic. Secondly, schwa-insertion – which breaks up the illicit final cluster in *twinkle* – fails to apply. This is due to the fact that the final *l* is syllabified with the affixal material. Needless to say, this option could not be available if the head of the phase was not interpreted until a following cycle. In (16b) the first phase is defined by the null verbalizing head. Here, LF interpretation gives us the verbal meaning associated with *twinkle*, and PF interpretation includes schwa insertion, as the string-final sequence is illicit. Upon interpretation of the subsequent nominalizing phase neither of these properties determined at the vP phase are altered.

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<sup>14</sup> There is more than one mechanism by which two morphemes may be included in the same spell-out domain. Initial interpretation within the same phase is one, while phonological movement is the other. This phonological movement must be triggered by phonological considerations and will be discussed further in the following sections. See also Ch. 3.

### 1.2.4 Summing up phases

What is most relevant for our forthcoming discussion of phase-by-phase interpretation is the generalization that root morphemes will never undergo phonological interpretation unaccompanied by the interpretation of their dominating derivational category-defining head, while Chomsky's strong phases,  $\nu$ P and CP, as well as DP, will induce interpretation of their complements only.

- (17) a. Complement-Interpretation phases:  $\nu$ P, CP, DP  
 b. Total-Interpretation phases:  $\nu$ P, aP, nP

At this point we can understand how cyclic derivation leads to phonological (and semantic) domains within words. At each phase interpretation creates a discrete domain where phonological and semantic rules apply. After interpretation, further merger can lead to larger domains that encompass but do not, under perfect assumptions, alter these previously created domains. Under certain assumptions about the phonological system, to be laid out in the following sections, we can determine whether phonological interpretation mirrors the syntactic derivations discussed in this section in ways that can be described as perfect.

### 1.3 PF interpretation: the input

Before examining just what the predictions are for a phase-based analysis of phonological interpretation let us discuss briefly the domain of phonological study within which the following chapters are situated. In this work, I focus on main stress patterns within words,

examining whether the patterns in various languages give evidence for a phase-based phonological interpretive system at the word, and sub-word, level.

Morpho-syntactic influence on phonological output has been an increasingly popular topic in the literature of the past few decades, and much of the recent work on the phonology-syntax interface has focused on the interaction of syntax and phonology at the phrasal level, (Kratzer and Selkirk 2007, Truckenbrodt 1999, Cinque 1993, Selkirk 1984, Zubizarreta 1998, Chomsky and Halle 1968, Wagner 2004, Arregi 2001, Kahnemuyipour 2003 and many others.) I will briefly discuss the relevance of the findings therein, focusing on the Null Theory of Phrasal Stress promoted in Cinque 1993.

What Cinque has shown is that there is a tendency within phrasal phonology for more deeply embedded morpho-syntactic objects (words) to carry main phrasal prominence. The Nuclear Stress Rule (NSR), reformulated in Cinque as the Null Theory of Phrasal Stress can be summed up as the proposal that “stress prominence in a phrase is a mere reflection of depth of embedding” (Cinque 1993: 245).<sup>15</sup>

- (18) a. John bought a book.  
       b. Ali ye ketaab xarid  
           Ali a book bought (Kahnemuyipour 2003)

In each of the above examples main prominence falls on the object of the verb – the most embedded constituent. This realization of stress is not due to word order, as in English (18a) the object follows the verb, whereas in Persian (18b) the

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<sup>15</sup> Although see Kahnemuyipour 2003 for an alternate view.



object precedes the verb.<sup>16</sup> In each case, the object is the most deeply embedded element, as syntactic headedness has opposite parameters in the two languages (contra Kayne 1994).

This outcome is expected within a theory of linguistic computation that includes phase-by-phase PF interpretation. Spell-out of the verbal complement, [a book], will occur at the most embedded cycle within the  $\nu$ P phase – nP/DP, and subsequently the verb will undergo phonological interpretation at the CP phase. The subject DP, as it must involve internal merger operations prior to its own merger into the subject position, is what Cinque terms a ‘minor path of embedding’. It is not merged to ‘the major path of embedding’ in a manner that results in all of its components entering into dominance relations with all previously merged items. It therefore must be interpreted phonologically on a separate cycle from that of the major path of embedding. This is congruent with Uriagareka’s (1999) notion of command units, Johnson’s (2003) numerphology account of adjunct islands, and with the proposal that DPs, having similar

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<sup>16</sup> There are many instances in which this direct mapping of most embedded constituent to main prominence is violated (see Kahnemuyipour 2003, Zubizarreta 1998 etc.). These perturbations will not be discussed here. Likewise, the influence of focus will not be examined herein. Word stress *can* be affected by focus as can be seen below (where focus/contrastive stress is indicated in bold). I will assume that this is due to the same factor that leads to focus stress in phrases.

ia) Did she get an **educating**?

ib) No, she got an education**.** (stress not affected by focus/contrast would fall on the penultimate syllable)

Kratzer and Selkirk (2007) expand upon Kahnemuyipour’s work and propose that it is the highest phrase within a phase that receives ‘major stress’, or phrase stress. As they note, this ‘highest phrase’ condition is not necessary in the examples above if it is the case that DPs are phases. That DPs are phases does not, however, eradicate the problem of explaining why low PPs do not receive the main stress in the  $\nu$ P phase when an object is present. Putting this issue aside, I note that the account of word stress offered in this dissertation need not reference PF sensitivity to syntactic labels, and that this referencing may not be possible under a phase based account if one assumes that at the point where Phonology has access to the domain of spellout phrases do not exist. It would be in line with the proposals herein to determine an alternate solution to phrase-referencing to explain stressing on VP-internal PPs.

functional-lexical structure to CPs, are also phases, hence spell out domains. The subject is therefore not a part of the relevant path of embedding within which main phrasal stress is determined. It falls out from this derivation that the most deeply embedded element will be interpreted first, and any prominence assigned within this first phonological cycle will be visible to later cycles along the same path of embedding, giving it an advantage in that each subsequent cycle includes a main prominence from the outset of its computation – in essence preventing it from assigning another.

Although it has been shown that both the Nuclear Stress Rule and the Null Theory are subject to exceptions, they can be shown to apply in a number of environments, and in languages from many different families. This being the case, it does seem that phrasal stress, in the default case, mirrors the syntactic derivation in a way that can be considered perfect. As Cinque notes, there is nothing inherent in any purely phonological methodology that derives this reflection of syntactic structure, indicating that prosodic domains must, at least in some cases, “be directly syntax driven,..” (pp.257). Let us therefore take the null hypothesis to be that where a language does not adhere to perfect mirroring of the derivation that there are other requirements at PF causing syntax-phonology mismatch.<sup>17</sup> Note that divergences must, under these assumptions, be purely phonological. Any time the syntactic structure affects the phonological outcome this is perfectly in line with the null hypothesis. A detailed study of these

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<sup>17</sup> Where I must note, as Cinque does, that this assumes a perfect knowledge of the syntactic structure of any language to be studied, a task that is difficult at best.

mismatches is not within the purview of this dissertation, but they are of interest and will be noted when relevant.

Note that the existence of these mismatches does not entail that the sensory-motor(S-I) interface allows imperfections, however. Chomsky (2005) argues that the syntax seems designed to be interpreted by the conceptual-intensional(C-I) interface, and this is why the Narrow Syntax and the semantic output seem to mirror each other closely. That the syntactic input and the S-M output do not mirror each other as closely is, he argues, evidence that the S-M output is an imperfect mapping. Perfection in either the phonological or semantic representations must conform to S-M requirements on one side, and C-I on the other. If the principles of the PF/S-M branch of the interpretive system can be fully understood we might find that the phonological output is indeed perfect – in that it does not violate any ‘...principles of computational efficiency...’ (3-4). I propose that there are conditions imposed at the S-M interface that cause mismatches between the syntax and the phonological output, and that this implies not that the S-M output is imperfect, but rather that it is perhaps more complex than the mapping to the C-I interface. If a full account of the environments in which these mismatches occur, and the mechanisms used to derive them, can be formulated, then we may find that the PF branch of the derivation is optimized, hence perfect. It is within this domain of inquiry that the following chapters are situated.

### 1.3.1 Deriving phonology from the syntax without recourse to the syntax

Before going on to discuss sub-phrasal derivations in detail, I would like to make clear the relevant properties of the syntactic and phonological systems assumed throughout this work. They can be informally summarized as follows;

- (19)     a. Phonology does not directly refer to the narrow syntactic structure.  
           b. The syntax does not consider the output of the phonology.

Consider the first step in Cinque's interpretive mechanism, 'Interpret boundaries of syntactic constituents as metrical boundaries' (pp. 244) What is fundamentally wrong with the intuition behind this step is, I propose, that syntactic structures interpreted by the phonological system do not contain, in any real sense, boundaries. At the point of phonological interpretation, syntactic information is simply not available. Consider the derivation of the DP 'a book'. Assuming DP is a phase, or an interpretive cycle, the DP is sent along the path to phonological form. At the point where this DP enters the interpretive branch of the computational system it is comprised solely of a hierarchical organization of feature bundles.

- (20)      $[_{DP}[_D [-\text{definite}]] [_{nP} [\text{lexical root}]]]$

Ignoring for now the nP phase and its internal structure, and assuming for the moment that the D head is interpreted with its complement, the first stage of interpretation along the PF branch is Morphological Structure(MS). At MS any dissociated morphemes will be inserted or lowering operations will occur, but these are not relevant in this thesis.<sup>18</sup> The next step in the derivation is vocabulary

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<sup>18</sup>     Dissociated Morphemes (Embick 1997) are overt morphological items that are not realizations of syntactic heads – i.e., agreement morphology. Other operations, such as Impoverishment, Fusion, and Fission may occur at MS, but are not relevant here.

insertion, or the replacement of the feature bundles with stored phonological forms – where stored forms contain all phonological information that must be memorized. These memorized forms will therefore include segmental information, but not predictable information such as syllable or foot structure.<sup>19</sup>

(21) [DP[D [a] [nP [book]]]]

Notably, this insertion proceeds from the most embedded to the least embedded morpheme in the relevant structure. Bobaljik (2000) has argued that (i) morphemes may be sensitive to the morpho-syntactic features of outer lexical items, and (ii) that outer lexical items may be sensitive to the phonological shape of inner lexical items, but not to their morpho-syntactic features. What this entails is that lexical insertion overwrites, or uses up, all syntactic information projected by a lexical item. A more detailed depiction of lexical insertion, beginning with the most embedded node and progressing outwards is therefore as follows.

- (22) a. [DP[D [-definite] [nP [lexical root]]]]  
       b. [DP[D [-definite] book]]  
       c. a book

As the projection of all aspects of nP derive from the features of the bundles within nP at (22a), lexical insertion erases all projections derived from these bundles, giving (22b). The same is true for the [-definite] D. Once lexical insertion applies D, and therefore DP, cannot be projected; they are no longer objects within the interpretive derivational space.

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<sup>19</sup> Some phonologists (e.g. Inkelas and Orgun 2003) have argued that syllabic information is present in the lexicon. I assume here that this is not the general rule but do not exclude the possibility. For certain lexical items to undergo lexical insertion with syllabic information present does not preclude the analysis I present here.

After lexical insertion, only purely phonological processes may apply, as only purely phonological items are available within the derivational workspace. It is here where operations such as Local Dislocation that are sensitive to linear order may apply (Embick and Noyer 2001). Only once the linear order of the lexical items within a cyclic domain have been determined can the phonological interpretation that includes building syllables, feet, phonological words, etc... ensue. But crucially, at this point in the derivation there can be no recourse to syntactic structure, as it is no longer present.

This does not mean that I am disagreeing with the intuition that syntactic structure drives phonological form, what I propose herein is, as I have stated, exactly the opposite. The syntactic derivation drives phonological interpretation, but not by having phonological form read syntactic structure. Syntax is responsible for the timing of phonological interpretation, as phases are syntactically defined. It is the fact that phases correspond with domains that can be equated with phrases in many cases that it appears that phonology can ‘see’ syntactic structure. The truth of the matter, however, is that the syntactic boundaries that are referenced in Cinque (1993), and many other works on the syntax-phonology interface, notably Selkirk (1984), are replicated in the phonology because of the fact that, after linearization, there is a beginning edge (the transition between no phonological information and the first segment) and a final edge (the mirror image) within the phonology that cannot demarcate a domain that differs in size from that of the phase from which it was derived. In

other words, the phonology interprets the feature bundles in domains of a size determined by the spellout mechanism.

### **1.3.2 The Narrow Syntax is phonology-blind**

The original conception of phases included the notion that phases lessened the computational burden by removing from the narrow syntax items that are no longer syntactically active. The Narrow Syntax, at the derivational point of the phase, is interpreted by PF (and LF). Any elements in the narrow syntax that have all of their features valued (they are no longer probes or goals) may be interpreted at PF and subsequently ‘forgotten’ by the narrow syntactic computational system (contra Nissenbaum 2000 and others). It is this notion of ‘forgotten’ that I would like to address in this section.

What the above intuition entails is that the syntactic component is cognizant of the phonological state of the various phases within it. If we have a syntactic object X, comprised of the phases A, B, and C as follows; [A[B[C]]], then it must be true that during the construction of phase B, phase C (at least the parts that have undergone PF interpretation) are not visible to elements within B – either because they are no longer syntactic objects, or because they are no longer present at all. Chomsky argued that this reduces the computational burden – essentially stating that remembering the structure of the previous phase is more computationally complex than not remembering. I do not disagree with this conceptual statement necessarily, although I am not clear on how computational complexity is determined here (see also Fox and Pesetsky 2004).

Nissenbaum (2000) altered the above perception of the phase, demonstrating that it is untrue that the syntactic structures of previously interpreted phases are no longer accessible in the narrow syntax. In chapter 4 I will offer evidence, supporting Nissenbaum (2000), that the narrow syntax must have access to the syntactic structure of phases that have already undergone interpretation.

If the Narrow Syntax remains syntactically active after the interpretation of a phase, then it must be the case that phonological interpretation applies in such a way so as to both destroy and preserve syntactic structure. I have explicitly stated that phases will give us the appropriate tool to explain word-level main stress systems in a perfect way. PF interpretation crucially replaces syntactic structure – there is no syntactic structure at PF. Issues of computational complexity aside, we have evidence for cyclic phonological interpretation, and it will be shown that we have evidence for syntactic operations targeting positions in the narrow syntax that have already undergone interpretation (as in Nissenbaum 2000). What occurs upon spell-out of a phase is that the phonological interpretive system reads off of the syntactic structure without altering it, and without carrying syntactic structural information into the phonological domain.

Within the narrow syntactic component nothing is affected by or has the ability to reference the copies sent to PF. It contains syntactic structure all the way down, for the duration of the computation. This entails that a position within, say, the object DP, can be targeted for further syntactic merger on a later



phase, as is proposed by proponents of Late Adjunction, as originally formulated by Lebeaux (1988). Late Adjunction involves the merger of a syntactic object to another in a manner that violates the Extension Condition. It will be argued in Chapter 4 that this type of merger offers insight into the emergence of bracketing paradoxes and other morpho-phonological puzzles. Notably, this Late Adjunction will be argued to target syntactic positions that are within phases that have already undergone interpretation. This being the case, we have evidence that interpretation does not affect syntactic structure.

At PF each copy will be interpreted, creating a phonological item that will be stored and eventually combined (in ways to be discussed in the following section) with the outputs of following phases. These outputs are purely phonological objects, and therefore are never the basis for further syntactic computation.

Nissenbaum's (2000) arguments for complement-spellout explain how the Narrow Syntax can be syntactically active while barring overt movement. All syntactic elements will surface in the position in which they are originally interpreted by PF. Overt movement occurs through the 'escape hatch' of the phase edge, while covert movement occurs after PF interpretation. This conception of phase interpretation is formalized as the Phase Impenetrability Condition.

(23) PIC: The domain of H is not accessible to operations *at ZP but only H and its edge*

The PIC describes the generalization that interpreted domains are islands, where elements inside the interpreted domain cannot be targeted for movement

operations.<sup>20</sup> I have proposed that H – the phase head – may not always be a part of the uninterpreted edge, depending on its featural makeup. We can know which elements will (or must) undergo further syntactic operations based on the status of their functional features. Unvalued features need to be valued prior to interpretation, and are the impetus behind movement. Therefore all elements within a phase that contain features not valued by the end of that phase must move to the periphery to escape interpretation. All elements that have their features valued will not move, and will therefore be interpreted. Consequently, it is not the case that interpretation causes islands, but rather that interpretation operates on domains containing only syntactic objects that are fully valued. Therefore, we do not expect elements within the interpreted domain of a phase to undergo further movement operations regardless of whether interpretation causes syntactic structure to become opaque within the narrow syntactic domain.

To sum up, phonological interpretation proceeds phase-by-phase. The domain of interpretation is determined by the syntax: the largest domain within the phase that contains no unvalued features will be copied and sent to the interpretive (PF and LF) systems. Syntax will proceed in parallel with this interpretation and is not altered by this interpretation. At PF and LF, the output of each phase is stored and integrated according to the principles that are operative in each branch of the computation.

#### **1.4 PF interpretation: the output**

To bring us back to the issues

raised at the beginning of the chapter, we must now answer the question of what it

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<sup>20</sup> See Fox and Pesetsky 2004 for an alternative view of phase-island effects.

is that is expected to occur at the PF interface that results in a ‘perfect’ mirroring of the syntactic structure. One way the system could be said to be perfect is if the phonological domains produced coincide exactly with the cyclic domains needed independently within the narrow syntax. I will take it to be a given that phases, as defined above, are the relevant syntactic cycles, recognizing that there is still much work to be done on the subject. As a starting point, therefore, we expect to be able to see evidence of each phase in the phonological output. We will see two patterns of evidence in the following discussion. The first kind of evidence shows that phonological rules and projection of prosodic structure do not span a phase boundary. The second kind of evidence stems from two different patterns of main prominence marking.

**1.4.1 Non-spanning of phase boundaries**      Possible evidence to look for at the word level to show that phonological rules and structures do not span phase boundaries would be consistent breaks in the projection of prosodic domains or the non-application of phonological rules across a phase boundary. In Chapter 3 we will see that this is exactly the case in Ojibwa, where feet do not cross a phase boundary, and hiatus resolution (to be discussed in Ch. 3) occurs only phase internally.

Ojibwa feet are iambic and syllables are exhaustively parsed from left to right. Degenerate feet (containing a single light syllable) are therefore only permitted at the right edge of a domain. In the following example the antepenultimate syllable *mi* should optimally be footed together with the

penultimate syllable *gi:*, if the entire verbal word were a single domain (as in 24c.), but this is not the attested output.

- (24) a. (nibǐ:)(mí)(ǵǐ:)(wè:) 'I walk on home'  
 b. [ni[[bi:mi-Ø][ǵi:we:-Ø]]]  
     [1P[[ALONG-FIN<sub>NP</sub>][GO HOME-FIN<sub>VP</sub>]<sub>VP</sub>]<sub>CP</sub>]  
 c. \*( nibǐ:)(mǵǐ:)(wè:)

The reason for this non-optimal footing is that these two syllables belong to separate phases, as can be seen in (24b)<sup>21</sup>. It is always the case in Ojibwa that footing does not cross a phase boundary. Therefore, we have an example of the phonology of Ojibwa mirroring the syntax in a way that can be deemed perfect – where the phonological and syntactic domains are parallel.

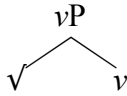
What we must assume from this, and from other evidence in the rest of this work, is that projection of prosodic domains must therefore be exhaustive at the phase level. Whether this projection is depicted as within Metrical Theory (Lieberman 1975, Lieberman and Prince 1977, Halle and Vergnaud 1987) or Prosodic Phonology (Nespor and Vogel 1986, Selkirk 1980), what is apparent is that syllables, feet, and prosodic words must be computed at the point of interpretation for each phase. The phonological computation does not have the capacity to ‘wait’ or ‘look ahead’ to a subsequent cycle – PF interpretation is complete at each phase.

What is also apparent from the above example is that prominence, here main stress, is computed over a domain that is larger than the phase. I have defined a word previously as the domain of main prominence assignment. In

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<sup>21</sup> The footing of the 1sg person marker will be discussed shortly.

(24a) the domain of main prominence assignment, here stress, is the entire string; *nibi:migi:we:.* Main stress falls on the antepenultimate foot, while the heads of all other feet in the word receive secondary stress. In this sense, we can see that prominence assignment (the marking of a head of the PW, e.g. with main stress) must be dissociated from the projection of phonological domains (Piggott 2000, Hayes 1995). Let us consider the derivation of (24) to see why this must be so.

- (25) a. First phase:
- i. merge: 
  - ii. copy to PF
  - iii. insert lexical items: gi:we:     $\emptyset$
- |     |     |                                 |
|-----|-----|---------------------------------|
| x   | x   | prosodic word<br>foot structure |
| (x) | (x) |                                 |
- iv. Compute Metrical Structure:    gi:we:

In the above the head of the prosodic word is undetermined, in that no foot has been assigned greater prominence than the other at the PW level, but both heads of feet are possible loci for stress marking. If prominence marking was part of the projection of prosodic structure it would necessarily be assigned here, assuming no look-ahead. Were that the case, one of the heads of the feet in (25a(iv)) would be assigned more prominence than the other, assuming that the PW must have a unique head. As this is not the case we must return to our original conclusion, that main prominence assignment and prosodic projection are dissociated.

Returning to the derivation, the aP phase is computed, giving the PF in

(25b)

- (25) b.
- |       |                                 |
|-------|---------------------------------|
| x     | prosodic word<br>foot structure |
| (x x) |                                 |
- bi:mi

This is (obviously) not the ultimate prosodic structure for this phase, but there must be a cycle where this is the predicted output. In fact, in *bi:migi:we:* ‘he walks on home’ *bi:mi* constitutes a foot in the surface output. What perturbs the structure in (25b) is the prosodification of the 1sg person marker *ni* upon PF realization of the CP phase.<sup>22</sup> At PF, foot structure must be projected. Yet in this (CP) phase no iambic foot is possible, as *ni* is a single light syllable. What occurs here is what I call prosodic cliticization (or P-cliticization) throughout the rest of this work.

- (26) P-Cliticization: A prosodic element may merge inside a linearly adjacent prosodic domain for prosodic purposes.

Although the above definition is broad, it suffices to capture all of the relevant phenomena, and to distinguish P-cliticization from syntactic cliticization analyses. Restrictions on P-cliticization will be refined throughout this work.

What is obvious here is that the projection of prosodic structure at the CP phase in (24) can proceed in two ways; (i) *ni* can project a degenerate foot, and continue projection of prosodic structure from there, or (ii) a PF operation can ‘repair’ the input to prosodification so that *ni* is footed optimally, avoiding an illicit prosodic word at the CP phase. The second option is taken in Ojibwa. *ni* undergoes P-cliticization to the adjacent phonological domain, namely the Prosodic word projected by *bi:mi*. Here re-footing must occur to preserve proper projection within the prosodic hierarchy (which would be violated by having a syllable adjoin directly to a P-word), and the left to right iambic parse is recomputed, giving the attested output in (27).

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<sup>22</sup> The exact syntactic position of subject person markers in Ojibwa will be re-examined in Ch. 3. No modifications presented there impact the discussion here.

- (27)    x        x                prosodic word  
           (x x) (x)               foot structure  
           nibi:mi

We have still not finished with the entire story however. We must now ask why a degenerate foot is permitted at the right edge of the aP domain, as in (27). This degenerate foot (*mi*) could also be avoided by another operation of P-cliticization targeting the PW projected at the vP phase (*gi:we:*). Here we must propose that P-cliticization only occurs when a degenerate foot cannot be dominated by a PW within its own phase. In the case of *nibi:mi*, the licit foot *nibi:* is sufficient to allow projection of a PW – hence the restriction on PW shape that causes P-cliticization of *ni-* is that a P-word may not consist of a single degenerate foot in Ojibwa. There is a licit P-word within the cyclic domain including *mi* in which *mi* may be included, and therefore P-cliticization of this degenerate foot to the PW projected in the vP phase will not occur. Therefore P-cliticization is a last resort, and degenerate feet will always be allowed in Ojibwa at the right edge of a P-word, so long as they are not the only constituent within that P-word.<sup>23</sup>

In chapter 3, we see that hiatus-resolution in Ojibwa, like foot projection, does not cross a phase boundary. Furthermore, the manner in which a hiatus is resolved supports the P-Cliticization analysis above. These are only a few of the examples to come that illustrate the first prediction above that projection of

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<sup>23</sup> We will see one exception to this generalization in Ch. 3.

(i)    [[(bí)][(dagò)(ʃin)]]        ‘he arrives here’  
           here-arrive

Here the adverbial modifier *bi* is a degenerate foot, and must independently project a PW. Further investigation must be performed to determine whether it is an exception or a principled divergence from the norm. There are principled reasons to expect divergence in the case mentioned.

prosodic structure and the application of phonological rules are bounded by the phase.

#### 1.4.2 Two patterns of prominence marking

The second type of phonological evidence for the perfect mirroring of syntactic phases in the phonology can be seen in main prominence marking domains within languages. As we saw in Ojibwa above, main stress assignment must be dissociated from prosodification at the phase level. I repeat the evidence below, where ‘(’ =foot boundary and ‘[’ =phase boundary.

(28) [(nibi:)(mí)][(gi:)(wè:)]

As noted, main prominence is marked once on the above word, not once per phase. If main prominence marking were an integral part of prosodification we would expect the opposite to be true, and for the above to surface as two distinct phonological words. Recall the examples in (3), repeated below.

- (29) a. [<sub>CP</sub>ni[<sub>TP</sub>gi: [<sub>VP</sub>[<sub>AP</sub>ini] [<sub>VP</sub>a:gam-ose:]]]] → [nigi:inia:gamose:]  
       '1SG-PAST-away-snowshoe-walk'  
       'I walked there in snowshoes'  
       b. [<sub>CP</sub>Why <sub>C</sub>could [<sub>TP</sub>he <sub>T</sub>have [<sub>AspP</sub>been [<sub>VP</sub>being [<sub>VP</sub>pushed]]]]]

It is obvious that similar syntactic domains in two different languages may be merged in the phonological component into a single word (29a), or they may not (29b). It is the cases in which they do that concern us here, along with their resulting phonological structures and their implications. The motivation for doing so is not known, and no answer to the question ‘why does the phonological



system perform this function?’ will be attempted here. It is enough to note that is does happen.

### 1.4.3 Main prominence marking within and without the phase

It is

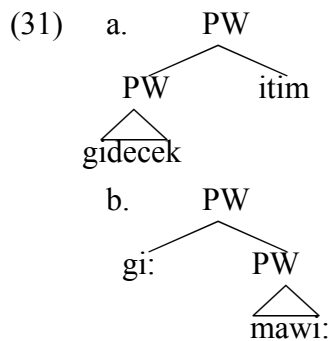
true that languages vary as to whether multiple phases surface as a single phonological word. What also varies, however, is whether main prominence is marked during each phase, or whether main prominence marking is delayed until all phases have undergone spell-out. These two possibilities follow directly from the dissociation of main prominence marking and prosodic structure building. Main prominence placement is dependant upon prosodic structure but is not a part of the prosodic structure, it is not associated with a particular level of the prosodic hierarchy. This being the case, main prominence may be marked as soon as there exists a prosodic structure to which it may be assigned. Crucially, however, it is not obliged to be assigned immediately upon completion of PW projection. It may be delayed until all phonological domains relevant to a word are interpreted. Contrast the following Turkish example (30a) with the Ojibwa data in (30b)

- (30) a. [CP [VP gid-ecek] i-ti-m ]                      →      gidecéktim <sup>24</sup>  
           go-fut-COP-past-1sg  
           ‘I will have gone’  
       b. [CP gí:[VP mawi:]]  
           past-cry  
           ‘he cried’

Turkish stress is canonically realized on the final syllable of a Phonological Word. The above example has been therefore analyzed as an

<sup>24</sup> It is debatable whether secondary stress surfaces in Turkish – see Sezer 2001 for one account of Turkish secondary stress. Note that secondary stress in Turkish, when attested, falls on the final syllable in each phase which is in keeping with the output expected within the framework presented in this thesis.

example of exceptional stress (Kabak and Vogel 2001, Inkelas and Orgun 2003, c.f. Kornfilt 1996 ). Like Ojibwa, the word in Turkish may span more than one phase – (30a) being composed of morphemes merged in two separate phases, *vP* and *CP*. Unlike Ojibwa, however, this entire complex is not the domain over which main prominence is assigned. It is consistently the final syllable interpreted within the most embedded phase in the word that receives main prominence in Turkish – as will be discussed in detail in the following chapter. Considering that the prosodic structures of the above words must be identical at least at the highest prosodic (PW) level - they each surface as a word - , we must have a principled reason for the differences in prominence marking.



In (31a) it is the lower domain containing *gidecek* in which main prominence is assigned, while in (31b) it is assigned in the dominant PW. We see here the two possibilities for main prominence assignment crosslinguistically.

- (32) PW-projection: The PW-level must be projected at the interpretation of each phase.<sup>25</sup>
- (33) Prominence Assignment: Prominence is assigned to a PW. It may be assigned either;
- a. Cyclically: immediately upon projection of a PW.

<sup>25</sup> This is true only of phases that contain phonological material. If all morphemes in a phase have raised out of the domain of interpretation a null output will result.

- b. Post-cyclically: after the dominant PW in a word has been projected.

I show in this thesis that the above prediction in (33a) accounts for the apparently irregular stress systems in Turkish and Cupeño (an Uto-Aztecan language). Furthermore, I predict that irregular stress patterns will never arise from the following prominence marking pattern;

- (34) Prominence is not computed upon projection of a PW in the first phase to undergo interpretation, but is computed only within the PW domain projected on a later phase.

The situation above would be one as in (35), where morphemes below the vP boundary are sent to PF, and project a PW, but where stress is not assigned.

- (35)  $vP = X+Y+Z$   $PF = XYZ$

Consequently, morphemes sent to PF at the CP phase would project a PW, and then stress would be assigned to only the elements sent to PF at this second phase.

- (36)  $CP = A+B+C$   $PF = (ABC)$  where stress is assigned in the domain ABC

As we are looking at word-level phenomena, the CP domain ABC must then merge with the vP phase. Assuming for the moment that stress will not be recomputed at this point, the final output will be one where stress is always found on the morphemes that are structurally higher.

- (37)  $[[XYZ]ABC]$   
:where there is stress on an element in ABC, but never in XYZ.

This pattern is argued to be an impossibility. When main stress/prominence assignment is cyclic it must be sensitive to all cycles.

Main stress *may* not be assigned in the first phase, but as predicted by (33b), stress assignment would then not be sensitive at all to the cycle. The vP

phase would undergo spellout, but not be stressed. This unstressed  $\nu$ P phase would then be followed by a similar derivation to the one above. The difference here would be that stress is not assigned until after amalgamation of all relevant PWs, and is assigned anywhere (depending on the prominence assignment rules of the particular language) in the domain of XYZABC, as seen in the Ojibwa examples above.

(38) [XYZ]  $\rightarrow$  [[XYZ][ABC]]  $\rightarrow$  Main stress is assigned to the entire string XYZABC

Why is the derivation in (35-37) unavailable to the phono-syntactic system? The derivation described violates the restriction against looking ahead to a subsequent stage of a derivation. The system cannot ‘look ahead’ (see Bobaljik 2000) to determine whether further material will be added to the word, and as all content words must have main stress, if stress is assigned at every phase main stress will be assigned on the innermost phase. The phonological interpretive system cannot distinguish between PWs based on the timing of their PF interpretation, as this timing is relative. Non-assignment of main prominence on the projection of the initial PW must therefore imply that main prominence projection is not cyclic, necessitating that its assignment will not be sensitive to any cycle.

Let me repeat the expected patterns. First, a language must project prosodic structure at every phase that contains overt morphology. Secondly, main prominence assignment may be computed either at each phase, or postcyclically, after multiple phasal PWs create a single word. Main prominence in all words should therefore be assigned according to the stress rules of a particular language

to either the entire word, or to the domain delineated by the first phase. It is argued here that this second option is responsible for the appearance of irregular stress patterns in multi-phasal words in many languages. This pattern is also congruent with Cinque's 1993 Null Theory of Stress assignment, as main stress (when assigned cyclically) will always surface on the most embedded syntactic domain.

**1.4.4 Summing up the phonological predictions** I have attempted here to delineate what properties the perfect interpretation of syntactic structure at PF should have. First, we must dissociate phonological domains from syntactic domains. The syntax determines the timing of cyclic interpretation (phases), and the phonological interpretation of these phases must contain no syntactic information. Secondly, we must dissociate main prominence marking from the projection of prosodic structure. Main prominence is assigned to prosodic structure; it is not a constituent of the prosodic hierarchy (as are syllables and feet) and therefore is dependent upon prosodic structure for its placement but not for the timing of its assignment. We therefore predict cross-phasal words to behave phonologically in one of two manners. First, main prominence/stress assignment may be sensitive to the phase. If this is the case we will see main stress within words conforming to Cinque's null theory of stress assignment. It will be assigned within the innermost phase and will be inherited by all further phases. Second, main stress assignment might not be sensitive to the phase in some languages – it may be post-cyclic. In these cases main stress may be

assigned to a domain that is not the most deeply embedded. This pattern is not in conformity with the Null Theory of stress assignment, but must follow from the dissociation of prominence and prosody. It is argued here and in the chapters to follow that these two patterns exhaust the cross-linguistic possibilities of prominence assignment.

### 1.5 Phonologically motivated perturbations

It is, unfortunately, not the case that phase boundaries are respected phonologically in all cases. This mismatch between cyclic syntactic operations and phonological domains is one source of the observation that phonology is not a perfect mirror of syntax. It is argued in this work that (at least some of) the imperfect mappings of syntax to phonology are principled, and therefore do not lead to the conclusion that the phonological interpretation of syntactic structure is prone to unprincipled imperfections.

We have already seen one instance where the above is true. In Ojibwa, prefixal person markers are interpreted within the phase to their right, apparently marring the parallel phonological and syntactic boundaries.

- (39)  $[_{CP} ni [_{aP} bi:mi:] [_{vP} gi:wè:] \rightarrow [_{CP/aP} (ni:)(mi:)] [_{vP} (gi:)(wè:)]$   
 \*  $[_{CP} (ni) [_{aP} (bi:mi:)] [_{vP} (gi:)(wè:)]$

As noted above, the person marker *ni* is monomoraic, therefore too small to be parsed into a licit foot in Ojibwa. This prevents the projection of prosodic constituents within the CP phase. This forces the person marker to incorporate (adjoin internally to) the phase to its right. Prosodic constituency must then be reparsed within the phase into which the prefix has incorporated, culminating in

the foot structure seen in (39). This phonological incorporation (P-cliticization) is shown to occur iff the phonological material interpreted within a phase is phonologically deficient in Ojibwa. Further evidence for this P-cliticization analysis is brought forth from the hiatus resolution strategies of the language. It is therefore predictable when the one-to-one matching between phonological and syntactic domains will be blurred, leading us to the conclusion that the phonology mirrors the syntactic derivation in a manner that is as perfect as possible given the particular VIs it has to work with.<sup>26</sup>

I do not propose here to account for all apparent mismatches between phonological and syntactic structure at the word level, but show in the following chapters that the above factors (the timing of main stress assignment and prosodic restrictions) are (some of) those that erroneously give the impression that the phonological interpretive system is not subject to the same level of strictness that are the syntactic and semantic components of the grammar. Only if all factors that give rise to principled mismatches can be found, can we then begin to discuss whether the phonological interpretive domain approaches a perfect mapping of syntactic structure.

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<sup>26</sup> When discussing the perfection of the computational system of language it is also important to consider that the system must have different measures of perfection in the NS and at the PF and LF branches. Implications that the phonology might be an imperfect system based on its divergence from expectations derived from syntactic considerations are therefore suspect. We expect certain correlations, assuming phases to determine the interpretive domains, – but the ‘imperfection’ seen here is perfect according to phonological principles. If the person marker were to not cliticize, this might be considered to be perfect from the point of view of syntax – but imperfect within the realm of phonology. We therefore need to examine the notion of imperfection closely and with skepticism.

**1.6 Conclusions** This chapter has set out to delineate and support the morpho-syntactic and phonological frameworks within which the analyses in the following chapters are situated. The salient points of these frameworks can be reiterated as follows:

- (40) Morpho-Syntax:
- a. The lexical items that undergo merger in the narrow syntax are feature bundles that may correspond to units that are smaller than the word at PF.
  - b. Functional morphemes, namely – but not necessarily limited to –  $C^0$ ,  $D^0$ ,  $v^0$ ,  $v^0$ ,  $a^0$  and  $n^0$ , trigger phases.
  - c. Phase heads will undergo interpretation with their complements iff they have no uninterpretable features.<sup>27</sup>
  - d. The narrow syntax is not altered by interpretation at PF or LF.
- (41) Phonology:
- a. Prosodic projection and main prominence marking are dissociated operations.
  - b. Main prominence marking may occur cyclically or post-cyclically.
  - c. Projection of prosodic structure is cyclic.

The above come together to give us the fact that phonological domains are often sensitive to syntactic domains. The implications of this fact are shown to have effects at the sub-word level as well as the phrasal level. This being the case, this thesis offers support for the Distributed Morphology proposal that syntax is responsible for the construction of both lexical and phrasal objects. It is also shown that PF is closer to a perfect interpretive system than has been previously assumed. Perturbations in the 1-to-1 mapping between the syntax and phonology are shown to have principled explanations.

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<sup>27</sup> Note that this formulation may be problematic in the case of DP movement in a language if  $D^0$  is interpreted with its complement. Thank you to Lisa Travis for pointing this out.



The following chapters are organized as follows. Ch. 2 will focus on languages where main prominence is assigned cyclically within cross-phasal words. It is shown that main stress patterns in Turkish and Cupeño that have been previously described as exceptional are in fact regular given the assumptions herein. Ch. 3 will focus on Ojibwa, first showing that phase-by-phase interpretation must occur at sub-word levels in the language, then demonstrating that main prominence assignment is not sensitive to these boundaries. Ch. 4 investigates further the implications of a DM model on the operations available at the level of the morpheme, demonstrating that the phono-syntactic predictions from the preceding chapters have implications for the syntax of words that do not fall out from any other morphological model. Chapter 5 then concludes, summarizing the findings in Ch. 2 through 4 and discussing areas in need of further investigation.

## CHAPTER 2

### PHASES AND EARLY PROMINENCE ASSIGNMENT:

#### EVIDENCE FROM CUPEÑO AND TURKISH

**2. Introduction** This chapter focuses mainly on the facts regarding sub-phrasal(word-level) phonology and its interaction with Chomsky's (1999) strong phases, namely  $vP$  and  $CP$ . The notion of strong phases influencing word level phonology may seem counter-intuitive, as these, as originally conceived, are phrase-level phases. It is argued here that these strong phases lead to visible phonological effects in words that cross one or more strong phase boundary.

The following sections look at the stress patterns in lexical items that cross a phase boundary in two unrelated languages – Cupeño (Uto-Aztecan) and Turkish (Altaic). Stress in these languages displays behaviour that the theory of word-level phases delineated in the previous chapter predicts. Specifically, stress/prominence is computed upon projection of prosodic structure within the first phase sent to the interpretive system.

Before turning to Cupeño and Turkish, let us recall briefly the discussion in the previous chapter. Stress in language depends on foot structure, which in turn depends on syllable structure, and therefore determination of the syllable/foot structure of a word must necessarily precede the implementation of any main and/or secondary stress rules in a language (Halle and Vergnaud 1987a). The question is how closely in the derivational sequence these two operations – footing and prominence marking– need to be determined. I argued in Chapter 1

that in some languages, footing and stress computation occur as a unit (cyclically), while in others prominence assignment is delayed (post-cyclic). I repeat (33) from Chapter 1 below in (1).

- (1) Prominence Assignment: Prominence is assigned to, but is not a projection of, the PW.  
It may be assigned either;
  - a. Cyclically: immediately upon projection of a PW.
  - b. Post-cyclically: after amalgamation of all PWs into a single surface PW has occurred.

We therefore have the following two predictions for prominence assignment in words that span a phase boundary.

- (2) Prominence within a multi-phasal word may be assigned either;
  - a. Upon interpretation of the first phase. Footing and Prominence may both be computed at spell out of phase A prior to the interpretation of later phases.
  - b. Upon completion of the interpretation of all phases. Footing may be computed at spell out of phase A, and consequently at phase B, etc. Prominence is assigned upon completion of the derivation.

Option (2a) will be the focus of this chapter. Ojibwa and English will be argued to be examples of (2b) in Chapter 3.

**2.1 First phase stress patterns** Both Cupeño and Turkish have quite regular stress patterns at the word level, where canonical word stress is on the initial syllable of the root in Cupeño and on the final syllable of the word in Turkish. In certain environments, however, the stress surfaces on a non-canonical syllable.<sup>1</sup> I propose here that this exceptional stress is due in both languages to the fact that these words are interpreted in multiple phases. These stress patterns can be explained with reference to the position of morphemes in relation to the

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<sup>1</sup> I focus here on verbal stress patterns.

strong phases,  $\nu P$  and CP. The goal of this chapter is to show that these stress patterns are not anomalous, but rather predicted within a theory that assumes a realizational morphological theory (such as Distributed Morphology) and the theory of phases, as outlined in Chapter 1. This chapter offers further evidence for the claims that words are constructed in the syntax, and that the syntactic derivation of a clause is computed cyclically, or in phases. We will see that both Cupeño and Turkish are examples of languages exhibiting the pattern predicted by (1a) above.

A concrete example may be of use here to situate the reader in the framework proposed above.<sup>2</sup> The following is an example from Cupeño, and will be expanded upon in Section 2.2.2. In Cupeño there are two classes of verbs, those that appear in constructions with light verbs<sup>3</sup> (3a), and those that do not (3b).

- (3) a. wíchax-ne-**n**-qal  
       throw-1sg-IN-imp.past.sg<sup>4</sup>  
       ‘I was throwing it’  
       b. pe-yax-qál  
       3.sg-see-imp.past.sg  
       ‘S/he saw’

<sup>2</sup> The following is an expansion of Barragan and Newell (2003).

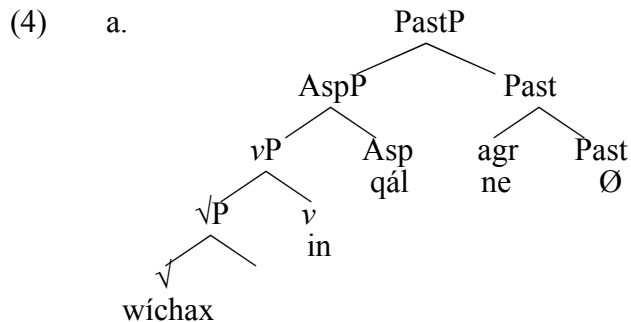
<sup>3</sup> That these affixes are light verbs will be argued below, though the classification of some of the relevant morphemes as *light* is not immediately apparent.

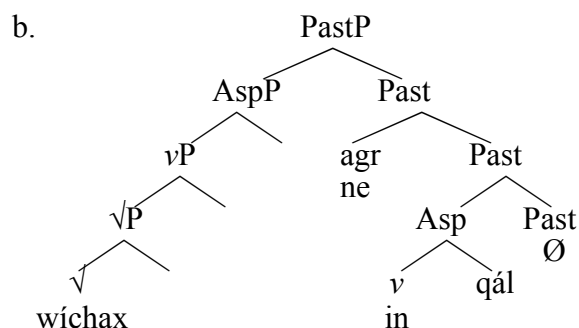
<sup>4</sup> List of Abbreviations: 1- first person, 2- second person, 3- third person, ABIL- Abilitative, ABS- Absolutive, Acc- Accusative, AOR- Aorist, BEN- Benefactive, CAUS- Causative, Comp- Complementizer, Cond- conditional, Conn- connective, COP- copula, DSS- Different Subject Subordinator, EPI- Epistemic, Fut- Future, IMP- Imperative, Imp – Imperfective, IN – in-class thematic light verb, NEG- negative, NOM- nominalizer, NPN- Non-possessed noun marker, OB – Object marker, Pass- Passive, Perf- Perfective, Pl – Plural, Pres – Present Tense, Prog- Progressive, PRT- Participle, Q- Yes/No Question marker, R- Realis, Recip- reciprocal, Sg – Singular, SUB- Subordinator, Vbl- Verbalizing derivational morpheme.

The bolded morpheme /-n/ in (3a) is merged in  $\nu$ P, and indicates transitivity (Barragan 2003). The verb in (3b) does not contain a light verb, or more correctly contains only one verbal root, whether it is light or not will be discussed below. If the light verb is present as in (3a), it will raise and host both Tense/Aspect/Mood (TAM) affixes (*-qal* ‘imperfective.past.sg.’), and the subject agreement prefix (*ne-* ‘1sg.’, and *pe-* ‘3sg.’). If a light verb is not present as in (3b), the main verb root will raise to host these affixes. Simply, the highest verbal element will raise to check uninterpretable features in the CP domain.

Turning to the realization of stress in (3a,b), we must first note that the TAM affix *-qal* surfaces with stress when no light verb is present (3b), but without stress when in a syntactic configuration that includes a light verb (3a). Default stress in the language is initial, but initial stress is overridden by affixes such as *-qal* in precise environments. I assume *-qal* to be marked in the lexicon as stressed. This stress will be subsequently referred to as inherent.

The position of stress in examples (3a,b) is determined by the position of each morpheme at the point it is sent to PF.



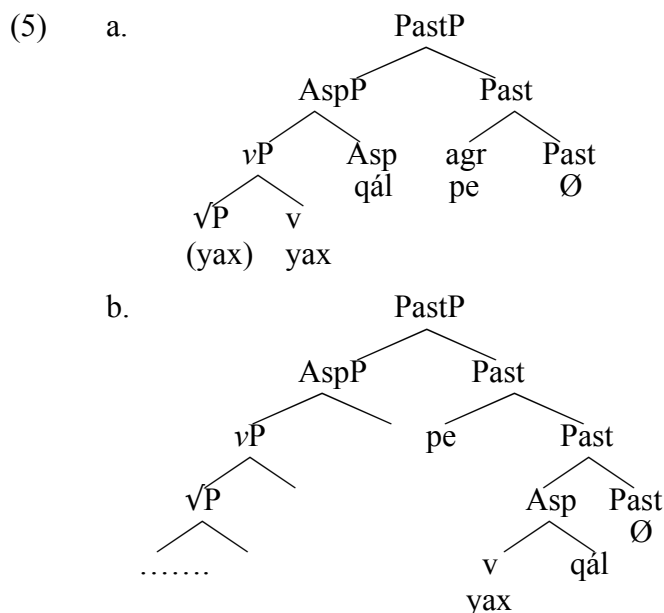


In (4a) we see the initial merger sites of each of the morphemes in (4b). The affixes *-qal* and *ne-* are always affixed to the highest verbal morpheme in the structure. In (4a), the light verb raises to AspectP and PastP. The main verb root has no motivation to raise, and therefore remains in its initial merger position. (4b) shows the structure of (4a) after all movement has occurred. Notice that the main verb root is the only element in the scope of the *vP* phase. When *vP* sends its complement to PF, upon merger of  $v^0$ , only *wíchax* will be sent. As the phonological component of the grammar cannot ‘look ahead’ and see whether further affixation to this root will occur, it will treat *wíchax* as a phonological word. As Cupeño assigns stress cyclically, at this point default initial stress is assigned. When the CP phase has been constructed, the remainder of the tree in (4b) will be sent to PF. The PW that dominates the CP morphemes also dominates *wíchax*, and to achieve this, the system adjoins the PW output of the CP phase to that of the *vP* phase; giving the structure  $[_{PW} [_{PW} wíchax] nenqal]$ . We have no evidence for secondary stress in Cupeño.

Were stress to wait to be assigned until the CP phase we would expect stress to surface on the inherently stressed aspectual suffix. This would be the case as inherent stress overrides default initial stress assignment when no previous stress has been assigned. The fact that it does not is explained if both PW

projection and stress assignment occur at each phase in Cupeño, and that structure preservation is persistent in the language. No previously assigned prominence marker will be demoted or moved within a PW.<sup>5</sup>

In (5a,b) below, we see the initial merger and final movement sites for the morphemes in (3b).



Here the root does not combine syntactically with a light verb in  $vP$ . In Section 2.2.3 I discuss in more detail the initial merger site of this root (and others like it). Whether *yax* is merged as a root or in  $vP$  is immaterial to the discussion here. It is the only available root to raise and host affixation/check features, and therefore will have raised to  $vP$  at the point where  $vP$  sends its complement to PF. Importantly, the  $vP$  complement contains no morphemes at PF, and all of the morphemes in the word - *pe-yax-qal* - is sent to PF at the CP phase. Here it is treated as a single PW. The inherent stress on *qál* surfaces, and therefore the default stress rule does not apply, giving [peyaxqál].

<sup>5</sup> We will encounter a principled exception to this statement in Ch. 3.

Note that in the derivation of (3a), shown in (4), the phonological merger, or cliticization (henceforth P-cliticization), of the output of the CP phase to the output of the  $\nu$ P phase does not affect the phonological structure computed at the  $\nu$ P phase. The PW projected upon interpretation of CP does not merge phonologically inside the previous PW, nor does it have any motivation to do so. That P-cliticization does occur is evident, as the CP domain does not carry word stress and therefore must be contained within a PW projection that also dominates the output of the  $\nu$ P phase. P-cliticization to the PW, seen here, and in Turkish below, disallows stress shifting. There is no motivation for prominence to be assigned on any phase but the first (iff it contains phonological material) as the nesting of the  $\nu$ P and CP phases creates an outer domain that already contains an element to which prominence has been assigned.<sup>6</sup>

In Section 2.2 I show that the above analysis captures all instances of non-standard stress within the verbal system of Cupeño. Section 2.3 goes on to demonstrate that this pattern is not specific to Cupeño, but is rather cross-linguistically attested. It is shown that non-standard stress in Turkish can also be accounted for within a phase-based theory of word stress.

**2.2 Cupeño stress<sup>7</sup>** Regular word stress in Cupeño can be defined as stress that falls on the first syllable of the root morpheme.<sup>8</sup> Irregular word stress is

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<sup>6</sup> This is not always the case, as will be seen in the discussion of Ojibwa epenthesis in chapter 3.

<sup>7</sup> This analysis of Cupeño relies heavily on work by Hill (2004, 2005) Barragan (2003), Barragan and Newell (2003) and Newell (2005).

<sup>8</sup> The *root morpheme*, or *root*, refers to the categoryless syntactic object that is the base of all non-functional words within the theory of Distributed Morphology. To avoid confusion, the *root node* of the tree, the topmost node, will always be referred to as such.



that which surfaces on an affix, or a non-initial syllable of the root. These two types of irregularity come from different sources. The focus in this work will be the irregular stress pattern induced by affixation, but in the interest of completeness, irregular root stress will be discussed here as well.

As mentioned, regular stress in Cupeño falls on the root. This stress is generally initial, as initial stress is default in the language as a whole (see Section 2.2.4 as this is not obvious until further aspects of the language are discussed), but is obscured by historical sensitivity to syllable weight. What this means is that historically, long vowels attracted stress. This long/short vowel distinction was at some point lost in many lexical items however, and therefore modern Cupeño stress appears to be unpredictable.

(6) a. Regular Initial Stress

?áyu  
'want'

b. Irregular Stress on a historically long Vowel

awál  
\*awá:l  
'dog'

Since non-initial stress is no longer predictable from the weight of the root vowels, it will be assumed here to be lexically specified, or inherent, if non-initial on the root.<sup>9</sup>

The most relevant aspect of regular stress in Cupeño for the purposes of this work is that root stress is persistent. It cannot be shifted through affixation. Importantly, that this stress is fixed is not dependent on whether this root stress is inherent or default initial. It is argued here that the fixed nature of stress on roots,

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<sup>9</sup> Throughout this work, inherent stress – stress encoded in the lexicon- is utilized as a last resort to account for patterns that cannot be derived.

regardless of whether it is lexically specified, is a function of the derivational system. As a descriptive simplification, I refer to these roots as *stressed*.

In addition to the cases of inherent root stress, certain affixes also display lexically specified (i.e. inherent) stress. These affixes surface as unstressed when merged with a stressed root (7), and stressed when affixed to unstressed roots (9). This phenomenon is what concerns us here, and will be called irregular, or exceptional, stress in Cupeño. It will be further discussed below in Section 2.2.2.

- (7) /ʔáyu-qá / → [ʔáyu-qa]  
 want-pres.sg  
 ‘...(He) wants’ (Alderete 2001a: 473)

In Cupeño the majority of roots are stressed, either inherently or initially, as in (7). There are, however, a few verb roots that are neither lexically specified for stress, nor do they bear default initial stress when affixed with an inherently stressed suffix. There are less than 50 of these unstressed roots in Cupeño (Hill 2005). The 12 of these that enter into verbal constructions are listed below.

(8) Stressless verbal roots in Cupeño

- |                         |                               |
|-------------------------|-------------------------------|
| a. kusr "get, take"     | g. nganga "weep"              |
| b. max "give"           | h. tewa "see"                 |
| c. neq "come"           | i. tuku "carry with tumpline" |
| d. yax "say/stative be" | j. meq "kill a single victim" |
| e. tava "put down"      | k. muu "shoot with bow"       |
| f. wen "put in"         | l. kwa "eat" <sup>10</sup>    |

When inherently stressed affixes are merged to one of the above roots, stress surfaces on the affix.

<sup>10</sup> The status of this verb, and of ‘shoot with bow’ is not fixed. These verbs sometimes behave as if they bear stress (Hill 2005: 29). The nature of the stressless roots will be discussed further in Section 2.2.3.

- (9) /max-qá/ → [max-qá]  
 give-pres.sg  
 ‘...giving...’ (Alderete 2001a: 470/1)

When no inherently stressed morphemes are affixed to a stressless root, default initial stress is assigned (10a,b). (10c) shows that this is not the case for stressed roots. When a stressed root is present, stress never shifts to a prefix.

- (10) a. /né-yax/ → [né-yax]  
 1sg-say  
 ‘I say’  
 b. /yax-em/ → [yáx-em]  
 say-clitic  
 ‘(you.PL) say!’  
 c. /ne-túl/ → [ne-túl]  
 1sg-finish  
 ‘I finished.’ (Alderete 2001b:50)

The exceptionally stressed affixes in Cupeño can be seen below in (11).

- (11) Inherently stressed suffixes  
 a. -qá ‘present tense’  
 b. -qál ‘past imperfective singular’  
 c. -í ‘nominal base i-ablaut suffix’  
 d. -í ‘different subject subordinator’<sup>11</sup> (Alderete 2001a<sup>12</sup>)

That these morphemes are inherently stressed can only be seen when they are affixed to a stressless root, as seen above in (9). Default initial stress would be expected if it were not for the inherent stress on the suffix.

<sup>11</sup> Bachrach (2004) offers an analysis wherein the nominal base and different subject subordinator morphemes in (15) are one and the same. If this is the case it does not significantly affect the analysis presented here.

<sup>12</sup> Note that Hill (2005) lists an additional suffix, *-nash*, as a marginal member of this list. As it does not pre-stress consistently I do not include it in this discussion.

The morphemes in (11) must be lexically specified to receive stress. They do not form a natural class, either phonologically or morpho-syntactically, so I will have nothing further to add on this matter.<sup>13</sup> What is important however, is their behaviour when more than one of them is affixed to a root.

Before giving examples though, there are two classes of stress-affecting affixes in the language that need to be introduced. The first is the group of pre-accenting affixes, seen below (Hill 2005:26-27).

(12) Pre-accenting suffixes

- |             |                     |
|-------------|---------------------|
| a. -‘aw     | ‘at’                |
| b. -č̣i     | ‘with/by means of’  |
| c. -ika/yka | ‘to’                |
| d. -ŋa      | ‘in’                |
| e. -pə      | ‘place of’          |
| f. -ŋa’aw   | ‘on’                |
| g. -ŋax     | ‘from’              |
| h. -we      | ‘augmentative’      |
| i. -ma      | ‘diminutive’        |
| j. -i/y     | ‘object case’       |
| k. -m       | ‘plural’            |
| l. -nin     | ‘causative’         |
| m. -pa      | ‘place of’          |
| n. -yew     | ‘do something with’ |

These suffixes, as the designation entails, cause stress to be realized on the syllable to their left.<sup>14</sup> As in the case of suffixes with inherent stress, the pre-

<sup>13</sup> These morphemes appear as though they may be able to be reduced to only two forms – where *-qa* is imperfective (and *-l* is a separate, past tense morpheme) and the two *-is* are collapsed (see fn. 11)

<sup>14</sup> The pattern here is actually slightly more complex. Occasionally, when the pre-accenting suffix follows another affix, the stress will skip that affix to be realized on the root. I have no evidence as of yet as to how this process interacts with other stressed suffixes. This problem, along with an account of why only affixes can affect the stress on the root, and not vice versa, will

accentuation affects a stressless root (13a), but not a root with inherent stress (13b).

- (13) a. /ne-ki-yka/ → nekíyka<sup>15</sup>  
           'to my house' (Hill 2005:27)
- b. /mème + yeke<sub>pre</sub>/ → mémeyke  
           'to the ocean' (Alderete 2001b: 244)

Aside from the placement of stress, these suffixes behave on par with the inherently stressed suffixes seen above in that their inherent stress is realized only when they are affixed to stressless roots.

The second class has been called Ablauting in the literature (Hill 2005). These affixes also attract stress in conjunction with stressless roots. These suffixes trigger insertion of a vowel after a consonant-final stem, and alter the final vowel of a vowel-final stem, and in both cases this vowel is where the stress is realized.

- (14) a. i-Ablaut Suffixes
- |             |                              |
|-------------|------------------------------|
| i. -qat     | 'purposive/immediate future' |
| ii. -ve     | 'realis subordinator'        |
| iii. -vichu | 'desiderative'               |
| iv. -ve'esh | 'agentive(nominalizing)'     |
| v. -veneq   | 'coming along verbing.'      |
| vi. -sh     | 'Non-possessed noun'         |

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be accounted for in future research. It is of note that this root-affix asymmetry appears to come for free in a theory assuming cyclic spellout.

<sup>15</sup> A note on pre-accenting is in order here. A theory of cyclic spellout like that espoused here allows for pre-accenting initiated by a suffix. This is due to the fact that the phonological form of the stem undergoing suffixation will be visible to the suffix at the point it undergoes spellout. What is predicted to not happen is post-accenting initiated by a suffix. As no phonological material that is structurally higher than a particular suffix will be phonologically present at the point of spellout of any given suffix. Post-accenting by a prefix should, however, be possible.

## b. a-Ablaut Suffixes

- |             |                               |                |
|-------------|-------------------------------|----------------|
| i. -la'ash  | 'instrument'                  |                |
| ii. -lu/lyu | 'go to do (purposive motion)' |                |
| iii. -nuk   | 'same subject subordinator'   |                |
| iv. -pi     | 'irrealis subordinator'       | (Hill 2005:43) |

The vowels introduced by these suffixes, like the stressed and pre-stressing affixes seen above, do not surface as stressed when affixed to a stem containing a stressed root (15a). These vowels do receive stress in constructions with stressless roots (15b). In both examples below the epenthetic vowels are bolded, and the ablauting affixes are italicized.

- (15) a. Epenthesizing Affix, Stressed Root  
 kúta-*ápi*-*ish*-em → kútapchem  
 bow-IRR.SUB-NPN-PL  
 'bows' (Hill 2003: 32)
- b. Epenthesizing Affix, Stressless Root  
 pem-tew-*ápi* → pemtewápi  
 3PL-see-IRR.SUB  
 'them to see' (Hill 2003: 58)

Pre-stressing and epenthesizing affixes in Cupeño will not be discussed in detail here as it would take us too far afield of the central discussion, but see Section 2.4 below for a discussion of how the behaviour of these affixes gives crucial insight the account of stress proposed here.

In Sections 2.2.1-2.2.3 the interactions of these affixes with each other, and with roots, are discussed in more detail, focusing on the inherently stressed affixes. In Section 2.2.4, I will offer a morpho-syntactic account of Cupeño exceptional stress patterns, arguing that they are predictable.

### 2.2.1 The morpho-syntax of stress in Cupeño<sup>16</sup>

The main goal in the analysis below is to illustrate how morpho-syntactic structures affect the stress system of Cupeño. Syntactic phases are shown to define cyclic boundaries in the verbal morphology, leading to word-internal phase-effects on stress.<sup>17</sup> This account captures the data more completely than does the optimality theoretic account offered in Alderete's (2001a,b) work on the language (to be discussed in Sections 2.4) and captures the fact that the stressed and stressless roots in Cupeño form morpho-syntactic natural classes. It is argued in Section 2.2.3 that stressless verbal roots in Cupeño are light verbs, heading *vP*, while stressed roots are merged as complements to *vP* (cf. Barragan 2003, Barragan and Newell 2003). In Section 2.2.4 it is shown how this difference in syntactic position can explain the stress differences between the two classes, as well as explaining why inherent stress cannot be shifted upon affixation. Before discussing the Cupeño verbal roots, Section 2.2.2 discusses the position of stress when more than one inherently stressed affix enters into a construction with a stressless root.

### 2.2.2 Root asymmetries: Effects of the morpho-syntax

We saw in Section 2.2.1 that there are two groups of roots in Cupeño; those that surface with stress on the root (either inherent or default), and those that do not. These stressed roots always surface with stress, regardless of affixation. Even when default initial stress applies, it surfaces no further left than the initial syllable of the root.

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<sup>16</sup> This section is an extension of a talk given with Luis Barragan at WECOL 2003. I am indebted to Luis, and to Jane Hill, for much discussion on the content of this section. Parts of this section are also discussed in Barragan (2003) and Barragan and Newell (2003).

<sup>17</sup> This can also be said of Oltra-Massuet and Arregi's (2005) account of Spanish stress in LI, although they do not explicitly state this.

In contrast, stressless roots only surface as stressed if they are initial in the word and no inherently stressed morphemes are affixed to them. If they are prefixed, initial stress falls on the prefix, not on the initial syllable of the root.

The focus in this section is to identify the cause of this division. Alderete (2001a,b) proposes that the distinction between stressed and stressless roots is lexically specified – they do not form natural classes. That claim presupposes that the distinction between these classes cannot have a non-phonological source – there is nothing about their morpho-syntactic nature or behaviour that could cause the stressed/stressless divide. I argue that the opposite is true. Below, I contend that the stressed/stressless class distinction among Cupeño verbal roots is morpho-syntactic.

Barragan (2003) makes the case that the position of the Person-Number prefixes in Cupeño is dependant on whether the verb is constructed solely of a main verb (16), or of both a main and a light verb (17).

- (16) a. ne-túl  
1SG-finish  
'I finished'  
b. cem-tewásh  
1PL-lose  
'We lost'
- (17) a. yút-ne-n  
raise-1SG-IN(light verb)  
'I raised'  
b. hét-pe-yax  
crouch-3SG-YAX (light verb)  
'He crouched'

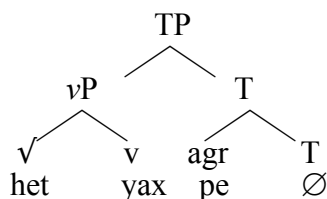
(Barragan 2003: 143)

Consider the position of the person-number prefixes in (16,17). In (16) there is only one possible host for a prefix, the main verb. In (17), however, the person-

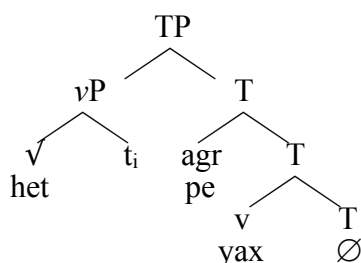


number morphemes surface following the main verbs, and preceding the light verbs *in* and *yax*. In (17) the light verbs are closest to the person-number prefixes syntactically, and therefore are able to raise and host the inflectional affixes. The main verbs cannot raise over the light verbs, and therefore will only host these morphemes when not c-commanded by a light verb.<sup>18</sup>

(18)<sup>19</sup> a.



b.



What is of great interest to us here is that the light verb /yax/ is also one of our stressless verb roots, listed again below. An interesting fact about all of the above stressless roots is that they can be distinguished from the stressed roots in that language by more than just their phonological divergence.

(19) Stressless verbal roots in Cupeño

- |                         |                               |
|-------------------------|-------------------------------|
| a. kusr "get, take"     | g. nganga "weep"              |
| b. max "give"           | h. tewa "see"                 |
| c. neq "come"           | i. tuku "carry with tumpline" |
| d. yax "say/stative BE" | j. meq "kill a single victim" |
| e. tava "put down"      | k. muh "shoot with bow"       |
| f. wen "put in"         | l. kwa "eat"                  |

<sup>18</sup> For argumentation that the PN prefixes are adjoined to a Tense head (PastP) see Newell (2003).

<sup>19</sup> Linear order is assumed throughout to be determined at PF. Headedness conforms here to the linear order of morphemes for purposes of exposition.

These stressless roots almost universally surface in constructions without light verbs, while the stressed roots may be affixed fairly productively with the light verbs *-in* and *-yax*. In the few cases that have been found where these stressless roots are in constructions with light verbs, the root is stressed. In these cases, this root stress is indistinguishable from default stress, as stress is initial and no prefixes are present in the attested examples.<sup>20</sup>

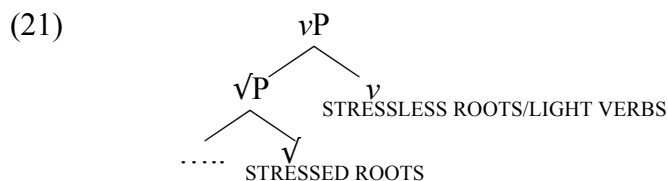
- (20) a. téw-in  
           ‘glance, take a quick look’  
       b. qwá-in  
           ‘eat a little’

These roots could be alternating between light and main verbs, but without data including PN prefixes we cannot be sure. Regardless, this data does not refute the analysis adopted here.

**2.2.3 Stressless roots in *vP***        Now, leaving these few examples aside, why would the stressless verb roots not productively enter into constructions with light verbs? It seems unlikely, in fact impossible within a realizational theory of morphology, that being lexically specified as unstressed could have such a morpho-syntactic effect, and therefore we must look to the morpho-syntactic component for an explanation. What I propose here (cf. Barragan and Newell 2003) is that these stressless roots are sitting in *vP*, the position in which light verbs are found.

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<sup>20</sup> There has been found one exception to this pattern: *wenín* ‘hit a target’ from *wen* ‘put in’. I cannot explain this exception.



If the stressless verbs are heading  $vP$ , then we would expect constructions containing these verbs to lack light verbs. Interestingly, the stressless verbs in (27a-f) can all be said to have ‘light’ semantics, and therefore appear to be prime light verb candidates.

A note on light verbs is appropriate here. What do I mean in saying that these verbs have light semantics? The semantic contribution of a light verb is hard to pin down, but all seem to “..further structure or modulate the event described by the main verb...” (Butt 2003). Typical light verbs are those such as ‘take’, ‘have’, or ‘give’ (22) or, in Chinese, directional verbs such as *diao* ‘fall’ or *shang* ‘ascend’ (23) among others.

- (22)
- a. take a hike, to hike
  - b. have a cry, to cry
  - c. give a ring, to ring

- (23)
- a. guan daio shouyinji  
shut fall radio  
‘switch off the radio’
  - b. guan shang men  
shut ascend door  
‘close the door’

(Butt: 7)

In (22,23) the light verbs do not have the meanings that they have when they act as main verbs.

$vP$ , the phrase projected by a light verb, is also the locus of merger for external arguments. The productive light verbs – those that enter into

constructions with main verbs – in Cupeño affect transitivity as well as the semantics of the main verb, where  $\emptyset$  generally indicates unergativity, *in* transitivity, and *yax* unaccusativity.

(24) Three way alternations ( $\emptyset$ /in/yax)

a. chéx	chéx-in	chéx-yax
‘to winnow’	‘to clean something’	‘to be clean, light, visible’
b. chux	chux-in	chux-yax
‘to melt’	‘to spit’	‘to be spat out’
c. ngey	ngey-in	ngey-yax
‘be dizzy’	‘shake something’	‘shake’
		(e.g. earthquake, or shimmy)

The verbs in the (19g-l), as opposed to those in (19a-f), do not have light semantics, and are not typical candidates for light verbs in any language I am aware of. Perhaps something in the historical development of these verbs can explain their behaviour, but this will not be pursued here. Their ‘heavy’ semantics may however lead us to assume that they are merged in  $\sqrt{P}$ , and move into  $v^0$  – giving evidence that heads may ‘escape’ the phase within which they are originally merged. This would not explain, however, why no overt light verb forms appear in construction with these roots, and therefore for the remainder of this work I will assume all stressless verbs to be merged in  $v^0$ .

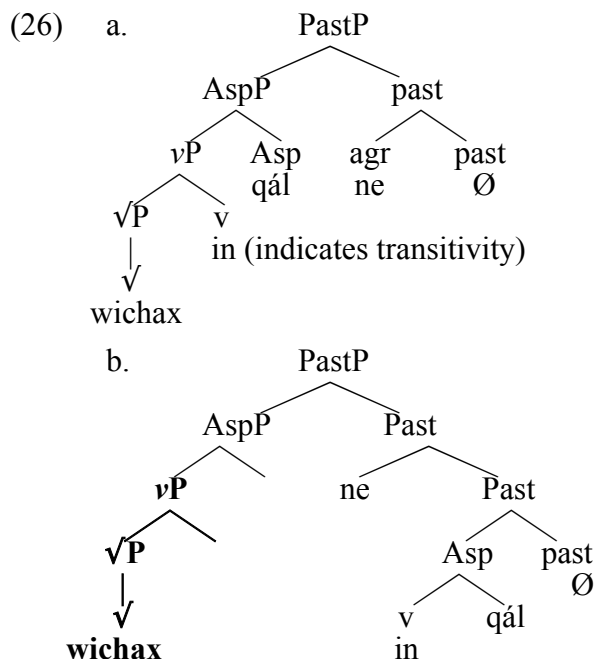
It is evident that all of the stressless verbs have the same phonological and morpho-syntactic behaviour, and will therefore all be treated as heading the projection  $vP$ . In the next section I show how this assumption regarding the syntactic position of roots in Cupeño can explain why  $\sqrt{}$  roots are stressed, and  $v^0$  roots are stressless.

### 2.2.4 The Cupeño phonological phase

In (26), repeated from (4),

we see the structure of a verbal word containing a main verb ( $\sqrt{\text{v}}$ ). Main verbs are always c-commanded by a light verb in  $\nu\text{P}$ .

- (25) wíchax-ne-n-qál  
 throw-1sg-IN-imp.past.sg  
 ‘I was throwing it’



The affixes /- qál/ and ‘past’ must enter into a checking relation with a verbal morpheme. What this means is that a suitable morpheme must raise into the heads containing the tense/aspect morphemes (the agreement morpheme is assumed here to be dissociated and adjoined in the morphological component of the grammar (Embick and Noyer (2001)).<sup>21</sup> In (26a) there is one verbal morpheme, /in/, and therefore it must raise. As the root has no impetus to move, only the light verb raises, and we end up with the configuration in (26b).

<sup>21</sup> Subject agreement prefixes surface only in the Past tense in Cupeño. In the Present, Immediate Future, and Future tenses subject agreement is signaled by copular clitics. Due to the fact that these agreement morphemes do not seem to have a fixed syntactic position I assume they are inserted in the morphological component, and are adjoined to the head of PastP.

At the point where  $\sqrt{P}$ , as a phase-head complement, is sent to PF, the root is isolated from the remainder of the verbal word (the  $vP$  phase is bolded in (26b)). Now, the PF component cannot ‘look ahead’ to determine if the main verb will be pronounced in isolation or as part of a larger whole, as discussed in Chapter 1. Each phase will project a PW, and therefore /wichax/ will constitute a PW that does not include any material outside of  $vP$  (see also Piggott and Newell (2006) for arguments that phase interpretation triggers PW projection). The fact that default stress is assigned to the first syllable in /wichax/ demonstrates that stress assignment is cyclic in Cupeño (27a). If it were not, the inherent stress on the affix would surface after PW projection at the CP phase (27b).

- (27) a. [<sub>PW</sub>[<sub>PW</sub> wíchax-]ne-n-qal]  
 b. [<sub>PW</sub> [<sub>PW</sub> wichax-]ne-n-qál]

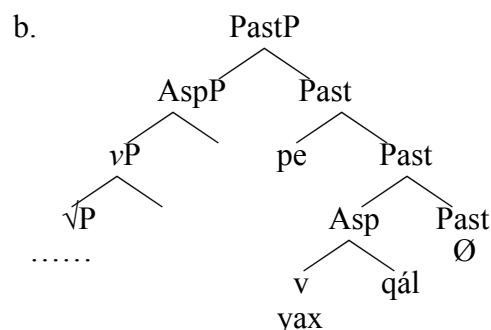
Stress can only surface on the suffix if it is interpreted in the first phase (that contains phonological content). Consider the derivation of a verb with no content in  $\sqrt{P}$ .<sup>22</sup>

- (28) pe-yax-qál  
 3.sg-see-imp.past.sg  
 ‘S/he saw’

- (29) a.
- 
- ```

graph TD
    PastP --> AspP
    PastP --> Past
    AspP --> vP
    AspP --> Asp
    vP --> sqrtP["√P  
....."]
    vP --> v["v  
yax"]
    Asp --> qal["qál"]
    Past --> agr
    Past --> Past2["Past  
Ø"]
    agr --> pe
  
```

<sup>22</sup>  $\sqrt{P}$  is represented here without content, as the root here could be phonologically null. I take no stand on this issue.



(29a) shows the initial merger sites of the morphemes in /pe-yax-qál/. Since the light verb is the only host available to check the features of the higher projections, it raises – creating the structure in (29b). Here PastP will be sent to PF at the CP phase, and will be spelled-out from the innermost to the outermost morpheme. At this point footing will occur. It is indeterminate in this example whether stress is assigned immediately after footing (within the interpretation of the phase) or post-cyclically. What is true however is that the inherently stressed morpheme receives stress – default stress is not assigned.

Returning to the derivation of (25) in (26a,b), we see that default stress is assigned, even though a stressed affix is present. This must be due to the fact that both footing and stress are computed on the innermost phase. Were footing to be assigned to the innermost phase, and then assigned to the outermost phase prior to stress assignment, the environment for stress assignment would be indistinguishable from the environment in the derivation of (29a,b). We would predict stress to fall on the inherently stressed affix. As it does not, something must bleed the environment in which the affix receives stress. Cupeño must therefore be an example of (1a), where footing and stress are both determined upon spellout of each phase.

We might want to ask if it would be a better analysis to assume stress assignment to the inherently stressed suffix on the second phase, with subsequent demotion of this stress. As we have no evidence that this is the case – no secondary stress is evident- we will not complicate the derivation in this way. It will be argued later in this work that stress demotion is not necessary in any of the cases considered herein, even where secondary stress surfaces.

We therefore have a principled derivational analysis of the verbal stress patterns in Cupeño. Specifying the light verbs as stressless is unnecessary, as their stressless nature is a result of their position in the syntax. As the data show, both main and light verbs are inherently stressless. The surface position of stress is predictable on the assumption that both footing and stress are assigned on the innermost spellout domain, or phase, containing phonological content.

**2.2.5 Summing up Cupeño** In the above sections I have argued for two main conclusions. First, the stressed vs. stressless root asymmetry evidenced in the Cupeño stress system stems not from the idiosyncratic nature of root phonology in the language, but rather from the principled organization of the derivational system as a whole. That main verb root morphemes have what appears to be inherent, immobile stress stems from the fact that, at the point where they are assigned phonological form, they are isolated derivationally from the rest of the verbal word. This isolation is brought about through the independently motivated mechanism of the phase/cycle/spellout domain. This stress pattern is of



interest as it shows a novel effect of phase theory, where ‘word’ construction is interrupted by a phase normally considered to only have effects on phrasal syntax.

Second, Cupeño assigns both prosodic structure and stress upon spellout of a phase. This account of Cupeño stress is of interest on its own, but I will argue below that this is not an isolated instance of the phonological phase with characteristics of (1a), or of word-internal phase-effects. In the following sections I will argue that what is known in the literature (Kabak and Vogel 2001, Inkelas and Orgun 2003, Kornfilt 1996) as Turkish Exceptional Stress is also the result of the phonological phase. As Turkish and Cupeño are unrelated, the argumentation below offers evidence of cross-linguistic support for the theory developed in this work.

### **2.3 Turkish stress**

In this and the following sections I will discuss Turkish Exceptional Stress and offer a phase based analysis like the one presented above for Cupeño that avoids stipulating special stress properties for specific morphemes. This analysis follows Kornfilt’s 1996 analysis of Turkish ‘small words’, but adds to it a unified account of all Turkish verbal inflectional morphemes that cause exceptional stress to surface. The data is shown to be consistent with a Cyclic Spellout analysis, as noted previously by Inkelas and Orgun (2003). We will see that stress on the innermost morpheme in Turkish can only be captured if both footing and stress are assigned upon spellout of each phase, as argued above for Cupeño. What the following discussion demonstrates

is that Turkish must also be a type (1a) language – where footing and stress are both assigned at the interpretation of the innermost phase.

First let us look at regular Turkish lexical stress. Turkish stress is almost invariably word-final, as can be seen below.

- (30) Regular Turkish Stress
- a. kitap ‘book’
  - b. kitaplík ‘bookcase’
  - c. kitapliklár ‘bookcases’
  - d. kitapliklarím ‘my bookcases’
  - e. kitapliklarimíz ‘our bookcases’
  - f. kitapliklarimizdán ‘from our bookcases’ (Kabak and Vogel 2001:316)

Exceptional stress is defined as those cases where stress appears in non-final position within the word.

- (31)
- a. kabá-y-di-lar  
rude-COP-past-3pl  
‘They were rude’
  - b. kal-dí-y-sa-niz  
stay-past-COP-cond(high)-2pl  
‘If you have stayed’
  - c. gél-me-di-niz  
come-NEG-past-2pl  
‘You didn’t come’
  - d. sakla-n-di-lár-da  
hide-recv-past-3pl-conn  
‘They also hid (themselves)’ (Kabak and Vogel 2001)

The following affixes, seen in (32), which trigger the exceptional stress pattern seen above, have been alternately analyzed as ‘pre-stressing’ (Inkelas and Orgun to appear), as ‘prosodic word adjoining’ (Kabak and Vogel 2001) or as unstressable (Hulst and van de Weijer 1991). The one non-phonological account in the literature (Kornfilt 1996) discusses the copular pre-stressing morphemes,

and their effect on stress, and touches on the question marker and the negative morpheme (to be discussed in Chapter 5), but does not discuss the morphemes *-dA*, or *-(y)ken*. In the following sections I will expand on Kornfilt's analysis of the copular morphemes and offer a unified analysis of the entire list of pre-stressing morphemes below. This account will show that all of these affixes sit at the edge of a phase.

- (32) Turkish pre-stressing verbal inflectional morphemes<sup>23</sup>
- a. *-Dir* epistemic copula
  - b. *-y* copular clitic (full form: *i*)
  - c. *-dA* clausal coordinator
  - d. *-(y)ken* 'when-adverbial complementizer'

**2.3.1 Kornfilt 1996** Kornfilt (1996) argues for the existence of the copular clitic seen in (32b). In doing so she gives arguments for complex Turkish verbs having two separate morpho-syntactic domains; the root+low aspect markings (participles) and the copula+high tense/aspect markings, as seen in (33). These are separate domains for stress assignment.

- (33) [kal-dí] [y-sa-niz]  
 [stay-past] [COP-cond(high)-2pl]  
 'If you have stayed'

In this section I will briefly overview Kornfilt's argumentation, but before I do, a few comments are in order, differentiating the scope of this work from that of Kornfilt (1996). Kornfilt's argument focuses on providing evidence for the complexity of the Turkish verbal word. In doing so she offers both syntactic and phonological evidence, as we will see below. What I am arguing here is that the

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<sup>23</sup> Two other "prestress affixes", listed below, will be discussed in Ch. 5.  
 (i) a. *-mI* yes/no question marker  
       b. *-mA* negative

verbal word in Turkish, like in Cupeño, is assigned phonological form cyclically, and that the relevant cycles correspond to syntactic phases. This allows us to unify the facts given by Kornfilt regarding the placement of the copula *-y*, the epistemic copula *Dir*, the negative copula *değil*, with the behaviour of the complementizer *-(y)ken*, and the clausal co-ordinator *-dA*.

### 2.3.2 Exceptional stress: Phrasal stress

Here I will review the arguments given in Kornfilt (1996) for the separation of the complex Turkish verbal word into participial+inflected copula. In Sections 2.3.3 and 2.3.4, I will relate the data introduced by Kornfilt to the analysis offered here, namely that these stress facts are caused by phases in the syntax and the manner in which Turkish assigns phonological structure to each spellout domain. In her conclusion, Kornfilt briefly notes that Turkish exceptional stress behaves like phrasal stress. Phrasal stress in Turkish falls on the leftmost element in a domain. As the complex verbal word in Turkish has multiple stress domains, it is therefore unexceptional that the leftmost (participial) domain receives main stress. A unified analysis of these facts, although fairly straightforward, will not be undertaken here, as we will continue to focus on word-level phenomena.

In informal speech, the complex verbal constructions comprised of the participle and inflected copula in Turkish are uttered as one word, and therefore included in a single domain for main stress. In these utterances the entire verbal complex surfaces with a single main stress, indicating that the participial and copular domains are contained within a PW.

- (34) /gid-ecék i-ti-m/      [gidecéktim]  
       go-fut COP-past-1sg  
       'I will have gone'

These constructions have been often analyzed as having a non-standard stress pattern in that stress is not word-final. Kornfilt argues that these verbal complexes are made up of more than one syntactic word, and should therefore be treated on par with phonological phrases. Exceptional stress is therefore expected in these constructions, as they consist of two (or more, see Section 2.3.4) stress domains, or phonological words. All of the examples in the following sections, unless stated as otherwise, are taken from Kornfilt (1996).

The first stress domain, consisting of all elements preceding the copula, is a participle. The second stress domain consists of the copula and its suffixes. Kornfilt notes that stress here is, in fact, word final in slow formal speech, as the participial and copula complex are pronounced separately. In these constructions the verbal complex consists of two separate PWs, and each PW surfaces with main stress on the final syllable.

- (35) /gid-ecek i-ti-m/      [gidecék idím]  
       go-fut-COP-past-1sg  
       'I will have gone'

The copular domain therefore may or may not undergo P-cliticization.

The epistemic copula '-Dir', and the negative copula 'değil' are in complementary distribution with the copula 'y'. '-Dir' is also pre-stressing. The negative copula, on the other hand, is never cliticized to the participial domain, and therefore negative copular constructions do not pose a problem for the generalization that stress is word-final in Turkish.

- (36) a. -Dir  
       /gid-ecek-tir/            [gidecéktir]  
       go-fut-EPI.COP  
       ‘She will definitely leave’  
       b. değil  
       /gid-ecek değil-im/ [gidecék değilim]  
       go-fut NEG.COP-1sg  
       ‘I will not go’

As we can see, the complex verbal word consists of two phonological domains, and therefore the fact that stress falls on the leftmost domain must be accounted for. In Turkish, phrasal stress falls on the leftmost PW as shown below in (37). In (35) above, stress is predicted to fall before the copula, if the verbal complex is treated as a phonological phrase.

- (37) Hasan begun [<sub>VP</sub> istakóz ye-di]  
       Hasan today     lobster eat-past  
       ‘Hasan ate (a) lobster(s) today’ (Kornfilt 1997: 505)

Due to the parallel between constructions like those in (35) and those in (37) Kornfilt proposes that at PF, the complex Turkish verb is treated not as phonological word, but like a phonological phrase. The fact that stress is final in the first stress domain is fully consistent with the Turkish phrasal stress system.

Kornfilt also offers syntactic evidence that the participial and inflected copula of the complex verb in Turkish are separate words. This evidence comes in two forms. Firstly, the domain of exceptional stress and the domain singled out by suspended affixation constructions (see 38,39) are identical, and secondly, the pre-copular forms can stand alone as participial predicates.

Suspended affixation in Turkish<sup>24</sup> is a conjunction of two forms, where inflection surfaces only on the rightmost form, as below. In (38b) and (39b) we can see that this suspension of affixation is optional – as both forms may be inflected.

- (38) a. hasta ve yorgun-du-m  
sick and tired-Past-1.sg  
'I was sick and tired'  
b. hasta-di-m ve yorgun-du-m  
sick-Past-1.sg and tired-Past-1.sg  
'I was sick and tired'
- (39) a. gel-miş ve git-miş-tir-Ø  
come-Perf. and go-Perf-Epi.Cop.-3.sg.  
'She has definitely/most probably come and gone'  
b. gel-miş-tir-Ø ve git-miş-tir-Ø  
come-Perf.-Epi.Cop.-3.sg. and go-Perf-Epi.Cop.-3.sg.  
'She has definitely/most probably come and gone'

This construction is illicit when trying to conjoin any verbal forms that do not correspond to the pre-copular/adjectival stress domain seen above.

- (40) \*yap-ti ve sat-ti-k  
make-past and sell-past-1pl  
'intended-We make (them) and sell (them)' (Kabak ms.: 3)

In (38a) and (39a) the first conjunct is a participial, or pre-copular, verb form. In (40) however, the first conjunct is not a participle. The simple past tense verbal paradigm is not constructed with a copular verb, but rather the tense marker *-Di* is affixed directly to the verb root. The juncture between the tense marker and the agreement affix *-k* is not a licit target for the suspended affixation construction.

<sup>24</sup> See also Kabak ms. for a discussion of Turkish suspended affixation as conjoined AspPs.

Participle predicates can also stand on their own, as nominal modifiers, while forms that do not correspond to the pre-copular morphological domain may not.

- (41) a. kitab-i oku-yacak kız  
           book-Acc. Read-Fut. girl  
           ‘The girl who will read the book’  
       b. \*oku-du kişi  
           read-Past person  
           ‘The person who read’

In (41a) the affix *-yacak* ‘future’ falls in the pre-copular domain when in a verbal construction. The affix *-du* ‘Past’ on the other hand, if in a complex verbal construction in Turkish, will be affixed to the copula. *-du*, then, is not a participle affix and when affixed to a verbal root will not be able to modify a noun.

**2.3.3 Turkish exceptional stress is *phasal*** In this section I will offer an analysis of Turkish Exceptional Stress that not only accounts for the copular affixes seen in the discussion of Kornfilt (1996) above, but also accounts for the behaviour of the complementizer *(y)ken*, and the co-ordinator *-dA*. I will show that what unifies the copular ‘pre-stressing’ morphemes with *(y)ken* and *-dA* is that each of these morphemes is sitting in the head of either *vP* or *CP*, Chomsky’s strong phases. It is this common syntactic position that causes the exceptional stress facts in Turkish.<sup>25</sup>

One of the basic claims of Kornfilt (1996), that the pre-copular domain in exceptional stress systems is an adjectival participle, largely anticipates the

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<sup>25</sup> It is of interest here that the pre-stressing and Ablauting affixes in Cupeño also seem to be fairly unified as to the syntactic positions they sit in, indicating possible additional phases.



analysis in this section. The focus here, differentiating this work from that of Kornfilt, is on why the copula surfaces, and what causes the participle to be realized as a separate domain for stress. Certain verbal paradigms in Turkish, such as the conditional and the past, differ from the participle + copular domain forms discussed in Section 2.3 in that they constitute a single domain for stress. In this section the cause of this division among verbal paradigms will be explored. In addition, the analysis here is able to associate the proposal of Kornfilt with the fact that it is almost universally morphemes in  $v^0$  and  $C^0$  that affect the stress system of Turkish in a seemingly exceptional way.

#### 2.3.4 Low vs. High Verbal Morphology

We have seen above that there appear to be two separate domains for verbal morphology in Turkish. The first domain attaches to roots and produces participles, and the second domain attaches to copulas and is followed by agreement morphology. Here I will discuss the reason for this split. In Cinque (2001) it is noted that some verbal affixes appear to attach in two different places. In these positions the affixes are attached to either the participle or to the copula, as seen with *-(y)abil* below.

- (42) a. Low reading : root modal ‘ability or permission’  
       oku-ya-ma-m  
       read-ABIL-NEG-1sg  
       ‘I am unable to/not permitted to read’
- b. High reading: alethic modal ‘possibility’  
       oku-ma-yabil-ir-im  
       read-NEG-ABIL-AOR-1sg  
       ‘I might not read; it is possible that I do not read’

- c. High and low reading  
 oku-ya-ma-yabil-ir-im  
 read-ABIL-NEG-ABIL-AOR-1sg  
 ‘I might be unable to read; It is possible that I shall be unable to read  
 (Cinque 2001:48, from Kornfilt 1997:375)

Cinque argues that the morphology in these examples is misleading. Rather than the same morpho-syntactic object being merged either in the participial or copular domains, these morphemes are in fact heading different syntactic projections depending on whether they are being attached in a low position (to the participle) or in a high position (to the copula). Note that Cinque does not make reference to either the copula or the participle, but rather to the cross-linguistic positions of the projections headed by these affixes. He notes that *(y)abil* when attached low has the semantics of Ability or Permission ( $\text{Mod}_{\text{Ability}}$ ), and that when attached high has the semantics of an Altheic Modal ( $\text{Mod}_{\text{Altheic}}$ ).

Important here is the fact that the affixes that do double duty generally appear once in the pre-copular domain and once in the post-copular domain. Cinque does not include the position of the copula in his hierarchy, but once this is done a pattern begins to emerge. This pattern is also the focus of Sezer (2001), who argues for three different hierarchical positions for Tense/Aspect morphology in Turkish.

Further evidence for this distributional pattern comes from the affixation of adjectival roots, and the copular verb *-ol* ‘be, become’. Adjectival roots are affixed on par with the participle forms in a verbal complex.

- (43) a. Adjective  
 kabá-y-di-lar  
 rude-COP-past-3pl  
 ‘They were rude’

- b. Participle  
kal-dí-y-sa-niz  
stay-aspect-COP-cond(high)-2pl  
'If you have stayed'

In both of these constructions the Tense/Aspect/Mood morphemes may not be directly affixed to the adjectival or participial root, but rather must be mediated by the copula. There are, however, some forms to which these 'high' morphemes may be directly affixed. In these constructions the TAM morphology is affixed directly to a verbal root.

- (44) a. git-tí-m  
go-past-1.sg  
'I went'
- b. git-sé-m  
go-cond.-1sg  
'I would go'

Kornfilt, among others (e.g. Good and Yu 1999), notes the dichotomy between the past and conditional paradigms and the participle-copula constructions. What is not discussed is why it is these simple verbal words that are the ones that do not require a copula to intervene when the Tense morphology is affixed. This will be discussed further in the following section.

**2.3.5 Turkish *v*Ps** Let us recap the distributional nature of the two classes of Turkish morphology under consideration here. The low, participial morphology can only affix to a participial root. It cannot affix to the copulas *-y* or *-Dir*, or to an adjectival root. The high, copular morphology can only attach either to the copulas *-y* and *-Dir*, or to a verbal root with no participial morphology. It cannot affix to an adjective or to the participial morphology.

I would like to propose that this split can be explained by appealing to the selectional restrictions of the affixes in question. I stipulate that the participial morphemes have the selectional restriction that they may only attach to a bare root, or to another participial morpheme. Kabak (2000) proposes that these participial morphemes project an Aspect Phrase, and I will use this term here. AspP may not attach to an adjective, or to a verbal element. AspP can only take another AspP or a root as a complement..<sup>26, 27</sup>

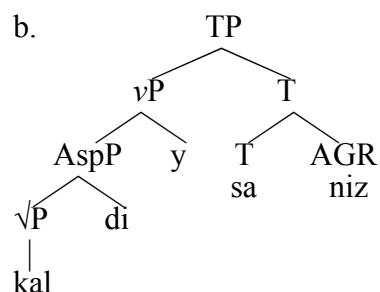
The high morphemes, on the other hand, select for a verbal complement, or *vP*. There is evidence that each non-participial inflectional morpheme in the verbal domain is hosted by a copula (Sezer 2001). I will assume that high morphology, which I will call Tense, can select for *vP* or TP. If it is the case that each Tense morpheme is affixed to a copula, then the selectional restriction is even tighter, where Tense morphemes select for a *vP* complement only. This type of analysis would not affect the main stress facts presented here, so in the interest of space it will not be discussed. Under the assumptions put forth here, the copulas *–y* and *–Dir* are light verbs, projecting a *vP*. This is illustrated in (43b), repeated here as (45) where AspP is a cover term for the position of any participial morphology, and TP is the position of any high verbal inflection.

- (45) a. kal-dí-y-sa-niz  
           stay-past-COP-cond(high)-2pl  
           ‘If you have stayed’

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<sup>26</sup> These morphemes may attach to passive/causative morphology. This may pose a problem for the analysis here, but this will be left for further research.

<sup>27</sup> See also Sezer (2001) for a detailed proposal regarding the selectional restrictions of Turkish verbal morphology.



At this point I have proposed that the ‘pre-stressing’ morphemes *-y* and *-Dir* are light verbs. In the next section I will discuss the ‘pre-stressing’ morphemes *-ki*, *-dA*, and *-(y)ken*.

### 2.3.6 Turkish CPs

When the morpheme *-dA* conjoins two clauses it surfaces as an affix to the last constituent in the first sentence. If there is a copula (vP) morpheme to its left, or the negative or yes/no markers, the exceptional stress property of the co-ordinator is not evident (46a). If there is no vP morpheme though, stress will fall to the left of the complementizer (46b).

- (46) a. Ahmet bıl-**mi**-yor-du-**da**  
 Ahmet know-neg-prog-past-coor.  
 ‘Ahmet didn’t know, and...’  
 b. sakla-n-di-lár-**da**  
 hide-recip-past-3pl-conn  
 ‘They also hid (themselves)’ (Kabak and Vogel 2001: 317)

The morpheme *-(y)ken* is labeled by Sezer as an adverbial complementizer. When affixed to the verb it means ‘while’. I will assume *(y)ken* to be sitting in CP, but this may not be the case, as it only attaches to adjectives and participles. It does not, however allow further suffixation, indicating that it is at the edge of a morphosyntactic domain. For a more complete discussion of the distribution of *(y)ken* see Sezer (2001). If this form is

not a CP, but rather a copula-affix sequence *i-ken* then it is not problematic, and falls under the discussion in Section 2.3.5.

- (47) kalk-mış-**ken** ‘While you are up....’  
 rise-perf-while (Sezer 2001: 9)

These two morphemes can be unified syntactically in that they are either heading a CP projection, in the case of the complementizer *(y)ken*, or possibly sitting just above the clause, in a Conjunction Phrase, in the case of the conjoining morpheme *-dA*.

- (48)
- 
- ```

  ConjP
  /  \
 CP   (dA)
 /  \
TP   (y)ken, (dA)
/
...

```

The fact that agreement morphology (linked to TP) cannot be suffixed to these forms is further evidence that these morphemes are not lower in the clause. What is important here is that the complement of CP, the highest TP, is a domain in which stress is determined, as will be shown in the following section.

### 2.3.7 The phasal nature of exceptional stress in Turkish Kornfilt (1996)

argues that stress is computed at the word level, and that the participles are ‘small words’ that constitute a separate syntactic and phonological domain in Turkish. This successfully accounted for the distribution of stress in these constructions, but not for the behaviour of the CP morphemes discussed in the previous section, which do not constitute separate words. Kornfilt’s analysis, along with the phonological analyses of Kabak and Vogel (2001), Inkelas and Orgun (2003) and van der Hulst and Van de Weijer (1991), do not tackle the question of why the

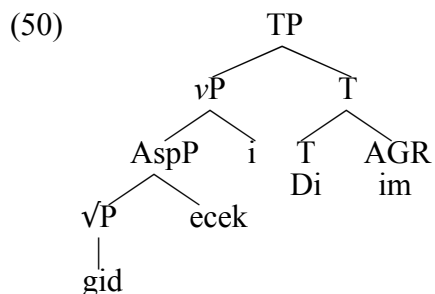
entire set of ‘pre-stressing’ morphemes, and not others, are responsible for exceptional stress.

In this section I will offer an explanation for Turkish exceptional stress that accounts for the distribution of verbal ‘pre-stressing’ morphemes in the language, as well as an account of why the participial forms must be separate from the copular domain, and therefore have to constitute a separate domain for stress. In Section 2.4.4 I compare this analysis to the proposals of Kabak and Vogel, Inkelas and Orgun and van der Hulst and van de Weijer.

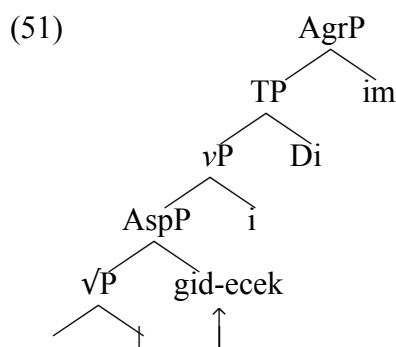
To do this I will first go through a derivation of the participle-copula construction, and then will go through a construction without the copula, but including a CP morpheme. Afterwards I will discuss the clitic-like nature of the copular complex. Let us take the following example as a starting point.

- (49)   gid-ecék-i-ti-m  
           go-fut-COP-past-1sg  
           ‘I will have gone’

Here we see that stress is exceptional in that it falls in the middle of the ‘word’, rather than at the end. To explain this phenomenon we must look to the structure of the ‘word’ in question. Below is a tree depicting the original projection site of each affix. As discussed in Section 2.3.4, the morphemes in the participial domain project an Aspect Phrase, while the morphemes in the copular domain project a Tense Phrase. These are merely labels to differentiate the two classes (see Cinque 2001 for a more detailed discussion of the nature of the projections that may be involved).



Now, as each of the morphemes heading either AspP or TP never surface as free-standing items, I will assume that each is affixed to a root via raising of this root into the head projected by each AspP or TP morpheme. As discussed above, each morpheme imposes selectional restrictions on its complement, thereby restricting the type of host that may raise to it. The AspP affixes select for AspP, or a root, and therefore the root and the low affixes may raise successive-cyclically to the highest AspP, as shown below.



Let us take a step back for a moment and assume that no little  $\nu$  morpheme has been selected in the numeration. We would have a structure like the one above, except the participle would be directly c-commanded by a TP morpheme. In this case the participle cannot raise to T, as it violates the selectional restrictions of *-Di*. If it were to raise, at the end of the derivation (or at some point during) the derivation would crash. If, on the other hand, the participle does not raise, the features of the TP affix checked through raising will not be deleted, and



the derivation will still crash.<sup>28</sup> To save this derivation, a numeration must be selected that includes a  $\nu$ P lexical item, resulting in the tree above in (51).

Here the derivation has culminated in a phase,  $\nu$ P. As  $\nu$ P is a phase, the complement of  $\nu$ , AspP, is interpreted by the PF and LF interfaces. We will not concern ourselves with the LF component here. At this point the PF component inserts vocabulary items, resulting in the form *git-ecek*. It must assign both foot structure and stress to this form. It assigns stress to the final syllable, according to the lexical stress rule of Turkish. If we go back to the tree, the light verb, *-i* may now raise to TP, satisfying the selectional restrictions of the TP head. At the end of the derivation, the copular construction will also be sent to PF, and will receive final stress.

(52) [[gid-ecék]<sub>PW</sub> i-tí-m]<sub>PW</sub>

What happens to the second stress, and the necessary inclusion of Turkish in the class of (1a) languages, will be discussed in Section 2.3.8, below. We will now turn to a derivation in which there is no copula, but where there is a co-ordinator, here *-dA*.

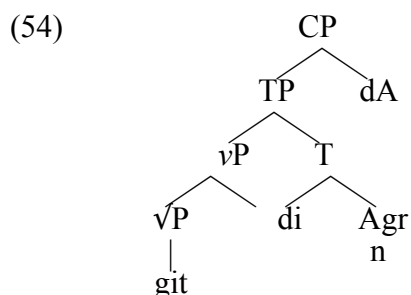
(53) git-tí-n-de  
go-past-2.sg-and  
'...you went and....' (Kornfilt 1997: 110)

Again, in the example above, stress is exceptional in that it is non-final. In this case, however, there are no participial morphemes in the construction, and therefore there are no AspP projections in the structure. The tree below indicates

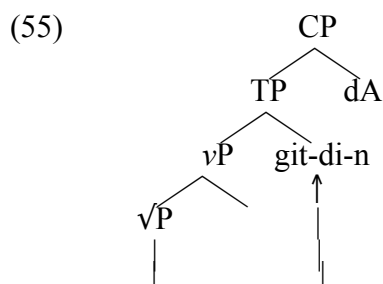
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<sup>28</sup> It must also be the case that the participle cannot raise through  $\nu$ P, becoming verbal and therefore being able to host TP affixes. This will be assumed here to be due to the selectional restrictions of  $\nu^0$ , barring raising of a non-root head into  $\nu$ P.

the original merger sites for each of the lexical items involved. If the co-ordinator sits above CP this does not affect the phonology of the derivation.



Here the innermost lexical item is the root *git*, and it is dominated by *vP*. This root may not be dominated by TP directly, as then the syntactic category of *git* will not be determined, and the selectional restrictions of T will not be met. As (the null) *vP* in this case dominates a root node, the root will raise into  $v^0$ . At this point *vP* will send its complement to PF, but the root will have ‘escaped’ spellout in this phase through raising. If escape were not possible we would expect stress to surface on the root. The root- $v^0$  will then raise to TP. At this point another phase has been constructed, and the complement of CP – TP- will be sent to PF.



The phonological component will then assign foot structure and final word stress to /gitdín/. At the end of the derivation /dA/ will also be sent to PF, and assuming it to be treated by the system in the same manner as the copular domain above, it also receives stress.

(56) [[git-dí-n]<sub>PW</sub> dé]<sub>PW</sub>

### 2.3.8 PW adjunction and stress

Neither of the forms in (52) and (56)

above surface with the two stresses indicated, except when the participle and copular constructions in examples like (52) are pronounced as separate phonological words. When this occurs they each receive final stress in the positions indicated.<sup>29</sup> When the copular construction or the co-ordinator is pronounced together with the participle or the verb, only the leftmost stress surfaces. In these instances I propose, as in Kabak and Vogel (2001), that the phonological structure created involves prosodic word adjunction – or P-cliticization-, just as in the discussion of Cupeño (Section 2.2.4).

The crucial difference between the two analyses is that Kabak and Vogel propose that this P-Word adjunction is due to the idiosyncratic nature of the pre-stressing affixes (see Section 2.4.4), while the analysis here offers a unified and principled account of the constructions: the syntactic position of these affixes is the cause of the exceptional stress facts. The motivation behind the adjunction here cannot be forced by the phonology. The adjunction of *-dA* could be due to the small size of the morpheme; it is too small to be a phonological word on its own, but this is not true of *-(y)ken* in its di-syllabic form (Inkelas and Orgun 1995).

Regardless of the motivation for the phonological adjunction of the *vP* and CP domains, both footing and stress are determined at the innermost phase, and as

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<sup>29</sup> Whether secondary stress surfaces in these forms is not clear. Most works claim that it does not (Kabak and Vogel (2001), Inkelas and Orgun (2003) and others). Sezer (2001) claims that secondary stress does surface. If it does, this follows nicely from the account herein. In a structure like in (i) main stress must fall on the innermost domain, yet secondary stress is free to surface on the outer domains.

i. [[[[ABC]XYZ]GHI]

Secondary stress in Turkish will not be discussed further here.

stress is a property of PWs, the innermost phase is a PW upon interpretation at PF, as represented in (52) and (56). The outputs of subsequent phases will adjoin to the lower P-Word in the instances seen above.

The entire adjoined PW, like any PW, can only have one main stress. As stress in Turkish is assigned cyclically it will always surface on the innermost PW. This stress is consistent with an analysis that assumes spellout from the inside-out, with the stress on the inner PW essentially blocking the stress on the outer P-Word. This is reminiscent of Inkelas and Orgun (2003) in assuming that it must be the innermost, not the leftmost, stress that surfaces.

Just as in the discussion of Cupeño inherently stressed affixes in Section 2.2, we would have no principled way of determining the stress patterns evidenced here if it were solely foot structure that was determined at the innermost phase. If (52) were computed as in (57), where ( ) indicates a right-aligned (to the phase edge) binary iambic foot, the adjunction would be at the prosodic level ‘foot’ and the entire structure would therefore constitute a single PW domain.

(57) [[gid-(ecék)-(i-tí-m)]<sub>PW</sub>

In the above structure stress is predicted to be final in the word, according to the stress rules of Turkish. That this is not the case can only be due to a prosodic word boundary preceding the copula. I have argued that the placement of this PW boundary is due to phase-by-phase interpretation.

**2.3.9 Summing up Turkish** In this section I have argued for a phase-based account of Turkish Exceptional Stress. The ‘pre-stressing’ morphemes in the verbal inflectional system are not a morpho-syntactically random selection of morphemes with non-canonical phonological behaviour, as suggested in previous phonological literature, but rather form the natural class of those morphemes that head Chomsky’s strong phases,  $\nu$ P and CP (but see fn. 35). As the complements of  $\nu$ P and CP are sent to the phonological interface separately from their heads, it is unsurprising that there should be a word-internal phonological boundary preceding the suffixes in question. The fact that there is more than one phonological domain in complex Turkish verbs has been argued previously by Kornfilt (1996). In this work I have expanded on this observation, showing a previously unreported distributional pattern, where these phonological domains occur only where predicted by the theory of phases.

The fact that stress in Turkish is dependant on phase-by-phase spellout, unified with the analysis of Cupeño in Section 2.2, offers a unique and principled view of how the derivational system of language can explain non-canonical lexical stress.

**2.4 Alternate Analyses** Both the Cupeño and the Turkish data discussed in this chapter have been previously analysed. The Cupeño exceptional stress facts have been discussed in detail in Alderete (2001 a,b). The Turkish prestressing morphemes have been discussed in Kabak and Vogel (2001), Inkelas and Orgun (2003) and van der Hulst and Van de Weijer (1991), among others. In

the following sections I examine the distinctions between the previous analyses and the one offered here. I conclude that a phase-based analysis of non-canonical stress patterns in both languages is more explanatorily adequate.

**2.4.1 Cupeño** In this section I discuss Alderete's (2001a,b) optimality theoretic account of stress in Cupeño. Alderete proposes that lexically specified root stress is responsible for the stress patterns seen in Section 2.2. What is of concern here is the question of at what point we decide that a property must be lexically specified. Lexical specification must be a last resort. If the derivational system can account for the surface stress pattern, proposing lexically specified morphemes to account for the same pattern violates Occam's Razor. I argue that the proposal I have put forth in this chapter captures a pattern that is not accounted for in Alderete's system, and therefore can eliminate the need for the lexical specification of stress on verbal roots.

The difference between those roots that always surface as stressed (main verbs) and unstressed roots (light verbs) in Cupeño is assumed in Alderete (2001a,b) to be due to the fact that stressed roots are specified in the lexicon as such. This lexical specification of stress implies that whether a root carries inherent stress or not is an idiosyncratic property of each root. Along with the assumption that (most) root stress is lexically specified, Alderete uses the proposed universal ranking  $\text{ROOT FAITH} \gg \text{AFFIX FAITH}$ , to explain why inherent stress on a root will always surface. That Max-Prom Root outranks Max-Prom Affix is argued to ensure that inherent Root stress will always surface.

- (58) a. Stressed root, Stressed affix  
 /pe-túl-qál/ → [pe-túl-qal]  
 3S-finish-imp.past.sg  
 'he finished'
- b. Unstressed root, Stressed affix  
 /pe-yax-qál/ → [pe-yax-qál]  
 3S-say-pres.  
 'he said'

In (58a) we have both a stressed root and a stressed affix in the input. As Max-Prom Root dominates Max-Prom Affix, stress surfaces on the root. In (58b), and all examples with stressless roots, Alderete utilizes alignment constraints, in addition to MaxProm-Affix, to explain the position of stress. These constraints are proposed primarily to account for the shifting of stress away from the Person-Number prefixes (which are inherently stressed in Alderete's account) in the event of an inherently stressed suffix. He proposes that stress alignment is optimally closest to the right edge of the word. I argue below that these prefixes are not inherently stressed, and therefore the work performed by alignment in Alderete's analysis is not what is causing stress to fall on the suffixes in the language.<sup>30</sup>

Before going any further, a quick aside is necessary to discuss the phonosyntactic position of the person number (PN) prefixes in Cupeño. Recall that these prefixes are stressed when in construction with a stressless root and when no inherently stressed suffixes are present.

- (59) /né-yax/ → [né-yax]  
 1sg-say  
 'I say'

<sup>30</sup> See also McCarthy (2003) for arguments that alignment constraints (and all gradient constraints) must be ruled out as possible constraints in Optimality Theory.

There are very few inherently stressed affixes in Cupeño. Alderete (2001a,b) makes the claim that the subject PN prefixes belong to the group of inherently stressed affixes, while I argue that the prefixes receive default initial stress. Alderete gives the following example as evidence that stress on the prefix is not default initial. If examples like (59) were instances of default stress, he claims, it would be expected to shift to the object marker *pi-* in (60), and we can see it does not.

- (60) /pi-pé-wen/ → [pi-pé-wen]  
       3sgOB-3S-put  
       ‘He put it’ (Alderete 2001b: 50)

What must be noted, however, is that the above object marker does not behave in the same way, phonologically or syntactically, as the subject markers do. The object morphology is not obligatory, and when it does appear, I claim, it is not integrated into the phonological word. This behaviour is typical, according to Peperkamp (1997), since non-integration into the phonological word is a typical property of clitic groups.<sup>31</sup> If the object prefix is external to the phonological word, it is therefore not a candidate for default initial stress.

Evidence that these object markers are indeed clitics comes from their behaviour in the imperative (Bacharach 2004). In Romance languages, like Spanish, object clitics are preverbal when the verb is tensed (61a), but post-verbal in the imperative (61b)<sup>32</sup>.

- (61) a. lo      necesito      ver esta semana  
       2.Obj need-1sg.pres see this week  
       ‘I need to see it this week’

<sup>31</sup> Syntactic clitics are distinct from P-clitics, and will not be discussed in detail.

<sup>32</sup> Thanks to Asaf Bachrach for helpful exchanges leading to this section.



- b. míralos  
 look.IMP-3pl.Obj  
 ‘Look at them!’

The same is true for the object clitics in Cupeño, as can be seen in (61) repeated here as (62a), and in (62b).

- (62) a. pi-pé-wen  
           3sgOB +3sg + PUT  
           ‘He put it’ (Alderete 2001b: 50)
- b. ela-ne-m=en  
       wait.for-IN-pl=1sg.ABS  
       ‘(You pl) wait for me!’ (Hill 2003:112)

That the subject agreement prefixes do not have the above properties of the object clitics has ramifications for the status of the subject prefixes. As they are affixes and not clitics, they are initial in the phonological word, even if an object clitic is present, as the object marker is external to the phonological word. The subject PN prefixes in Cupeño are mandatory in the past tense, and are therefore analyzed here as agreement markers, not clitics. I do not, therefore, include the subject PN prefixes in the group of Cupeño affixes that have the property of being inherently stressed. As stress falls on these prefixes only if stress is not assigned either to the root, or to an inherently stressed suffix, this stress will be analyzed here as default initial. The domain, or phase, in which default stress applies will then determine whether this stress falls on the verbal root or on the agreement affixes (when present). As we have seen, this fact falls out nicely when the derivational history of the word is taken into consideration.

As the subject agreement morphemes have been removed from the list of inherently stressed affixes, we will only look here at the interactions evidenced when multiple stressed suffixes are merged with a stressless root. Alderete

proposes that constraints on the edge-alignment of stress in Cupeño determine the data. Align-Right outranks Align-Left, predicting that the rightmost stressed suffix will surface with stress in the output form.

- (63) /yax-qál-í/ → [yex-qel-í]  
 say-past.imp.sg-DSS  
 ‘while...was saying’ (Alderete 2001b: 243)

As main stress can only be realized on one of the two stressed affixes, one alignment constraint must be violated. In (63) stress surfaces on the final morpheme, therefore Align-R must outrank Align-L.

The different subject subordinator /-í/ (glossed DSS in (63)), when in construction with other inherently stressed affixes, always surfaces with stress. However, the stress on Cupeño verbs is not generally consistent with the above ranking of alignment constraints. In the following section I show that the different subject subordinator suffix is the exception to the rule. It will be argued that the general pattern in Cupeño is for the leftmost, or innermost, stressed affix to surface as stressed.

**2.4.2 The Dispute over a Misbehaving Affix** This section is a discussion of which of the following patterns exemplifies the general stress pattern of Cupeño verbs. It will be shown, contra Alderete, that (64a), where the rightmost affix surfaces as stressed, is an exception. In cases where there is an unstressed root and more than one stressed suffix, the general pattern is argued to be for the leftmost affix to surface as stressed (64b).

- (64) a. /yax-qál-í/ → [yex-qel-í]  
 say-past.imp.sg-DSS  
 ‘while...was saying’ (Alderete 2001b: 243)
- b. /yax-í-qá-te/ → [yex-í-qe-t]  
 say-NOM-pres.imp.sg.-nnp  
 ‘one who is going to say’ (Alderete 2001b:482)

In both examples above, the root verb is stressless. In (64a) we see that, of two inherently stressed affixes, it is the different subject subordinator /-í/ that surfaces as stressed. In alignment terms, the rightmost relevant affix is stressed. In (64b), however, of the two inherently stressed affixes, it is the nominalizer that surfaces as stressed. In this case we can say that the leftmost relevant affix is stressed. The task of this section is to determine which of these examples constitutes an exception to the general pattern of stress assignment in Cupeño.

For Alderete (2001a,b), it is the nominalizing affix that is seen to be misbehaving. Alderete offers an alignment account of stress in constructions with unstressed roots. Here it is useful to discuss why Alderete needs the ranking he proposes to explain why stressed suffixes always win out over stressed prefixes in Cupeño. Remember that Alderete assumes that the Person-Number subject prefixes in the language are inherently stressed. A tableau to this effect can be seen below.

- (65) Rightmost Affix Stress: /áf + root + áf.../ → [af- root-áf...]

/pé + yax + qál/	Max-Prom Affix	Align-R
a. pé-yax-qal	*	yax-qal!
☞ b. pe-yax- qál		*

(Alderete 2001b: 54)

To account for the anomalous behaviour of the nominalizing affix, Alderete appeals to the constraint STRESS-TO-í, ranked above AlignR. This constraint causes stress to be realized on the nominalizer. This constraint is not

meant to endow all suffixes containing /i/ with a special status, but is specific to the nominalizing morpheme. Alderete speculates that there are a number of reasons that the nominalizer could be behaving this way. It could be due to the derivational status of the nominalizing morpheme, or it could be a dominant morpheme that triggers deletion of neighboring stress, or it could be due to the special status of noun faithfulness, but does not commit to any of these analyses.

As I pointed out above, there is no good reason to assume that the Person-Number prefixes in Cupeño are inherently stressed. If we assume that they are not stressed, then Alderete's alignment constraints are almost out of a job. AlignR has the job of causing stress to fall on the different subject subordinator *-í*, rather than on a suffix to its left, while Stress-to-*í* is responsible for causing stress to fall on the nominalizer, rather than on a suffix to its right. It is only examples containing either the different subject subordinator or the nominalizer that Alderete uses to support his rankings. What we end up with therefore, are two morpheme specific constraints, with one ranked arbitrarily over the other (Stress-to- *í* >> AlignR).

Now, let's look at this pattern from a cyclic-spellout point of view. Assuming affixes to be spelled-out from the innermost to the outermost morpheme, we can propose that the first inherently stressed morpheme will realize stress. Assuming only one stress per word, and that stressed morphemes cannot override existing stress, as seen in the previous section, no other stressed morphemes will be able to surface as stressed.<sup>33</sup> Only suffixes have exceptional

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<sup>33</sup> The second is a contentious assumption, but not specifically for Cupeño. Examples of further affixation shifting the position of stress are not hard to find (e.g. *origin*→*original*→*original-ity*). It will be argued in the next chapter that even examples such as these are not instances of shifting stress.

stress in Cupeño, and therefore this stress pattern can also be captured by a constraint such as LEFTMOST. This would predict, using OT type constraints, that the DSS morpheme is the exception to the rule here, giving the ranking STRESS-TO-DSS. >> LEFTMOST. The question here is how to decide between the two analyses.

What would be nice to have at this point would be an example containing both the nominalizer and the different subject subordinator both affixed to the same verb. Unfortunately, I have come across no such examples. It seems we will have to look to indirect evidence for the correct analysis of these two morphemes. In Section 2.2 Ablauting affixes were introduced. As these affixes only affect stress in construction with a stressless root – as do the inherently stressed affixes – we can look to how these affixes behave when more than one of them is affixed to a verb for the answer to our above problem. Below we see a construction with both the i-Ablaut realis subordinator /-ve/ and the a-Ablaut irrealis subordinator /-pi/.

- (66) chem-tew-íve-max-ápi → chem-tew-íve-max-api  
 1pl-see-R.sub-BEN-IRR.sub.  
 ‘to look ahead for ourselves’ (Hill ms. 51)

What the above example shows is that it is not only the nominalizer that is a problem for Alderete’s AlignR constraint. Example (66) is, however, consistent with a cyclic spellout account of stress in Cupeño. What I propose here is that, at PF, the first morpheme with lexical stress to be spelled-out will surface as stressed. In this case, the innermost stressed morpheme will undergo spellout first

giving us the correct results. A Leftmost constraint is therefore unnecessary, as the correct output is predicted by the derivation.

A cyclic-spellout account such as this allows us to account for all instances of stress in the language, except for constructions involving the different subject subordinator /-i/. The behaviour of this morpheme will have to be stipulated, but this leaves us with only 1 ‘misbehaving’ affix in the language, while Alderete’s AlignR, assuming the pattern in (66) to be representative of epenthesizing affixes, would have to include many.

**2.4.3 Cupeño and cyclic spellout** Any theory of cyclic-spellout (Mohanan 1986, Bobaljik 2000 and others) proposes that phonological interpretation applies from the most embedded morpheme to the least. This entails that more embedded affixes will undergo phonological processes before those that are less embedded. I follow the DM tenet that lexical items in the syntax (including affixes) have no phonological form, but rather receive phonological form when sent to PF. PF then, can see, and is constrained by, the structures it receives. Optimality Theoretic accounts assume that the input to the phonological component of the grammar is a string of sound, and whether this string is accompanied by a structural (non-linear) representation, or what the structure would be if there is one, is not agreed upon in the literature (but see Kiparky 2000, for a cyclic implementation of OT). Because of this, many phonological constraints are formulated not to refer to structure, but rather can only refer to edges or specific morphemes. Within the representational morpho-phonological

system I am assuming, as discussed in the previous chapter, reference to edges of words can only occur after linearization. After PF has spelled-out the terminal nodes of a structure, the syntactic structure is no longer available and only a linear phonological string remains. In this section I contrasted the current OT analysis of Cupeño stress (Alderete 2001a,b) with the derivational analysis presented in Section 2.2.4. The affixes surfacing as stressed in Cupeño are almost invariably the innermost affix structurally. I believe such a generalization, along with a cyclic-spellout view of the phonological system, can explain the position of stress on exceptionally stressed verbal words in Cupeño. The fact that a phonological string such as *wíchaxnenqal* has the complex phonological structure  $[_{PW}[_{PW}wíchax]nenqal]$ , which mirrors the syntactic structure  $[_{CP}[_{VP}wíchax]nenqal]$  cannot be readily captured in any non-stipulative manner in Optimality Theoretic terms. The proposed universal ranking  $ROOTFAITH \gg AFFIXFAITH$  follows from the derivational system, therefore making its stipulation unnecessary.

#### 2.4.4 Turkish

Turkish exceptional stress, like Cupeño, has been previously analyzed as being due to inherently stressed morphemes, among other analyses to be discussed here. The proposals of Kabak and Vogel (2001), Inkelas and Orgun (2003) and van der Hulst and Van de Weijer (1991) are all able to account for the Turkish exceptional stress patterns, but each involves certain stipulations that are, by nature, non-optimal solutions to the problem at hand. The problems encountered by these accounts are discussed below.

Inkelas and Orgun (2003) analyze the affixes in (32), repeated here as (67), as pre-stressing.

- (67) Turkish pre-stressing verbal inflectional morphemes
- a –Dir epistemic copula
  - b –y copular clitic (full form: i)
  - c –dA clausal coordinator
  - d –(y)ken ‘when-adverbial complementizer’

This property is stipulated as part of the lexical entry for these affixes. These affixes are proposed to have a lexically specified trochaic foot structure (depicted in (68)), which causes stress to fall on the syllable preceding the affix.<sup>34</sup>

- (68) Inherent Trochaic Foot
- (\*     )
- σ   σ
- dA

The problem with this account, as has been mentioned, is that these affixes constitute a natural class. Each morpheme is merged in the head of vP or CP – they are phase heads.<sup>35</sup> I have argued that the pre-stressing property of these affixes can be derived from the phase-by-phase spellout of the narrow syntax. Therefore idiosyncratic lexical specification is not necessary here. In the present account, the innermost of the above affixes will trigger PF interpretation of its complement. As Turkish assigns stress, hence P-Word status, at each phase, the position of stress in these instances does not need to be stipulated. Inkelas and

<sup>34</sup> Inkelas and Orgun propose that all non-standard stress in Turkish involves a pre-specified Trochaic foot. This is taken to explain the fact that exceptional stress in Turkish is never final. It is unclear to me why this fact needs accounting for. As regular stress in Turkish is final, any final stress should be interpreted by the speaker as regular, based on the overwhelmingly regular stress pattern of the language.

<sup>35</sup> The negative and yes/no markers will be discussed in Chapter 5. These two morphemes are arguably not phase heads. It will be proposed that each of these morphemes is merged to the complement of a phase head. If this is the case then it would explain why these morphemes also appear to be ‘pre-stressing’.



Orgun's account is consistent with the cyclic spellout view discussed herein in one respect though, as they introduce the rule 'Innermost' or 'Input Wins', to account for the fact that the most deeply embedded morpheme with exceptional stress will decide the position of stress in the entire word.

- (69) /güzel-leş-tir-**me**-di-y-se-ler-de/ → güzel-leş-tır-me-di-y-se-ler-de  
 beautiful-VBL-CAUS-NEG-past-COP-cond-pl.-PRT  
 "If they didn't make (it/him/her) beautiful..."

The second account to be reviewed here, that of van der Hulst and van de Weijer (1991), proposes that the morphemes in (67) are unstressable. In their account stress is assigned cyclically to each affix that is attached to the stem. After each cycle of stress assignment, a stress clash avoidance rule deletes the leftmost stress. This procedure pushes the word stress to the right edge of the word. Unstressable morphemes interrupt this process. There is no clash resolution, and the stress to their left is not deleted.

- (70) stepwise stress (kal-dí-y-sa-niz)  
 a. kál  
 b. kál-dí                      stress clash resolution →      kal-dí  
 c. kal-dí-y                    no resolution  
 d. kal-dí-y-sá                no resolution  
 e. kal-dí-y-sá-níz            stress clash resolution →      kal-dí-y-sa-níz  
 f.                                delete rightmost stress →      kal-dí-y-sa-niz

Stress continues to be assigned to all morphemes following the unstressable morpheme, until the derivation is completed. van der Hulst and van der Weijer therefore need, like my analysis in Section 2.3.8, a post-lexical rule that deletes (or demotes) the rightmost of two word stresses. The problematic aspect of the above account is again that, for van der Hulst and van der Weijer, the pre-specified stressless nature of the affixes in (67) is arbitrary.

The third account, offered by Kabak and Vogel (2001), also attributes an arbitrary property to the affixes in (67) to account for their ‘pre-stressing’ abilities, although they get, in my opinion, closest to the correct analysis. Kabak and Vogel stipulate that the affixes in (67) are Prosodic Word Adjoiners (PWAs).<sup>36</sup> Unlike in Peperkamp (1997), who proposes that clitic groups adjoin to the phonological word, these affixes are not assumed in Kabak and Vogel’s account to constitute a natural class. These PWAs cannot attach inside the PW, but rather must adjoin to it. Since in Turkish default stress is assigned to the final syllable of the PW, Kabak and Vogel capture the distribution of Turkish Exceptional Stress.

- (71) [[sakla-n-ır]<sub>PW</sub>-Ø-di-niz]  
 hide-recip-aor-COP-past-2pl  
 ‘You used to hide (yourselves)’

The main flaw here is, once more, that these PWAs are stipulated as such, without any suggestion of why this should be so.<sup>37</sup> In fact, Kabak and Vogel (2001: 332) state explicitly that PWAs do not form a morpho-syntactic natural class.

It has previously seemed problematic that certain suffixes and clitics have similar types of idiosyncratic stress properties since they do not form a natural class either morphologically or syntactically. By considering these items in terms of a single phonological property, however, we are now able to identify a natural class, albeit one that is independent of their morphological and/or syntactic properties. The crucial property, as we have demonstrated,

<sup>36</sup> Glyne Piggott (1994) motivates Prosodic Word Adjunction on purely phonological grounds. His account however, is tied to the nature of extrametricality, and cannot be extended to the Turkish data.

<sup>37</sup> Kabak(ms.) alludes very briefly to the fact that possibly something more, and morpho-syntactic, may be affecting the Turkish stress patterns discussed here.

is that the set of suffixes and clitics in question attaches by adjunction to a Phonological Word. (93)

Another serious problem for this account (and for that of Inkelas and Orgun) is that the status of these morphemes as PWAs is consistent *whether or not they are phonologically null*, as in (71). As the Prosodic hierarchy is a phonological object, it must be projected from segmental material. What Kabak and Vogel propose, therefore, is that projection of the prosodic hierarchy be dissociated from the phonology, leaving us with the problem of how, or why, this is accomplished.

#### **2.4.5 Turkish and cyclic spellout**

What is assumed, in all of the above accounts, and stated explicitly in Kabak and Vogel, is that the group of pre-stressing morphemes in Turkish are a morpho-syntactically random group of affixes with idiosyncratic phonological properties. In Section 2.3 I argued that no lexical pre-specification of phonological features is needed to account for Turkish Exceptional Stress as these affixes do form a morpho-syntactic class. They are those morphemes that, like the light verbs in Cupeño, fall just outside of a phase-induced spellout domain. The principled reason for the affixes in (67) to be ‘prosodic word adjoining’ is that each sits in either  $\nu$ P or CP. Phase-by-phase spellout ensures that the complement of  $\nu$ P or CP will surface with regular stress.

**CHAPTER 3.<sup>1</sup>****PHASES AND LATE PROMINENCE ASSIGNMENT: EVIDENCE FROM OJIBWA**

**3. Introduction** In the previous chapter we saw that word stress mirrors the syntactic derivation in an optimal way in Cupeño and Turkish. In both of these languages main stress surfaces on the most deeply embedded constituent within the word. In other words, stress is regular within the first phase, even if it seems irregular within the entire word. This is due to the fact that both projection of prosodic structure and stress assignment occurs at PF upon interpretation of each phase in these languages, (1a) below. This pattern was one of the possibilities introduced in Chapter 1, based on the fact that stress is necessarily dependant upon footing and PW projection. Stress cannot be assigned until the prosodic structure that determines its placement is present. What this dependency did not entail, however, was that stress must necessarily be assigned upon the interpretation of each phase. The other option, (1b) below, is that PW projection occurs during the interpretation of each phase, and that stress assignment is computed over the entire string (where the relevant string throughout this work can be interpreted as ‘word’ – or P-cliticization group) after all phases have undergone PF interpretation.

- (1) Stress may be computed;
- a. Upon interpretation of the first phase. Footing and Prominence may both be computed at spell out of phase A prior to the interpretation of later phases.

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<sup>1</sup> This Chapter is an expansion of work co-authored with Glyne Piggott and presented at the MFM (2005), MOT (2005), NAPHCA (2006) and the 37<sup>th</sup> Algonquian Conference (2005) as well as published in the proceedings of the 37<sup>th</sup> Algonquian conference (2005), and McGWPL (2006).

- b. Upon completion of the interpretation of all phases. Footing may be computed at spell out of phase A, and consequently at phase B, etc. Prominence is assigned upon completion of the derivation.

The goal of this chapter is to demonstrate that languages of type (1b) exist. Type (1b) languages are those where (main) prominence marking is post-cyclic. This Delayed Prominence Projection (DPP) is argued here to optimally account for the behaviour of stress within Ojibwa and English.

In previous accounts of cyclic stress assignment stress shifting or demotion rules were proposed (Chomsky and Halle 1968, Liberman 1975, Liberman and Prince 1977). It is proposed here that this theoretical apparatus is necessary only if main stress assignment is forced to apply at the same point in the derivation as is PW projection. The alternative presented here internalizes the fact that the output of footing and PW projection each necessarily contain one member syllable that is interpreted as the peak, or head. It is to this head that main prominence is assigned. Importantly, like the determination of the strong syllables at the foot level, this head of a PW must be determined prior to prominence assignment. Assuming this to be so, head syllables may be targeted by phonological rules regardless of whether they have been assigned prominence, or stress. This being the case, all surface realizations of segments that have been proposed to have been stressed on a previous cycle may be reanalyzed as having been assigned the status of strong syllable on a previous cycle. Admittedly, this proposal predicts nothing new about the cyclic placement of strong syllables. The advantages it offers are (i) no reduction rules are necessary in order to shift main stress due to cyclic interpretation, and (ii) main stress placement on an element

within an outer cycle, rather than on the first (innermost) cycle – discussed in the previous chapter – has a principled explanation. The outer cycle is present at the point in the derivation where stress is assigned. Consider the following classic example.

- (2) a. condensation [kandenseɪʃən]  
b. compensation [kəmpəenseɪʃən]

The classic view of the different surface realizations of the second vowels in the above near minimal pair is that *condensation* is interpreted in two cycles, while *compensation* is interpreted in 1, as \**compense*, not being a word in English, is ineligible for cyclic interpretation. The derivation of (2a) is therefore typically proposed to be as follows;

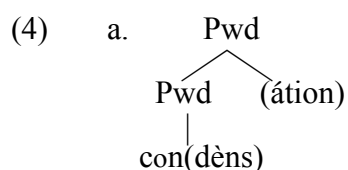
- |     |             |                   |  |
|-----|-------------|-------------------|--|
| (3) | a. Cycle I  | kanðɛns           |  |
|     |             | kan(dɛns)         | footing  |
|     |             | kan(dɛ́ns)        | stress assignment  |
|     | b. Cycle II | kan(dɛ́ns)ejʃən   |  |
|     |             | kan(dɛ́n)(sejʃən) | footing  |
|     |             | kan(dɛ́n)(séjʃən) | stress assignment  |
|     |             | (kàndɛn)(séjʃən)  | Stress Demotion, Clash Resolution,<br>and Main stress assignment |

Lieberman (1975) discusses how stress is dependant on feet, which are in turn dependant upon the weight or strength of one syllable in the foot – the strongest of which will become the foot's head according to the phonological rules of any particular language. The determination of the head syllable must occur prior to stress assignment. It is therefore possible that the non-reduction of the vowel in the head syllable of the first cycle in (3) is due to the fact that it is the head of a foot, and not to the fact that it is assigned stress on the first cycle. This

makes exactly the same predictions for cyclic rule application as the traditional proposal, but allows for stress to be assigned to the syllable with the most prominence after all derivational steps have been completed.

The advantages of the proposal that stress is assigned post-cyclically in some languages have already been stated, and are repeated here. First, it does away with stress demotion rules. Secondary stress is not a demotion of stress, but rather a function of the fact that only one syllable may carry main stress, while more than one syllable can be prominent. Secondly, this delay in stress assignment can aid in accounting for the fact that main stress in some languages does not uniformly fall on the most deeply embedded domain of the word, contra the pattern seen in the previous chapter.

Recall that a prosodic word is defined in this thesis as a domain in which one and only one main stress may be assigned. Assuming this to be the case, main stress should always fall on the most embedded PW in a structure if stress is assigned cyclically and phonological interpretation at the cycle is persistent, i.e. Structure Preservation (SP) is in effect. That SP – where structure projected in one cycle survives unaltered at a later cycle – has been recently touted in the Optimality Theoretic (OT) literature (e.g. Benua 2000, Pater 1995) as an effect of Output-Output Correspondence. It has also informed much, if not all, of the pre-OT literature on cyclic phonology. The question here becomes, then, why main prominence assignment should not be persistent.



If the above inner PW were assigned stress cyclically, then we immediately confront the problem outlined above. The lower PW containing ‘*condens*’ does not carry main stress on the surface, and therefore main stress, if it were assigned cyclically, would not be persistent.

Acknowledging that there are two phonological cycles in the interpretation of *condensation*, the above problem can, and must, be resolved in either of the following two ways. (5) represents an elaboration of the classic derivation (where cycles=PWs), while (6) incorporates the insights of the typology in (1).

- (5) a. PW  
       |  
       ft  
       (condéns)
- b. PW  
    /  \  
 ft  ft  
 (cònden)(sátion)
- (6) a. PW  
       |  
       ft  
       (condens)
- b. PW  
    /  \  
 PW  ft  
 (cònden) (sátion)

In (5a) main stress assignment is computed. In (5b) main stress is reassigned and later readjustment rules such as clash resolution apply. In (6a,b) the head of each foot/PW is determined (in bold) cyclically. Main stress is assigned post-cyclically to the rightmost head and secondary stress is shifted due to stress clash avoidance. The vowel determined to be a head in (6a) retains this status and is not reduced. The lack of vowel demotion in multi-cycle words like *condensation* then may be due to the fact that the syllable in question has been assigned the status of PW



head upon the first cycle, and not due to its being stressed in the interpretation of the first cycle. If we can find evidence that other languages behave this way, we can support the above proposal typologically. I argue in this chapter that Ojibwa is necessarily a type (1b) language, showing that late stress assignment occurs even though phonology (prosodic projection) is computed cyclically.

In sum, it is the case in some languages that main stress does not necessarily fall on the innermost cyclic domain. Assuming persistence of phonological structure, we must propose that words in languages such as English and Ojibwa (to be discussed throughout this Chapter) have a different prosodic derivational history from those seen in Chapter 2. In languages like English and Ojibwa this difference is due to the timing of main stress assignment, as outlined in (6). At each phase PW structure is determined. It is only post-cyclically that main (and secondary) stress is assigned, and main stress is determined at the level of the highest PW. What this entails is that not all PWs must be assigned main prominence. The innermost PW in *condensation* remains devoid of main prominence – but is subject, as a part of the higher PW, to secondary stress assignment.

As main stress assignment may be post-cyclic, it is unsurprising that main stress may fall within any cyclic domain in late-stressing languages. Nevertheless, cyclic effects can be seen in these languages. Phases are argued to universally interpret certain morpho-syntactic configurations (e.g. *vP*, *CP*, *nP*...) and this cyclicity is visible in the surface phonology regardless of whether main stress assignment is operative at the phase level.

The majority of this chapter will be dedicated to a detailed study of Ojibwa phases. It is impossible to discuss late stress assignment until it is clear that multiple phonological cycles exist in the derivation of Ojibwa words. Once it is clear that Ojibwa words contain independent phonological domains, we can see that stress must be assigned late in this language.

The first sections of this chapter will therefore be devoted to discussing a phase based analysis of Ojibwa prosodic structure that can be nicely accounted for in the framework of the previous chapter. We will see that in Ojibwa PWs are computed on every phase and P-cliticization is operative. I show that phasal domains are relevant for Ojibwa footing/PW projection, creating visible phonological effects. The effects to be discussed here are hiatus resolution and restrictions on the surface placement of degenerate feet. In the final sections of this chapter we see that, conversely, these phasal domains are not relevant for main stress assignment, as permitted by a theory that includes late prominence assignment.

**3.1 A phase-based analysis of Ojibwa** Ojibwa, like Cupeño and Turkish, offers phonological evidence for phase by phase spell out within words that coincides with the domains predicted by Marantz (2001), Marvin (2002) and Chomsky (2001) and others. Footing, hiatus resolution, and Degenerate Foot repair strategies will give evidence for vP, aP, nP(numP/possP), DP and CP domains within the Ojibwa word. It is shown that (1) hiatus resolution is never operative across a phase boundary, (2) footing never crosses a phase boundary,

and (3) when the PF output of a phase does not meet all prosodic requirements in Ojibwa it is cliticized inside the phonological domain (PW) to its right. Only if no cliticization domain is available and no repair strategy is viable do sub-optimal PWs in Ojibwa surface.

**3.1.1 Ojibwa hiatus resolution** Ojibwa, like many languages, disfavours vowels in hiatus. Intriguingly, not all instances of vowels in hiatus are repaired, and when VV sequences are repaired, the language has two distinct repair strategies. Each response to a VV sequence in Ojibwa is argued here to be crucially linked to phase-by-phase computation and to a predictable distinction between pre- and post-interpretation repair strategies.

In order to repair surface VV sequences, Ojibwa employs two distinct strategies; epenthesis, as in (7a), or deletion, as in (7b).

- (7) a. **nida**:pawe: 'I have nightmares'  
       ni-a:pawe:  
       '1P-have-nightmares'  
       b. name:g 'sturgeons'  
       name:-**ag**  
       sturgeon-PL'

These can be compared with instances where vowels in hiatus are tolerated (in bold) in the language, as in (8b-d).

- (8) a. a:gamose: 's/he walks in snowshoes'  
       b. **gi:-a**:gamose: 's/he walked in snowshoes'  
       c. nid-**ini-a**:gamose: 'I walk there in snowshoes'  
       d. ni-**gi:-ini-a**:gamose: 'I walked there in snowshoes'

It is argued here (see also Piggott and Newell (2006a), (2007) and Newell and Piggott (2006)) that the hiatus repair strategies in (7) are predictable – as is

the non-resolution in (8), and this predictability stems from the domain in which each morpheme in the verbal word undergoes spellout. We will focus here on the distinction between the vowel deletion repair strategy, and the environments in which no repair is effected. It is argued that vowel deletion occurs when two morphemes are spelled out within the same phase, while no repair strategy is effected when two morphemes are spelled out in separate phases. Consonant epenthesis, to be discussed in Section 3.2.2 occurs upon phonological cliticization, which is driven by a language-specific restriction. Before we can see that the above proposals are justified, we must discuss the morpho-syntactic properties that lead to the conclusion that the cyclic phonological domains seen in Ojibwa are indeed simultaneous with proposed syntactic word-internal phases in the language.

**3.1.2 Ojibwa morphosyntax** Ojibwa gives ample evidence for Marantz' (1997) claim, along the lines of work in Pesetsky (1995), that roots carry no category features, and that the determination of categorical features is a function of the syntactic environment into which a root morpheme is inserted (see Harley and Noyer 2000) for further discussion of the distinction between root morphemes and functional morphemes). Particularly, each Ojibwa 'word' is demonstrably minimally bi-morphemic, where the root morpheme is merged with a category-defining head.<sup>2</sup> Therefore all Ojibwa words (as do, arguably, all words) have at least the following structure.

---

<sup>2</sup> There are instances where the category-defining head is not phonologically overt.

- (9)
- ```

      x
     / \
  root  category-defining-head (a,n,v)

```

In Ojibwa, a lexical item may not surface without a category-defining head, classically labeled a ‘final’, examples of which are in (10a) for verbs, (10b) for nouns, and (10c) for adjectives/adverbs.

- (10) a. *wa:b-i*  
           light reflection-AI FINAL  
           ‘see’  
           *wa:b-am*  
           light reflection-TA FINAL  
           ‘see someone’
- b. *niba:-win*  
           sleep-FINAL  
           ‘sleep’  
           *niba:-igan*  
           sleep-FINAL  
           ‘bed’
- c. *omb-i*  
           upwards-FINAL  
           ‘upwards’  
           *aga:-i*  
           small-FINAL  
           ‘small’

Note that it is possible for roots to surface in the environment of more than one type of category-defining head. In (11a) the root *wa:b* is merged with a verbal final, while in (11b) it is merged with an adjectival/adverbial final.

- (11) a. *wa:b-am*  
           light reflection-TA FINAL  
           ‘see someone’
- b. *wa:b-i*  
           light reflection-FINAL  
           ‘white’

Considering the above initial generalization, let us return to the examples in (8), repeated below as (12).

- (12) a. a:gamose: 's/he walks in snowshoes'  
 b. gi:-a:gamose: 's/he walked in snowshoes'  
 c. nid-ini-a:gamose: 'I walk there in snowshoes'  
 d. ni-gi:-ini-a:gamose: 'I walked there in snowshoes'

In (12), *ini* is an adverbial modifier, and *agamose:* is a verb. The (minimal) structure according to the theory of Distributed Morphology of each can be seen in (13) below.

- (13) a.   
       b.
- Diagram (13a) shows a tree with root 'a' branching into a check node  $\checkmark$  and a terminal node 'a( $\emptyset$ )'. The check node  $\checkmark$  is dominated by the terminal node 'ini'.  
 Diagram (13b) shows a tree with root 'v' branching into a check node  $\checkmark$  and a terminal node 'v( $\emptyset$ )'. The check node  $\checkmark$  is dominated by the terminal node 'a:gamose:'.

When merged together, they constitute the compound structure seen in (14).

- (14)
- Diagram (14) shows the merged tree. The root is 'v', which branches into 'a' and 'v'. The 'a' node branches into  $\checkmark$  and 'a( $\emptyset$ )', with  $\checkmark$  dominated by 'ini'. The 'v' node branches into  $\checkmark$  and 'v( $\emptyset$ )', with  $\checkmark$  dominated by 'a:gamose:'.

I have already demonstrated in the previous chapters that category-defining heads induce interpretation. This being the case, the adjectival and verbal elements above are within separate phases, as each category-defining head (a,v) will induce interpretation at the interfaces. This multi-phasal configuration is

always present when VV sequences are tolerated in Ojibwa. Let us consider why this should be the case.

In the derivation of the above compound, before the verb and adjective can be merged, there are internal merger operations that must occur inside the *a* and *v* phases. The root *ini* must be merged with the adjectival category-defining head, and the root *a:gamose* must be merged with the verbal category-defining head. At each point where a category-defining head is merged a phase is completed and interpretation will be triggered. Crucially, this interpretation must be triggered prior to the two phases merging into a compound structure. Whether these two pre-compound merger operations are sequential or parallel is not of concern here. What must be true, however, is that upon interpretation of, say,  $[[ini_{\sqrt{}}]\emptyset_a]$ , there are no other elements within the phonological computational space. This being the case, there is no hiatus to resolve. The same situation holds within the  $[[a:gamose_{\sqrt{}}]\emptyset_v]$  phase.

Upon PF interpretation each of these phases will project to the PW level.

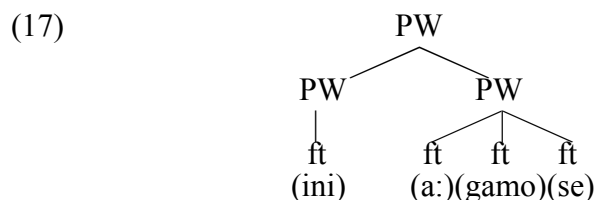
(15) *PWd Projection*

Every phase corresponds to a prosodic word. (Piggott & Newell 2007: 23)

Ojibwa footing is exhaustive, iambic, and parsed from left to right (Piggott 1983), giving the following structures;

- (16) a. 
$$\begin{array}{c} \text{PW} \\ | \\ \text{ft} \\ (\text{ini}) \end{array}$$
- b. 
$$\begin{array}{c} \text{PW} \\ / \quad | \quad \backslash \\ \text{ft} \quad \text{ft} \quad \text{ft} \\ (\text{a:})(\text{gamo})(\text{se}) \end{array}$$

After interpretation, syntactic merger of the adjective and verb occurs. As two separate PWs have already been constructed, and prosodic structure is persistent, the syntactic structure in (14) will give rise to the phonological structure in (17).



Within each sub-PW there is no hiatus to resolve. And although the higher PW does include hiatus, it is not resolved. This fact makes it clear that it is not a ban on linear VV sequences that triggers hiatus resolution in Ojibwa, but rather it is a ban on the insertion of adjacent vowels within a PW that is not tolerated. We can deduce from this pattern that vowels in hiatus are only resolved during prosodic projection. As a PW is projected at the interpretation of each phase, this resolution can also be described as being restricted to PWs or to co-phasal constituents.<sup>3</sup>

This sensitivity to the phase can therefore be stated formally as follows;

---

<sup>3</sup> Different resolution strategies can be tied to differences in phonological derivations. In the root-root compound in (i), which is computed in a single phase, the first root is one that happens to have a consonant-final allomorph that is selected in environments where the following morpheme is vowel initial. In most cases of phase internal hiatus resolution, the second vowel in the sequence is deleted, as no allomorphic variants are available, as seen in (15), repeated below as (ii). In (iii) vowel deletion does not occur as the root to which the vowel-initial suffix merges is consonant-final.

- i. inima:daga: 'swim away'  
ini-a:daga:  
'away-swim'
- ii. name:g 'sturgeons'  
name:-ag  
'sturgeon-PL'
- iii. miskominag 'raspberries'  
miskw-imin-ag  
'red-berry-PL'



(18) *Phase Integrity/PF*

Conditions on the well-formedness of prosodic categories are imposed on all elements that emerge within a phase  $\alpha$ , if the elements are solely within phase  $\alpha$ .  
(Piggott & Newell 2007:16)

Emergence here is crucial. VV sequences are permitted within a phase if they do not emerge during prosodic projection within that phase. After projection has occurred, as long as no modifications are effected, VV sequences will be tolerated.

**3.2 The Ojibwa verbal domain**

Now let us turn to the

examination of the Ojibwa verbal domain specifically. It is not only at the juncture between suffixes and the root that V-deletion is employed to resolve vowels in hiatus (as in (7)). Nor is it solely the juncture between a modifier and a modified constituent that hiatus is not resolved (14). We will begin with a discussion of the non-resolution of VV sequences in non-modificational structures in 3.1. We will then compare this to the consonant epenthesis strategy for hiatus resolution. These phenomena, along with the vowel deletion strategy, will allow us to pinpoint the exact nature and timing of hiatus resolution in Ojibwa. In Section 3.2.4 we will return to a discussion of vowel deletion, demonstrating that phases offer an explanatory account of the patterns of hiatus in Ojibwa.

**3.2.1 Hiatus resolution by deletion vs. hiatus non-resolution**

Let us return to the examples of non-resolved hiatus seen in (8) and (12), repeated below as (19).

- (19)
- |                         |                               |
|-------------------------|-------------------------------|
| a. a:gamose:            | 's/he walks in snowshoes'     |
| b. gi:-a:gamose:        | 's/he walked in snowshoes'    |
| c. nid-ini-a:gamose:    | 'I walk there in snowshoes'   |
| d. ni-gi:-ini-a:gamose: | 'I walked there in snowshoes' |

The general verbal template for Ojibwa verbs is as follows<sup>4</sup>.

- (20) Person Prefix : Tense : Modifier : Verb : Suffixes

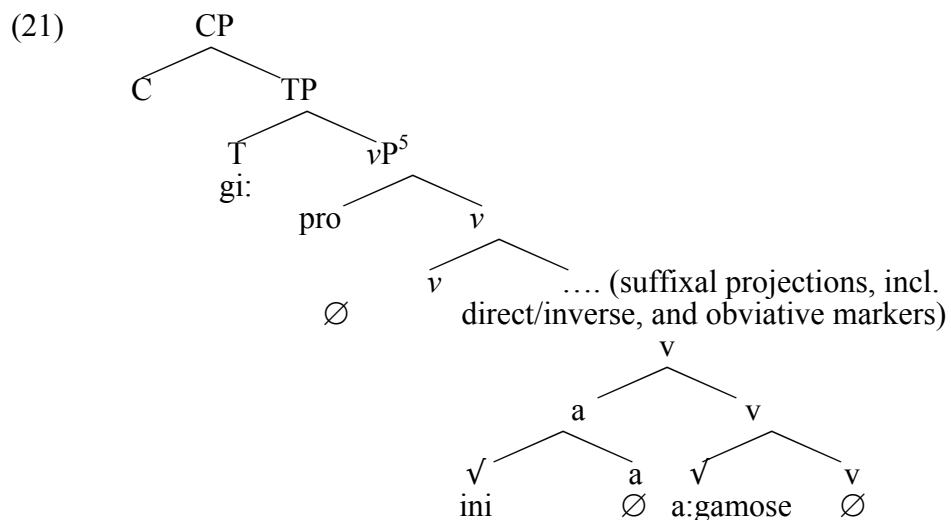
We will ignore the suffixes here. It is enough to note here that vowels in hiatus are always resolved by vowel deletion between the verb and a suffix. Person prefixes, tense morphemes, and modifiers may all be phonologically null, yet when they are overt their behaviour offers telling information about the process of hiatus resolution in Ojibwa.

We have already discussed the structure of the verb and its modifier. Each of these constituents is necessarily complex within DM theory and we have seen overt morphological evidence that this is the case. Now, we must note that the syntactic configuration of the tense morpheme in relation to the verb and/or the modifier is different from that between the modifier and the verb. Nonetheless, the phonological juncture between the tense morpheme and the constituent to its right is a boundary for hiatus resolution, just as is the juncture between the modifier and the verb. The fact that this is the case allows us to pinpoint the position in the procedural interpretation of a phonological object wherein hiatus is resolved.

Consider the following Ojibwa verbal structure, omitting the position of the Person prefix for now.

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<sup>4</sup> Only Independent Order verbs are considered here.



The above structure incorporates the proposal that subjects are introduced in  $vP$ , and that Ojibwa is a polysynthetic language, as is Potawatami ((Halle and Marantz 1993), McGinnis (1995)). Therefore overt DP arguments are introduced externally to the clause in adjoined positions, while non-incorporated argument positions are filled by null pronominal elements. The verb depicted above includes an incorporated object, *a:gam* ‘snowshoe’. The  $vP$  internal structure projected by the object is irrelevant here and not depicted.

Remember that we have two parallel mergers and instances of interpretation at the  $aP$  and  $vP$  phases. Subsequently, we have interpretation after merger of all elements within the  $vP$  phase. As the complement of  $v$  contains only the previously interpreted  $vP$  and  $aP$  domains, no further work is done by the Phonology at the  $vP$  phase, and PW projection is persistent. Note that this assumes, as in the last chapter, that prior interpretation of phases that are within the spellout domain of any phase head  $X$  will be visible upon interpretation of

<sup>5</sup> See Pykkannen (2002) and Marantz (2001) on the distinction between voiceP ( $vP$  here) and the category-defining head ‘ $v$ ’.

phase X. There is therefore no reanalysis of the aP and vP phases into a single domain, as the phonological system already has interpretations of these structures in its memory cache. Subsequently, T and C are merged. At interpretation of the CP phase the tense morpheme *gi:* will undergo spellout.

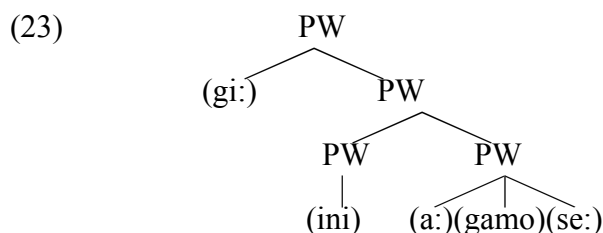
Now we must consider the fact that, under the assumption that previously interpreted phonological objects in the same command unit of a phase head are visible upon interpretation of that phase, the vowel initial adverbial modifier is a member of the CP complement, and therefore is available to influence the interpretation of the tense morpheme. The vP phase will be matched with its previous phonological interpretation and then the tense head will undergo lexical insertion, as phonological and morphological interpretation proceeds from the most to least embedded element (Bobaljik 2000).

(22) *gi:* [PW[PW ini] [PW a:gamose:]]

As the VV sequence consisting of the final phoneme in the tense morpheme and the initial phoneme in the modifier is licit on the surface we know that it is not purely linear order that determines when the resolution of vowels in hiatus occurs. There is however a coherent structural description of when hiatus must occur. In (18) it was proposed that VV sequences will be resolved only if both vowels are introduced within the same phase.

Consider the projection of prosodic structure in (22). The tense morpheme *gi:*, being heavy, can project a licit iambic foot (being a heavy syllable), and therefore a licit PW when the phase within which it is merged is interpreted. As it is not pronounced separately from the constituent to its right (they are part of the

same PW for purposes of main stress assignment (Section 3.5)), we must allow for the fact that it adjoins to the prosodic structure already available within its phase, giving the structure in (23).



Note that the structural configuration of the adjective + verb is distinct from that of the tense morpheme + verb. The adjective and verb are contained within phases that are mutually exclusive, while the phase containing the Tense morpheme also contains the *vP* phase. Nonetheless, hiatus resolution occurs in neither case. Why does this not lead to a hiatus resolution strategy between T and *vP*, as the VV sequence that results is visible upon interpretation of the CP phase?

If we compare the above with a construction wherein hiatus is resolved we can pinpoint the timing of hiatus resolution by vowel deletion.

- (24) name:g 'sturgeons'  
 name:-ag  
 'sturgeon-PL'

The plural morpheme in Ojibwa is also an overt exponent of nominal class (inanimate vs. animate). In the following example the distinction between animate and inanimate nouns is distinguished by the plural morpheme (-ag 'PL inanimate, -an 'PL animate). I assume here that nominal class features are properties of category-defining heads.

- (25) a. oda:ba:n 'car'                      oda:ba:n-ag 'car-PL' (ANIMATE)  
           oda:ba:n 'sled'                    oda:ba:n-an 'sled-PL' (INANIMATE)



- (27) a. vocabulary insertion  
 root-Num/n → name:-ag ‘sturgeon-PL’
- b. syllabification  
 na.me:.ag
- c. foot projection<sup>7</sup>  
 ft  
 |  
 (na.me:)(ag)
- d. PW projection  
 PW  
 / \  
 ft  
 |  
 ((na.me:)(ag))

Now, as we have seen in the case of *gi:inia:gamose*, it is not the case that hiatus is resolved at any point in the derivation where a linear sequence of two vowels exists. More specifically, it cannot be the case that an unprosodified vowel that is linearly adjacent to a previously prosodified vowel is subject to deletion, else the vowel sequence that crosses the boundary between the tense morpheme and the modifier would be resolved upon lexical insertion of *gi:*. Also, as the hiatus that spans the modifier-verb boundary is not resolved it cannot be the case that resolution occurs after the prosodic structure dominating both vowels is projected.<sup>8</sup> It can therefore be deduced that it is at step ((27a) or (27b)) that hiatus is resolved. The restriction on VV sequences must be one that makes no reference to prosodic boundaries, or we would expect resolution in one or both of the situations described above. Therefore, hiatus resolution by vowel deletion occurs either when a sequence of vowels arises upon lexical insertion or during

<sup>7</sup> In (27c,d) footing of the plural morpheme is left undetermined. As the vowel in this morpheme is subject to hiatus it will not project a nucleus, syllable or foot. It remains throughout this derivation only because the exact timing of its deletion has yet to be determined.

<sup>8</sup> Post prosodification resolution of hiatus is not accomplished by vowel deletion, but rather by consonant epenthesis. This will be discussed in the following sections.

syllabification. We therefore have either a ban on VV sequences with no intervening prosodic structure, or on the projection of two adjacent nuclei. As soon as a vowel has been incorporated into the phonological hierarchy (has been designated as part of a syllable), it is no longer permitted to delete. If the vowel has been prosodified then its deletion would alter the phonological structure previously introduced. If a vowel is deleted before projection of prosodic structure, or better yet, is not permitted to be realized adjacent to another vowel and is never inserted at the point of VI, then the persistence of phonological structure is unaffected.

After deletion, syllable projection can proceed, followed by foot and PW projection. The timing of deletion results in a pattern where no VV sequences arise within a single phase/PW – as codified by Phase Integrity/PF. In the derivation of the CP phase in (22), there is no point where there are adjacent vowels within the PW projected by the tense morpheme *gi:*, therefore the environment for hiatus resolution is not met, resulting in surface hiatus. In (27), however, both vowels are inserted during the interpretation of the same phase. The deletion of the second vowel prior to syllabification ensures that (i) hiatus is resolved, and (ii) the prosodic structure is persistent. There is no point within the phase that re-projection of prosodic structure is triggered due to an alteration at the segmental level.

### 3.2.2 Hiatus resolution by consonant epenthesis

The above discussion focused solely on the vowel-deletion hiatus resolution strategy in Ojibwa. We



have seen, however, that this is not the sole means employed in Ojibwa to resolve VV sequences. Consonant epenthesis is also a licit repair strategy in the language.

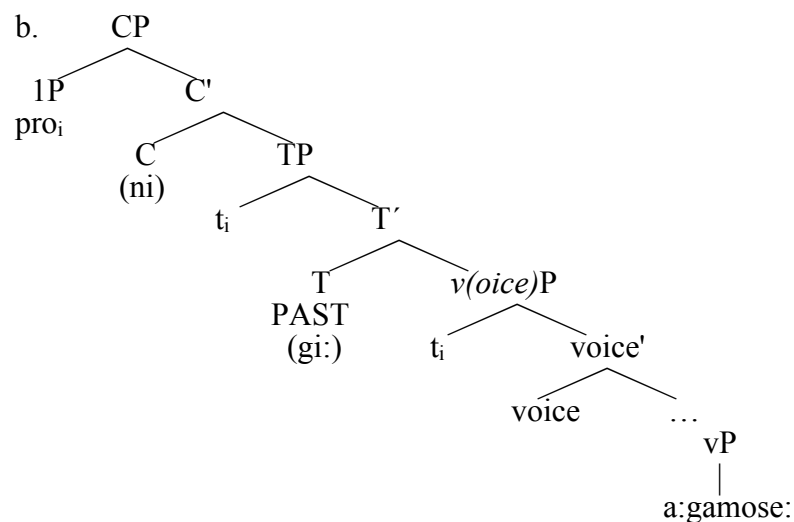
- (28)    *nida:pawe:* 'I have nightmares'  
           *ni-a:pawe:*  
           '1P-have-nightmares'
- (29)    a. *a:gamose:*                's/he walks in snowshoes'  
           b. *gi:-a:gamose:*        's/he walked in snowshoes'  
           c. *nid-ini-a:gamose:*    'I walk there in snowshoes'  
           d. *ni-gi:-ini-a:gamose:* 'I walked there in snowshoes'

In (28) and (29c) the VV sequences that occur due to the placement of the Person prefix and the lexical item to its right are resolved through consonant epenthesis.

It is the timing of hiatus resolution that influences the resolution strategy employed in the examples above. What we have learned from the previous section is that it is not the linear configuration of vowels in Ojibwa that triggers hiatus resolution, but that the timing of vocabulary insertion is crucial to whether resolution occurs. It is only when the vowels in question are inserted at the same procedural point in the derivation (during the same phase) that they run afoul of the ban on VV sequences in the language. The prosodic structure of *gi:inia:gamose:* includes two instances of two nuclei in sequence, yet neither pair of vowels projected prosodic structure during the same phase of the derivation. The question then becomes, at what point in the derivation of (28) and (29c) does the person prefix undergo interpretation?

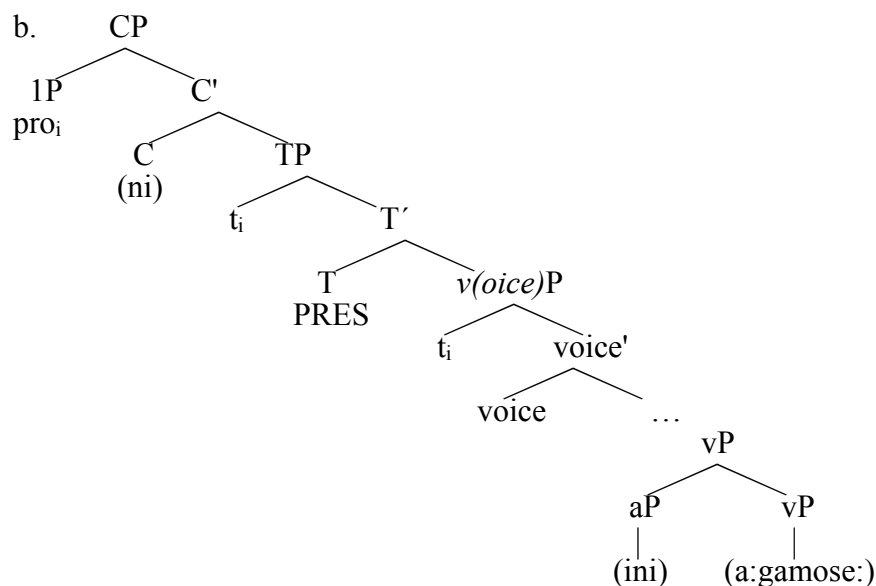
Remember that this analysis of Ojibwa adapts a proposal by McGinnis (1995) who in turn follows Halle & Marantz' (1993) analysis of Potawatami, that a word like (30a) is the realization of the pieces in (30b) (where the dotted line allows for the possibility of a more elaborate structure). Both Ojibwa and Potawatami are polysynthetic languages in the sense of Baker (1996). What this entails is that overt DP arguments are adjoined to CP, and that internal to CP arguments are realized by null pronominals. Person prefixes are therefore overt realizations of features projected in the specifier of CP, as in (30). It may also be the case that this agreement is a subject clitic as in Halle and Marantz (1993:141), with phonological differences from clitics in Potawatomi that are not crucial to the discussion here. It is proposed that the overt Person prefix is realized in  $C^0$ . What is important for the discussion here is that the proposed structure necessitates that the Person prefix is interpreted not within the CP complement domain – as is tense morphology – but in the following phase. Recall that for Chomsky's 'strong' phases (CP and  $vP$ ) interpretation occurs only for elements within the complement of the phase head.

- (30) a. nigi:a:gamose:                    'I walked in snowshoes'  
       ni-gi:-a:gam-ose:  
       '1P-PAST-snowshoe-walk'



According to the structure above, we seem to immediately run into a problem with our analysis. The tense morpheme in (30) is interpreted in a separate phase from the verb, and therefore hiatus resolution does not occur. However, in (31), the person marker is also interpreted in a separate phase from the tense marker (as it is not part of the complement of CP, but rather the edge) and hiatus is resolved by consonant epenthesis. This calls into question the analysis of non-resolution in the previous sections. Interpretation of morphemes in separate phases appears to not be entirely predictive of whether hiatus resolution will occur.

- (31) a. *nidinia:gamose:* 'I walk there in snowshoes'  
       *ni-Ø-ini-a:gam-ose:*  
       1P-Pres-there-snowshoe-walk



It is, of course, not the case that phasal interpretation fails to be predictive of hiatus non-resolution. In the case of the person markers, there is a confounding factor. Recall that each phase must fully project to the PW level ((15) – repeated as (32)).

(32) *PWd Projection*

Every phase corresponds to a prosodic word. (Piggott & Newell 2007: 23)

In addition to (32), Ojibwa has a restriction on the placement of degenerate feet (Piggott & Newell 2006a/2007). Degenerate feet – those that are neither bi-syllabic nor bi-moraic – may only surface at the right edge of a PW.<sup>9</sup>

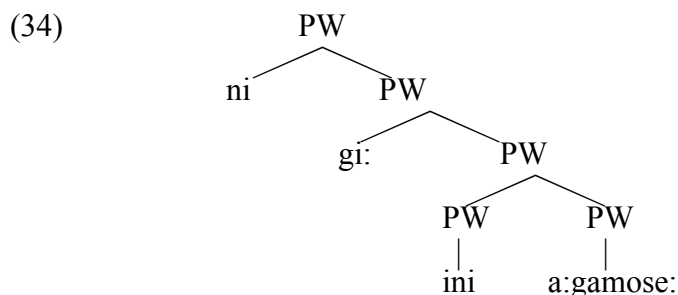
Note that the person markers in Ojibwa are all monomoraic.

- (33)
- |    |      |
|----|------|
| ni | ‘1P’ |
| gi | ‘2P’ |
| o  | ‘3P’ |

As the person markers are initial (left-edge) they cannot remain in their original position in the PW. Cliticization and re-footing must occur in order for a

<sup>9</sup> Minimal words in Ojibwa must also consist of a licit (non-degenerate) foot. Different repair strategies from those presented here are responsible for minimal word repair. For further discussion see Piggott (2007).

licit Ojibwa PW to be constructed. Person markers are not phases unto themselves (as are the adverbial modifiers) and therefore, like tense markers, would optimally be incorporated into the word through P-cliticization as follows;<sup>10</sup>

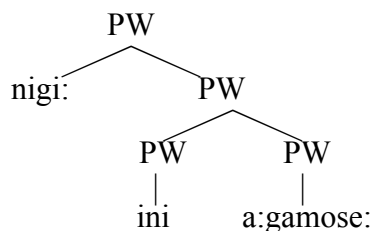


As the person prefix is too small to project a licit foot, it is not possible for *ni* to remain footed at the left edge in the highest PW. Of note, however, is the fact that the PW dominating *gi:* is visible to the phonological system during the phase where *ni-* is interpreted. What occurs therefore is that *ni* is incorporated into the phase to its right.<sup>11</sup>

<sup>10</sup> These prefixal clitics are ditingishable in phonological size and syntactic make-up from their pronominal counterparts in Ojibwa. Pronouns, unlike clitics, are bi-morphemic, displaying a Final morpheme on par with adjectives, nouns, and verbs. Therefore not all pronominal elements are incorporated into the PW to their right, as is the case with in the following discussion.

<sup>11</sup> Note that the only licit single mora foot in the language (G.P. p.c.) is the adverbial modifier *bi* ‘gloss’. The modifier position is predicted by the theory espoused here to be the only position a non-minimal word may surface. Given the structure of modifiers above, they do not have access to other phonological material at the point of spell out, and therefore cannot incorporate. We will see in Section 3.4 that Ojibwa does employ another repair strategy in situations where a phase creates a non-minimal word and cannot incorporate into a previously projected PW, but this strategy also cannot result in a repair in the situation of *bi*. In accordance with Section 3.4 we expect that the little *a* head should be overtly realized here to augment the phonological size of the root. The phonological realization of the little *a* head is, however, a vowel, *i*, and therefore will be deleted due to hiatus resolution. There is therefore no strategy available within Ojibwa to repair the violation of degenerate foot placement or word-minimality in this case. The distinctive behaviour of adjunct members of words will be discussed further in Ch. 4.

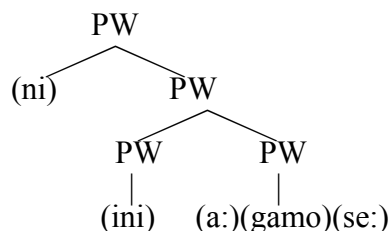
(35)

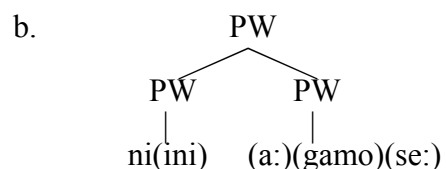


In (35) there is no hiatus involving the person marker and the material to its right, but if we consider the derivation of (31), *nidinia:gamose*: ‘I walk there in snowshoes’, we can see why it is that hiatus is resolved by epenthesis in these cases. In (31) the person marker *ni* has been merged phonologically into the PW to its right, projected by the modifier *ini*. At this point, the two vowels are within the same PW. Each phase (ignoring phases that violate the restriction on degenerate feet at the left edge) is a PW. If Phase Integrity (18) were due to a linear restriction on vowels in hiatus then we would have no way to account for the different resolution strategies employed. In contrast, as vowels in hiatus are repaired by deletion during vocabulary insertion – as argued above – we do have an explanation as to why epenthesis rather than deletion is employed as a hiatus repair strategy in the above example. In fact, we have evidence that it is at the earliest possible point in the derivation that vowel deletion occurs.

The person marker must first project a syllable, foot, and PW in order to trigger cliticization. Were this to not occur then the violation banning degenerate feet at the left edge of a PW would not be triggered.

(36) a.





When the person marker is incorporated into the PW to its right (36b), the prosodic structure of the PW must be altered to conform to the requirement that degenerate feet are disallowed at the left edge. All elements within the nested PW into which the person marker is incorporated must re-project prosodic structure in accordance with the iambic foot pattern imposed by Ojibwa (see Section 3.3 for further discussion of footing and phases in Ojibwa).

(37) a. ni(ini)

b. niini

c.

```

      σ   σ   σ
      |   |   |
    ni  i  ni

```

d.

```

      (σ) (σ) (σ)
      |   |   |
    ni  di  ni

```

e.

```

      PW
     /  \
    PW   PW
   /  \ /  \
(nidi)(ni) (a:)(gamo)(se:)

```

As this is the case, each of the vowels in a VV sequence will be re-syllabified after phonological incorporation. As neither vowel is deleted here, it cannot be that the ban on vowels in hiatus is a ban on adjacent vocalic nuclei. It must therefore be that the restriction is unquestionably on the vocabulary insertion of a sequence of two vowels.

Thus we have an explanation for the consonant epenthesis repair strategy employed in (31) and similar constructions. The person marker must be syllabified, and subsequently must be found to be in a disallowed position in the

PW. In order for syllabification to have proceeded, insertion of all segmental material must have occurred. Therefore, at the point in the derivation where the PW restriction is repaired through phonological cliticization, both vowels – in the current phase (above CP), and the former (CP) – have already undergone vocabulary insertion. As deletion in Ojibwa is in reality a ban on the insertion of adjacent vowels, this operation is no longer available – both vowels have already undergone vocabulary insertion. It is proposed within this account of hiatus resolution that, due to the tendency for structure preservation to be enforced within the phonology, that repair strategies that occur after vocabulary insertion are more likely to involve processes, like epenthesis, that preserve the segmental structure of items already interpreted.<sup>12</sup> In any case, it is only in derivations involving phonological cliticization that epenthesis is employed to resolve vowels in hiatus in Ojibwa.

Vowels are not permitted in hiatus within a PW. At the point of vocabulary insertion these sequences can be repaired through the failure to spell out one of the vowels in the sequence without necessitating both spellout and consequent deletion. After vocabulary insertion of both vowels has occurred, and the vowels have been merged inside the same PW, and therefore hiatus is resolved through epenthesis to avoid deletion of previously inserted material.

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<sup>12</sup> Vowel coalescence and diphthongization would also preserve the integrity of the segments involved. It is, of course, not inconceivable that deletion may also occur, as some structure changing operations must occur in language, for example the re-projection of prosodic structure after cliticization in (38).



### 3.2.3 Beyond person markers

In the above section it is argued that repair of vowels in hiatus by epenthesis in Ojibwa occurs only upon phonological cliticization of elements originally interpreted in separate phases. Epenthesis is a post-vocabulary insertion repair strategy, while deletion is concurrent with vocabulary insertion. One question that might arise from the above discussion is whether this epenthesis strategy is unique to derivations including person markers. If this were the case it could be argued that epenthesis in these cases is a lexically specified repair strategy. In other words, for the proposal that the timing of VV hiatus resolution crucially determines its strategy (deletion or epenthesis), it must be shown that this strategy is not a morpheme specific response to VV sequences.

There is one tense morpheme that has monomoraicity in common with the person markers in Ojibwa. The behaviour of this morpheme gives us the crucial evidence we need to determine that it is indeed phonological cliticization that causes hiatus to be resolved through epenthesis.

Recall that the past tense morpheme *gi:*, which is bi-moraic, does not induce any repair strategy. The future tense marker *wi:* displays the same behaviour. They are interpreted in separate phases from the elements in *vP*, and meet the prosodic requirements of the language.

- (38) a. *gi:a:gamose*: 'he walked in snowshoes'    \**gi:da:gamose*:  
       [[gĩ:][á:](gamò)(sè:)vP]...CP  
       b. *wi:a:gamose*: 'he will walk in snowshoes'    \**wi:da:gamose*:  
       [[wĩ:][á:](gamò)(sè:)vP]...CP

On the other hand, the 1<sup>st</sup> person marker *ni*, which is monomoraic, does induce the epenthetic repair strategy, despite undergoing interpretation in a separate phase from the elements in TP. The 2<sup>nd</sup> person marker *gi* displays the same behaviour (the 3<sup>rd</sup> person marker is null in the constructions considered here).

- (39) a. *nida:gamose:* ‘I walk in snowshoes’      \**nia:gamose:*  
           *ni-a:gamose:-Ø*  
           1P-snowshoe.walk-v  
           [*ni* [(*nidá:*)(*gamò*)(*sè:*)<sub>vP</sub>]...CP]
- b. *gida:gamose:* ‘You walk in snowshoes’      \**gia:gamose:*  
           *gi-a:gamose:-Ø*  
           2P-snowshoe.walk-v  
           [*gi* [(*gidá:*)(*gamò*)(*sè:*)<sub>vP</sub>]...CP]

This epenthesis has been argued here to be due to the fact that a monomoraic morpheme cliticizes inside the PW to its right to avoid a prosodic ban on degenerate feet at the left edge of PWs in Ojibwa, and therefore hiatus resolution is triggered after vocabulary insertion in these cases.

Now consider the indefinite future tense morpheme *ga*. If it is a peculiar property of person prefixes that epenthesis is utilized to repair hiatus, then this monomoraic tense morpheme should pattern with the other tense morphemes, and VV sequences should be licit between *ga* and a following vowel-initial morpheme in the vP domain. This is not the case.

- (40) *nigada:gamose:* ‘I will walk in snowshoes’      \**nigaa:gamose:*  
           *ni-ga-a:gam-ose:-Ø*  
           ‘1P-FUT-snowshoe.walk-v’  
           [ *ni* [*ga* [(*nigà*)(*dá:*)(*gamò*)(*sè:*)<sub>vP</sub>] TP]...CP]

The VV sequence resulting from the insertion of the indefinite future tense morpheme is repaired in the same manner as are the examples of hiatus resolution

induced by the person markers. The proposal in the previous section is borne out. The ban on left-edge degenerate feet causes P-cliticization of *any* monomoraic element to the interior of the phase to its right. Further evidence for P-cliticization from the foot patterns in Ojibwa will be offered in Section 3.3.

**3.2.4 Summary of hiatus (non)resolution** Hiatus resolution in Ojibwa gives evidence that phonological interpretation proceeds cyclically in the language. The syntactic domains corresponding to these cyclic phonological domains have been argued so far to be aP, vP/vP, nP, and CP – all domains that have been proposed in the morpho-syntactic literature (Marantz (2001), Di Sciullo (2003), Arad (2003) and Marvin (2002)) to be phases. Ojibwa employs three different strategies for managing vowels in hiatus that correspond with the timing of the spell out of the vowels involved.

First, vowels in hiatus are resolved through deletion if they undergo vocabulary insertion within the same phase (41). Hiatus is resolved in these cases by disallowing the vocabulary insertion of sequences of vowels.

- (41) a. name:g                    ‘sturgeons’  
           name:-ag  
           sturgeon-PL

Secondly, vowels in hiatus remain unresolved if the vowels in question undergo vocabulary insertion in separate phases (42). This is due to the fact that vocabulary insertion in these cases only involves one of any sequential pair of vowels in each phase, and hiatus is resolved only upon vocabulary insertion of new material within a single phase.

- (42) a. aP-vP  
       inia:gamose:                   ‘He walks there in snowshoes’  
       ini-a:gamose:  
       there-snowshoe.walk
- b. CP-vP  
       gi:a:gamose:                   ‘He walked in snowshoes’  
       gi-a:gamose:  
       past-snowshoe.walk
- c. CP-aP-vP  
       gi:inia:gamose:               ‘He walked there in snowshoes’  
       gi:-ini-a:gamose:  
       past-there-snowshoe.walk

Thirdly, in the case where the phonological material introduced in a phase does not meet requirements on degenerate foot placement within the PW, this material is cliticized inside the PW of the adjoining phase. As this cliticization occurs after vocabulary insertion, the vowels involved are not deleted, and epenthesis occurs.

- (43) a. nidinia:gamose               ‘I walk there in snowshoes’  
       ni-ini-a:gamose  
       1P-there-snowshoe.walk
- b. nigadinia:gamose:               ‘I will walk there in snowshoes’  
       ni-ga-ini-a:gamose:  
       1P-Fut-there-snowshoe.walk

**3.3 Footing and phases**               Hiatus resolution is not the only indicator of phonological cycles in Ojibwa. Just as hiatus resolution is bounded by the phase, footing in Ojibwa never spans a phase boundary. In other words, footing occurs upon phonological interpretation of each phase, where a phase does not necessarily coincide with a word. In addition, phonological cliticization and its impact on foot structure gives further evidence for phase impenetrability at PF.

### 3.3.1 Degenerate feet

Foot construction in Ojibwa (i) proceeds from left to right, (ii) is iambic, and (iii) is arguably exhaustive (Kaye (1973), Piggott (1980), (1983), c.f. Hayes (1995)). Ojibwa therefore permits degenerate feet at the right edge of a word, as monomoraic feet must sometimes be constructed.

- (44) a. [(wĩ:)(kwá:)(bò:)(zò)]      ‘he is carried along by the current’  
           wi:kw-a:bo:-zo  
           ‘pull-liquid-Final’
- b. [(ginwá:)(bikĩ)(zĩ)]      ‘it is a long metal object’  
           ginw-a:bik-izi  
           ‘long-metallic-Final’
- c. [(wà:)(bimí)(nagĩ)(zi)]      ‘it is a pale round object’  
           wa:b-iminag-izi  
           ‘pale-round-Final’

Recall that degenerate feet are restricted to the right edge of the Prosodic Word.

The position of degenerate feet in the language is therefore an additional test for the proposal above that Ojibwa contains word-internal phases. If at each phase phonological interpretation applies only to material that has not undergone previous PF interpretation and if a PW must be projected at each occurrence of PF interpretation, then multi-phasal words will contain multiple PWs. The language should therefore permit degenerate feet word internally at the right edge of any phase. This is indeed the case. In (45) we have three words that contain both a verb and a preverbal modifier. They therefore each have two phases.

- (45) a. [[(iní)][(dagò)(ʃin)]]      ‘he arrives there’  
           there-arrive
- b. [[(bí)][(dagò)(ʃin)]]      ‘he arrives here’  
           here-arrive

- c. [[(bò:)(ní)][(mìni)(kwè:)]]                      'he quit drinking'  
quit-drinking

In (45a) a degenerate foot surfaces at the right edge of the word. On the surface it therefore appears that footing can have applied to each phase separately or to the entire word. In (45b,c) however, we see evidence that footing, and PW projection, occurs phase internally, as does hiatus resolution. In (45b) the preverbal modifier is monomoraic, and is parsed as a degenerate foot. In (45c) the final syllable of the modifier is parsed as a degenerate foot. Were it the case that footing was computed over the entire string, left to right parsing would give the following patterns;

- (46) a. \*(bidá)(goʃin)  
b. \*(bó:)(mìni)(nikwè:)

The foot patterns in (46a,b) result in no medial degenerate feet, and therefore should be optimal if the word is parsed as a single PW. As the footing in (46) does not surface we must conclude that each of the above phases constitutes a separate PW, and that the Phase Impenetrability Condition is in force, preventing the construction of feet across phase boundaries. Feet in Ojibwa never span a phase boundary, just as hiatus resolution is never implemented across a phase boundary, reinforcing the conclusion that multiple phases may exist in the derivation of Ojibwa words.

**3.3.2 Cliticization of degenerate feet**                      The phonological size of person markers and the indefinite future morpheme is the cause of the phonological cliticization operation discussed above in Sections 3.2.2 and 3.2.3.

In the following section I discuss the effect of cliticization on foot structure in Ojibwa, as well as further restrictions on phonological cliticization of degenerate feet. We see that both cliticization and refooting are sensitive to phase boundaries.

### 3.3.3 Refooting

When discussing hiatus resolution, we noted that the resolution strategy employed in Ojibwa differed depending on whether a VV sequence emerged upon vocabulary insertion or after phonological cliticization.

- (47) a. Deletion upon Vocabulary Insertion within a Phase  
           name:g                   ‘sturgeons’  
           name:-ag  
           sturgeon-PL
- b. Non-Resolution upon Vocabulary Insertion in Separate Phases  
           inia:gamose:       ‘He walks there in snowshoes’  
           ini-a:gamose:  
           there-snowshoe.walk
- c. Epenthesis after Phonological Cliticization  
           nidinia:gamose     ‘I walk there in snowshoes’  
           ni-ini-a:gamose  
           1P-there-snowshoe.walk

Footing in Ojibwa also parallels this divide, occurring both before and after phonological cliticization. The examples in (45) reveal that footing is computed upon PF interpretation of each phase. It is also the case though, that refooting must occur if phonological cliticization introduces new material into an already interpreted phase.

Phases containing only a monomoraic morpheme, as in the case of CP phases containing the person markers, are interpreted at PF as PWs containing

only a degenerate foot. As this structure is dispreferred in Ojibwa, monomoraic morphemes cliticize phonologically inside the phase to their right. As new information has been added inside the PW that is the target of cliticization, prosodic projection must reapply to ensure that all constituents are integrated properly into the prosodic hierarchy. This reapplication may create degenerate feet word-internally, in accordance with Phase Impenetrability. Specifically, re-prosodification occurs only within the affected phase/PW, leaving open the opportunity that a degenerate foot will be created at its right edge. These facts argue for a phonological version of the Phase Impenetrability condition (Chomsky 2001, Piggott & Newell 2006a/2007), repeated below, as repair strategies do not affect any phase but the one immediately previous (sequentially) – the phase cliticized to.

(48) *Phase Integrity/PF*

Conditions on the well-formedness of prosodic categories are imposed on all elements that emerge within a phase  $\alpha$ , if the elements are solely within phase  $\alpha$ .

(Piggott & Newell 2007:16)

Note that any phonological relativization of Phase Impenetrability is neither a weakening of the original syntactic formulation, nor an indication that phonological and syntactic phases are different kinds of objects. What this relativization entails is that phases will have syntactic effects and phonological effects, each according to the requirements and operations relevant within each domain.

Consider the derivation of (49a), detailed in (49b).

- (49) a. ni-bìmígì:wè:                      ‘I walk on home’  
           [1P[[along-FINaP][go home-FINvP]vP]...CP]



- b. (i)  $[[(\text{bimi})-\emptyset aP][(\text{gi:})(\text{we:}-\emptyset)vP]vP]$   
 (after spellout of  $aP$  and  $vP$ )
- (ii)  $[ni[[(\text{bimi})-\emptyset aP][(\text{gi:})(\text{we:}-\emptyset)vP]vP]] \dots CP]$   
 (after spellout of [Spec, CP])
- (iii)  $[ \text{ni}[[ni(\text{bimi})-\emptyset aP][(\text{gi:})(\text{we:}-\emptyset)vP]vP]] \dots CP]$   
 (after cliticization)<sup>13</sup>
- (iv)  $[ \text{ni}[[ni(\text{bi})(\text{mi})-\emptyset aP][(\text{gi:})(\text{we:}-\emptyset)vP]vP]] \dots CP]$   
 (after re-footing)

In (49bi) we see the original PF interpretation of the  $vP$  and  $aP$  phases, resulting in two licit PWs,  $[(\text{bimi})]$  and  $[(\text{gi:})(\text{we:})]$ . (49bii) adds the PF interpretation of the CP phase. The monomoraic person marker *ni* is not permitted to project at PW, as it surfaces at the left edge of a phase, and therefore must be cliticized inside the phase to its right (49biii). After cliticization, the  $aP$  phase must be refooted, giving the final phonological structure in (49biv). Note that in (49biv) refooting results in the formation of a degenerate foot (*mi*) that is not word final. This degenerate foot would be avoided by footing the last syllable within the  $aP$  phase with the first syllable of the  $vP$  phase, creating a licit iambic foot. That this cannot occur is evidence that each phase projects a PW, and that phase boundaries cannot be crossed in order to prevent a degenerate foot from being formed. These examples conform to the requirement in Ojibwa that degenerate feet may only surface at the right edge of a PW.

### 3.3.4 Restrictions on P-Cliticization

Both the person and tense prefixes that violate Ojibwa's PW requirement undergo phonological cliticization

<sup>13</sup> The syntactic position of the person marker is in grey, while the cliticized, phonological position is in black.

into the PW to their right in order to be successfully incorporated into a PW. Consider again an example in (45b).

- (50) [[(bí)][(dagò)(ʃín)]]      ‘he arrives here’

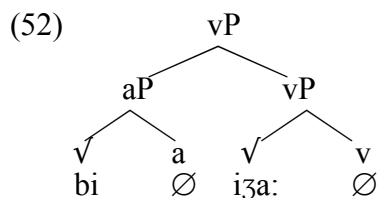
This appears to be a counter-example to the P-cliticization repair strategy, as the word begins with a degenerate foot. It is, however, a crucial and predictable violation of this generalization that demonstrates once again that phonological repair strategies operate derivationally rather than on the surface string of segmental material.

It is useful here to examine the contrast between the two words in (51).

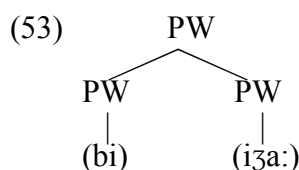
- (51) a. bíɪɜ̀à:      'he comes  
          bi-ɪɜ̀a:-Ø  
          here-go-3P  
       b. níɪɜ̀à:      'I go'  
          ni-ɪɜ̀a:  
          '1P-go'

The above examples are near-minimal pairs, but their surface representations are quite different. In (51a) hiatus is unresolved, and main stress falls on the first syllable. In (51b) hiatus is resolved, and main stress falls on the second syllable.

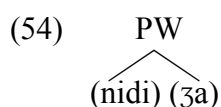
If we consider solely the segmental makeup of these two words the differences are baffling. Examination of the syntactic structure, and the derivational history, of these words gives us the crucial information needed to explain the phonological differences of (51a) and (51b). In (51a) the modifier *bi* is interpreted by the phonological system separately from the verb *ɪɜ̀a:*, as it constitutes an aP phase.



What this structure entails is that neither phase (aP or vP) is contained within the other at the point of interpretation. It is therefore not possible for *bi* to cliticize inside the vP phase – as the vP phase is not visible at the point where it is spelled out. What this means is that the cliticization procedure for repairing PW violations in Ojibwa is not available to the modifier.<sup>14</sup> As this is the case, the only options left to the PF system within the aP phase are to allow a degenerate PW to surface at the left edge, or for the derivation to crash. As the modifier does surface, the latter option is obviously not taken. PW projection must occur upon PF interpretation, giving the following phonological structure (after vP interpretation).



Example (51b), on the other hand, differs in that the phase in which the person marker is interpreted properly includes the vP phase. The vP phase is therefore visible to the PF system at the point of interpretation of the person marker, allowing for cliticization and hiatus resolution. This also entails that the person marker is footed with the verb after post-cliticization refooting occurs.



<sup>14</sup> We will see below in (3.4) that another possible repair strategy is also unavailable here. This has no bearing on the discussion at hand.

The distinction in main stress placement between (51a) and (51b) becomes obvious when their derivational differences are examined. In both examples main stress is realized on the head of the penultimate foot. As the penultimate foot in (51a) contains only *bi*, main stress falls on the modifier. After cliticization of the person marker and subsequent hiatus resolution in (51b) the penultimate foot is *nidi*, and the first syllable of the verb is stressed according to the iambic foot pattern of Ojibwa. As main stress placement in Ojibwa occurs after interpretation of all phases and is insensitive to phase boundaries this is unsurprising. Patterns of hiatus repair and main stress placement are due to the process of PF interpretation and its dependence on syntactic phases – it is neither the specific morphemes involved nor their phonological properties that bring about the distinctions in (51), but rather the distinctions emerge from the derivations of each word.

### 3.4 Possession structures

Returning to the discussion of hiatus resolution patterns in Ojibwa, we see that examining the distinction between Alienable and Inalienable Possession constructions in Ojibwa offers incontrovertible evidence that specific hiatus resolution strategies are derivational and are not triggered by specific morpheme(s). The only effective predictor of whether hiatus will be resolved by deletion or epenthesis is syntactic structure and the timing of cyclic interpretation.

Ojibwa, like many languages, distinguishes between Inalienably (55a) and Alienable (55b) possessed nouns. The most common items to be included in the

Inalienable category, cross-linguistically, are kin terms (as in (55a)) and body parts. It is the distinction between these two types of possessed nouns that determines the hiatus resolution strategies in the above examples.

- (55) a. no:komis                    'my grandmother'  
           ni-o:komis-Ø  
           1P-grandmother-FIN
- b. nide:mikwa:n            'my spoon'  
           ni-e:mikwa:n-Ø  
           1P-spoon-FIN

We can see that hiatus resolution functions differently in Inalienable and Alienable Possession constructions, even though the same person markers are involved in both. These person markers are the same morphemes we saw in the preceding sections. The fact that the hiatus resolution strategy differs among the possessive structures makes a morpheme-specific account impossible. Importantly for the discussion of hiatus, person prefixes may be found preceding roots that are vowel initial in possession constructions. This configuration, as in the verbal constructions, leads to an underlying VV sequence. In Inalienable constructions this hiatus is resolved through deletion (55a), while in the Alienable constructions it is resolved through epenthesis (55b).

This contrast should put to rest the possibility that hiatus resolution through consonant epenthesis is a morpheme specific or phonologically circumscribed phenomenon. It will be shown in the following section that the syntactic derivational differences between these two constructions lead to the contrast seen above. The syntactic structures of each of the possession constructions are discussed below, and evidence for cyclic domains interior to these constructions are discussed. Finally, it is shown how these construction-

internal phases allow us to predict the particular hiatus resolution strategy in each case, in exactly the manner seen in the previous sections.

**3.4.1 Hiatus facts** Both hiatus resolution strategies available in Ojibwa are employed in possessive constructions. The two possessive constructions in Ojibwa are detailed in (56).

(56) a. Alienable Possession Constructions

niʒi:ʃi:be:nsimag  
 ni-ʒi:ʃi:b-e:ns-im-ag  
 '1P-duck-DIM-POSS-PL'  
 'my little ducks, ducklings'

b. Inalienable Possession Constructions

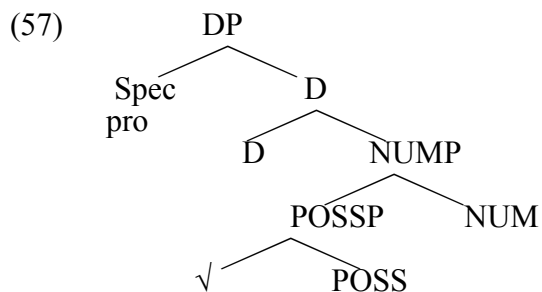
nida:nise:nsan  
 ni-da:nis-e:ns -Ø-an  
 '1P-daughter-DIM -POSS-PL'<sup>15</sup>  
 'my little daughters'

In both constructions the diminutive morpheme is optional, and may be phonologically null (see Piggott 2007). The overt possessive suffix is disallowed in the Inalienable Possession constructions, and the Person prefixes are mandatory in both. The possessive suffix is discussed below.

Ignoring the Diminutive morpheme, as it plays no part in the discussions to follow, the structure of nominal possession in Ojibwa is as follows;<sup>16</sup>

<sup>15</sup> The default assumption, which will not be challenged here, is that all possessive structures contain a possessive morpheme. It may be the case, however, that the inalienable structures do not contain a possessive morpheme (Piggott 2007).

<sup>16</sup> The trees in this section reflect the surface position of the morphemes involved. I take no stand on the direction of syntactic headedness in the language.



This structure assumes that, as in the clausal constructions in the previous sections, the argument position in [Spec;DP] is filled by a null pronominal element. Agreement with this null pronominal is realized at D.

Assuming this is the structure for both alienable and inalienable possessive constructions, how is the difference in hiatus resolution justified? As a first step we must ask what the cycles of interpretation (phases) internal to the DP are, if any? Piggott (2007) argues that both PossP and NumP determine the nominal category of the root and are therefore phases.<sup>17</sup> Evidence for this claim comes from repair strategies triggered by word minimality violations within the DP. Recall that phases universally project to the Prosodic Word level, and a phonological output that is smaller than an iambic foot in an Ojibwa phase is cliticized to available phonological material – where available phonological material is material contained within a phase that is subordinate to the phase in question. In the above representation, at PossP, there is no subordinate phase to which cliticization could occur. Consequently, a root that does not meet word minimality requirements in this position must be repaired by different means. The repair strategy in this case involves the forced realization of morphemes in the Poss<sup>0</sup> and Num<sup>0</sup> positions. The overt morphological exponents of both Poss<sup>0</sup>

<sup>17</sup> Matushansky (2004) also suggests that NumP is a phase.

and Num<sup>0</sup> may be null – but crucially this null exponence is disallowed if the nominal root consists of a single light syllable. The exponents of Poss<sup>0</sup> and Num<sup>0</sup> are as follows;

- (58) a. Possessor allomorphy  
im, Ø
- b. Number allomorphy  
NUMBER ↔ /ag/ /[+Animate, +Plural]  
NUMBER ↔ /an/ [-Animate, +Plural]  
NUMBER ↔ /a/ [+Animate]  
NUMBER ↔ /i/ (Elsewhere) (Piggott 2007:18)

Possessor allomorphy is not well understood in all environments at this point, although one situation will be discussed below where the null exponent of the possessive is predictable. The possessive morpheme has a tendency to be null after nasal-final roots, but may also be null after roots that do not end in a nasal.

- (59) a. nimaʃkimodim 'my bag'  
ni-maʃkimod-im  
'1P-bag-POSS'
- b. nimaʃkimod 'my bag'  
ni-maʃkimod-Ø  
'1P-bag-POSS' (Piggott 2007:19)

Importantly, the possessive morpheme is invariably overt when in construction with monosyllabic roots – roots that cannot meet word-minimality requirements independently.

- (60) a. ninikim, \*ninik 'my wild goose'  
ni-nik-im, \*ni-nik-Ø  
'1P-wild goose-POSS'
- b. nimisim, \*nimis 'my piece of firewood'  
ni-mis-im, \*ni-mis-Ø  
'1P-firewood-POSS' (Piggott 2007:19)

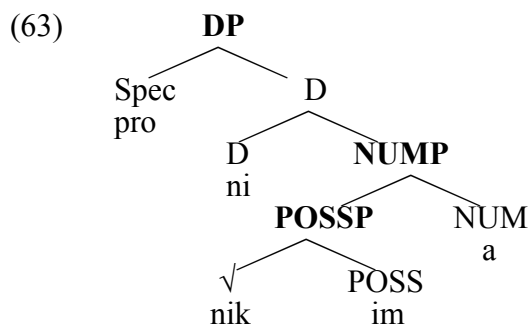


Possessive morpheme allomorphy is not the only construction which displays sensitivity to the phonological size of the root it attaches to. Number allomorphy is sensitive to the animacy class of the nominal root, as well as to number. A confounding factor in the exponence of the number morpheme is, however, that short word-final vowels are subject to deletion in Ojibwa (Piggott 2007). Hence it is generally the case that singular nouns carry no overt exponence of number (61). Like the possessive morpheme though, in construction with roots that do not meet the word-minimality requirements of the language, the morpheme cannot surface as phonologically null (62).

- (61) a. a:gam                    ‘snowshoe’  
       a:gam-a  
       ‘snowshoe-ANIM.SG’  
       b. mazikin                ‘shoe’  
       makizin-i  
       ‘shoe-INANIM.SG’
- (62) a. nika \*nik-Ø            ‘wild goose’  
       nik-a  
       ‘wild goose-ANIM.SG’  
       b. miʃi \*miʃ-Ø           ‘firewood’  
       mis-i  
       ‘firewood-INAN.SG’

The above facts argue for the phasehood of both PossP and NumP. Considering the structure in (57), if it were the case that the first phase to undergo interpretation was DP, we would expect that the mandatory person marker would contribute to the determination of word-minimality. If the person prefix were considered, there should be no instance where either the possessive or number morphemes would have to be mandatorily overt. The ungrammatical *\*nirik* and *\*nimis* in (60) conform to the word minimality requirements of the language at

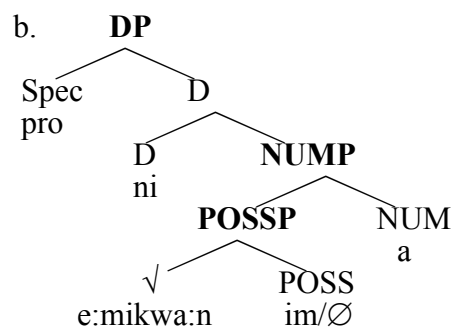
DP. It is only at the intermediate phases that word minimality is violated due to the null exponence of the possessive morpheme. As word minimality violations are computed at PossP and NumP, the phases within the DP are determined to be those in bold below.



At PossP, the possessive morpheme cannot surface as null when the root is monomoraic, as this would prevent the projection of a licit PW. If PossP is not present (in non-possessive structures) the mandatory overt exponence of the Number morpheme is enforced at the NumP phase. Subsequently, the person prefix is inserted in the DP phase and has no effect on word minimality enforcement upon previous phases.

That either the possessive or the number morpheme must surface when affixed to a monomoraic root demonstrates unquestionably that the root morpheme and the person prefix in alienably possessed constructions undergo spellout in separate phases. Just as in the verbal derivations in Section 3.3 above, the person prefix does not meet PW conditions on degenerate foot placement. To effect a repair, the person prefix is cliticized within the subordinate phase, and the post-spellout hiatus repair strategy, epenthesis, is employed to eliminate the offending phase-internal VV sequence.

- (64) a. **nide:mikwa:n** 'my spoon'  
           ni-e:mikwa:n-Ø  
           '1P-spoon-FIN'



c. **Phase 1: PossP**

Root and Poss undergo spellout. Null exponence of Poss is permitted

**Phase 2: NumP**

Number morpheme undergoes spellout

**Phase 3: DP**

Person marker undergoes spellout and consequent cliticization inside the NumP phase due to word minimality violations

Hiatus is repaired by epenthesis

Word-final vowel deletion occurs post-cyclically

The question we must answer now is why does the above derivation differ in the case of Inalienably possessed nouns? Remember that hiatus is resolved, not by epenthesis, but by deletion in Inalienable constructions.

- (65) no:komis 'my grandmother'  
       ni-o:komis-Ø-i  
       1P-grandmother-POSS-NUM

In (65) both the possessive and number morphemes are unpronounced for different reasons. The Possessive morpheme is never permitted to surface in an inalienable construction. The reason for this is argued (Piggott 2007, Piggott & Newell 2006a/2007) to be due to a featural distinction between inalienably and alienably possessed roots.<sup>18</sup> Inalienably possessed roots, unlike alienably

<sup>18</sup> This feature has the same role as the internal argument associated with inalienable roots in Vergnaud and Zubizarreta (1992).

possessed roots, cannot surface in a non-possessive construction in Ojibwa (73); their possession is mandatory.

(66) \*o:komis ‘grandmother’

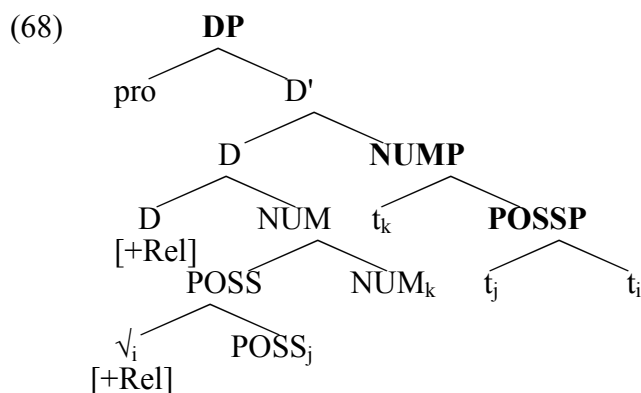
The feature that ensures possession in these constructions is proposed to be +REL (relational). It is further proposed that the feature +REL is incompatible with the overt possessive morpheme. Featural allomorphy ensures that the zero-allomorph is always chosen in inalienable constructions. This in itself cannot explain the lack of singular number morphemes in inalienable constructions, as some inalienable roots are mono-syllabic and do not meet word minimality requirements. Consider the following contrast;

- (67) a. *ninik* 'my arm'  
         ni-nik-Ø-i  
         '1P-arm-POSS-SG'  
       b. *ninikim*, \**ninik* 'my wild goose'  
         ni-nik-im, \*ni-nik-Ø-i  
         '1P-wild goose-POSS-SG'

(67a) contains the +REL inalienable root *nik* ‘arm’, which has the same phonological shape as the –REL inalienable root meaning ‘wild goose’(67b). Nevertheless, the only possible surface form in (67a), *ninik*, is illicit in (67b), \**ninik*.

This distinction is due again to the +REL feature on the root. This feature forces the root to only be interpretable in the domain of a possessor. As discussed, possessors are introduced in [SPEC;DP], and enter into a feature checking relation with D<sup>0</sup> that causes morphological exponence to surface in the head position. If the +REL root were to be interpreted in either the PossP or NumP phases the requirement that the root be in the domain of a possessor would

not be met at LF. It is therefore the case that +REL roots raise to D<sup>0</sup> in order to check the  $\varphi$ -features of the possessor.<sup>19</sup>



In a derivation where the root raises to D, the root, POSS, and NUM are all interpreted at the DP phase, and no earlier. It is this delay in interpretation that causes both the lack of overt singular marking, and the deletion strategy for hiatus resolution in inalienable constructions. At DP the person marker, the root, the possessive morpheme and the number morpheme all undergo spellout. The possessive morpheme will be null due to featural allomorphy, but both the person and number morphemes will be realized.

- (69) a. Spellout of DP  
           ni-nik-Ø-i  
           ‘1SG-arm-POSS-ANIM.SG’  
       b. [ninik]

The number morpheme will then undergo truncation, as the root+person-marker will always conform to the word minimality requirements of Ojibwa. In the situation where the +REL root is vowel-initial, the resolution of the ensuing hiatus through deletion will be as discussed in Section 3.2.1. As both vocabulary items are inserted within the same phase, this is the expected outcome.

<sup>19</sup> It may also be the case that the possessor argument is merged low, in [Spec;nP], following Vergnaud & Zubizarreta (1992).

- (70) a. Spellout of DP with hiatus  
           ni-o:komis-Ø-i  
           ‘1SG-grandmother-POSS-ANIM.SG’  
       b. [no:komis]

The cause of the distinction in hiatus resolution between the two types of possessive structure is completely dependant on the derivation of these constructions.

### 3.5 Stress assignment in Ojibwa

The preceding sections have outlined an explanatory account of Ojibwa hiatus resolution and prosodic projection that demonstrates that word-internal cycles of interpretation, or phases, are operative within the language. The second goal of this chapter is, however, to argue that, despite the cyclic interpretive nature of Ojibwa, main stress is assigned non-cyclically. In other words, syllabification, footing, and PW projection are dissociated from stress placement in that the former are computed at every phase, while the latter is only computed at the end of the derivation. If this is true then Ojibwa must indeed be a type (1b) language, as stated in Section 3.

Two things must be demonstrated for the above to be successfully argued. The first, that Ojibwa projects a PW at each phase, has been shown to be true based on the repair strategies related to the surface realization of degenerate feet employed in both the verbal and nominal domains of the language. It is also the case that all prosodic levels below the PW must also be projected at each phase in Ojibwa. It has been demonstrated that syllabification must occur at each phase to prevent hiatus resolution across phase boundaries (Section 3.2). That footing

occurs only phase-internally has been established by examining post-cliticization refooting (Section 3.3).

Therefore, if Ojibwa is a type (1b) language, main stress assignment must be computed with no reference to the above established phasal domains.

### 3.5.1 Ojibwa main stress assignment

Piggott (1983) (and

subsequently Halle & Vergnaud (1987b) and Hayes (1995)) has established that Ojibwa main stress always falls on the antepenultimate foot in Ojibwa words that contain three or more feet, and on the penultimate and only feet of words of two and one feet respectively (the syllables that receive main stress are bolded in (71)). On the surface this pattern may be obscured by vowel reduction – which we will not consider here. Remember that feet in Ojibwa are iambic, and therefore long vowels cannot surface in the weak position in a foot.

- (71) a. (nibì)(mib**á**)(tò:)(mìn)      ‘we run’  
           ni-bimibato:-min  
           ‘1-run-PL’
- b. (bim**ó**)(sè:)                      ‘he walks’  
           bimose:-w<sup>20</sup>  
           ‘walk-3’
- c. (nib**á**:)                            ‘he sleeps’  
           niba-w  
           ‘sleep-3’

(Piggott 1983:99)

The exact prosodic formulation of main stress placement in this language is not crucial to the discussion herein – the generalizations exemplified by (71) being sufficient to demonstrate that stress assignment here cannot be constrained by phase boundaries.

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<sup>20</sup> Final glides (as well as final short vowels) are subject to deletion rules. (Piggott 1983)

None of the above examples contains multiple phases, as suffixes are incorporated into the phase of the root, and the preverbal person markers are cliticized inside the phase to their right. In (72), however, we have an example of a word that unquestionably contains multiple phases.

- (72) [(nibì)(mí)][(gì:)(wè:)] 'I walk on home'  
 ni-bimi-gi:we:  
 1-along-go home

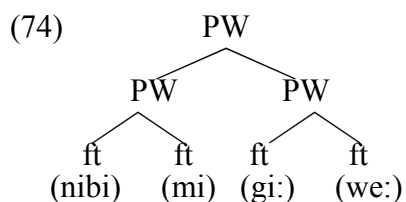
In (72) there are two separate phonological phases after cliticization of the person marker, indicated by square brackets. The word-medial degenerate foot is evidence here that (at least) two separate phases of interpretation have occurred. Within each phase there are two feet.

Let us consider where main stress should fall in this example if main stress were assigned phase-internally. Taking into account the stress pattern introduced in 3.4, upon interpretation of the vP phase, main stress should be assigned to the penultimate foot in vP – namely (*gí:*). Parallel interpretation of the modifier should then give us a surface realization where another main stress is realized on the lone foot (*bimí*). Assuming that refooting induces a recomputation of the entire prosodic structure within the aP phase, main stress placement in the aP should shift after cliticization to surface on the penultimate foot, giving (*nibí*)(*mì*). Concatenation of these two phases would result in one of these two stresses undergoing promotion to main stress of the entire word, as in (73a,b).

- (73) a. [(n**í**)(mì)][(gì:)(wè:)]  
 b. [(nibì)(mì)][(**í**)(wè:)]



In neither case should it be that the main stress of the word falls on the antepenultimate foot (*mi*). The only situation in which stress may surface correctly is if the stress algorithm considers the content of both phases simultaneously. This entails that the intermediate PW levels of prosodic structure must be ignored by the (main) stress assignment algorithm of the language. Recall that the PW structure of (72) is as in (74)



In (74) the only PW relevant for stress assignment is the highest PW. This indicates that PW projection and stress assignment are dissociated in the language, and further, that main stress assignment is delayed. It does not occur immediately after the projection of any PW. Secondly, at the point of PW projection for the two phases in the above example, these PWs are not visible to each other. It is not until the aP phase is merged to the vP phase, and until that entire construction is interpreted at PF, that the final foot of the aP phase can possibly be considered to be in an antepenultimate position and, hence, a target for main stress assignment. That stress assignment is sensitive to the structure after refooting occurs, due to the cliticization of the person prefix, demonstrates that stress assignment occurs even later than this. It is only after CP has undergone interpretation, and refooting has occurred, that *mi* becomes a potential host for main stress.

Late assignment of main stress is also evident in the nominal domain.

- (75) [(gitʃi)][(ò:)(gimà:)]  
 gitʃi-o:gima:  
 great-chief

That there are two phases in (75) is overtly supported by the lack of hiatus resolution. Main stress falls on the final foot within the aP phase. That the main stress on this word falls within the aP phase can again only be explained by post-cyclic stress assignment, as in the verbal domain.

These facts demonstrate incontrovertibly that main stress assignment in Ojibwa must be post-cyclic. Cyclic domains project to the PW level, but main stress is not assigned within the first cyclic domain, differentiating Ojibwa from the languages discussed in Chapter 2. Counter-evidence would come from data demonstrating that the syllables slated for main stress assignment within each phase have stress that is more prominent than other secondary stresses in the word. I am aware of no evidence supporting this. Since there is no evidence for stress demotion, the simplest solution is the one presented here.<sup>21</sup>

### 3.6 Conclusions and Implications

The data and argumentation in this chapter lead us to the conclusion that Ojibwa has the following properties. First, the cycles of phonological interpretation, or phases, evident from the data are aP, vP, vP CP, PossP, NumP and DP. That these phases go beyond those originally proposed by Chomsky (2001) is not in question, but neither is it questionable that phases identical or similar to these have been proposed in more recent literature, and that the data seems to bear out the existence of many more

<sup>21</sup> Note that secondary stress may be assigned cyclically in Ojibwa. If it is, it does not affect the analysis of main stress offered in this Chapter.

phases than originally proposed. That this is the case gives further support for the theory of Distributed Morphology, as word internal phases behave on par with those proposed to account for phrasal phenomena. The positions of PW boundaries in the language are not predictable in any phonological sense, and therefore phases are a crucial tool for an explanatory account of hiatus resolution and footing in Ojibwa. Further syntactic and phonological evidence of these non-canonical phases will be presented in the following chapter.

Second, it seems suggestive based on the data presented in this chapter that the manner in which disallowed phonological strings are repaired is reflected in the procedural point in the derivation where the repair is effected. Structure preservation has been proposed to account for these patterns, and further cross-linguistic study is necessary to bolster this proposal.

Third, there are at least two phonological domains within which prosodic computation occurs in Ojibwa. The phase in which lexical insertion occurs is concerned with PW structure, and only at a later time is main stress assigned to dominant PW domains. The PW node is recursive.

All of the above demonstrate that languages like Ojibwa undergo a different type of computational procedure along the PF branch than do languages like Turkish. The timing of main stress assignment in these two language types is late and early, respectively. Interestingly, the domain of the phase is relevant for both, and indicates that the computation of language in phases is cross-linguistically constant.

**CHAPTER 4.****MORPHO-SYNTACTIC IMPLICATIONS OF WORD-INTERNAL PHASES**

**4. Introduction**        The previous chapters have argued that phases, or cyclic spellout domains, are operative within words and have focused mainly on the phonological interpretation of morphemes merged by ‘set merge’ (Chomsky 2001b), or non-adjunction. What we have seen is that phonological domains within words mirror morpho-syntactic domains. As this is the case, it brings further evidence to bear on representational theories of morphology such as Distributed Morphology. It is clear that the preceding data point toward the right theory of language being one where morphology and syntax are interchangeable terms – at least within the narrow syntax. This being true entails that domains of interpretation parallel each other inside and outside of the domain generally considered to be the ‘word’. If this is the case, however, more parallels are predicted.

This chapter focuses on another aspect of the morphology/syntax comparison, and examines whether another operation (aside from the phase) that has been proposed to be operative within the narrow syntax is indeed operative below the level of word. The operation in question is that of Late Adjunction (Lebeaux 1988, Stepanov 2001, Chomsky 1993, Nissenbaum 2000). I argue, like Nissenbaum (2000), that Late Adjunction is operative at the morphological level. That this should be the case is unsurprising if morphemes are the building blocks of the narrow syntax. It is also fortunate for any representational theory of

morpho-syntax, as its absence would have had to be independently ruled out. The fact that the Late Adjunction of morphemes does occur argues for a simpler system than would exist otherwise, a boon for the minimalist theory as well. In demonstrating that phases are operative within words in the preceding chapters, it follows that morphemes are syntactic objects. That late adjunction is an operation available to morphemes demonstrates the same point. The two arguments bolster each other, and therefore – although they may seem at first glance to be unrelated – they are integrally dependant.

Morphemes that display properties of adjuncts, to be enumerated below, are argued here to merge, like phrases, by ‘pair merge’ (Chomsky 2001), or adjunction. This adjunction leads to phonological and morpho-syntactic phenomena that are expected if phases are operative within words. In each of the languages in Chapter 2 virtually all of the structures involved morphemes merged in c-command relations (within a command unit (Uriagereka 1999)), by set merge, not adjunction (morphemes merged in a separate command unit). What I explore in this chapter is what effects adjuncts have on the morphological, syntactic, and phonological structure of a word.

**4.1 An Ojibwa Modifier** This chapter takes the discussion of the Ojibwa modifier *bi* ‘towards speaker’ as a starting point and diverges from the previous two chapters in that it discusses the incorporation of word-internal adjuncts in a system in which phonology is computed in phases.

Remember that *bi-* ‘towards speaker’ in Ojibwa is the only element that does not conform to the requirement that phases contain at least one non-degenerate foot. It is quite possible that this is an exception that is not explainable at any theoretical level, but it may also succumb to the explanation given in the previous chapter. It was noted there that *bi-*, being an adjunct, has no phonological material within the phase in which it is first interpreted to which it could adjoin. This being the case, in order to conform to the prosodic requirements of the language that ban the Ojibwa PW from being composed of a single degenerate foot it must be augmented, or deleted. Unfortunately, the augmentation operations (really non-deletion: see Piggott 2008, and Chapter 3, Section 3.4.1 of this thesis) available in Ojibwa conspire to leave *bi-* as a monomoraic output<sup>1</sup>, deletion not being operative as a repair strategy here. What is notable about this example is that all other monomoraic phases are repaired through cliticization, and the only possible syntactic position in which this operation could fail to apply is within an adjunct, assuming spellout to function as has been laid out in the previous chapters. Discussion of this single Ojibwa morpheme will, unfortunately, not give us the solid evidence we need to determine whether morphological adjuncts in general behave as one would expect – being numerated and interpreted separately and prior to merger with the main ‘trunk’ of a syntactic tree structure. But this morpheme does behave as expected

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<sup>1</sup> Recall that the number morpheme in possession structures is obligatorily overt when the base to which it attaches is monomoraic. If the adverbial final morpheme, *-i*, were to be forced to surface as an affix on the monomoraic root *bi* the result would be a surface structure where hiatus emerged within a PW, as in (i).

(i) [PWbi-i]  
towards.speaker-FIN

As hiatus is resolved by deletion within a PW, the output in (i) is not attested.

if this were the case, and therefore the question to be examined in this chapter is whether the conclusive evidence for the independent interpretation of sub-phrasal adjuncts can indeed be found. I argue that it can be, and that this affirmative answer is expected and necessary if the thesis that morphology and syntax are indistinguishable within the narrow syntax is to be proven to be true.

**4.2 Characteristics of a Morphological Adjunct** Before appealing to morphological adjunction to explain certain morpho-syntactic facts to be discussed in the sections to follow, I must first define what it means to be a morphological adjunct. First, a morphological adjunct is any  $X^0$  that is (1) not selected for and (2) whose contribution to the word it adjoins to involves no projection of category features. Like all modifiers, a morphological adjunct does not affect the grammaticality of a given statement; in other words, its absence does not lead to ungrammaticality. Secondly, following Lebeaux (1988) and Stepanov (2001), an adjunct may, and possibly must, be merged counter-cyclically – to a non-root node. This requirement gives an explanatory account of multiple syntactic phenomena discussed in these works. Thirdly, a morphological adjunct may be interpreted phonologically prior to a-cyclic merger. Following Uriagereka (1999) and Johnson (2003), I argue that each separate command unit (or tree) must undergo spell out separately from that of the tree to which it is merged – regardless of the presence of a Chomskian phase head. The only exception to this rule is in the case of mono-morphemic adjuncts, which may escape this requirement. Let us examine each of these requirements in turn.

### 4.2.1 Selection and Projection

An adjunct is any syntactic object

whose merger invariably produces a node in the syntactic tree of the same type projected by the object adjoined to.

- (1) a. [[Bill<sub>DP</sub>] [ate<sub>VP</sub>]].  
 b. [[Bill<sub>DP</sub>] [slowly [ate [in the garden<sub>PP</sub>]<sub>VP</sub>]<sub>VP</sub>]<sub>VP</sub>]]]

In (1a) we see an adjunct-free structure, while in (1b) the adjuncts *slowly*, and *in the garden* have been merged to VP. The outputs of these adjunctions are identical types -VPs- demonstrating that the adjunct projects no features.

These properties can also be seen in objects which are word-internal. It is these objects that fall under the heading of morphological adjunct.

- (2) a. [palatable<sub>A</sub>]  
 b. [un[palatable<sub>A</sub>]<sub>A</sub>]  
 (3) a. [place<sub>V</sub>]  
 b. [ré[place<sub>V</sub>]<sub>V</sub>] ‘to place again’<sup>2</sup>

The prefixes in (2b) and (3b) are phonologically ‘separate’ from the base to which they merge – evidenced by the non-assimilation of the nasal to the following consonant in (2b), and the main stress surfacing on the prefix in (3b). They also project no category features. These properties are those which are ascribed to adjuncts in general, and therefore I contend that morphemes such as *un-* and *re-* are adjuncts. A comprehensive examination is necessary to determine which morphemes have adjunct properties in any language, and a subset of these will be discussed in this chapter.

<sup>2</sup> The example in (3b), and others like it, will be contrasted with its alternate pronunciation and meaning in (i) in Section 4.2.4.

i. *replacer* ‘to substitute’



### 4.2.2 Late Adjunction

As morphemes can be adjuncts the null assumption is that they should have all properties ascribed to other syntactic adjuncts, including the ability to late adjoin within the narrow syntax. Late Adjunction was first proposed in Lebeaux (1988) to account for the adjunct/argument asymmetries in Condition C effects, seen in (4) and (5).

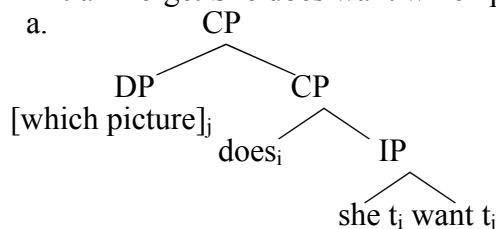
- (4) a. \**She<sub>i</sub> wants the picture of Seonaid<sub>i</sub>.*  
       b. \**Which picture of Seonaid<sub>i</sub> does she<sub>i</sub> want?*
- (5) a. \**She<sub>i</sub> wants the picture that Seonaid<sub>i</sub> likes.*  
       b. *√Which picture that Seonaid<sub>i</sub> likes does she<sub>i</sub> want?*

Examples (4a) and (5a) show typical Condition C violations, where the R-expression *Seonaid* is c-commanded by the pronoun *she*, leading to ungrammaticality. In (4b) the movement of *Seonaid* to a position not c-commanded by the pronoun does not save the construction. However, surprisingly, in (5b) this movement leads to grammaticality. This is argued to be due to the fact that the argument [*of Seonaid*], but not the adjunct [*that Seonaid likes*], must be merged with *picture* before movement. The adjunct is merged after movement, and therefore *Seonaid* in (5b, see the derivation in 6) is never c-commanded by *she*. In (5a) the adjunct is also merged late, but to a position c-commanded by the pronoun, causing ungrammaticality.<sup>3</sup>

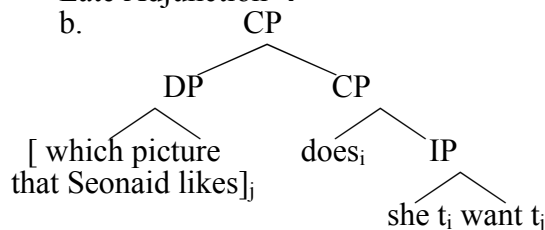
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<sup>3</sup> This explanation is also compatible with the Copy Theory of movement, as argued by Chomsky (1993) and Fox & Nissenbaum (1999).

(6) Initial Merge: She does want which picture. →



Late Adjunction →



I argue here that it is the difference in behaviour between adjuncts and non-adjuncts that distinguishes the contrasting behaviour of the morphemes *in-* and *un-* in the sections to follow. It is argued here that it is not only the phonological ‘separateness’ of the morpheme *un-* that argues for its status as an adjunct, but also its appearance in bracketing paradoxes, a phenomenon argued here to be possible only when an adjunct is present.

Note that this late adjunction is disallowed in theory if there is a No Tampering Condition (Chomsky 2005), which bans alterations to already constructed syntactic objects. Two things should be mentioned here. First, if multiple specifiers “tuck in” rather than extend the tree (as first argued in Richards 1998), then ‘No Tampering’ cannot be strictly correct. Chomsky’s *On Phases* (2007) allows for tucking in. Also, he notes that “Given the basic properties of adjunction, we might intuitively think of  $\alpha$  as attached to  $\beta$  on a separate plane, with  $\beta$  retaining all its properties on the “primary plane,” the simple structure.” (2001: 18). This statement allows an adjunct to ‘tamper’ with any syntactic object not merged through adjunction, as in Bobaljik (1994), where

adverbials are shown to not interfere with merger under adjacency. In addition, adjuncts do not tamper with the phonological form of the object adjoined to. They are always inserted and interpreted at an edge (Nissenbaum 2000's Linear Edge Condition), minimizing again any tampering effects that they might be considered to cause.

Although there may be reasons to reject the idea of late adjunction (Chomsky 2001b, 2005), I will from this point forth assume it to be a valid syntactic operation, and therefore a valid morpho-syntactic operation.

#### **4.2.3 Multiple Spellout and The Smallest Possible Command Unit** If

Late Adjunction is an available operation for adjuncts, and morphemes can be adjuncts, then the smallest possible adjunct must be monomorphemic. This entails, following current theories of cyclic spellout such as Uriagereka's Multiple Spell-Out (MSO) (1999), Johnson's (2003) Renumeration, and Chomsky's Phases (1998 and subsequent work), that the smallest possible spellout domain is monomorphemic.

Chomskian phases are proposed to be units of structure created from a numeration that includes a phase head. This phase head triggers interpretation of its complement (Nissenbaum 2000), and, according to Uriagereka and Johnson, but not Chomsky or Nissenbaum, interpretation causes the complement domain to be invisible for further syntactic operations. Traditionally these phase heads have been argued to be C and  $v^*$ (transitive v). Legate (2003) gave some arguments that unaccusative and passive vPs also have the properties assigned to phases (e.g. phonological independence, cyclic movement domains), Adger (2006), Svenonius

(2004), Heck & Zimmermann (2004), Boskovic (to appear) and Rappaport (2001) are among those who argue that DP is a phase (and DP is also argued to have some properties of phases in Matushansky 2004). Other phases, those induced by category-defining heads such as *n*, *a*, and *v*, have been proposed by Marantz (2001), DiSciullo (2005), Arad (2003) and Marvin (2002), among others, and have been alluded to as possible phases in Chomsky (2001). That phases go beyond the original proposed two is quite uncontroversial at the moment. Phases seem to be evident as smaller and smaller domains, up to and including *xP* phases, which can include only two morphemes, and the monomoraic phases to be discussed in this chapter. Chomsky's most recent work on phases notes that "Phases should, presumably, be as small as possible, to minimize computation after Transfer and to capture as fully as possible the cyclic/compositional character of mappings to the interface." (2005:20) On the surface it might seem that monomorphemic phases takes this a step too far – there is no evidence that any adjunct morpheme is itself a phase head. Yet consider that the MSO argument for adjuncts (as well as subjects) was proposed to explain the induction step of Kayne's (1994) Linear Correspondence Axiom. The command structure of a syntactic tree is bifurcated whenever an adjunct or a subject is present, resulting in multiple syntactic objects that have no direct command relations. If linearization piggybacks on command structures, then multiple command structures within a tree will cause problems for linearization. Therefore the adjunct and/or subject must be interpreted separately from the rest of the tree in order to ensure convergence at the interfaces.

Although a monomorphemic adjunct will not cause any difficulties with linearization, and therefore will not cause a derivation to crash if it is merged prior to its own interpretation, I argue that this is not something that the computational system can ‘see’.<sup>4</sup> The fact that MSO allows for divergent command structures to be linearized properly at the output is a result of spelling out command units independently from each other. This linearization, however, cannot be referred to in the Narrow Syntax, as phonological considerations are irrelevant there. This notion has been labeled ‘No Look-ahead’ in the minimalist literature. As this is the case, a monomorphemic adjunct numeration should be permitted, and required, to undergo interpretation in the same manner that larger adjunct structures do.

This being the case, neither the theory of Phases nor the theory of MSO disallow monomorphemic adjuncts, on the contrary, both must allow for them. We can therefore continue under the assumption that a monomorphemic adjunct is both an expected syntactic object, and incorporated into the derivation in the same way that other adjuncts are. The one confound, briefly mentioned above, is that monomorphemic adjunct have the possibility of not undergoing interpretation separately from the Syntactic Object to which they merge. This is due to the fact that a monomorphemic adjunct will not introduce a separate

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<sup>4</sup> Note that a monomorphemic adjunct does not conform to the schema of a phase in which a head triggers the interpretation of its complement. This is unproblematic within the MSO framework (Uriagereka 1999). It is also permitted within a complement-spellout model (Nissenbaum 2000, following Ross 1967) if a null projection with the properties of a phase head merges with any root node.

ii. [Who did [you [ask about phases<sub>VP</sub>]<sub>TP</sub>]<sub>CP</sub>]?

In (ii) the complement of C<sup>0</sup> is the final domain in the derivation that is triggered to undergo interpretation by a phase head. The interpretation of C<sup>0</sup> and its specifier also undergo interpretation, but this operation is not triggered by a phase head. Interpretation therefore cannot be always dependant on the existence of a phase head within the narrow syntactic structure.

command structure from the one to which it merges. As this is the case, no crash will result from the merger of an uninterpreted monomorphemic adjunct. An uninterpreted monomorphemic adjunct will be interpreted upon the completion of the phase within which it is merged. The next section argues that these two possibilities are a natural outcome of the existence of monomorphemic adjuncts, and that this dual nature is indeed evident in the data.

#### 4.2.4 Monomorphemic Adjunct Dualism

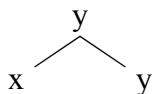
Monomorphemic

adjuncts may or may not be interpreted prior to merger to the tree to which they adjoin. Therefore monomorphemic adjuncts may merge pre- or post-interpretation. Note that this does not allow them to escape the fact that adjuncts may be late merged. Consider the following schematic derivations.

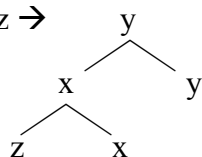
- (7) a. Merger of a monomorphemic adjunct prior to interpretation.

(i) Numeration  $\{x, y, z\}$   $z = \text{an adjunct}$

(ii) Merger of  $x$  and  $y \rightarrow$



(iii) Acyclic merger of  $z \rightarrow$

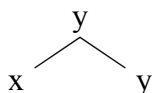


(iv) Interpretation of  $\{z, x, y\}$

- b. Merger of a monomorphemic adjunct after interpretation

(i) Numeration  $\{x, y, \}$

(ii) Merger of  $x$  and  $y \rightarrow$

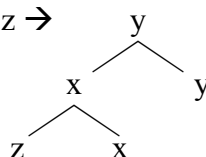


(iii) Interpretation of  $\{x, y\}$

(iv) Numeration of  $\{z\}$

(v) Interpretation<sup>5</sup> of {z}

(vi) Acyclic merger of z →



(iv) Interpretation of {{z},x,y}

In both of the derivations above late (a-cyclic) merger of the adjunct occurs, and in neither case is there a possibility of crash due to linearization ambiguities, however they are determined, as the final syntactic structures of both (7a) and (7b) are identical. Therefore a monomorphemic adjunct may be numerated in an uninterpreted state or in an interpreted (remerged) state, and both derivations will lead to an interpretable output and should therefore both surface. This is the case. Consider the following examples<sup>6</sup>.

- (8) a. [PW[PWre-][PWplace]] → rí:plès ‘to place again’  
 b. [PWre-place] → rəplès ‘to substitute’
- (9) a. [PW[PWre][PWcover]] → rí:kʌvər ‘to cover again’  
 b. [PWre-cover] → rəkʌvər ‘to regain’
- (10) a. [PW[PWde][PWbrief]] → dí:brif ‘to remove x’s underpants’<sup>7</sup>  
 b. [PWde-brief] → dəbrif ‘to question/instruct’

In (8a), (9a), and (10a) the prefix and verb are in separate PWs, as indicated by the stress patterns and the length and tenseness of the vowel of the prefix. Why should this be the case? Rubach and Booij (1984) propose that certain prefixes belong to a class of affixes labeled ‘non-cohering’. What this entails is that these prefixes will never form a part of the PW projected by the

<sup>5</sup> Note that the adjunct must be active in the narrow syntax in order to undergo interpretation. As it is monomorphemic it does not undergo merger to another node until after interpretation. Therefore the narrow syntax must allow monomorphemic phases.

<sup>6</sup> Thank you to Glyne Piggott for pointing this pattern out to me.

<sup>7</sup> As in the James Bond film *Goldeneye*. Thanks to Lisa Travis for pointing this out to me.

stem to which they adjoin, therefore necessarily forming their own PW. This proposal is a restatement of the facts. Why should these specific morphemes exhibit such a property? I attempt to explain here why the above prefixes form separate PWs from the base to which they attach. The proposal that these affixes are adjuncts, and that adjuncts – phrasal or morphemic – may be interpreted separately from the tree to which they adjoin explains this phonological pattern. If an adjunct prefix is interpreted on its own, and phonological interpretation causes the projection of prosodic structure to the PW level, as proposed in the preceding chapters, then the autonomous interpretation of adjuncts insures that they will project a separate PW from that projected by the base to which they attach.

The semantic interpretation of the examples in (8)-(10) parallels the phonological distinctions between the (a) and (b) examples. The semantics of the words in (8a), (9a), and (10a) is compositional, indicating two separate domains for interpretation; the prefix and the root. Assuming that interpretation at PF and LF targets the same syntactic domains (contra Marusic 2005) then the LF interpretation of the above prefixes will also occur separately from the interpretation of the base. Therefore the combination of the semantic interpretations of the prefixes and their bases will necessarily be compositional. Both the phonological and semantic facts follow if the prefix and the verb are interpreted separately at PF and LF.

In examples (8b), (9b) and (10b) the prefix and the verb are parsed together, both phonologically and semantically. They are members of the same



PW – as evidenced by the stress on the verb and the reduction of the prefix vowel, and the semantics of the whole is not compositional. The semantics of the prefixes and roots are lost, and their combined semantics is idiomatic. In these examples the prefix is merged as in (7a) – inside the little-*v* head.

In both cases the prefix involved is an adjunct. It is not selected for nor does it project. The (a) examples involve interpretation of the adjunct prior to merger, while the (b) examples involve interpretation post-merger. I have argued above that it is only when a monomorphemic adjunct is involved in a derivation that these pairs arise.<sup>8</sup> In the following section I will discuss another phenomenon that necessarily involves adjunction: the bracketing paradox.

### 4.3 Bracketing Paradoxes

The option of late merge for morphological adjuncts helps explain a class of puzzles that have come to be known as “bracketing paradoxes” (Nissenbaum 2000, Newell 2005a, b). Consider the following examples.

- (11) a. unhappier  
       b. ungrammaticality  
       c. nuclear physicist

In each of the above, the bracketing that explains the morpho-phonological output (the first in each example in (12)) is not the bracketing that is necessary to explain the semantic scope of the morphemes in question (the second).

---

<sup>8</sup> It is not the case that we find these pairs with every monomorphemic adjunct. What is true, however, is that we only find these pairs when an adjunct is involved. The reason behind the distribution of these pairs within the realm of monomorphemic adjuncts is a subject for future research.

- (12) a. PF[un[happier]] vs. LF[[unhappy]er]  
 b. PF[un[grammaticality]] vs. LF[[ungrammatical]ity]  
 c. PF[nuclear[physicist]] vs. LF[[nuclear physic]ist]

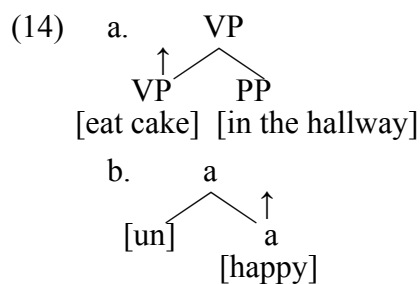
In the first example, *un-* must be merged outside of the comparative morpheme in order to allow for the proper allomorphic variant of *er/more* to surface (Embick and Noyer 2001). In the second example *un-* is argued to be merged outside of *-ity*, as it is a non-cohering, or level two affix, and the latter is cohering, or level one. The third example demonstrates the same problem as the second with different morphological pieces – *nuclear* must be merged after *-ist* due to level ordering requirements. *-Ist*, being a Level 1 affix, must be merged with the root before the Level 2 compound is derived.

The LF bracketings in (12) encode the scope of the morphemes involved. If someone is *unhappier* they are [more [not happy]], *ungrammaticality* is the [state of being [ungrammatical]], and a *nuclear physicist* is [someone who studies[ nuclear physics]].

I contend, following insights first presented in Nissenbaum (2000), that each of the above paradoxes, and in fact all bracketing paradoxes, must involve an adjunct, and that the properties of adjunction laid out in the previous sections give an explanatory account of how bracketing paradoxes emerge.

- (13) *Bracketing-Paradox Adjunct Generalization*  
 A Bracketing Paradox will arise iff the structure includes an adjunct.

Like syntactic adjuncts (14a), the prefix *un-* in *unhappy* does not change the syntactic category of the base to which it attaches (14b), nor is it selected by the base.

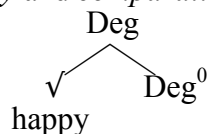


Making the assumption that *un-* is a morphological adjunct allows a resolution to the bracketing paradox.

#### 4.3.1 The Adjunction Solution to Bracketing Paradoxes

As claimed

above, the morpheme *un-* is a morphological adjunct. Further arguments that this is so can be seen below in Section 4.3.2.1. As it is an adjunct, it is therefore adjoined acyclically. This acyclic adjunction allows for the phonological restrictions of the synthetic comparative to be met at the point of vocabulary insertion, and the correct relative semantic scope of the negative and comparative morphemes. (15) details the derivation of *unhappier*.

(15) A timeline for insertion of *un-*:a. 1<sup>st</sup> Numeration:(i) merger of *happy* and *comparative/degree head*<sup>9</sup>

## (ii) Interpretation at the Interfaces

PF

Late Lexical Insertion → selection of *er* allomorphPhonology → spellout of *happier*

LF

[more [happy]]

b. 2<sup>nd</sup> Numeration:(i) incorporation into the narrow syntax of *un*

## (ii) Interpretation at the Interfaces

PF

Phonology → spellout of *un*<sup>10</sup>

LF

[negative]

<sup>9</sup> As the degree head merges with roots and creates adjectives it can be classed as a category-defining head, and hence a phase head. Evidence that the degree head and the root are interpreted within the same phase can be seen by comparing the derivations of ‘younger’ and ‘singer’.

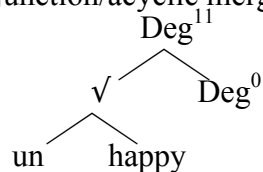
|      |         |          |
|------|---------|----------|
| i)   | young   | [yʌŋ]    |
| ii)  | younger | [yʌŋgər] |
| iii) | sing    | [sɪŋ]    |
| iv)  | singer  | [sɪŋər]  |

Looking at (i) and (iii) we can see that a root ending with the consonant cluster [ŋg] undergoes [g] deletion when this cluster appears word finally. Comparing (ii) and (iv) we see that the comparative morpheme, unlike the nominalizing morpheme, ‘saves’ the [g] from deletion. This non-deletion is due to the fact that the [g] can be syllabified as an onset of the syllable headed by the vowel in the comparative morpheme. For this to occur it must be the case that the comparative morpheme is visible at the point where the root is interpreted at PF. In comparison, the root-final [g] in the nominalized *singer* is deleted despite the presence of a vowel in the suffix. This is due to the fact that there are two phases in the derivation of *singer*. The nominalizing morpheme only merges with verbs, and therefore there must be a null verbalizing head merged to the root prior to nominalization: [[[sing]v]er]. As both the verbalizing and nominalizing heads are category defining, two phases of interpretation exist in the derivation. The lack of an intermediate interpretive domain explains the behaviour of root-final [g] in comparative structures.

<sup>10</sup> That *un-* is numerated and interpreted separately from the SO to which it eventually merges also explains the lack of nasal assimilation in examples such as *unlikelier* (c.f. *illogical*). As no assimilation trigger is present at PF upon interpretation of the negative morpheme it will never assimilate. Note that *un-* is one of the adjunct morphemes alluded to in Section 4.2.4 that does not seem to have the option to merge prior to interpretation. Why this should be so will be left for future research.

c. 3<sup>rd</sup> Numeration:

(i) Late Adjunction/acyclic merger of un



(ii) Interpretation at the Interfaces

PF

Phonology

→

spellout of *unhappier*

LF

[more[un [happy]]]

In (15a) we have the root *happy* and the category defining phase head *Deg*. The phase is sent to Morphological Structure(MS) and Phonological Form(PF). The degree head undergoes morphological merger with its complement at MS (following Embick and Noyer 2001), as its complement is of the correct phonological shape for vocabulary insertion of the synthetic comparative. The PF output is [happier]. Note that this merger is purely morpho-phonological and involves no syntactic lowering (see 15c). This is crucial for the correct LF interpretation of the construction. At LF, *-er* remains in a position that scopes over *un-*. In (15b), the adjunct is numerated and undergoes spell out alone. This part of the derivation need not be prior to or post (15a), it may be simultaneous. These two parts of the derivation cannot affect one another. In (15c) *un-* has merged to the syntactic node dominating *happy*. The base position of the degree head remains in a position that scopes over the negative morpheme, while it is simultaneously phonologically interior to *un-*. The PF output at this phase is [un[[happi]er]], while the syntactic bracketing is the LF appropriate [[un[happi]]er]. The apparent bracketing paradox is therefore the result of the

<sup>11</sup> Note that I am not taking a stand on the headedness of the Degree Phrase. In the analytic comparative (e.g. *more intelligent*) the exponent of the Degree head surfaces to the left.

derivational nature of the PF system in conjunction with the late adjunction of *un-*.

We see that late adjunction and a MSO theory of left-branch cyclic interpretation gives an explanatory account of the *unhappier* bracketing paradox. This type of derivation is also one that allows, transparently, for the resolution of paradoxes reflected in *ungrammaticality* and *nuclear physicist*, and, I argue, all bracketing paradoxes. There are however a few issues specific to the *unhappier* paradox that are left to be resolved.

### 4.3.2 *in-*, and Adverbial Adjuncts

Two problems with the above account are immediately apparent. First, why is it that *un-* can produce bracketing paradoxes like the one above, but the seemingly synonymous *in-* cannot. And second, why is it that adverbial adjuncts like *incredibly* interfere with the allomorphic choice of the degree head, while *un-*, apparently merged to the same position – does not. I address both of these issues below.

#### 4.3.2.1 The *un-/in-* Distinction

Given the claim that *un-* is a morphological adjunct, we might expect the morpheme *in-* to have the same designation. *in-* appears to perform the same semantic function as *un-*, where an adjective *X* merged with *in-* acquires the interpretation *not X* (possible vs. impossible). *In-* also appears to not project category features, merging with adjectives to produce adjectives.

The comparison of *in-* with *un-* however appears to break down in the realm of comparatives, the environment which is important here for

demonstrating the late adjunct status of *un-*. *in-* merges only with Latinate roots, which generally do not take the synthetic comparative morpheme, even when they meet the phonological requirements. In the analytic comparative, *more* always transparently scopes over the negative morpheme, and there is therefore no bracketing paradox. For some speakers however, there is one example that will be argued here to illustrate the different status of *in-* and *un-*, namely *\*impoliter*.<sup>12</sup>

Before a proposal concerning the ungrammaticality of *\*impoliter* can be given, we must note that the morphemes *in-* and *un-* display some striking phonological and syntactic differences. First, *in-* is phonologically ‘closer’ to the root than is *un-*. The nasal in (16a) assimilates to the following consonant, while in (16b) it does not.

- (16) a. intolerable vs. impolite  
b. untrue vs. unpopular

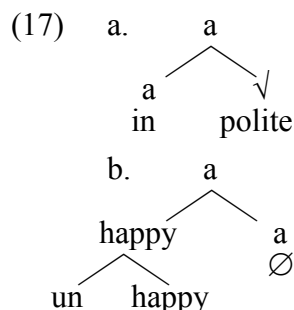
This difference is argued here to be due to the fact that *in-* but not *un-* is spelled out in the same phase as its sister, and is therefore in the same phonological domain.

Second, *in-*, but not *un-*, is restricted to adjectival environments. The Latinate bound adjective *ept* may be prefixed with *in-*, giving *inept*, but the Latinate verb/noun *aid* cannot, *\*inaid*. *un-*, conversely, may affix to adjectives (*unhappy*, *unattractive*), verbs (*untie*, *undo*), or even to proper nouns (*unBritney*), as in ‘She is the *unBritney*, which is what the music industry needs’.<sup>13</sup>

<sup>12</sup> Thank you to an anonymous source for bringing the importance of the following example to my attention.

<sup>13</sup> The *un-* that attaches to adjectives, and the *un-* that attaches to verbs have traditionally been thought of as homophonous, but different, morphemes. This is due to their different semantics, where adjectival *un-* negates, and verbal *un-* indicates a reversal of the action denoted

Third, *in-*, but not *un-*, attaches to bound roots, as in *inept*, and *inane*. As *ept* and *ane* have no category features, the adjectival features of these word must be projected by the prefix. These differences follow if we assume that *in-* projects an adjectival label and is therefore a category-defining head, while *un-* does not, and is not, giving the following structures.



Now, returning to the discussion of *\*impoliter*, the Latinate adjective *polite* may take the synthetic comparative, giving us *politer*. As this is a two syllable adjective, it should behave on par with the *unhappier* paradox, should *in-* be a morphological adjunct. Contrary to expectations, if we were to assume *in-* to behave on par with *un-*, *\*impoliter* is not grammatical. This is explained by the assumption that *in-* does project category features, and therefore must be merged cyclically, necessarily bleeding the environment for insertion of the *-er* allomorph of the comparative.<sup>14</sup> In other words, as *in-* carries adjectival features, it cannot be late adjoined (or adjoined at all for that matter) and must be interpreted along with the root prior to the merger of a degree head. Therefore the complement of the degree head in the relevant example is *impolite*, which is phonologically too large to allow the lexical insertion of the synthetic comparative morpheme. As

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by the verb. I believe this difference may be due to the semantics of the base attached to, but will not pursue this idea here.

<sup>14</sup> For arguments leading to the conclusion that *-er* and *more* are indeed allomorphs, see Embick and Noyer (2001).



there is no adjunction in the derivation of *impolite* it will never give rise to a bracketing paradox.

This illustrates the distinction between a true morphological adjunct and a morpheme that only appears to not project, because the category it projects happens to be the same as the category of its base (*-in* attaches to adjectives and creates adjectives, masking its category defining properties). It is only a member of the class of true morphological adjuncts that may cause the appearance of a structural paradox.

#### 4.3.2.2 Adverbial Adjuncts

I have argued that acyclic merger of the negative morpheme *un-* to the categoryless root morpheme in a degree phrase gives evidence that morphological and syntactic adjunction behave on par, and this in turn offers an explanatory account of the fact that only constructions including adjuncts may result in a bracketing paradox.

One might ask, however, why all adjuncts do not behave the same way in this comparative structures. It has been noted, both by Embick and Noyer (2001) and Kiparsky (2005) that adverbial modifiers block the local dislocation (morphological merger) of the degree morpheme.<sup>15</sup> *Incredibly*, like other adjuncts, neither is selected for, nor projects. It should therefore be able to late merge on par with *un-*. Unlike representations with *un-*, however, the synthetic

<sup>15</sup> Note that there are exceptions to this rule; e.g. Embick's "metalinguistic" comparatives (iii) and constructions involving manner modification (iv). These are discussed in Embick (2005).

iiia. John is more sad than tired.

b. \*John is sadder than tired.

(Embick 2007:17)

iv. Fred is more ploddingly slow than Larry.

(ibid:29)

comparative (i.e. *-er*) is blocked when adverbs like *incredibly* are present, even when the adjective is the right phonological size to permit it.

- (18) a. He is Deg<sub>i</sub> slow-er<sub>i</sub> than his mother.  
 b. \*He is Deg<sub>i</sub> incredibly slow-er<sub>i</sub> than his mother.  
 c. He is Deg-more incredibly slow than his mother.

Embick and Noyer argue that local dislocation is blocked phonologically. The adjective is not phonologically adjacent to the degree head in these cases (18b), and therefore the environment within which local dislocation occurs has been destroyed. This in itself poses a problem for my analysis, under the assumption that *incredibly*, like *un-*, is an adjunct. Both should permit the derivations in (19), but only (19b) is licit.

- (19) a.      Deg    =incredibly slower  
               /      \  
           [more/er] slow  
               /      \  
           incredibly slow  
       b.      Deg    =unhappier  
               /      \  
           [more/er] happy  
               /      \  
           un     happy

Note that adverbs are transparent to local dislocation of the tense morpheme in English (20) and it is therefore questionable why affixation should be blocked in the comparative (see Bobaljik 1994, Ochi 1999 and Skinner 2008 for compatible analyses of the placement of the Tense morpheme in English).

- (20) Alan T<sub>i</sub> often play-s<sub>i</sub> hockey.

Fortunately, the data above is only an apparent problem for the late-adjunction analysis of bracketing paradoxes. The structures involved are, in reality, not parallel. An altogether different reason for the adverb to block

affixation of the Degree head to the adjective is presented in Kiparsky (2005). The Degree head in the modified comparative cases does not modify the adjective, but rather the adverb. In the cases in question, the degree head must be merged with the adverbial, rather than the adjective, and therefore we do not expect local dislocation to occur. Consider the following. Note that the semantics of (18c) does not match the structural description in (21a), but rather in (21b). In (21a) we have the meaning that the degree to which John is incredibly slow is higher, while in (21b) the degree to which it is incredible (that John is slow) is higher.

- (21) a. John is [more [incredibly slow]].  
 b. John is [[more incredibly] slow].

The structural description of (18c) should therefore be as in (22).

- (22)
- 
- ```

graph TD
    slow1[slow] --- Deg[Deg]
    slow1 --- slow2[slow]
    Deg --- more[more/er]
    Deg --- incredibly[incredibly]
  
```

This being the case, and taking into account that the entire Degree phrase in (22) is an adjunct, phonological interpretation of the degree head will take place in a separate phase from that in which the adjective is interpreted. Local dislocation is therefore not expected.

This does not, however, solve the problem above of why *un-* but not *incredibly* may late adjoin inside the degree phrase. Why is it not possible to get the output in (18b), derived from the structure in (19a)?<sup>16</sup>

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<sup>16</sup> I thank both Alan Bale and Tobin Skinner for helpful discussions leading to the discussion to follow.

Consider the types of arguments taken by the degree head. The degree head may only merge with adjectives that are gradable (see Kennedy 1999 for a recent analysis of gradability).

- (23) a. more happy  
b. \*more elected<sup>17</sup>

Adverbs like *incredibly* must also merge with gradable adjectives.

- (24) a. incredibly happy  
b. \*incredibly elected

What is crucial here is that an adjective modified by an adverb like *incredibly* is no longer gradable. It is treated on par with definite descriptions like *three feet tall*. *More three feet tall* is ungrammatical for the same reason that *more [incredibly tall]* is – the complement of the degree head must be gradable, and in these cases it is not.

Therefore the inability of counter-cyclic merger is explained. There is no relevant morpho-syntactic distinction between *un-* and *incredibly*, rather, the distinction is semantic. Counter-cyclic merger of the adverb creates an illicit complement for the degree head, and therefore the construction with the interpretation indicated by (21a) crashes at the LF interface.

One might ask at this point if there are adverbs that may adjoin counter-cyclically in this environment. I would predict that any adverb that does not fix the degree of the adjective – hence creating a non-gradable adjective – should not be banned from counter-cyclic adjunction and should behave on par with *un-*.

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<sup>17</sup> Note that you can force this interpretation, just as you can force the reading of *more dead*. Importantly, in these cases the semantic interpretation of *elected* and *dead* is gradable.

Perhaps it is due to the fact that adverbs like *incredibly* are related to semantic degree themselves that the above pattern surfaces. Consider the following.

- (25) a. Jill is more recently short than Jack.<sup>18</sup>  
 b. \*Jill is recently shorter than Jack.

Does an expression such as *recently short* fix the degree to which either Jack or Jill is short? If not, *recently* should be a prime candidate for counter-cyclic merger in this case. Note however, that this derivation is not possible, as otherwise (25b) would be expected to be grammatical on par with *unhappier*. If we examine (25a), we notice that we run into the same problem as with the degree adverb *incredibly*. The interpretation of (25a) can only be one wherein *more* takes *recently* as its complement, on par with (21b), and not where the degree head dominates the adjective, as in (21a).

This pattern, however, is not indicative of a distinction in ability to merge counter-cyclically between adjuncts like *un-* and *recently* any more than the differing pattern between *un-* and *incredibly* was. *Recently*, unlike *incredibly*, selects for a sister that is non-gradable, while the degree head selects for a dependant that is gradable, as we saw above. What we must assume in this case that gradability can be fixed for a gradable adjective in the absence of an overt adverb.

- (26) a. [incredibly recently] short  
 b. \*incredibly [recently short]  
 c. recently [incredibly short]  
 d. recently [[-gradable] short]

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<sup>18</sup> Jack and Jill have both been involved in accidents (perhaps involving a pail of water), each resulting in the loss of part of their crown (the top of the head), due to a bad fall. Jack fell down first, while Jill came tumbling after.

e. recently elected

In this case, *recently* itself is not specified for gradability, and therefore may be modified by *incredibly* (26a). When *recently* merges with an adjective however, the adjective must be non-gradable (26b). The non-gradable adjective, modified by *recently* or not, is therefore not modifiable by *incredibly*, which we have seen only merges with gradable adjectives. *Recently* may however merge with *incredibly smart*, as *smart* is no longer gradable when modified by *incredibly*. What we must assume therefore is that, as schematized in (26d), and on par with underlyingly non-gradable adjectives, normally gradable adjectives like *short* may become non-gradable through non-visible means by merger with a null syntactic head. This being the case we have as solution as to why adverbs like *recently* may not merge counter-cyclically into a degree construction. The complement adjective in a degree construction is necessarily gradable, and therefore not compatible with the selectional restrictions of *recently*.

It is still the case that adverbs that select for a gradable adjective and do not affect its value for gradability should be able to merge counter-cyclically and allow local dislocation across their merger site. Unfortunately, I have found no adverbs of this type.<sup>19</sup> Therefore *un-*, which as we recall from previous discussion, negates the interpretation of a gradable adjective (i.e. behaves semantically on par with the elusive adverb described in the last paragraph), is the only viable adjunct for counter-cyclic merger into a degree phrase.

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<sup>19</sup> A possible exception is *remarkably whiter*, although my informants disagree as to whether this comparative can have the interpretation in (vb) as well as (va). Thanks to Tobin Skinner for this example.

va.	[remarkably [whiter]]	‘X is whiter to a remarkable degree’
vb.	[[remarkably white]er]	‘X is remarkably white to a greater degree’

### 4.3.3 Summing up the Bracketing Paradox

Like the phase-based

analysis of stress patterns in the previous chapters, the analysis of bracketing paradoxes here argues for a linguistic computational system wherein morphemes are the building blocks utilized by the narrow syntax. In addition, the analysis in the previous sections demonstrates that the cyclic nature of the phonological interpretive system, along with the manner in which adjuncts are incorporated into a syntactic object, predicts the distribution of and explains the existence of bracketing paradoxes. This account, unlike previous work on bracketing paradoxes (Kiparsky (1982), Pesetsky (1985), Falk (1991), Spencer (1988), Stump (1991), Sproat (1992), Light (1991) to name a few) brings to bear no mechanical apparatus that is not independently necessary. The following sections will expand the domain of the adjunct solution to Bracketing Paradoxes, explaining the similar paradoxical nature of particle verbs.

### 4.4 Extending the Analysis: The Particle Verb

Particle verbs

(PV) are another construction that lend themselves to a solution involving late adjunction. This argues further for a syntax whose basic building blocks are morphemes and not words. This being the case strengthens the analysis of stress in the previous chapters, as it is crucial for all analyses that syntactic operations target word-internal domains.

In this section I will endeavor to do two things. First, I will offer a solution to the nominalized PV bracketing paradox discussed in Müller (2003). I will show that late morphological adjunction, along with certain assumptions

about the structure of nominalized verbs in German, resolves the paradox. In (27a) we see the surface phonological order of the morphemes involved, and in (27b) the necessary (under Müller's assumptions) LF bracketing.

- (27) a. PF[herum-[ge-renn-e]]  
aimless-ge-run-e  
b. LF[ge[herum-renn]e]

The proposed paradox here stems from the fact that the particle *herum* is phonologically outside of the nominalization (*ge- -e*), while simultaneously being within its semantic scope – the meaning of (27) being ‘acts of aimless running’ and not ‘aimless acts of running’.

After showing how late adjunction also solves the nominalized particle verb paradox I offer a novel approach to the long standing question of whether particle verbs have the structure of a complex predicate or a small clause (Section 4.4.2).

It has been argued that some particle verbs must be phrasal, a term that I will use for all accounts where the particle is not proposed to be an adjoined head (e.g. Wurmbrand 2000, Kratzer 1993, den Dikken 1992, 1993 among others). Kratzer, for example, notes that in German the prefix *un-* cannot attach to XP constituents, therefore all PVs that may be affixed with *un-* are considered to be  $X^0$ s (28a), while those that do not accept *un-* affixation are XPs (31b).

- (28) a. das un-[<sub>X<sup>0</sup></sub>ab-geschickte] Manuskript  
the un off sent manuscript  
"the manuscript that wasn't sent off"  
b. \*das un-[<sub>XP</sub>weg-geschickte] Manuskript  
the un off sent manuscript  
"the manuscript that wasn't sent off" (Haiden: syncom<sup>20</sup> case 117)

<sup>20</sup>

[http://www.univ-lille3.fr/silex/equipe/haiden/particle/case\\_117\\_vepa.htm](http://www.univ-lille3.fr/silex/equipe/haiden/particle/case_117_vepa.htm)



The delimitation problem<sup>21</sup> (Ludeling 2001) surrounding particle verbs makes a cohesive analysis difficult, and I will therefore focus here on countering the argument that all particle verbs are phrasal, projecting a small clause. This analysis therefore falls into the group of analyses of PV that argue that the particle and verb combine to form a complex  $X^0$ . The most solid argument in the literature that PVs must be phrasal is that the particle and verb may be separated in the syntax. Even those particles as in (28a), that accept un-affixation, will be separated from the verb under V2.

- (29) Ich sendete das Manuskript ab  
       I sent the manuscript off  
       'I mailed the manuscript'

This, it is argued, is a slam-dunk argument against the proposal that particle verbs are complex heads. To accommodate this data, proponents of the complex  $X^0$  theory of particle verbs must in some way allow for excorporation of the verbal head. Here I will assume that excorporation is not possible (c.f. Baker 1988), but I will argue that morphological late adjunction gives us a possible  $X^0$  account of particle verbs which avoids the issue of excorporation entirely.

#### 4.4.1 The *Herumgerenne* Paradox

Müller (2003) notes that the nominalizing circumfix *ge-* *-e* gives rise to a bracketing paradox in combination with a particle verb. The nominalization does not appear, morphophonologically, to scope over the particle, while the semantics of the nominalization does scope

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<sup>21</sup> It is clear that particles do not all have the same syntactic/distributional properties. The delimitation problem refers to the difficulty in determining exactly what domain of phenomena a theory of particles should cover.

over the particle. As mentioned, the meaning of this construction is ‘acts of aimless running’, not the phonologically implied ‘aimless acts of running’.

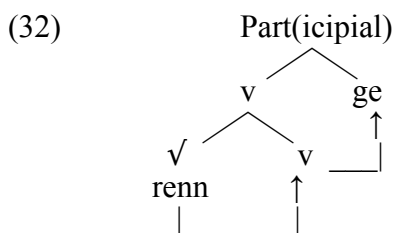


Müller contends that the entire structure above is predetermined (projected) by a verb that takes a particle, and that this semantic/structural encoding is what allows the interpretation given.

Here I contend that *herumgerenne* only leads to a structural paradox if one assumes that *ge- -e* is a circumfix, and that being phonologically outside this circumfix entails structural c-command of the circumfix. It is only these assumptions that force the particle to be morphologically outside the nominalization. There is reason to believe that this is not the case. The prefix *ge-* is not restricted to nominalized forms, but is rather a participle prefix, found also in the participial *ge- -t* and *ge- -n* constructions.

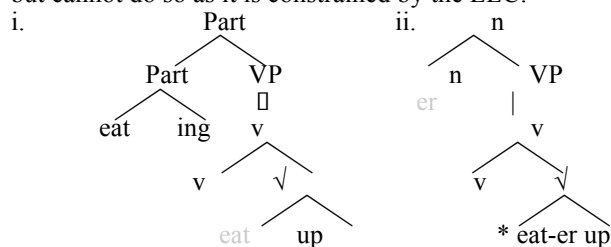
- (31) a. ich habe gebetet ‘I have prayed’  
 b. ich habe gesungen ‘I have sung’

Suppose that the prefix *ge-* were to merge with the verb, independently of the *-e* nominalizer.



In (32) the verb and the participle head are merged. Now suppose that the participle has features that trigger raising of the verb.<sup>22</sup> Subsequently, the nominalizing head *-e* is merged. At this point, the particle may be merged to the initial merger position of the verb, allowing a structure where the nominalizing *-e* scopes over the entire particle verb.<sup>23</sup> I contend that the particle is not adjoined to the position the verb has raised to, but rather to the initial merger site of the verb root. The reasoning for this is as follows. An adjunct, being the type of object that does not project, has no formal features that can be targeted by an Agree operation. If we assume that formal features are targeted for agree/movement then we must assume that adjuncts cannot be moved (Stepanov 2001). An adjunct must therefore be merged to the point in a structure where it will be interpreted. Given that predicate movement reconstructs, then for the verb and particle to be interpreted as a head-adjunct structure, the particle must be merged to the trace of verbal head movement, pictured in (33)<sup>24</sup>.

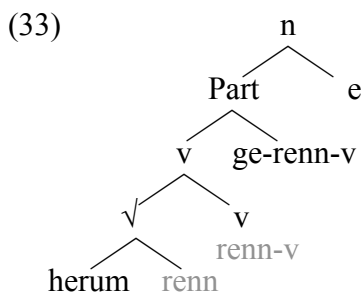
<sup>22</sup> Assuming this to be correct allows an analysis of the difference in grammaticality between (i) and (ii) below. If participle morphology triggers raising then the particle in (i) can merge to the phonological edge, while allowing its selectional restrictions (attaches to roots) to be met. In (ii) the syntactic edge and the phonological edge no longer match up. If we assume morphological lowering on par with comparative structures (c.f. Embick and Noyer 2001) then the syntactic edge of 'eat' is the phonological edge of 'eater'. Further merger of 'up' confounds PF instantiation, as 'up' is in a syntactic configuration that requires spellout at the right edge of 'eat', but cannot do so as it is constrained by the LEC.



This will be expanded upon in Section 4.5.

<sup>23</sup> This derivation would also go through if we assume *ge-* *-e* to be a circumfix (single head), although this would confound the explanation of the data in fn. 21.

<sup>24</sup> Grey=trace/copy position.



In (33) we can see the PF position of the verb in black. The LF position of the verb is the bottommost position in grey. The paradox is therefore resolved. The nominalizing morpheme does scope over the entire particle verb, while late adjunction explains the phonological separateness of the particle.

#### 4.4.2 The Structure of (some) Particle Verbs

As mentioned in the

introduction to this section, a goal here is to offer an analysis that allows syntactic separation of the particle and the verb in particle verb constructions, without precluding a complex predicate analysis of the structure. The debate over this issue is large and beyond the scope of the present work. However, the above analysis in Section 4.4.1, in addition to resolving the nominalization paradox, allows for a derivation where the particle verb is a complex head, while explaining how inflection can intervene between the particle and the verb. Verb movement, followed by low late adjunction of the particle permits intervening morphology (and phrases), while maintaining a complex predicate analysis. This observation will be expanded upon here, offering a possible solution to the debate over whether some particle verbs are complex predicates.

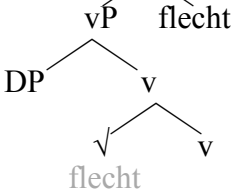
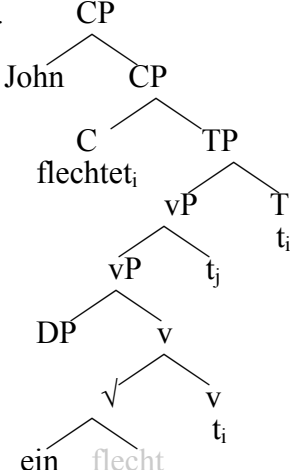
### 4.4.3 Particle Verbs are Complex Predicates

The argument that

particles are late adjuncts allows for a single account that maintains that particle verbs are complex X<sup>0</sup>s, while easily explaining their ability to be syntactically separated.

Non-nominal particle verb constructions (34), where the verb is separated from its particle (V2) can be accounted for by assuming raising of the verb and late, low merger of the adjunct, just as in the *herumgerenne* derivation above (35).

- (34) [CP John [c flechtet] [TP den Buchstaben [VP [vein ti]]]]  
 John braid the letter in  
 'John inserted the letter'

- (35) a.  (first strong phase)
- b.  (second strong phase)

merger position is where the verb is interpreted at LF, we then expect an idiomatic reading to be possible here. No special structure is needed to explain the apparent ability of the verb to excorporate, as the verb and particle are never in a structural position where they must be separated. This surface (as opposed to LF) separation allows for the fact that inflection and phrasal elements may intervene between the verb and the particle.

Note that the particle must merge on the left so as to not violate the Linear Edge Condition (Nissenbaum 2000:201).

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

Merger to the right of the verb's copy would position the particle between the copy and the null  $v^0$  head.<sup>25</sup> This structure would also derive the left-adjoined position of the particle in the nominalized forms. Interestingly, in English particles are (almost) uniformly found on the right. As the English *vP* is left-headed, this also falls out from the LEC. Whether this LEC-determined particle position is cross-linguistically valid will be left to further research. It does however lead to an explanation of a further anomalous effect that arises on the PF interpretive branch in collusion with late adjunction and word-internal phases. I discuss some further issues with particle verbs below in the following sections.

#### 4.5 Phonological Double Affixation

Given that late adjunction can

solve the structural paradox<sup>26</sup> that has given rise to the large literature on particle

<sup>25</sup> This is of course assuming that German is right-headed below CP.

<sup>26</sup> Acknowledging that much more work needs to be done.

verbs, we must look to corroborating evidence. One phenomenon that arises in particle verb nominalization constructions offers additional evidence that particles are late adjoined. This phenomenon is semantically vacuous (or phonological) double affixation. Consider the following.

(37) Bounty, the quicker picker upper.

The above slogan for paper towel exemplifies the construction under discussion. Note that the nominalized particle verb *pick up* surfaces with two realizations of the morpheme *-er*. This double affixation is purely phonological. The meaning of the nominalizing affix is *one who does X* – and the meaning of *picker upper* is *one who picks up*, not *one who picks one who ups*, which would be expected if the two *-ers* were realizations of two separate nodes in the syntactic tree. I contend here that, like bracketing paradoxes, this double affixation will surface only in the presence of – and because of – an adjunct.

(38) Double Affixation Adjunct Condition

All words with semantically vacuous double affixation have the following structure:

base–affix–adjunct–affix<sup>27</sup>

What is of concern in this section is why the above should be the case. I examine two adjunction structures below – particle verbs and diminutives, and argue that late adjunction offers a coherent solution and that this in turn offers further corroboration for the bracketing paradox solution above, and the word-internal phases argued for in the previous chapters.

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<sup>27</sup> Affix= a non-adjunct morpheme, adjunct= an adjunct affix, and where the instantiations of the two affixes are featurally indistinguishable- that is, they are allomorphs of the same morpheme.

#### 4.5.1 Particle Verbs and Semantically Vacuous Double Affixation<sup>28</sup> In

the above discussion of bracketing paradoxes it was proposed that particles are late adjuncts. This being the case, particles adjoin a-cyclically to the structure with which they combine. This, I argue, leads to seemingly anomalous phonological effects at PF – namely double affixation. Before we can discuss the reason for this, we must closely examine the data.<sup>29</sup>

- (39) a. picker upper  
       b. pickable uppable  
       c. picked up  
       d. picking up

In the above data we notice that it is only the derivational morphology in (39a,b) that triggers double affixation. Why should this be the case? As we saw in the discussion of German particle verbs, verbs will raise to check features of inflectional affixes. I contend that this is not the case for derivational affixes, as no unvalued features (phi, tense, case) are present on derivational morphemes. This distinction offers a sound explanation for why the above pattern should arise. Taking *picked up*, we can assume that the verb raises to voice/little v (the distinction between the two being unimportant for the discussion here) as all verbs do.

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<sup>28</sup> This section expands upon Nissenbaum (2000).

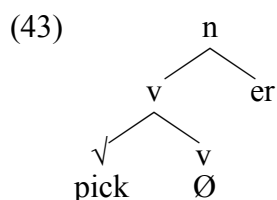
<sup>29</sup> See fn. 21 for a derivational account of the ungrammaticality of *\*picking uppig*.





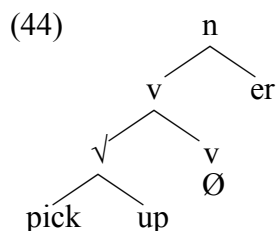
What is crucial here is that nothing intervenes in the morpho-syntactic structure between the tense morpheme and the verb onto which it lowers. Lowering (Embick and Noyer 2001) is defined as the post-syntactic movement of a head to the head it immediately c-commands. Note crucially that this lowering has absolutely no effect on the position of a morpheme in the narrow syntax – the narrow syntax is unaltered. Therefore in the structure above the tense morpheme may licitly merge with the verb in *v(oice)* at PF. The particle does not interfere in this operation in any way, and the output is therefore *picked up*.

Now we can turn to the derivation of a particle verb with a derivational morpheme, such as *picker upper*. Remember that a derivational affix contains no features that would trigger raising of the verb/root. As this is the case we can safely assume that the verb/root remains in the position of initial merger. Merger of the nominalizer to *v* gives us the following structure.



We can assume that a morpho-phonological operation such as lowering or morphological merger also accounts for the fact here that *-er* is merged phonologically to the verb within its complement. Now it is possible to merge an adjunct particle a-cyclically into the structure above. The question of where the particle is merged is an important one, one that needs much more research. In the examples above the particle was merged to the categoryless root node. If it is the case that the particle does merge to the root node then it should be possible to do

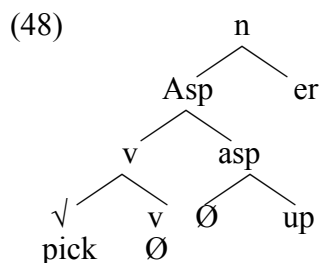
that within the same phase that the nominalizer is merged – giving the following structure. Remember that the first phase – the verb and the root – has already undergone interpretation triggered by the category defining v-head.



If it were the case that (44) were the input to the PF branch at the second phase of interpretation the phonological output should be the ungrammatical *\*pick upper*. Vinka (1999), however, proposes that particles merge into an aspectual projection c-commanding v. This could account for the argument structure alterations that occur when an adjunct is present. Note that adjuncts, unlike the result phrase complements that they are sometimes proposed to be, can add an argument, remove an argument, or not affect argument structure at all.

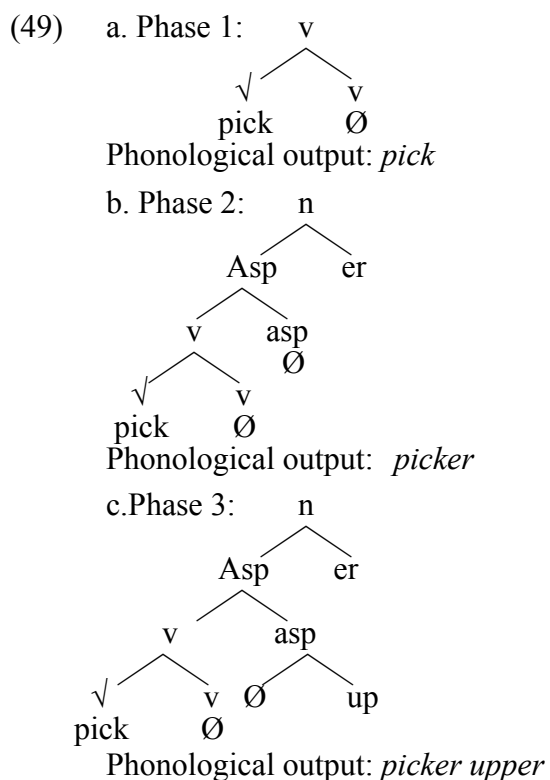
- (45) a. He read the book.  
b. He read on (\*the book)
- (46) a. He ate (his sandwich).  
b. He ate up \*(his sandwich).
- (47) a. He threw (the dice).  
b. He threw up (the dice).

It has been acknowledged since Vendler (1957) that aspectual distinctions and argument structure are interrelated. I therefore propose that particles are late adjoined to a null aspectual head as follows. Note that this entails that it is not the adjunct that causes the alterations in argument structure, but rather the null aspectual head.



Admittedly, this structure poses the same problem as the one above – namely that the particle could be late adjoined within the same phase headed by – *er*, allowing for the particle and the nominalizer to be interpreted within the same phase, giving an ungrammatical output. What this structure does do is to move the merger site of the particle into the outer phase. The possible depth of merger of a late adjunct is also a question that must be left to further research.

(48) above is the proposed final narrow syntactic structure of *picker upper*. The derivation, taking into account late adjunction and phases induced by category defining heads is as follows.



The phonological output of the third phase must include two realizations of *-er* for the following reason: the linearization of *-er* includes the information that it must be realized as a suffix on the nearest head in its complement. In the above derivation the complement of *-er* is modified after it has already undergone one round of interpretation. At the interpretation of Phase 2, above, the nominalizing suffix is phonologically realized as a suffix to the string *pick*. Recall that this suffixation is purely phonological. Syntactically no movement occurs and the structure in Phase 2 is unmodified. Subsequently, the particle is merged a-cyclically and intervenes between the nominalizer and the verb root. This merger cannot affect the phonological output of the previous cycle (*picker*), but must add to it according to the LEC. If the particle is interpreted we get the output *picker up* - but in doing so masks the nominalizing morpheme. *-er* requires that it be a suffix on its complement, and this is no longer the case. It therefore must be realized again, giving the licit output *picker upper*. This derivation explains both the double phonological realization of the derivational morpheme, and its single semantic realization. The morpheme is only present once in the narrow syntax and it is a purely phonological and interpretive effect that causes it to be overtly realized twice.

If it were not for word internal interpretive cycles, or phases, and late adjunction of morphemes the above derivation would not be possible. The existence of semantically vacuous double affixation is expected and explained within the framework presented here.

#### 4.5.2 Diminutive Double Affixation

Double affixation also occurs

in diminutive constructions. The diminutive morpheme is proposed here to be an adjunct (following Bachrach and Wagner (2006))<sup>30</sup>. Double affixation is triggered by the late adjunction of a diminutive morpheme surfaces in both Breton and Yiddish. The similarity of these constructions, and the parallel of the diminutives with the particle verb constructions above, demonstrates that semantically vacuous double affixation is a cross-linguistic phenomenon.

##### 4.5.2.1 Breton

Breton double affixation comes in two forms, semantically non-vacuous, and semantically vacuous. This section first teases apart the relevant differences between the two. It is ultimately semantically vacuous double affixation that we are concerned with here.

Breton Nouns may be pluralized twice. If a Breton noun has a double plural, it is semantically distinct from the regular plural – in idiosyncratic ways. It is also often the case that the singular plural is irregular (rather than the regular plural affixes; *-ed*(animate) or *-où*(inanimate)).

- (50) a. bugel            ‘child’  
       b. bugal-e        ‘children’  
           child-PL  
       c. bugal-e-où    ‘several groups of children’  
           child-PL-PL
- (Stump 1989:271)

---

<sup>30</sup> Whether the adjunct status of the diminutive morpheme is universal or language specific is subject to further research.

(50c) is not the double affixation we are concerned with here. Each of these plurals is interpreted at both the PF and LF interfaces, and therefore the two overt elements are realizations of separate morphemes.

Unlike the double affixation seen in the previous example, the double affixation that concerns us here has no semantic effect. Breton diminutive nouns, when pluralized, surface with two overt plural markers, one on each side of the diminutive morpheme.

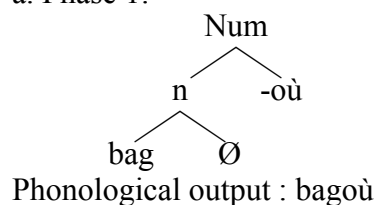
- |      |                                      |                |
|------|--------------------------------------|----------------|
| (51) | a. labous                            | ‘bird’         |
|      | b. labous-ig<br>bird-DIM             | ‘little bird’  |
|      | c. labous-ed<br>bird-PL              | ‘birds’        |
|      | d. labous-ed-ig-où<br>bird-PL-DIM-PL | ‘little birds’ |
|      | e. *labous-ig-où<br>bird-DIM-PL      |                |
|      | f. *labous-ed-ig<br>bird-PL-DIM      |                |
- 
- |      |                                   |                |
|------|-----------------------------------|----------------|
| (52) | a. bag                            | ‘boat’         |
|      | b. bag-ig<br>boat-DIM             | ‘little boat’  |
|      | c. bag-où<br>boat-PL              | ‘boats’        |
|      | d. bag-ou-ig-où<br>boat-PL-DIM-PL | ‘little boats’ |
|      | e. *bag-ig-où<br>boat-DIM-PL      |                |
|      | f. *bag-ou-ig<br>boat-PL-DIM      |                |

As we can see from the ungrammatical (52e,f) and (53e,f), these words have no singular plural. The meaning of these words, however, is what one would expect

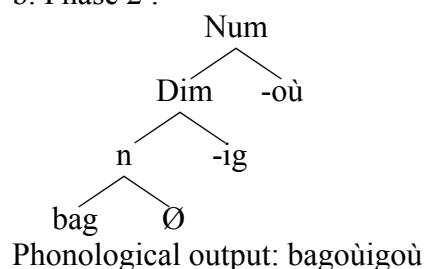
if the plural marker were only interpreted once. We do not see the idiomatic semantics of the double plural in (50). Therefore we have a different phenomenon from that in (50). These are two surface realizations of the same morpheme. If the plural morpheme were merged into the narrow syntax twice, it would have been interpreted at LF twice.

We can account for the above purely phonological doubling in the same way that we accounted for the doubling of the particle in the previous section. The diminutive, like the particle, does not project any category features and therefore may be merged a-cyclically. The plural projects number features, and is therefore a non-adjunct and must be merged cyclically.

(53) a. Phase 1:



b. Phase 2 :



The plural morpheme here doubles for exactly the same reason as did the nominalizing morpheme in (49). Linearization and dominance conspire to force the plural morpheme to spell out twice. Note that although the adjunct projects no features it can still condition allomorphy of the plural morpheme. This is not unexpected. We assume that allomorphy is triggered here by lexically specified classes of morphemes, as is plural (54) and tense morphology in English.



- (54) English Plural allomorphy
- |              |   |                  |
|--------------|---|------------------|
| -(r)en       | ↔ | child, ox        |
| vowel change | ↔ | mouse, tooth.... |
| ...          |   |                  |
| -s           | ↔ | elsewhere        |

**4.5.2.2 Yiddish** Yiddish (like Breton) diminutive nouns, when pluralized, surface with two overt plural markers, one on each side of the diminutive morpheme.<sup>31</sup> Yiddish has many ways of marking plural, two of which are *-im* for Hebrew masculine nouns, and *-er* for (some) German nouns. Plural is always *-ex* on diminutives, and the diminutive marker is *l*. (phonological processes cause the output to be *dl*. after *n*, *x* after *l*., and *le* after vowels. The ‘.’ indicates syllabicity).

- |      |                                    |                |               |
|------|------------------------------------|----------------|---------------|
| (55) | a. dorn.                           | ‘thorn’        |               |
|      | b. dern-er<br>thorn-PL             | ‘thorns’       |               |
|      | c. dern-dl.<br>thorn-DIM           | ‘little thorn’ |               |
|      | d. dern-er-l-ex<br>thorn-PL-DIM-PL | ‘little thorn’ | (Bochner:416) |
|      | e. *dern-er-l<br>thorn-PL-DIM      |                |               |
|      | f. *dern-dl.-ex<br>thorn-DIM-PL    |                |               |
| (56) | a. xet                             | ‘sin’          |               |
|      | b. xato-im<br>sin-PL               | ‘sins’         |               |

<sup>31</sup> Regular plural nouns are affixed with *-en*, and do not undergo this double affixation. The order of affixation in these cases is however diminutive-plural, which is consistent with the theory here - if we assume in these forms the diminutive suffix is not late adjoined. Why this would be so is the subject of future work.

- |       |           |              |
|-------|-----------|--------------|
| (iii) | oyer      | 'ear'        |
|       | oyer-n    | 'ear-pl'     |
|       | oyer-l-ex | 'ear-dim-pl' |

- |                                   |              |            |
|-----------------------------------|--------------|------------|
| c. xet-l.<br>sin-DIM              | ‘little sin’ |            |
| d. xato-im-l.-ex<br>sin-PL-DIM-PL | ‘little sin’ |            |
| e. *xato-im-l.<br>sin-PL-DIM      |              |            |
| f. *xet-l.-ex<br>sin-DIM-PL       |              | (ibid:415) |

Like the Breton examples, these diminutives must have a double plural, and the meaning of these words is what one would expect if the plural marker were only interpreted once. The derivations of the (d) examples above are identical syntactically to the Breton diminutives. Morpho-phonologically we see varying exponents of the plural morphemes. This is not a problem for the analysis here. Within a realizational morphological system allomorphy may be triggered by the morpho-phonological features of c-commanded nodes. Just as the comparative morpheme in English is sensitive to the phonological size and historical origin of the base to which it attaches, so is the Yiddish plural. That this base is altered between the two interpretations of the plural morpheme causes allomorphic variation.

#### 4.5.3 Summing Up Semantically Vacuous Double Affixation

The

double affixation phenomenon seen here serves as an example of a phonological reflex of the phase by phase interpretation of words in conjunction with late adjunction. Both of these are operative within words, and therefore offer further evidence that morphological domains operate on the same principles traditionally ascribed to the phrasal domain. Each instance of double affixation involves a

morpheme that does not project – an adjunct. It is proposed here that this cannot be accidental and that any instance of semantically vacuous double affixation is caused solely by the interaction of these adjuncts with the interpretive linguistic system.

**4.6 Conclusion**            The main goal of this chapter has been to offer additional evidence, through the discussion of structural paradoxes, for the thesis that syntactic and morphological domains are of the same type and are interpreted by means of identical narrow syntactic processes. Under the analysis laid out above, structural paradoxes are no longer paradoxical. There is no need at any one point in the derivation to posit two structural representations for these phenomena, but rather the phonological and semantic structures are defined separately, at the interfaces. The appearance of two necessary structures has been argued to be due to the cyclic nature of the syntactic derivational system, crucially joined with the theory that syntactic adjuncts may be late merged inside an already derived syntactic representation. This analysis holds that all bracketing paradoxes contain a morphological adjunct, and that no bracketing paradoxes will occur in constructions that do not involve adjunction.

## CHAPTER 5.

### CONCLUDING REMARKS

#### 5. Overarching conclusions

Phonological and syntactic derivations are argued in this dissertation to interact in ways that demonstrate first that phonological analyses must always take into account the syntactic structures and derivational histories of the forms in the attested outputs under study, and second that syntactic analyses must pay attention to phonological realizations, as these outputs can mirror crucial syntactic information. Main stress patterns, Hiatus Resolution strategies, Bracketing Paradoxes, and Phonological Doubling are all argued to have explanatorily adequate solutions only if a well-defined role of the syntax-phonology interface is acknowledged.

Focusing on word-internal phonological processes, the previous chapters converge on the following conclusions: (1) Phases target syntactic objects that are smaller than the phrase, (2) Phase-by-phase interpretation causes the construction of word-internal phonological domains (Prosodic Words), (3) Phonological operations may apply at (i) each stage of interpretation (at all phases), or (ii) the final stage of interpretation (post-syntactically), (4) Phonological interpretation does not affect the Narrow Syntax, and (5) Late Adjunction may target syntactic objects that are smaller than the phrase, resulting in phono-syntactic mismatches.

All of the above confirm and expand upon proposals elaborated in the recent research in linguistics that focuses on phenomena that arise at the interface

between syntax and phonology. All point towards the conclusion that syntax must inform phonological analyses, or rather, that many phonological solutions are incomplete without reference to the fact that phonology interprets syntactic structure. It must be kept in mind that there are conditions imposed at PF, and operations occurring in the narrow syntax, that cause mismatches between the syntax and the expected phonological output. Such facts do not imply that PF outputs are unprincipled or imperfect, but rather that the mapping operation is more complex than previously understood. A full account of the environments in which these mismatches occur, and the mechanisms used to derive them, must be formulated before we can determine whether the PF branch of the derivation is an optimal system.

### 5.1 Summary of arguments presented

Following Marantz (2001) and many others, phases (Chomsky 1999) are argued here to be operative word-internally. Each phase is instantiated as a PW through the mechanisms of interpretation operative on the PF branch. Phonological Words (PW) are not limited in size by the syntax, and may be overt instantiations of any syntactic structure that constitutes a phase, from little xPs (a root and category defining head) to CPs, as evidenced by the languages discussed in the previous chapters. Therefore multi-phasal words are necessarily (barring certain phonological repair strategies) composed of a nested PW structure, as in (1).

- (1) [PW.....[PW ]]

This phase-induced PW structure is shown to offer explanatory solutions to questions raised by the patterns of irregular stress assignment in Turkish and Cupeño (Ch. 2), and the multiple repair (and non-repair) strategies for hiatus resolution in Ojibwa (Ch. 3).

In Turkish and Cupeño, irregular stress patterns surface when words span one (or more) phase boundaries. In single-phase words main stress surfaces on the final syllable in Turkish, and on the initial syllable in Cupeño.

- (2) kitap-lik-lár  
book-case-PL  
'bookcases'

- (3) né-yax  
1sg + say  
'I say'

It is argued in Ch. 2 that main stress in these languages is computed at each phase, and therefore surfaces within the complement of the innermost phase in multi-phasal constructs.

- (4) [[kabá<sub>AP</sub>]-y<sub>VP</sub>]-di-lar<sub>CP</sub>  
rude-COP-past-3pl  
'They were rude'

- (5) a. [[wíchax<sub>VP</sub>]-ne-n-qal<sub>CP</sub>]  
throw-1sg-IN-imp.past.sg  
'I was throwing it'  
b. [pe-yax-qál<sub>CP</sub>]  
3.sg-see-imp.past.sg  
'S/he saw'

In (4) and (5a) main stress is assigned in the innermost, *vP*, phase. The important distinction between (5a) and (5b) is that while both contain the inherently stressed suffix *qál*, only in (5b) does this stress surface. Main stress is always assigned in the first phase sent to PF, and therefore stress shifts away from

stressed suffixes like *qál* when they are not interpreted in the first phase. The conclusion that can be drawn from the data above, and those like it, is that stress patterns that appear to be surface-irregular are in truth regular at the phase level.

Similarly, the Ojibwa data in Ch. 3 demonstrates that hiatus-resolution strategies are influenced by the phase-by-phase computation of syntactic structures that correspond to phonological domains that are smaller than the word. Hiatus that arises from the phonological interpretation of syntactic nodes that fall within a single phase is resolved by failing to spell-out one of the offending vowels.

- (6) [name:g<sub>numP</sub>]  
 name:-ag  
 sturgeon-PL  
 'sturgeons'

Hiatus that arises from the phonological interpretation of syntactic nodes that fall within separate phases remains unresolved. This indicates that hiatus resolution is only operative within a single phase.

- (7) [gi:-[a:gamose:<sub>vP</sub>]<sub>CP</sub>]  
 3SG-snowshoe.walk  
 's/he walked in snowshoes'

A third resolution strategy – epenthesis – is operative when two morphemes that undergo spell-out in separate phases are merged into a single PW through phonological cliticization. Here both vowels have undergone spell-out before merging into a single PW, and therefore the non-realization strategy operative in (6) is not possible.

- (8) [ni[nid-ini<sub>aP</sub>]-a:gamose:<sub>vP</sub>]<sub>CP</sub>]  
 1SG-there-snowshoe.walk  
 'I walk there in snowshoes'

These strategies demonstrate first that complex PW structures affect phonological phenomena in ways that are not easily explained without reference to cyclic interpretation, and second that epenthesis is the only truly phonological repair strategy employed in Ojibwa to avoid hiatus – apparent deletion (as in 6) is operative only at Vocabulary Insertion, and is therefore morphological in nature.

Ojibwa also offers evidence that other phonological processes may or may not be sensitive to phase boundaries. PW construction, as is argued to be the case for all languages, is bounded by the phase. That this is the case is apparent from the discussion of hiatus resolution, and also by the inability of foot construction to span a phase boundary in Ojibwa. Degenerate feet are only permitted at the right edge of a PW.

- (9)    [[(bo:)(ni)<sub>aP</sub>][(mnikwe)<sub>vP</sub>]<sub>vP</sub>]  
          quit-drinking  
          'he quit drinking'

In the above example, left-to-right iambic footing of the segmental string would give an output that does away with the medial degenerate foot. This footing cannot surface however, due to the fact that PWs are bounded by phases and therefore the feet that they dominate cannot span a phase boundary. Nonetheless, main stress assignment in Ojibwa is not bounded by the phase. The main stress algorithm of the language takes into account all feet in the dominant (outermost, or highest) PW, allowing for main stress to surface outside of the innermost PW, contra the patterns seen in Turkish and Cupeño.

- (10)   [[gí-[iʒà:<sub>vP</sub>]<sub>CP</sub>]]  
          here-go  
          'he went'



The main stress assignment and hiatus resolution patterns seen in Turkish, Cupeño, and Ojibwa all support the overarching conclusion of this dissertation; that syntax must inform phonological analyses. The phases that are at the root of the phonological phenomena seen here are mirrored in the syntactic structure. That this mirroring exists gives evidence that phonological cycles and domains are integrally dependant upon the narrow-syntactic computational system and the domains defined there. If we want to get our phonological analyses right, it is necessary to look beyond phonology.

Further evidence that phonological and syntactic analyses are inter-dependant is offered in Ch. 4. In this chapter the main tenet of Distributed Morphology (Halle and Marantz 1993), is further explored. That claim, that word-formation occurs in the syntax and is regulated by the same mechanisms that govern the computation of phrasal syntax, seems apparent if phases are operative at the sub-word level. What must also be true, I argue, is that if phases cause surface-apparent effects on the phonology of words, then other syntactic operations should also do so. Specifically, it is demonstrated that the operation of Late Adjunction (Lebeaux 1988, Stepanov 2001) can offer new insight into anomalous phono-syntactic mismatches.

Bracketing Paradoxes (11), Particle Verbs (12), and Double Affixation (13) are examined in Ch. 4. What these constructions have in common is that their surface phonological forms appear not to be predictable from their underlying syntactic/semantic structures.

- (11) Bracketing Paradox (English)
- a. Phonology: [un[happier]]  
Semantic gloss: \*not more happy
  - b. Semantics: [[unhappi]er]  
Semantic gloss: √ more unhappy
- (12) Particle Verb (German)
- a. Phonology: [herum[gerenne]]  
Semantic gloss: \*aimless act of running
  - b. Semantics: [ge[herumrenn]e]  
Semantic gloss: √ act of aimless running
- (13) Double Affixation (Breton)
- a. Phonology: bagouigou  
Semantic gloss: \*groups of little boats  
√ little boats

Importantly, it is argued here that what the above also share is the fact that one morpheme in each of these types of constructions is an adjunct. That morphemes may be adjuncts, and that adjuncts may be late adjoined offers a cohesive account of the above constructions. It is argued here that the types of phono-syntactic mismatches seen in (11-13) will surface only if an adjunct is present in the derivation.

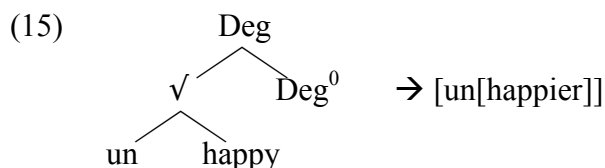
First, Bracketing Paradoxes such as *unhappier* are discussed, and it is argued that *un-*, among other prefixes, is an adjunct (following Nissenbaum 2000). This, along with the theory of word-internal phases, allows for a first cycle in which non-adjuncts are merged and then interpreted at PF.

- (14)
- $$\begin{array}{c}
 \text{Deg} \\
 \swarrow \quad \searrow \\
 \sqrt{\text{happy}} \quad \text{Deg}^0
 \end{array}$$

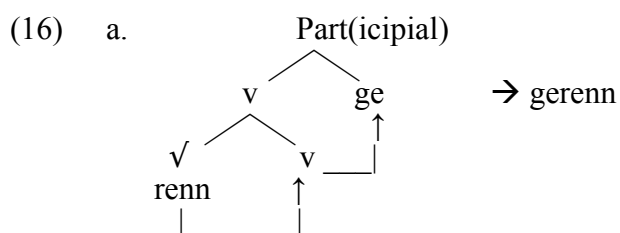
→ happier

After interpretation, the adjunct may be acyclically merged. As the adjunct is interpreted at PF separately from the structure into which it merges (Uriagereka

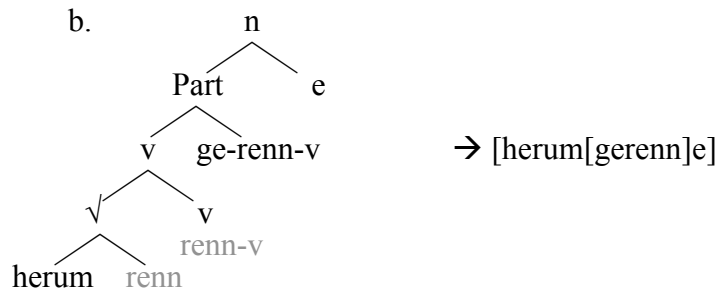
1999) this derivation leads to a paradox. First, the adjunct morpheme is phonologically separate from the base to which it attaches (as in 11a), and second, it is syntactically (and semantically) c-commanded by other morphemes within the word (as in 11b).



Particle Verbs are argued to have a similar derivation to Bracketing Paradoxes. Here the phono-syntactic mismatch derives from the fact that particles appear to be at times syntactically interior to the Particle Verb (12a), yet at other times are syntactically separable from the verb with which they combine. It is argued that in cases where the particle and verb are separated, the verb is merged with other non-adjuncts (inflectional affixes) which cause the verb to raise in the first phase of the derivation. In the second phase, the particle is late-adjoined to the initial merger site of the verb<sup>1</sup> – allowing it to be simultaneously syntactically interior to, yet phonologically separate from, the verb.



<sup>1</sup> The particle may be merged to Asp. See Ch. 4 for discussion.

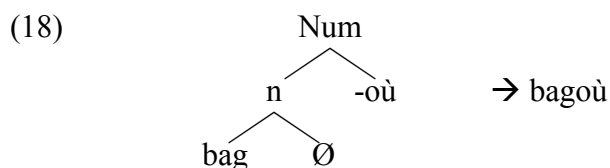


Lastly, it is argued that Double Affixation (13) will only occur when a morphological late adjunct intervenes syntactically between two affixes that have been interpreted on a previous phase. The Double Affixation discussed here is semantically vacuous; the affix is pronounced twice but interpreted only once at LF. This pattern is shown to occur in English(17a), Breton(17b), and Yiddish(17c).

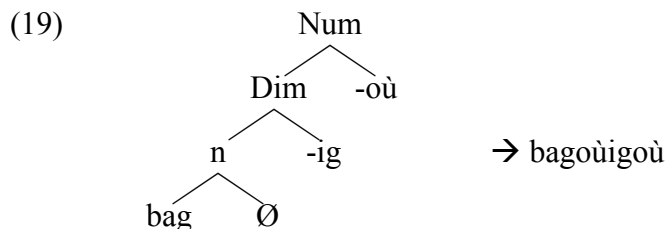
- (17) a. thrower upper 'one who throws up'  
           throw-n up-n  
       b. bag-ou-ig-ou 'little boats'  
           boat-PL-DIM-PL  
       c. dern-er-l-ex 'little thorn'  
           thorn-PL-DIM-PL

In each case the doubled affix is argued to surface on either side of an adjunct morpheme. It is the manner in which this adjunct morpheme is merged into the tree that causes the phonological doubling. Adjuncts, as noted, may be merged a-cyclically. This a-cyclic merger allows an adjunct morpheme to confound the mapping between the syntax and the phonology introducing a linearization problem upon interpretation.

In a first phase, the non-adjuncts are merged and interpreted at PF.



In the phase in which the adjunct is merged it intervenes syntactically between two previously interpreted morphemes.



At PF interpretation of the phase that includes the adjunct, the morpheme dominating the adjunct is simultaneously phonologically dominated by and syntactically dominating the adjunct. As the output of PF is persistent, this anomaly is rectified not by altering the output of the previous phase, but spelling out the non-adjunct morpheme a second time.

This repair strategy only occurs when morphological adjuncts are present, as in the case of Bracketing Paradoxes. That this is the case gives further support for the theory of late adjunction originally put forward in Lebeaux (1988). These type of data demonstrate that syntactic operations target sub-word level morphemes, giving extra credence to the proposal that words are created in the Narrow Syntax.

## 5.2 Implications and areas for future research

As I said above, this dissertation carries an important message for phonologists, and for linguists in general. Determining whether a phonological phenomenon is caused by its interaction with the syntactic component is a necessary part of phonological analysis. This being the case, if a comprehensive and explanatory account of this phenomenon is to be realized it will only be through careful

consideration of the interaction between the narrow syntactic derivation and the operations of the PF branch. As the data discussed here lead to the conclusion that syntax affects phonology in very specific ways, namely that phases in syntax at the sub-word level cause phonological patterns that would otherwise be unexpected, we can also conclude that the phonology can lead to new discoveries about the workings of the narrow syntactic derivation. This two-way interaction must be explored to its fullest.

In that vein I have suggested that phases may not have a uniform behaviour at PF. In Ch. 1 I argue that the evidence points toward an interpretive mechanism wherein phase heads may or may not be interpreted with their complements. This dual behaviour of syntactic phase heads is proposed to be due to whether these heads carry uninterpretable features (see also Chomsky 1999, Svenonius 2004). This leads, in general, to a divide between the more ‘functional’ phase heads –  $v^0$ ,  $C^0$ ,  $D^0$ - and their more ‘lexical’ peers –  $a^0$ ,  $v^0$ ,  $n^0$ . The former appear to be phonologically separate from their complements – indicating that they spell out in a separate phase (20) -, while the latter behave as though they are interpreted phonologically in the same phase as their complements (21).

(20) [[gid-ecek- $i_{vP}$ ]-ti- $m_{CP}$ ] → gidecéktim  
 go-fut-COP-past-1sg  
 ‘I will have gone’

(21) [name:- $ag_{numP}$ ] → name:g  
 ‘sturgeon-PL’  
 ‘sturgeons’

In (20) the head of  $vP$ , the copula  $-i$ , is outside of the domain in which main stress is assigned. This demonstrates that the  $vP$  phase head is not interpreted until the

CP phase is sent to PF. As stress is final within the phase in Turkish, we would expect stress to fall on the head of *vP* if it were interpreted with its complement. In (21) we see that the vowel in the suffix is deleted after a root-final vowel. It is argued in Ch. 2 that hiatus is resolved by deletion only when two vowels are interpreted within the same phase. It is also argued that NumP is a phase in the language. As the affix is the overt realization of the head of NumP, (21) is evidence that the phase head is interpreted with its complement. An attempt has been made in Ch.1 to distinguish the two behaviours of phase heads, but their exact properties still need further examination. When the properties that determine which morphemes are spelled out within each phase are fully understood we can then make stronger predictions about phonological domains.

In the same vein, there are some anomalous affixes in Turkish to be accounted for that are arguably not phase-heads, but they do not undergo interpretation in the same domain as their complements. In Ch. 2 I accounted for the behaviour of all of the pre-stressing morphemes listed in (22), except for the two in bold.

- (22) Turkish pre-stressing verbal inflectional morphemes
- a. –Dir epistemic copula
  - b. –y copular clitic (full form: *i*)
  - c. –dA clausal coordinator
  - d. –(y)ken ‘when-adverbial complementizer’
  - e. –mI yes/no question marker**
  - f. –mA negative**

Neither the yes/no question marker *-mI* nor the negative morpheme *-mA* are unquestionably heads of *vP* or CP, yet stress on the verbal word invariably

falls to their left. I do not assume the yes/no question marker to be in C, as it may surface between the participle and the copula, while the C affixes discussed in Chapter 2, Section 2.3.6 only appear c-commanding TP. I propose a brief but, I believe, correct beginning to an analysis of the relevant facts below, following the analysis in Kornfilt (1996).

The yes/no question marker *-mI* may surface in two verbal positions, at the left edge of AspP in (23a), or TP (23b). It may also affix to an adjective (23c), or a noun (23d).

- (23) a. gid-ecék-Ø-**mi**-siniz  
       go-fut.-cop-Q-2pl.  
       ‘Will you go?’ (Kornfilt 1996)
- b. gel-di-níz-**mi**  
       come-past-2pl-Q  
       ‘Did you come?’ (Kabak and Vogel 2001: 317)
- c. hastá-Ø-**mi**-siniz  
       sick-cop-Q-2pl.  
       ‘Are you sick?’
- d. adám-Ø-**mi**  
       man-cop-Q  
       ‘a man?’

What is apparent here is that the question marker is parasitic on domains that would be treated as independent stress domains regardless of whether *-mI* is present. In other words, *-mI* is affixed at the right edge of a phase. Kornfilt argues that this morpheme cliticizes to the smallest domain available. This domain in (23a) is the complement of a null copula (AspP), the domain of (23b) is TP. In (23a) *-mI* cannot affix outside the agreement morpheme at TP, as the smaller copular domain is available. In (23b) the verb has raised to TP, and therefore the smallest spellout domain is TP. In (23c) a null copula must be present to mediate



the agreement affixation on the adjective, and the same is the case in (23d) on the noun. The question marker, therefore, seems to behave as a true clitic, with its distribution dependent on a phonological rather than a syntactic domain. To discuss how exactly this is accomplished by the derivational system is left for future research.

Turning to the negative morpheme *-mA*, we see that it attaches to an even lower domain than the one imposed by the *vP* copula. It can attach to the verbal root (24a), to the passive morpheme (24b), to a verbalizing derivational morpheme (24c) or to the low abilitative affix *-(y)abil* (24d).

- (24) a. *gít-me-yeceğ-im*  
           go-NEG-fut.-1sg  
           ‘I will not go’  
       b. *at-ıl-ma-di-lar*  
           throw-pass-NEG-past-3pl  
           ‘They were not thrown away’  
       c. *kara-lá-ma-di-niz*  
           black-vbl-NEG-past-2pl  
           ‘You didn’t blacken it’ (Kabak and Vogel 2001)  
       d. *oku-yá-ma-yabil-ir-im*  
           read-abil-NEG-abil-aor-1sg  
           ‘I might be unable to read.’ (Cinque 2001: 48)

The low abilitative is followed by the aorist affix *-ir*, which is considered to be part of the participial morphology. As *-ir* dominates *-mA* we can see that the negative morpheme may attach within the participial domain..

When the entire participial domain is negated, the negative copula *değil* is used. As *değil* heads a *vP* projection, I will propose that *-mA* does as well. If we assume that the complement of NEG does not raise, then the phonological independence of the pre-negative domain follows the from a phase-based

analysis. As negation blocks movement in many languages cross-linguistically, this assumption is not unwarranted. As a  $vP$ , NEG will send its complement to PF and LF. NEG will therefore be the first affix dominating a spellout domain. This proposal is preliminary, and needs more rigorous semantic and syntactic investigation, but seems to me to point to the direction to take here.

Also examined in this dissertation, in Ch. 4, is the behaviour of morphological adjuncts. I believe the definitions and predictions given allow us to make strong predictions that need further testing. Phono-syntactic mismatches are predicted to occur only as the outputs of structures that include adjuncts. As outlined above, I have examined only three constructions that bear out this prediction. As the inventory of morphological adjuncts is expanded cross-linguistically it is predicted that we will encounter more of these paradoxical constructions and that they will be readily explained by late adjunction.

This also entails that, as noted by Cinque (1993), we need to have a full understanding of the syntax of a language before we are able to account for the phonological structures derived from it. Not only do we need to examine the behaviour and properties of phase heads, we must also be aware of the implications of the phono-syntactic mismatches in Ch.4 for syntactic theory in general. I have offered evidence in Ch. 4 that supports a proposal put forth in Nissenbaum 2000 – namely that phase-by-phase computation does not in any way affect the syntactic structure that undergoes interpretation. As PF interpretation does not erase, or ‘flatten’, syntactic structure, it is predicted that the only bar for further syntactic operations inside a previously interpreted phase must be purely

syntactic. As Double Affixation shows, the phonology has the ability to ‘fix’ the output of syntactically altered phases.

The work on stress and hiatus in Chs. 2 and 3 also indicate paths for future work. Word-internal phases create phonological domains that can potentially affect all phonological phenomena. An area of inquiry that appears to easily lend itself to analyses like the one here includes spreading phenomena such as harmony and disharmony. Pensalfini (2002) gives evidence that vowel harmony (VH) in Jingulu is restricted to the first phase of interpretation. He argues, for example, that VH in the nominal system is restricted to roots and their category-defining heads. [+high] harmony is triggered on the root only by phase heads (25a,b). If a suffix that is outside of this first phase carries [+high] features it will not harmonize with the root, even if it is phonologically adjacent (25c).

- (25) a. bardarda-Ø → bardarda  
           younger sibling-n.masc.  
           ‘younger brother’  
       b. bardarda-rni → birdirdirni  
           younger sibling-n.fem.  
           ‘younger sister’  
       c. bardarda-Ø-rni → bardardarni  
           younger sibling-n.masc.-ERG

The data in (25) give evidence for VH being restricted to the same domains as is hiatus resolution by deletion in Ojibwa. Additionally, it gives further support to the proposal that little xP heads are spelled out with their complements.

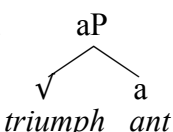
Another possible direction for further research on stress within the theory presented in this work would be a reanalysis of English stress. English main stress does not fall uniformly within the first phase of interpretation. Its assignment must therefore be insensitive to the phase (according to the proposals put forth

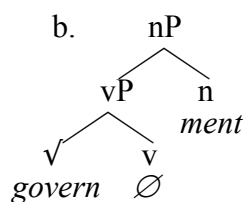
here). This entails that, contra the standard analyses, English main stress assignment is non-cyclic.

Consider the distinction between English Level 1 vs. Level 2 morphology. Level 1 morphemes always behave as if they are part of the same cyclic domain (PW) as the base to which they attach (26a), while level 2 affixes do not (26b).

- (26) a. *tríumph* vs. *triúmphant*  
 b. *góvern* vs. *góvernment*  
 c. *góvernment* vs. *gòvernmental*

Assuming that it is universally true that the PW (and therefore the foot) does not cross a phase boundary, it is obvious that the affix *ant* in (26a) is included in the same PW as is *tríumph*, as it bleeds Peripherality Condition – allowing the final syllable of the (nominal) root to lose its status as extrametrical, as does *–al* in (26c). What is especially interesting here is that main stress in (26c) surfaces in a phonological domain that is obviously not a member of the most embedded phonological domain. This leads us to the conclusion that English main prominence, like in Ojibwa, is assigned post-cyclically. The phonological and syntactic structures in (26a) and (26b) mirror each other in a perfect way. Consider the structures below:

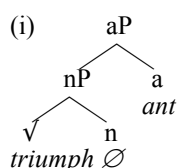
- (27) a. 



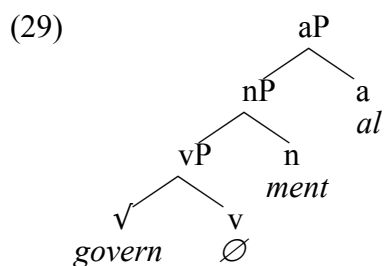
- (28) a. [ (tri)(úmph)<ant><sub>aP</sub>]  
 b. [[ (góvern)<sub>vP</sub>] <ment><sub>nP</sub>]

The above structures incorporate the proposal in Marantz (2001) that Level 1 affixes are those that may merge either directly with roots, or to category-defining heads, while Level 2 affixes are those which only merge with category-defining heads.<sup>2</sup> Pursuant to the discussion in Chapter 1 (27a) will result in the phonological interpretation of both the root and the category-defining head at the aP phase (28a). We therefore expect that all elements within the phase must be footed and may impact upon prominence placement within the word, as is the case. In (27b) we predict two domains of interpretation, at the vP and nP phases (28b). This is just what we see phonologically. The PW projected at the vP phase is not affected by the phonological material in the second phase – as this material projects its own PW. At this point, these examples do not lead us to the conclusion that English prominence assignment must be post-cyclic, as in each case prominence is marked on an element within the most embedded phase.

<sup>2</sup> This entails that the structure of (24a) may also be as in (i). It will become clear that it is impossible to distinguish between these two structures due to the incorporating nature of Level 1 affixes. As the phonological output does not coincide with the structure in (i) – which is similar to (24b), and therefore predicts two phases of interpretation, the simpler of the two structures (24a) is adopted here. The question of why some level 1 affixes seem to only merge with roots will not be addressed.



Turning to (26c), we run into an obvious imperfection. We have a structure (29) that includes three category-defining heads, and therefore predict three phase domains to be reflected in the phonology. This does not hold true of the surface phonology, as the morpheme *al* has the same effect on its base whether it is simple or complex. In addition, prominence surfaces on an element that does not lie within the most embedded phase/PW (30a).

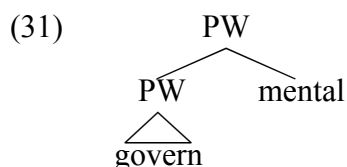


(30) a. [<sub>vP</sub>(gòvern)][<sub>nP/aP</sub>(mént)<al>]

b. \*<sub>vP</sub>(góvern)][<sub>nP</sub>(ment)][<sub>aP</sub><al>]

In keeping with the Ojibwa data, we must therefore assume that Level 1 affixes in English undergo PW incorporation. Obviously this cannot be related to their phonological size, as is the case for PW incorporating affixes in Ojibwa, as some Level 1 affixes are the same phonological size as independent words (i.e. *-ity*, *city*) and therefore have no phonological motivation to cliticize. We must therefore assume that this is a lexically specified property of these particular affixes.<sup>3</sup> Note that in (30a) main prominence is not assigned to an element within the most embedded phase. We must therefore conclude that the phonological structure of English multi-phasal words is as in (31), and that main stress is assigned post-cyclically, within the highest PW.

<sup>3</sup> Notably, all Level 1 affixes in English are vowel-initial. Whether this has any impact on their phonological behaviour is not pursued here.



The problem with this account of English stress, as stated above, is that stress/prominence assignment has been proposed to occur on every cycle/phase (Halle and Vergnaud 1987). This cyclic stress assignment offers an explanation for why some vowels to which stress has been assigned on an initial phase behave differently from vowels that were never in a position to receive stress. This cyclic stress assignment has been famously used to account for the distinction between the words in (32).

- (32) a. *compensátion*  
 b. *condeensátion* (Chomsky and Halle 1968)

In (32a) there is one phase, as *-ation* merges directly with the root *compense*. This must be the case as *compense* is not an independent word in English. In (32b), however, *-ation* merges with the previous phase *condense*, which is an independent word in the language. This distinction is phonologically marked by the distinction in vowel quality in the second syllable in the two examples. In (32a) the second vowel is not stressed, and therefore reduces. In (32b) the second vowel is also unstressed, but does not reduce. This is proposed to be due to the fact that main stress is assigned to the second vowel of *condense* upon projection of a PW in the first phase.

The problem with this account in relation to my predictions is that if main stress is assigned upon initial projection of a PW then I predict main stress to always fall within the domain of the PW projected in the first phase, for the same

reasons it does in Turkish. This is not the case in English, and therefore I claim that stress assignment cannot be cyclic in English. What this does not entail is that PW projection is not cyclic in English, as it must be under the assumptions here. What the source of the non-reduction of the vowel in (32b) must therefore be is PW projection rather than stress assignment. As I have argued, prominence/stress assignment cannot be equated with projection of prosodic structure within the PW. The initial phase of *condensation* must therefore mark heads of feet, but not prominence.

- (33)    (    x)            prosodic word  
           (x   x)            foot structure  
           condense

Here we can assume that it is marking the second syllable as the head of the PW that prevents reduction of the vowel. In the following phase refooting occurs due to the incorporation of the Level 1 affix *-ation*, but the previous head-marking of the second syllable prevents its vowel from reducing. If all effects of cyclic stress assignment can be reformulated in this manner, then we can reconcile the cyclic effects on vowel reduction in English with the fact that stress assignment must be post-cyclic. We therefore have no mismatch between the prediction that a phonological representation that includes main stress assignment to a vowel outside of the most embedded phase must indicate post-cyclic stress assignment, and the fact that the cycle can have an impact on the phonological realization of words within these languages.

Furthermore, the proposal in Ch. 4 that bracketing paradoxes will arise only if an adjunct is present can be expanded to the phrasal level. One source of



the view that phrasal phonological structure does not mirror syntactic structure stems from examples like the following, originally introduced in the Sound Pattern of English (Chomsky and Halle 1968:372).

(34) The cat that caught the rat that stole the cheese

Prosodic phrasing of the above DP (35) does not appear to match the syntactic constituency (36) of the structure.

(35) (the cat) (that caught the rat) (that stole the cheese)

(36) [the cat that caught [the rat that stole [the cheese]]]

The problem here is resolved by noting that the syntactic structure of the DP in (35) is not that in (36). This DP is headed by the noun *cat* and contains two modifiers, as follows.

(37) [the cat [that caught the rat [that stole the cheese]]]

Following Cinque (1993) and Uriagereka (1999), and Wagner (2006), I propose that these adjuncts are interpreted by the phonological system separately from and prior to their merger into the syntactic structure in (37). This being the case, prominence is determined in the constituent *that stole the cheese* prior to its merger with the noun it modifies, *rat*. Also, *that caught the rat* is assigned prominence before merger with *cat*. In this derivation the syntactic and phonological domains are perfect mirrors of one another.

In conclusion, the data and analyses in this dissertation give insight into the syntax-phonology interface, a sub-field of linguistic analysis that, although growing, is still in its infancy. More work is needed to pin down the exact mechanisms operative at the syntax-phonology interface, and the investigations in

this work attempt to bring us closer to that goal. I hope that the conclusions drawn from these investigations are relevant for all linguists, as compartmentalized linguistic study should be suspect. It is imperative that we are constantly on the lookout for data that betray cross-domain interactions.

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