A Post-Spell-out Explanation of Variation in Reduplication*

Tobin R. Skinner
McGill University

ABSTRACT

In this paper, I present a uniform analysis of several cross-linguistic cases of variable outputs in reduplication, focusing primarily on apparent cases of free variation in reduplicated forms of Tagalog and Ndebele verbs. I claim that the reduplicant in these languages is a Lowering morpheme, and I posit a revised theory of post-syntactic Lowering in which multiple levels within a complex head may be targeted as landing sites for a lowering head (cf. Embick and Noyer 2001). This potential variation in post-syntactic hierarchical structure gives rise to the observed surface variations, when combined with a prosodic template model of reduplication (Marantz 1982) and a cyclic view of Vocabulary Insertion under Distributed Morphology (Halle and Marantz 1993). Furthermore, I illustrate in detail how both syntactic limitations and phonological output constraints (i.e. Optimality Theory, Prince and Smolensky 2004) work together to preclude ungrammatical constructions. In addition, I investigate the interaction of narrow syntactic phase constraints and post-syntactic transformations.

1. INTRODUCTION

1.1 MORPHOLOGICAL VARIATION – A BRIEF OVERVIEW

In some languages, certain reduplicative operations may produce several distinct overt realizations, all of which are produced in free variation by native speakers, and carry no semantically intelligible differences. One such example is Tagalog aspectual reduplication, where the position of the reduplicant may fluctuate within the verb. In the following cases, reduplication in Tagalog indicates that the entire event is not yet complete (from Rackowski 1999; **boldface** and brackets '[]'indicate the reduplicative aspectual morpheme):

*Thanks to Joey Sabbagh and Raph Mercado for their help with the Tagalog data and our many, many discussions on the topic. Special thanks to my supervisors, Glyne Piggott and Lisa Travis, for their advice, support, and, above all, patience during the writing of this paper.

(1) a. *Base form*
ma-ʔi-pa-bili
ABL-TM-CAUS-buy
'be able to have (s.o.) buy'

b. *Reduplicated outputs*
ma-ʔi-pa-[**bii**]-bili
ma-ʔi-[**paa**]-pa-bili
'will be able to have (s.o.) buy'

In (1), either the verb root *bili* or the causative morpheme *pa-* may be targeted for reduplication.[1]

A similar example is the case of reduplication in the Bantu-language Ndebele. Here, a phonologically small root allows for the optional copying of affixes into the reduplicant (data from Sibanda 2004):[2]

(2) a. *Base form*
zw-is-a
taste-CAUS-FV
'cause to taste'

b. *Reduplicated outputs*
[**zwisa**]-zw-is-a
[**zwayi**]-zw-is-a
'cause to taste a bit'

In (2), the causative suffix *–is* may be optionally copied into the reduplicant; when it is not, the reduplicant instead meets its disyllabicity requirement via epenthesis of both *–a* and *–yi*. Both forms in (2b) are freely generated by Ndebele speakers.

In this paper, I propose that the alternations we observe in these patterns of reduplication are the result of a post-syntactic Lowering operation in which a simplex head may choose from among various hierarchical positions when lowering into a complex head. In the cases above, the reduplicative morpheme is base-generated outside of vP and lowers post-syntactically into the complex verb head, freely targeting a number of different positions within that head. I begin with an overview of some current assumptions regarding post-syntactic transformations.

1.2 POST-SYNTACTIC MOVEMENT

In studying the mapping from hierarchical syntactic structure to linearized phonological representations, we have identified a relative handful of exceptional cases whose surface ordering cannot be accounted for via the normal transformational mechanisms of syntactic

[1] See Section 2.1.1 for the status of the ability marker *ma-* and the topic marker *ʔi-* in reduplication.

[2] I assume final vowel (FV) *–a* and *–yi* to be epenthetic segments that are added after reduplicative copying takes place. See Section 2.1.2.

derivation (e.g. upward head and phrasal movement). Though tokens of some of these phenomena may be pervasive in a given language, such as affix-hopping in English (see below), the cross-linguistic distribution of such exceptions is far from widespread, with only comparatively few apparent contra-syntactic operations having been observed. A canonical example of such an operation is T(ense)-lowering in English:

(3) *English*
a. John often eats cabbage.
b. * John eats often cabbage.

(4) *French*
a. * Jean souvent mange du chou.
Jean often eat.3S.PRES DET cabbage
b. Jean mange souvent du chou.
Jean eat.3S.PRES often DET cabbage

Assuming that the vP-adjunct *often/souvent* does not undergo movement, the relative ordering of the verb and the adjunct in (3) and (4) shows that V in French raises over the adjunct and out of vP, whereas in English V does not move out of vP (Pollock 1989). Importantly, the third person present tense morpheme *–s* appears as a suffix on the English verb, suggesting that T has lowered into vP to adjoin to the verb. If this downward movement were to occur in the narrow syntactic derivation,[3] it would violate general notions of syntactic well-formedness; namely, T would move to a position from which not only does it not c-command its trace, but it is also c-commanded by its trace, creating an untenable situation that would eventually cause the derivation to crash. Taking these facts into consideration, it has long been assumed that lowering operations such as this take place post-syntactically in the PF component of language, and thus are not subject to the same evaluation metrics as the narrow syntax (Chomsky 1957).[4]

The advent of Distributed Morphology (Halle & Marantz 1993) has sparked a great deal of investigation into post-syntactic transformational operations, leading theoreticians to more formally articulate the potential of movements after syntactic Spell-out, as well as their limitations. Two central claims of Distributed Morphology (DM) are the following: 1) all morphological processes occur syntactically or post-syntactically, i.e. there is no morphologically generative pre-syntactic Lexicon; and 2) the post-syntactic operation of Vocabulary Insertion (VI) maps phonological features onto morphosyntactic feature bundles, in the process converting a syntactic hierarchy into a linearized string of phonologically contentful morphemes. Crucially, the feature bundles manipulated in the narrow syntax,

[3] As is common practice, I use "narrow syntax" to refer to pre-Spell-out structural derivations. As we will see, certain post-Spell-out operations are sensitive to syntactic hierarchy, though they do not occur in the narrow syntax.

[4] Lexicalist approaches to morphology (Chomsky 1981, DiSciullo and Williams 1987**)** in which all morphological derivations take place pre-syntactically in the Lexicon (e.g. *eats* enters into the syntax already inflected for tense and agreement) need not assume a lowering analysis of these phenomena. Fully addressing the Lexicalist v. non-Lexicalist debate is outside the scope of the current project, but, over the course of this paper, we will see evidence to support the non-Lexicalist approach.

which are stored in the mental Encyclopedia, are devoid of any phonological features until the morphological process of VI (*Late Insertion*, Halle and Marantz 1993).

Embick & Noyer (2001) propose that there are two possible post-syntactic movement operations, one occurring before VI and one occurring after:

(5) *Lowering*
A head X^o may be lowered to the head of its complement Y^o before Vocabulary Insertion.
$[_{XP}\ X^o \ldots [_{YP} \ldots Y^o \ldots]] \rightarrow [_{XP} \ldots [_{YP} \ldots [_{Y^o}\ Y^o + X^o] \ldots]]$

(6) *Local Dislocation*
After Vocabulary Insertion, an element may only adjoin to a string-adjacent element ('*' indicates a relationship of linear precedence and adjacency).[5]
[X * Y * Z] → [Y+X * Z]
[X * Y * Z] !→ [Y * Z+X]

Since Lowering occurs before VI, it is sensitive to hierarchical syntactic structure, whereas Local Dislocation, which takes place after VI, is sensitive only to string adjacency in a linearized array of morphemes. Moreover, since Local Dislocation occurs after VI, it is potentially susceptible to restrictions imposed by prosodic conditions on phonological strings. For example, Embick & Noyer (2001) claim that the pattern of the superlative morpheme *–est* in English may be explained by Local Dislocation. We observe that English superlative *–est* may only attach to a stem with two or fewer syllables:

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

As Abney (1987) argues, *–est* is base-generated in a position from which it c-commands the adjective and takes semantic scope. Since suffixation of *–est* is sensitive to the prosodic shape of the adjective, it must be the case that the adjective has undergone VI before *-est* is evaluated for Local Dislocation. Therefore, it is subject to an operation of Local Dislocation in which the underlying order [X * Y] is converted to [Y+X] after VI, where Y is a phonologically contentful adjective with two or fewer syllables. Thus, unlike Lowering, which only takes syntactic categories and features into consideration, Local Dislocation is *vocabulary sensitive*, taking into account certain post-VI phonological properties.

As we saw in (3a), Lowering may skip intermediate adjuncts, as it is sensitive only to head-complement hierarchical structure (Bobaljik 1994). However, since Local Dislocation operates on a linearized array of morphemes, adjuncts are opaque for this type of transformation:

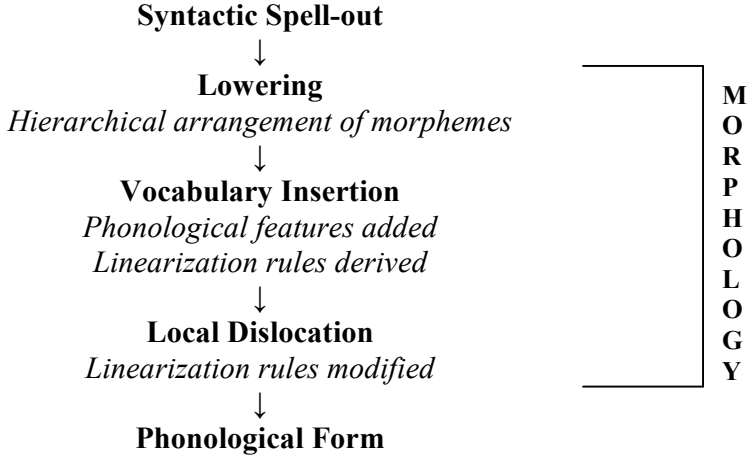
[5] We use the notation "Y+X" to indicate that the element X has adjoined to the element Y. See below for an explanation of the nature of these elements.

(8) a. Cheating is the huge-st error a student can make.
b. Cheating is the mo-st vastly huge error a student can make.
c. *Cheating is the vastly huge-st error a student can make.
d. ?*Cheating is the vastli-est huge error a student can make.

The modifier of *huge* blocks Local Dislocation of the superlative morpheme, since it has been linearized between this morpheme and the adjective. Example (8c) shows that *–est* may not move over both *vastly* and *huge*. Furthermore, the ungrammaticality of (8d) proves that, even though *vastly* meets the prosodic conditions on Local Dislocation of *–est*, the superlative morpheme may not adjoin to it (compare *the costli-est error*, in which *costly* has a similar prosodic shape to *vastly*). This can only be due to the fact that morphological category information is still visible after VI. That is, since *vastly* is an adverb, rather than an adjective, it may not be a target of Local Dislocation with the superlative morpheme. Therefore, we conclude that VI creates a string of phonologically contentful words that retain (at least some of) their syntactic category information, but lack any complex internal hierarchical organization. I will return to this fact in later discussions.

In this way, it is shown that operations on the PF branch consist of an ordered set of computations that take as their input the previously derived syntactic structure, giving that structure a form such that it will be interpretable by the phonological component of language (Embick 2006). I illustrate this order of operations as follows (adapted from Embick & Noyer 2001):

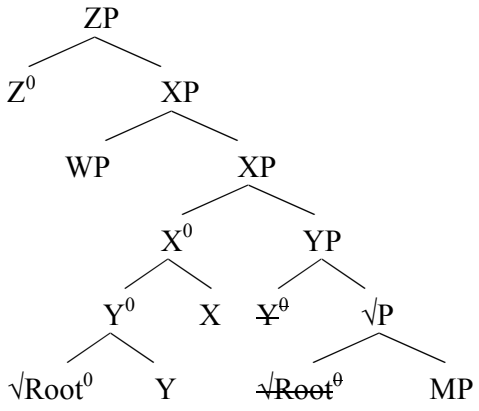
(9) *Post-syntactic operations*



Given the definitions of morphological PF processes under this model, post-syntactic transformations are limited in their effects on the original syntactic representation; Lowering may only involve downward head-to-head movement, and Local Dislocation may only invert two linearly adjacent objects.

Embick & Noyer (2001) and Embick (2006) propose even further limitations on what may be targeted in these PF operations. Consider the following hypothetical syntactic structure as an input to morphology (~~strikethrough~~ shows a trace of a moved element):[6,7]

(10)



According to Embick & Noyer (2001), there are only two ontological classes of objects present in such a structure that enter into the computation of morphological transformations:

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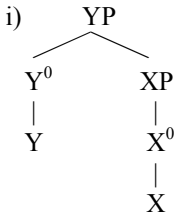
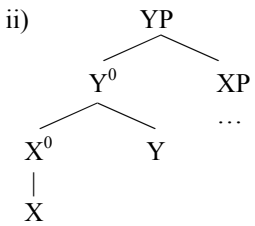
[6] X^0 represents any head projection of category X that is not immediately dominated by another head projection of category X (Chomsky 1995) **or** is non-terminal. However, note that it may be possible to streamline this definition simply to "any non-terminal head projection" if we assume that features of a head project a non-branching category projection as follows:

i)



Head-movement of X^0 to Y^0 would produce the following structure, in which X^0 is merged directly under Y^0:

ii)



However, I leave investigation into this model of head-projection for future research.

[7] As I am dealing strictly with the formation of complex words, I use $\sqrt{Root}^0$ to indicate the most deeply embedded morphosyntactic object.

(11) a. M(orphological)-Word: a (potentially complex) head not dominated by further head-projection (e.g. Z^0 and X^0 above).

b. Subword: a terminal node within an M-Word (e.g. X, Y, and $\sqrt{Root}^0$ above).

Additionally, M-Words may only undergo Lowering or Local Dislocation to other M-Words, and Subwords may likewise only do so to other Subwords.[8] For example, under this view, if the M-Word Z^0 were to lower, its only available target for head-adjunction would be the M-Word X^0, as is the case of T-lowering in English (where $Z^0 = T^0$ and X^0 = complex v^0 containing v and V). Similarly, if the Subword $\sqrt{Root}^0$ were to undergo Local Dislocation, it could only do so with the terminal Y. I merely introduce these concepts here, as more concrete implementations of this system will be addressed later.

1.3 A PROBLEM FOR M-WORDS AND SUBWORDS IN REDUPLICATIVE VARIATION

A crucial prediction of this model, and one that is acknowledged by Embick & Noyer (2001), is that intermediate projections like Y^0 in (10) have no ontological status for any PF transformation process. Because of this, interpolation of an M-Word into another M-Word is expected to be impossible (Embick 2006).[9] However, I claim that several cases of morphological variation, chief among them the variations in reduplication of complex verbs seen in Section 1.1, provide evidence that these intermediate levels of a complex head have a status as ontological objects for morphological processes. I argue that a Lowering M-Word morpheme, when targeting a complex head, may target any X^0 of that complex head, not simply the head that corresponds to the definition of M-Word above. In relation to (10) above, I will show that morphological variation in the reduplicative patterns in question supports the idea that a Lowering morpheme in the position of Z^0 may freely adjoin to X^0, Y^0, or $\sqrt{Root}^0$ of the complex head, thus deriving a case in which Z^0 is interpolated between terminals of another M-Word, namely X^0.[10] However, I will also show that the ontological status of these intermediate projections only holds for cases of Lowering; once linearization occurs as a result of VI, these intermediate projections are lost, as is all hierarchical information, and so may not be targeted for Local Dislocation operations.

In the remainder of this paper, I present more data to support this theory, showing not only that this view of Lowering strengthens the model in (9) without making incorrect predictions, but also that this view of morphological variation as a result of post-syntactic transformations provides a much more economical theory than previous analyses of these alternations. I also claim that this model accounts for several more cases of morphological variation in reduplication. Additionally, I will take a closer look at the impetus for Lowering, examining the interactions between Lowering morphemes and linearization domains/phases (Fox & Pesetsky 2005). It will be shown that the domain of variation in these reduplication patterns is limited to what is standardly assumed to be the syntactic phase (e.g. vP). I will

[8] We should also note that Subwords may not interact with other Subwords that are contained in a separate M-Word.

[9] See Section 3 for an example from Latin *que* that supports the impossibility of interpolation under Local Dislocation.

[10] Note that I do not claim that M-Words may target Subwords during PF transformations. We will maintain this distinction, and disallow any operations that involve both classes of elements.

ultimately explore the possibility that post-syntactic Lowering occurs as a last resort mechanism where subsequent syntactic Raising is either prohibited or unable to satisfy the features of an attracting head, due to the effects of VI/linearization on morphologically complex words during Spell-out of a syntactic phase. I claim that linearization of a complex head at Spell-out creates a syntactic object that only retains the topmost category feature of that complex head, thus nullifying any more deeply embedded syntactic category features, disallowing those features from participating in any subsequent feature-checking operations. Thus, a c-commanding head with such an uninterpretable feature must lower into a complex head before that complex head undergoes linearization, if possible, as a last resort to satisfy its feature-checking requirements. By doing this, we will move one step closer to a more parsimonious theory of the interface effects of syntactic Spell-out and morphological transformations.

2. MORPHOLOGICAL VARIATION – A CLOSER LOOK

2.1 VARIATION IN REDUPLICATION

In the following two subsections, the patterns of reduplicative variation in Tagalog and Ndebele will be briefly examine, illustrating how in each language verbal reduplication appears to target morphosyntactic objects, rather than just phonological strings.

2.1.1 TAGALOG (AUSTRONESIAN)

The data in (12) show that the contemplated (i.e. incomplete) reduplicative morpheme in Tagalog may target a number of different positions within a complex verb, with a few exceptions. It is important to note that these variations derive no semantic effects (Rackowski 1999), and that native Tagalog speakers may freely generate any of the grammatical forms (data from Raph Mercado, p.c.).

(12) a. *Base form*
ma-ka-pag-pa-hintay
ABILITY-COMPLETE-TRANS-CAUSE-wait
'be able to cause someone to wait'

b. *Possible reduplicative outputs*
* [**maa]-**ma-ka-pag-pa-hintay
ma-[**kaa]-**ka-pag-pa-hintay
ma-ka-[**paa]-**pag-pa-hintay
ma-ka-pag-[**paa]-**pa-hintay
ma-ka-pag-pa-[**hii]-**hintay
* ma-ka-pag-pa-hin-[**taa**]-tay

'will be able to cause someone to wait'

The position of the reduplicative morpheme is clearly constrained by morphosyntactic structural considerations; that is, the reduplicant does not simply target syllables or other prosodic units irrespective of their morphological characteristics. Crucially, the modal prefix *ma-* may not be a target of reduplication. The following example suggests that the *ma-* prefix

is unable to be targeted for reduplication above due to categorial or structural reasons, rather than some sort of phonological linear edge prohibition on Tagalog reduplication (from Rackowski 1999, her (9)):

(13) a. pag-lagy-an
TRANS-place-LOC

b. pag-[**laa**]-lagy-an
[**paa**]-pag-lagy-an
'will place'

Note that the reduplicant may appear at the left edge; thus, the unavailability of *ma-* for reduplication in (12b) cannot be attributed to a constraint on the phonological position of the reduplicant.

Other prefixal morphemes in Tagalog are also unavailable for reduplication. For example, the topic marker *ʔi-* in the following example may not be reduplicated, similar to *ma-* in (12) (from Rackowski 1999, her (10)):

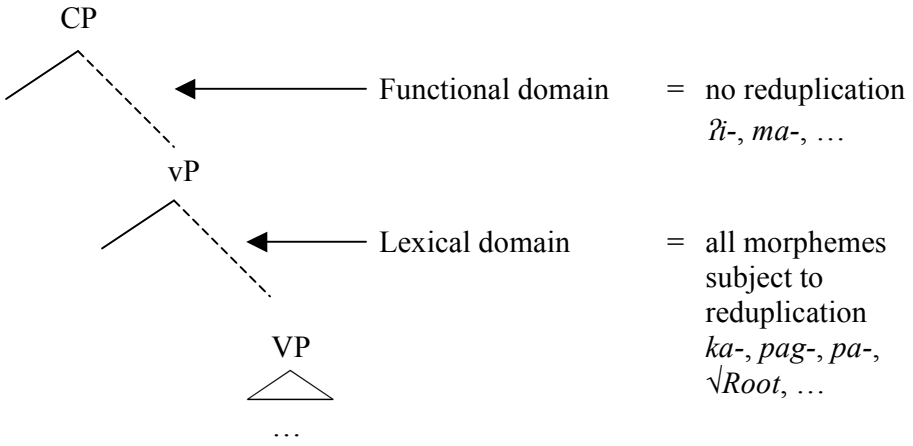
(14) a. ʔi-ka-pa-niwala
TM-COMPLETE-CAUSE-believe

b. *[**ʔii**]-ʔi-ka-pa-niwala
ʔi-[**kaa**]-ka-pa-niwala
ʔi-ka-[**paa**]-pa-niwala
ʔi-ka-pa-[**nii**]-niwala
'will cause someone to believe'

Following Cinque's (1999) cross-linguistic hierarchy of syntactic projections, Rackowski (1999) and Travis (in prep) observe that Tagalog aspectual reduplication is limited to heads that are generated within the lexical domain (e.g. causative and transitivity markers, and verb roots, located in or below vP) and may not target heads in the functional domain (e.g. tense and modals, located above vP in TP, CP, etc.).[11] In short, anything that is generated above the topmost vP is outside the scope of reduplication in Tagalog. I illustrate this generalization as follows:

[11] Note also that categories in the lexical domain may introduce arguments, whereas those in the functional domain may not. The exact nature of the categorial specification of the heads in question will not be at issue in this paper. Rather, the present concern is merely the placement of certain heads within the articulated clausal structure.

(15)



Following these previous analyses, I assume that reduplication is somehow syntactically constrained, rather than completely dependent on any sort of phonological output constraints (see section 2.2). Only morphosyntactic heads that are contained within a specific domain may be targeted for reduplication. In Section 3, I address the issue of how this limitation arises, in addition to providing an account of the observed variations.

2.1.2 NDEBELE (BANTU)

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

(16) a.	nambith	[**nambi**]-nambith-a	'taste a bit'
		* [**nambith**]-nambith-a	
		* [**namb-a**]-nambith-a	
		* [**nam**]-nambith-a	
b.	nambith-el	[**nambi**]-nambith-el-a	'taste a bit for'
		* [**namb-a**]-nambith-el-a	(applicative *–el*)
		* [**namb-e**]-nambith-el-a	

However, when the root is monosyllabic in Ndebele, certain suffixes may be optionally copied into the reduplicant. Indeed, the pattern similar to Tagalog, in that morphemes that are base-generated within the lexical domain are available for reduplication. The examples (17) show that the applicative and causative morphemes, commonly believed to be generated in the lexical domain (Pylkkänen 2001),[12] may be optionally targeted for reduplication (recall that I analyze *–a* as epenthetic to satisfy the phonological conditions of reduplicant

[12] Pylkkänen (2001) distinguishes between high and low applicatives, the former generated above vP and the latter below vP. See Section 3.4.3 for more on the location of these applicative heads.

disyllabicity and/or NOCODA; see Section 3.4 for more on phonological effects in reduplication):

(17)	a.	lim-el	[**lim-e**]-lim-el-a	'cultivate a bit for'
			[**lim-a**]-lim-el-a	(applicative -*el*)
	b.	lim-is	[**lim-i**]-lim-is-a	'make cultivate a bit'
			[**lim-a**]-lim-is-a	(causative -*is*)

The condition on reduplicant disyllabicity is met in (17) by either copying the first vowel of the applicative or causative morpheme, or through epenthesis of -*a*.[13] In this case, reduplication of the suffixes appears to be truly optional.

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

(18)	a.	lim-e	[**lim-a**]-lim-e	(subjunctive -e)
			* [**lim-e**]-lim-e	
	b.	lim-i	[**lim-a**]-lim-i	(negative -i)
			* [**lim-i**]-lim-i	

The subjunctive and negative suffixes may not be copied into the reduplicant here, and so only epenthetic -*a* may be used in (18) to meet the condition on the size of the reduplicant.

Furthermore, if the root is merely consonantal, there is an even greater amount of variation (similar to –*a*, -*yi* is an epenthetic syllable):

(19)	a.	dl	[**dl-a-yi**]-dl-a	'eat!'
	b.	dl-el	[**dl-a-yi**]-dl-el-a	'eat for a bit'
			[**dl-e-yi**]-dl-el-a	
			[**dl-el-a**]-dl-el-a	
	c.	dl-is	[**dl-a-yi**]-dl-is-a	'make eat a bit'
			[**dl-i-yi**]-dl-is-a	
			[**dl-is-a**]-dl-is-a	
	d.	dl-el-i	[**dl-a-yi**]-dl-el-i	'not eat for a bit'
			[**dl-e-yi**]-dl-el-i	
			[**dl-el-a**]-dl-el-i	
			* [**dl-el-i**]-dl-el-i	

[13] In previous analyses of Ndebele reduplication (e.g. Hyman et al. *in press*, Inkelas & Zoll 2005), -*a* is treated as a semantically empty epenthetic morpheme, rather than simply an epenthetic phonological segment, as these theories rely on a purely templatic morphology for reduplication, in which morphological 'slots' must be filled. This distinction is not crucial to the present analysis, as it is only important that –*a* is not present in the underlying syntax. However, as illustrated in Section 3, the analysis presented here will obviate the need for a templatic morphology and, consequently, epenthetic morphemes.

Given this robust sensitivity to morphological structure, it may be assumed that reduplication in Ndebele does not rely solely on phonological conditions, but rather that, like Tagalog, its targets are restricted to those morphemes generated in the syntactic lexical domain.

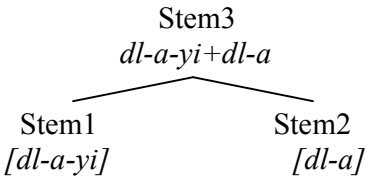
3. MORPHOLOGICAL VARIATION AS A RESULT OF LOWERING

3.1 PREVIOUS MORPHOLOGICAL ACCOUNTS

Given the incontrovertible morphological sensitivity of both Tagalog and Ndebele reduplication, it is not surprising that each has been previously analyzed as a result of morphological operations. However, the recent treatments of these phenomena have proposed new and somewhat language-specific post-syntactic operations to account for the observed variations. I will only briefly address these here, mentioning them only in order to illustrate that others have examined this topic from a morphological perspective. It is outside the scope of this paper to give each theory the full attention it deserves.

Inkelas & Zoll (2005) propose a Morphological Doubling Theory to account for the variations in Ndebele reduplication. Under this theory, the reduplicant is not an individual morpheme that attaches to a verbal stem, but rather a separate syntactic derivation of another verb stem, thus accounting for the potential morphological complexity of the "reduplicant". The stem generally considered to be the reduplicant, Stem1, must be morphosemantically identical to the stem generally thought of as the base, Stem2, after the point of morphosyntactic derivation (i.e. Stem1 and Stem2 must contain identical morphemes, modulo the semantically empty epenthetic morphemes).[14] Therefore, reduplication is simply concatenation of two individual verb stems. Given that there are striking differences between the shape of Stem1 and Stem2 (see the data in Section 2.1.2), it is proposed that each is evaluated by a different ranking of phonological output constraints (i.e. co-phonologies). A third co-phonology is used to evaluate the entire combined structure for basic word-level well-formedness. For example, to derive (19a), a morphosyntactic derivation like the following is required:

(20)



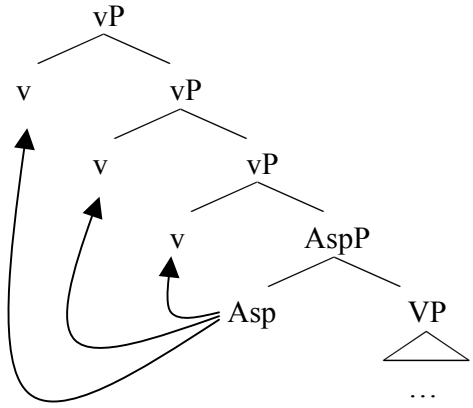
In (20), the phonological well-formedness constraints for Stem1 and Stem2 are evaluated via different sets of constraint rankings on output forms, while the combined structure, Stem3, is subject to a third set of constraint rankings, one that determines word-level well-formedness. While the presence of multiple stems and co-phonologies might account for the variations in question, I believe a major drawback to this theory is the fact that the reduplicant no longer has a status as a separate, individual, semantically meaningful morpheme. Reduplication cross-linguistically carries its own specific semantics, suggesting that it is stored in the

[14] In actual practice, this is more a subset relation of morphemes, rather than a strict parallel identity condition; Stem1 may only contain a subset of the semantically contentful morphemes of Stem2.

mental Encyclopedia as its own morphosemantic feature bundle. Additionally, as will be shown, I believe that we can account for these morphological variations without positing the presence of co-phonologies.

Rackowski (1999) takes a much simpler approach to account for reduplicative variation in Tagalog. Following Travis (1994, 1996, in prep), Rackowski argues that the reduplicative morpheme in Tagalog is generated in an aspectual projection that immediately dominates VP.[15] After syntactic Spell-out, the head of this AspP undergoes a process of upward morphological scrambling to a higher v head to check an uninterpretable v-feature on Asp:

(21) *Morphological scrambling*



A welcome consequence of this analysis is that, given that the reduplicative head is consistently base-generated in the same position, the variations in the surface realizations are derived on the PF branch, correctly predicting that they have no effect on the structure sent to LF, and thus no effect on semantic interpretation. However, as the landing sites of this scrambling operation are limited to v heads, this theory requires that all morphologically overt projections in the lexical domain be v heads in order to account for the range of reduplicative variations. While this in itself is not strictly problematic, an additional concern is raised when we observe that reduplication may target the V root (see data in Section 2.1.1), which presumably does not carry a v-feature, and is therefore unable to check the presumed uninterpretable feature on Asp. A further potential problem for this analysis is that post-syntactic head-movement generally appears to be limited to downward or rightward transformations, such as Lowering and Local Dislocation (see section 1, Embick & Noyer 2001).[16] In the following sections, I will present a theory of morphological variation that allows us to obviate these issues, but also permits us to maintain the benefits of Rackowski's theory.

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[15] See the following section for a discussion of Inner vs. Outer Aspect with respect to Tagalog reduplication.

[16] I will not entertain the conjecture made in Chomsky (2000) that all head-movement occurs on the PF branch. If this were true, and if Rackowski is correct, then we would derive a system of post-syntactic head-movement in which heads may lower or raise, and, when raising, may obey or violate the head movement constraint (HMC, Travis 1984). As of now, I see no way to motivate a tractable theory of such PF transformations.

3.2 A NOTE ON ASPECT IN TAGALOG

As illustrated above, Rackowski (1999) base-generates the reduplicative aspectual morpheme of Tagalog as sister to VP. However, the placement of this morpheme is not uncontroversial. Following Smith (1991), Travis (in prep) observes that there are two different classes of aspect: viewpoint aspect and situation aspect. Viewpoint aspect generally corresponds to grammatical notions such as perfective/imperfective and progressive, whereas situation aspect denotes the *Aktionsart* or eventuality classes of Vendler (1967); e.g. activity, accomplishment, achievement, and state. This distinction becomes quite robust when we observe that viewpoint aspect is often realized via overt morphology, while, on the other hand, situation aspect is rarely encoded overtly. Considering that the functional domain normally houses overt verbal inflectional morphemes, and that the lexical domain is believed to encode eventuality structures (Davidson 1967), it becomes clear that viewpoint aspect is housed in the functional domain, and situation aspect in the lexical domain. For this reason, Travis (in prep) labels viewpoint and situation aspect as Outer Aspect and Inner Aspect, respectively, projecting Inner Aspect within the VP-shell (Larson 1988), and Outer Aspect above the VP-shell.[17]

Looking at the Tagalog reduplicative morpheme, it is plain to see that the reduplicant has more characteristics of Outer Aspect than Inner Aspect; not only is it encoded overtly in the morphology, but, more importantly, its semantic contribution is one of incompleteness. However, in the representation in (21), this morpheme is projected as Inner Aspect, due to the fact that 1) its overt distribution is limited to the lexical domain (i.e. it may target only those morphemes generated below vP), and 2) it encodes a type of morphological aspect (Travis in prep). In the next section, I will argue that this morpheme is base-generated more appropriately in the functional domain as Outer Aspect, and that the observed surface patterns are derived via post-syntactic Lowering into the lexical domain.

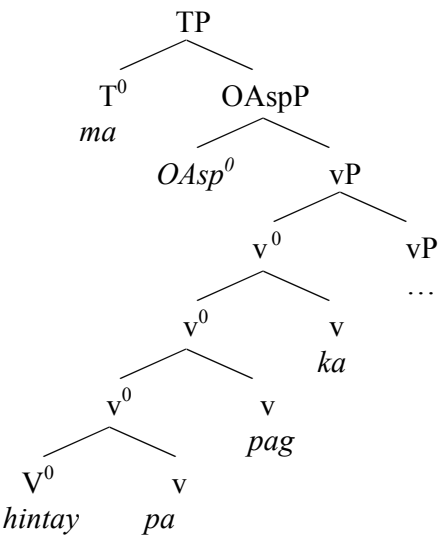
3.3 INTERPOLATION UNDER LOWERING

3.3.1 LOWERING IN TAGALOG REDUPLICATION

Thus far, it has been claimed that morphological variation in reduplication is best treated as a post-syntactic, pre-phonological transformation, and that generating the Tagalog reduplicative morpheme in the functional domain is most consistent with the theory of syntactic aspect. Taking this into account, and the available post-syntactic transformational operations presented in Section 1, I make the further observation that morphological variation in Tagalog reduplication is too varied to rely on the process of Local Dislocation. Assuming that the reduplicative morpheme is consistently base-generated within the functional domain as a sister to the topmost vP, the string adjacency limitations of Local Dislocation do not transparently allow for such numerous possibilities in the ultimate surface position of this morpheme. For example, consider the following tree as a possible output of the narrow syntax:

[17] Travis (in prep) includes an Event Phrase (EP) between Outer Aspect and the VP-shell, but I will not address the role of this projection in any detail here.

(22) ma-OAsp-ka-pag-pa-hintay *'will be able to cause someone to wait'*



I assume iterative and obligatory head-movement of V to the topmost v, producing a structure that is consistent with Travis' (1984) Head Movement Constraint (HMC). Additionally, I follow Bobaljik (1994) in assuming that affixation occurs under adjacency; however, the status of an affix as a prefix, suffix, or infix is lexically determined at VI.[18] In the absence of Lowering, an initial post-VI linearization of the above structure is derived as [ma * OAsp^0 * [$_{v^0}$ ka * pag * pa * hintay]] (where *ma*, OAsp^0 and v^0 are M-Words),[19] standardly assuming cyclic linearization from the bottom up. Note that since the morphemes *hintay*, *pa*, *pag*, and *ka* are all contained within the same complex head v^0, they are considered Subwords of the M-Word v^0. Furthermore, since, following Embick and Noyer's (2001) model, M-Words may only interact with other M-Words in post-syntactic transformations, the M-Word OAsp^0 may not directly target any of these Subwords, but rather can only target the rightward adjacent M-Word v^0. Thus, Local Dislocation only transparently allows for the re-ordering [ma * [$_{v^0}$ [ka * pag * pa * hintay]+OAsp]], where OAsp^0 has undergone Local Dislocation with v^0.[20] Not only does this linearization not explain the availability of multiple variations, but it also derives an ungrammatical structure. Furthermore, under this view, it would be difficult to posit some process of phonological copying into the reduplicant; if all elements are given phonological features upon VI, the strongest hypothesis would suggest that the reduplicant also receives its phonological

[18] The manner in which the directionality of affixation is determined is not crucial to the current analysis, though the proposed system of post-syntactic linearization will allow for a clearer exposition.

[19] At this point in the discussion, it may be assumed that the entire complex word undergoes Spell-out/linearization during a single process. However, see later sections for an investigation into the role of phases in the linearization of these structures.

[20] If head-movement of V to v did not take place, thus resulting in a one-to-one mapping between individual morphemes and M-Words, the only standard linearization occurring as a result of Local Dislocation would be [ma * ka+OAsp * pag * pa * hintay], which also does not account for the required variations.

features at this stage of the derivation, i.e. before Local Dislocation. However, if the reduplicant moves only after VI in a Local Dislocation operation, the morpheme would be limited to copying the phonological features of the leftmost linearized constituent in the vP domain, which is not the case.

Taking these facts into consideration, it is clear that Local Dislocation may not provide for the type of morphological variation evident in the patterns in question. However, with one slight modification to the definition of Lowering, a post-Spell-out Lowering operation onto a complex syntactic head will easily account for the observed variations.

Consider again the syntactic structure in (22) as an input to morphology, in addition to the pattern of reduplicative outputs in (12), repeated below:

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

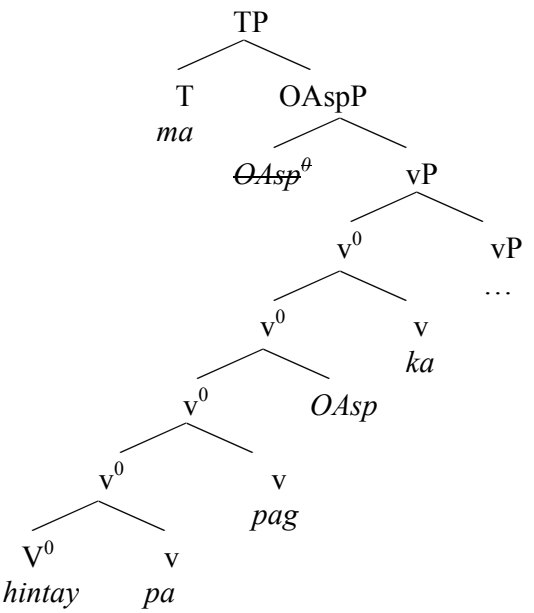
Assuming that OAsp lowers into the complex v head before VI, the alternations in (23) may be derived simply by redefining Lowering as follows:

(24) *Lowering (revised)*
A head X^0 may be lowered to *any head Z^0 of the (potentially complex)* head of its complement Y^0 before Vocabulary Insertion.
$[_{XP}\ X^0 \ldots [_{YP} \ldots [_{Y^0}\ Y^0\ [W^0 \ldots]]]] \rightarrow [_{XP} \ldots [_{YP} \ldots [_{Y^o}\ [Y^0 + X^0\ [W^0 \ldots\ ]]]]]$
$[_{XP}\ X^0 \ldots [_{YP} \ldots [_{Y^0}\ Y^0\ [W^0 \ldots]]]] \rightarrow [_{XP} \ldots [_{YP} \ldots [_{Y^o}\ [Y^0\ [W^0 + X^0 \ldots\ ]]]]]$

Under this view of Lowering, interpolation of an X^0 among terminals of a complex head complement is allowed. To illustrate, an output such as (23c) is derived in the following manner, where OAsp lowers to adjoin to the v^0 immediately dominating the transitivity marker *pag* (note that at this point in the derivation, no terminal has yet received any phonological features; the morphemes in italics are thus intended to denote morphosyntactic feature bundles):[21]

[21] As Embick and Noyer (2001) argue, movement of an M-word to another M-word converts the moved M-word into a Subword.

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



Again, I assume that VI and linearization of the complex head occur in a cyclical fashion from the most embedded elements to the least embedded elements, and that the directionality of affixation is determined via the individual Vocabulary item; in this case, all affixal morphemes are prefixes. In this way, the complex head in (25) derives the following linearization cycles:[22]

(26) Cycle 1: [pa * hintay]
Cycle 2: [pag * pa * hintay]
Cycle 3: [*OAsp* * pag * pa * hintay]
Cycle 4: [ka * *OAsp* * pag * pa * hintay]

As VI is responsible for adding phonological features to morphosyntactic feature bundles, I propose that reduplicative morphemes are also given their phonological features during this process. I assume, following Marantz (1982), that the reduplicative morpheme is pre-specified only for a prosodic template; i.e., its Vocabulary entry contains a prosodic skeleton, but no phonological segments. Thus, it is dependent on an adjacent element for its segmental phonology. I also assume that all morphemes must be given full phonological form, including segments, upon VI. Thus, during the linearization Cycle 3 in (26), OAsp must look to the phonological features of its sister, which has already been linearized and

[22] In all of the examples of linearization cycles shown here, I tacitly assume an initial operation in which the root morpheme is given its phonological features. For the sake of conciseness, this stage is omitted from the representations. Furthermore, note that a morpheme is linearized with respect to its entire sister, e.g. on Cycle 2 in (26), *pag* is linearized with *[pa * hintay]*, rather than simply *pa*, deriving a linearization schema like *[pag * [pa * hintay]]*. However, since intermediate hierarchical structure is erased upon VI, the embedded brackets will be left out to avoid confusion, except in those cases where such organization remains meaningful.

given phonological form, and copy that string of phonological segments into its pre-specified template (in the case of the aspectual reduplicant in Tagalog, the prosodic template consists of a heavy syllable with no coda):

(26') *Prosodic template from Vocabulary associated with OAsp morphosyntactic feature-bundle:*
Cycle 3': [σ * pag * pa * hintay]

Phonological segments from sister copied into prosodic template:
Cycle 3": [**paa** * pag * pa * hintay]

Cycle 4': [ka * **paa** * pag * pa * hintay]

Note that, under this theory, the phonological shape of the reduplicant is determined before the later stage of PF evaluation; however, this does not rule out later alteration to the form of the reduplicant. I merely argue that all underlying phonological material is inserted during VI, and that the resulting form is sent to PF for evaluation via output constraints.

Crucially, I argue that it is not the case that reduplicative copying targets morphosyntactic material, but rather that it copies whatever phonological material is available to it during the cyclic process of Vocabulary Insertion. Therefore, the morphological variations we witness in reduplicative patterns are only the result of syntactic and post-syntactic transformations that occur before phonological form is given to terminal nodes.

Initially, it may appear that this system poses a problem for the notions of M-Words and Subwords, since these intermediate X^0 levels had no ontological status under the previous theory. However, I propose a further modification to the definition of M-Word as follows:

(27) M-Word: a (potentially complex) head X^0.

Under this expanded definition, any non-terminal head projection or any terminal head of category X that is not dominated by another segment of category X will qualify as an M-Word (see fn. 6). Therefore, the restriction that M-Words may only interact with other M-Words in PF transformation processes is maintained.[23] When a simplex M-Word lowers into a complex M-Word, any M-Word level of that complex M-Word is a possible merger site. In later sections, I will show how this modification does not over-generate for cases of Local Dislocation, due to the effects of linearization on syntactic categories. In the next section, it will be shown that the reduplicative patterns in Ndebele support the Lowering hypothesis of morphological variation.[24]

[23] This modification to the definition of M-Word still does not predict that Local Dislocation may account for the observed variations, since Local Dislocation may still only invert an M-Word with a linearly adjacent M-Word. See Section 3.3.4 for more on the effects of VI on M-Word status.

[24] It is worth noting that Embick and Noyer (2001) do not address cases of Lowering into an overtly morphologically complex head containing more than one prefix or more than one suffix. Note that in their discussion of [dis-agree-d], which contains just one prefix and one suffix, they claim that T^0 lowers to the highest v^0. However, if the structure of this verb is of the following form before Lowering, adjunction to any X^0 will produce the correct output after VI:

3.3.2 LOWERING IN NDEBELE

Lowering of the reduplicant in Ndebele works identically to Lowering in Tagalog, with the only difference being the directionality of affixation of certain morphemes, and the prosodic shape of the reduplicant. Consider the negated applicative construction of the consonantal verb root *dl* 'eat', repeated below:

(28) dl-el-i
- a. [**dl-a-yi**]-dl-el-i 'not eat a bit for'
- b. [**dl-e-yi**]-dl-el-i
- c. [**dl-el-a**]-dl-el-i
- d. * [**dl-el-i**]-dl-el-i

I assume that (28b-c) are merely phonological variants of the same morphological structure,[25] and that negative *–i* is unavailable for reduplication, since it is generated in the functional domain outside of the scope of the reduplicant. In (28a), the reduplicant contains only the root plus epenthetic segments, and in (28c), the reduplicant contains the root, the applicative morpheme, and epenthetic *–a*. I propose the following syntactic structure as the input to morphology for all grammatical forms (28a-c):[26]

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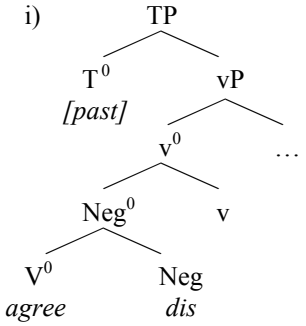
i)



Therefore, interpolation is only visible when there is a sequence of one or more adjacent morphologically overt prefixes/suffixes after linearization.

[25] As both *–a* and *–yi* are cases of epenthesis, I merely argue that they are in competition with each other at phonological form, perhaps as a result of the interaction of the following constraints:

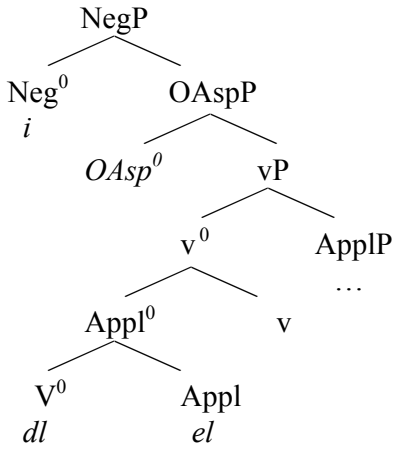
i) MAX(RED)
Do not delete any segment from the reduplicant.

ii) *DORSAL
Dorsal vowels (e.g. [a]) are prohibited.

If MAX(RED) and *DORSAL are crucially unranked with respect to one another, deletion of a segment from the reduplicant will be equally as costly as epenthesis of *–a*. This captures the generalization that coronal segments (e.g. [i]) are most often the least marked segments cross-linguistically (however, note that the exact features of vowels are still controversial). Nevertheless, since both structures in (28b-c) contain the same morphosyntactic make-up, this phonological variation will not be a concern in the remainder of the discussion.

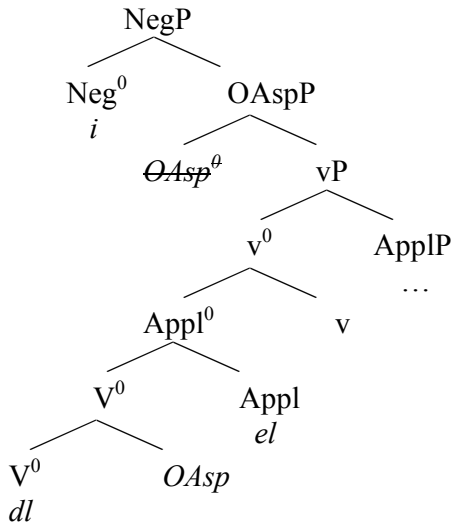
[26] Note that the Ndebele reduplicant is also projected as Outer Aspect, since its meaning "for a short while/a bit" patterns semantically with other instances of Viewpoint aspect, i.e. it relates information regarding how an event lies on a timeline.

(29)



To derive the form in (28a), $OAsp^0$ lowers to V^0 as follows:[27]

(30)



At VI, the following linearizations take place (the Vocabulary entry for the reduplicant in Ndebele consists of a disyllabic prosodic template with no final coda):

[27] I claim that the root may always be targeted as an X^0 projection, as Lowering to a root does not convert the root into a terminal. See fn. 6 for the structure of roots.

(31) Cycle 1: [$\sigma\sigma$ * dl]

Phonological copying into reduplicant:
Cycle 1': [**dl** * dl]

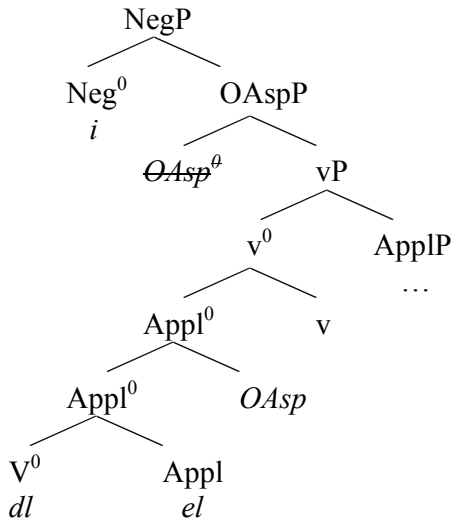
Epenthesis to satisfy remainder of required phonological template:[28]
Cycle 1": [**dlayi** * dl]

Cycle 2: [**dlayi** * dl * el]

Cycle 3: [**dlayi** * dl * el * i][29]

Due to the requirements of the reduplicant's phonological template, ***[dl]*** in (31) is augmented to ***[dl-a-yi]*** via epenthesis. Similarly, to derive (28c), $OAsp^0$ lowers to $Appl^0$:

(32)



Deriving the following linearizations upon VI:

[28] It is unclear whether epenthesis of segments occurs at this stage of the derivation, or during the later stage of PF evaluation. I leave this as an open question.

[29] See Section 4 for more on linearization of morphemes in the functional domain with respect to morphemes originating in the lexical domain. Additionally, I assume a phonologically null v, but do not include it in the linearization rules.

(33) Cycle 1: [dl * el]

Cycle 2: [$\sigma\sigma$ * dl * el]

Phonological copying into reduplicant:
Cycle 2': [**dlel** * dl * el]

Epenthesis to satisfy prosodic template:
Cycle 3: [**dlela** * dl * el * i]

Again, the reduplicant ***[dlel]*** must undergo epenthesis to satisfy the reduplicative morpheme's template.[30] It will later be shown that certain Ndebele reduplicative constructions may interact with both suffixes and prefixes simultaneously.

In this section, I have argued that morphological variation in Tagalog and Ndebele reduplication is the result of interpolation under Lowering of an M-Word to another M-Word, under the new definition of M-Word. The next section illustrates how and why such interpolation is unavailable after linearization of a complex syntactic head.

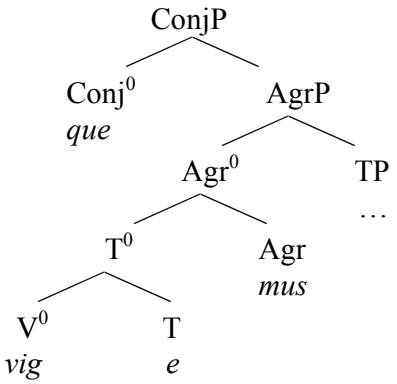
3.3.4 THE UNAVAILABILITY OF INTERPOLATION UNDER LOCAL DISLOCATION

In the preceding sections, it has been claimed that intermediate X^0 levels of a complex head are part of the ontology of morphological objects, and thus are possible landing sites for post-syntactic movement, contra previous accounts of this type of movement. However, Embick & Noyer (2001) and Embick (2006) provide irrefutable evidence that these levels are transparent for Local Dislocation. For example, the Latin enclitic *–que* 'and' is never interpolated within a complex head:

[30] In the case of epenthesis of *–yi*, the *[l]* must be deleted due to phonotactic constraints. See fn. 25.

(34) a. vivimus vigemus-que
live.1PL.PRES flourish.1PL.PRES-and
'we live and flourish'

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



c. *Impossible interpolated forms*
*vig-que-e-mus
*vig-e-que-mus

It is clear from the examples in (34c) that *–que* does not lower to any intermediate X^0 of the complex head of its sister. The following examples, also from Embick (2006), illustrate that *-que* encliticization is blind not only to intermediate levels, but also to category; i.e. it attaches to any projection to which it is linearly adjacent:[31]

(35) a. diu noctu-que
day.ABL night.ABL-and
'by day and by night'
b. contra-que legem
against-and law.ACC
'and against the law'
c. maius-que commodum
more-and profit.ACC
'and more profit'

As Embick (2006) points out, the evidence indicates that Latin *–que* is sensitive only to linear sequences (note that it attaches to a modifier in (35c), and thus its inversion with the element

[31] Crucially, I assume that sensitivity to category information under Local Dislocation is a specific property of individual morphemes. As shown in the case of superlative *–est* in English, this morpheme may only adjoin to an adjectival element. Nevertheless, while Latin *–que* is not sensitive to category, its transformations are clearly limited by linear order.

to its right is a case of Local Dislocation. Therefore, movement of *–que* occurs after Vocabulary Insertion and linearization.[32]

So, why are intermediate X^0s possible targets for Lowering, as suggested by the reduplication data above, but not for Local Dislocation, as shown in (34c)? The answer lies in the effects of linearization operations on the syntactic categories of complex heads. After linearization of the terminals in a complex head, the resulting structure only retains the syntactic category of the topmost head. That is to say, before linearization/VI, a complex head is a hierarchical syntactic structure of two or more X^0 projections. However, after VI, the complex head is converted into a single head-projection with multiple terminal elements. That is, following the standard DM assumption that linearization deletes hierarchical syntactic information, I claim that intermediate categorial head projections are deleted, as well, preserving only the most dominant category of the complex head, along with the terminal elements/Subwords. In a sense, the complex head is *atomized*; it is converted from a unified collection of head-projections with individual terminals into a single atomic head with multiple terminals. Thus, a complex syntactic head that contains many embedded M-Word levels will be transformed into a single M-Word upon linearization.[33] I illustrate this with the structure in (34b) as follows:

[32] Further evidence to support the hypothesis that *–que* undergoes Local Dislocation is that it cannot attach to a phonologically 'weak' preposition. E.g.:

i) in rebus-que
   in things-and
   'and in things'
ii) *in-que rebus

As it is sensitive to prosodic properties, *-que* must move after VI, in this case after a string-vacuous Local Dislocation of *in* and *rebus* in which the order is not changed. I.e. [W * X * Y] → [W * X+Y] → [X+Y+W].

[33] This does not create a problem for superlatives or comparatives in English. As the superlative and comparative morphemes do not lower prior to VI, they will maintain their M-Word status after VI, and thus are free to undergo Local Dislocation with adjacent M-Word adjectives that meet the proper phonological conditions.

(36) *Linearization of* vig-e-mus-que

$[_{V^0}$ vig]

Linearization of T^0 retains category T, loses category V:
Cycle 1: $[_{T^0}$ vig * e]

Linearization of Agr^0 retains category Agr, loses category T:
Cycle 2: $[_{Agr^0}$ vig * e * mus]

Linearization of $Conj^0$ head with linearized complex head Agr^0 (note that –que *is a separate M-Word before Local Dislocation, as it is not contained within the complex head):*
Cycle 3: $[[_{Conj^0}$ que] * $[_{Agr^0}$ vig * e * mus]]

Local Dislocation of enclitic M-Word –que *with adjacent M-Word Agr^0:*[34]
LD: $[_{Agr^0}$ [vig * e * mus]+que]

This model of linearization therefore predicts that the intermediate M-Word levels that are available landing sites for Lowering will no longer be present after VI, due to atomization of the complex head, and so, in keeping with previous analyses, these intermediate levels will never be available for Local Dislocation operations.[35] The loss of these syntactic levels will be crucial to later discussions on Lowering vs. Raising. For now, however, I note only that the revised definition of M-Word holds for the observable instances of both Lowering and Local Dislocation, due to the fact that what qualifies as an M-Word will differ before and after Vocabulary Insertion.

3.4 PHONOLOGICAL INEFFABILITY AND SYNTACTIC RESTRICTIONS

The preceding sections have addressed the availability of several different possible forms in the reduplicative patterns of Tagalog and Ndebele. In this section, however, the discussion will focus on various impossible surface realizations of reduplicated verbs in these languages. In what follows, I argue that certain forms are correctly precluded from surfacing due to syntactic restrictions, while others are rendered illicit due to constraints on phonological outputs. By incorporating an analysis of these non-viable representations, I hope to strengthen the theory of Lowering presented above.

3.4.1 THE NDEBELE OBJECT MARKER *ZI-*

When the prefixal object marker *zi-* appears with a consonantal verb root in Ndebele, it may be optionally copied into the reduplicant ('FV' marks the epenthetic final vowel):

---

[34] Again, note that when an M-Word undergoes Local Dislocation with a rightward adjacent M-Word, it is converted into a Subword of the M-Word to which it adjoins. Thus, the M-Word *–que* is converted to a Subword of Agr^0 upon Local Dislocation.

[35] Note, however, that as the Subword terminals are still present, they may undergo Local Dislocation operations with other Subwords. See the discussion below on the passive in Ndebele for more on this.

(37) uku-zi-dl-is-a
to-them-eat-CAUS-FV
'to feed them'

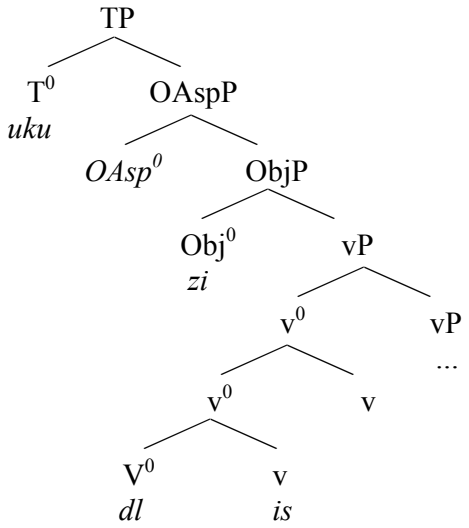
a. uku-zi-[**dl-is-a**]-dl-is-a
uku-zi-[**dl-i-yi**]-dl-is-a
uku-zi-[**dl-a-yi**]-dl-is-a

b. uku-[**zi-dl-a**]-zi-dl-is-a
uku-[**zi-dl-i**]-zi-dl-is-a

The data in (37), under our proposed theory of reduplicant Lowering, indicate that the reduplicant may adjoin to a position from which the object marker may either be included or excluded from its scope. Furthermore, the examples in (37b) suggest that the position of the prefix may vary within the complex head, attaching either below or above the causative affix.[36] That is, in the first example in (37b), the reduplicant may target the object marker and the verb root to the exclusion of the causative affix, suggesting that the reduplicant may take syntactic scope over just the object marker and the root. Alternatively, the second example in (37b) shows that the reduplicant may also take scope over the object marker, the causative affix, and the root. I take this variation to be an indication that the object marker has also lowered into the complex v^0 head. I propose the following structure at syntactic Spell-out for all examples in (37):

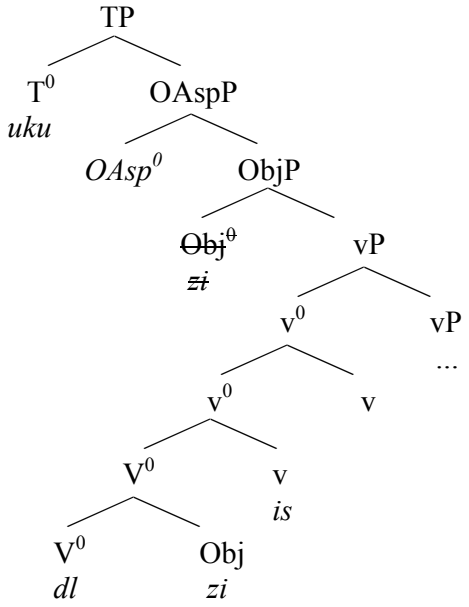
[36] It's possible that the object marker is a type of clitic. While addressing the clitic/affix distinction is outside of the scope of the current study, note that the proposed treatment of the object marker in Ndebele is not incompatible with the theory of cliticization presented in Sportiche (1998), in which it is argued that clitics are projected in their own phrase above the verb complex. Thus, if clitics are taken to be Lowering morphemes – i.e. morphemes that must adjoin to the head of their complements before linearization (see Section 4) –, the variations in (37) are easily accounted for. Sportiche (1998) also proposes that a null DP, syntactically and semantically related to the clitic, is generated in object position of the verb, thus saturating a theta-role of the verb. This does not affect the present analysis, so I do not represent it here. Also, for a purely Lexicalist view of clitic/verb constructions, see Miller and Sag (1997).

(38)



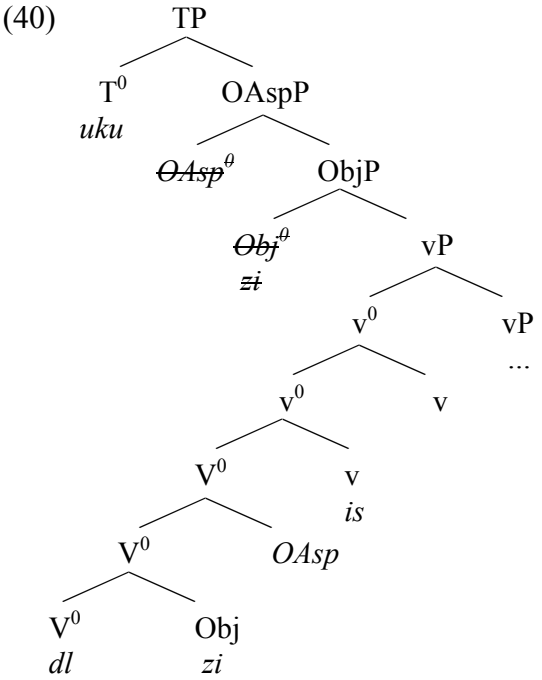
Positing that, in the presence of multiple Lowering morphemes, the lowest morpheme must move first, *zi* is first adjoined to an X^0 of its vP complement. Here, it lowers directly to the verb root:

(39)



Next, as the head position of ObjP has been vacated, $OAsp^0$ also lowers into the complex v^0 head. In this example, it also lowers to V^0:

(40)



Linearization of this structure yields the following cycles (*zi* is lexically specified as a prefix):

(41) Cycle 1: [zi * dl]

Cycle 2: [$\sigma\sigma$ * zi * dl]

Phonological copying into reduplicant:
Cycle 2': [**zidl** * zi * dl]

Epenthesis to satisfy template:
Cycle 2": [**zidla** * zi *dl]

Cycle 3: [**zidla** * zi * dl * is]
etc…

Lowering of the object marker to different X^0 projections in relation to the adjunction site of OAsp will derive all the available variations in (37). For example, lowering *zi-* to v^0 and $OAsp^0$ to V^0 will produce *uku-zi-[**dl-a-yi**]-dl-is-a*. I leave it to the reader to work out these derivations, noting that the expanded freedom given to Lowering operations straightforwardly accounts for the presence of these alternations.

It is interesting to note that the optional inclusion of the prefixal object marker in the reduplicant is impossible when the verb root has the form CVC or larger:

(42) uku-zi-nambith-a
to-them-taste-FV
'to taste them'

a. uku-zi-[**nambi**]-nambith-a
b. *uku-[**zi-na**]-zi-nambith-a

I argue that this is due to phonological output conditions on faithfulness of the reduplicant to the root (McCarthy & Prince 1995).[37] When the root is small enough to be contained entirely within the reduplicant, the reduplicant must contain the entire root, but may optionally include information from prefixes and/or suffixes. However, when the root itself is too large to be entirely contained within the reduplicant (i.e. it is disyllabic or larger), the reduplicant may only contain information from the root; i.e. the reduplicant must be maximally faithful to the root. Furthermore, it is never the case that the left edge of the reduplicant does not correspond to the left edge of the base. These generalizations are captured with the following constraints:

(43) FAITH(RED, ROOT)
Every segment in the root has a correspondent in the reduplicant.[38]

(44) ANCHORIOLEFT(RED)
Any element at the designated periphery [Left] of S_1 [RED] in the input has a correspondent at the designated periphery of S_1 [RED] in the output.

(45) ANCHORLEFT(RED, BASE)
Any element at the designated periphery [Left] of S_1 [RED] has a correspondent at the designated periphery of S_2 [Base].

Ranking FAITH(RED, ROOT) high will guarantee that the form of the reduplicant that is most faithful to the root will always be the most optimal. Where the verb root is smaller than CVC, there will be no violations of FAITH(RED, ROOT), thus allowing for additional information to be copied into the reduplicant to fill the underlying prosodic template of the morpheme. To account for the ineffability of forms like (42b), I implement a CONTROL model of phonological evaluation (Orgun and Sprouse 2002), in which the optimal output candidate from EVAL undergoes a further evaluation of strictly inviolable constraints in CONTROL. If the most optimal candidate from EVAL violates any of the constraints in CONTROL, the form is ungrammatical, and a lexical gap is created (cf. Prince and Smolensky's 1993 MPARSE

[37] It may at first appear that this is a case of vocabulary sensitivity, as in those examples of Local Dislocation. However, as reduplication may copy the object marker, the object marker must reach its landing site before VI, thus ruling this out as an instance of vocabulary sensitivity. Furthermore, note that the relative positions of the object marker and aspect projections are unimportant, since both lower, and thus freely attach to any appropriate position in the complex head.

[38] This constraint captures the generalization that verbal reduplication in Ndebele privileges copying of the root. This suggests that the actual target of Lowering is the verb root itself. However, for economy reasons, the reduplicant may adjoin to other possible landing sites within the complex head that contains the root. See fn. 49.

model). Under the currently proposed system, inputs to phonology are constrained via syntactic and post-syntactic transformational operations. Thus, while the form in (42b) may be generated post-syntactically, it will 'crash' at PF due to CONTROL, as the most optimal candidate violates a strictly inviolable constraint.[39]

This is illustrated in the following tableaux (note that, for the sake of conciseness, outputs that alter the base beyond epenthesis of *–a* will not be considered, as these are ruled out by higher-ranking constraints; furthermore, note that the underlying template of the reduplicant does not allow for a reduplicant that is larger than two syllables; *uku* omitted for clarity):

(46)

EVAL		
[**zi-na**]-zi-nambith	FAITH(RED, ROOT)	ANCHORIO(RED)
a. [zi-na]-zi-nambith-a	***!**	
☛ b. [nambi]-zi-nambith-a	**	*

CONTROL	ANCHORL(RED, BASE)
✂	*!

In (46), EVAL chooses the form that contains a reduplicant that is most faithful to the root (note that ANCHORIO(RED) need not be evaluated here, since the form in (46b) wins at a higher stage of evaluation).[40] However, when this optimal output is evaluated by CONTROL, it incurs a fatal violation, as it does not satisfy the inviolable constraint that requires that the left edge of the reduplicant and the base correspond to each other (i.e. the left edge of the reduplicant is [n], whereas the left edge of the base is [z]). Therefore, given the input from morphology, a lexical gap is derived.

However, if post-syntactic Lowering of the reduplicant occurs to a position in which the object marker is not copied into the reduplicant, the following input/output scenario is derived at PF (note that the output in (47a) incorporates the object marker into the reduplicant to meet minimality):

---

[39] I also assume that the following constraints are active, but will not consider outputs that violate them, for the sake of conciseness:

i) NOCODA
Codas are not allowed.

ii) I-CONTIGUITY
The portion of S_1 standing in correspondence forms a continuous string.
(no string-internal deletion).

[40] Following standard OT assumptions, the GEN component of PF produces a (possibly) infinite number of outputs, each of which is evaluated with respect to IO-faithfulness and markedness constraints. Thus, the form ***[nambi]-zi-nambith-a*** is a product of GEN, and while it violates ANCHORIO(RED), it is the form that best satisfies the higher-ranking FAITH(RED, ROOT) constraint.

(47)

EVAL		
zi-[**nambi**]-nambith	FAITH(RED, ROOT)	ANCHORIO(RED)
a. [zi-na]-nambith-a	***!**	
☛ b. zi-[nambi]-nambith-a	**	

CONTROL	ANCHORL(RED, BASE)
✓	

In (47), the most optimal EVAL candidate also satisfies the inviolable CONTROL constraint, and so the output is correctly predicted to be successful. As subminimal roots (e.g. C and CV roots) will not incur any necessary violations of FAITH(RED, ROOT), the optimal EVAL candidate will be determined via ANCHORIO(RED). For example:

(48)

EVAL		
zi-[**dlisa**]-dl-is	FAITH(RED, ROOT)	ANCHORIO(RED)
a. [zi-dl-a]-dl-is-a		*!
☛ b. zi-[dlis-a]-dl-is-a		

CONTROL	ANCHORL(RED, BASE)
✓	

(49)

EVAL		
[**zidli**]-zi-dl-is	FAITH(RED, ROOT)	ANCHORIO(RED)
a. zi-[dl-is-a]-zi-dl-is-a		*!
☛ b. [zidli]-zi-dl-is-a		

CONTROL	ANCHORL(RED, BASE)
✓	

Therefore, it has been shown that, although the proposed model of morphological variation allows for a great range of possible syntactic structures, certain structures will be ruled out at the later stage of phonological evaluation.

3.4.2 TAGALOG *MAG-*

The Actor Topic marker *m-/-um-* in Tagalog, which appears in contexts in which the external argument is also the grammatical subject of the verb, undergoes a phonological process of coalescence when it precedes the morphemes *pag-/pa-/pang-*:[41]

[41] For more on the voice/topic alternations in Tagalog, see Schachter (1976).

(50) a. mag-linis (m + pag - linis)
AT-TRANS-clean
'to clean'

b. mag-bili (m + pag - bili)
AT-TRANS-buy
'to sell'

As illustrated in Section 3.3.1, the transitivity marker *pag-* is generated within the scope of reduplication, i.e. within the lexical domain. However, if this morpheme undergoes coalescence with the AT morpheme, it may no longer be reduplicated (Carrier 1979):

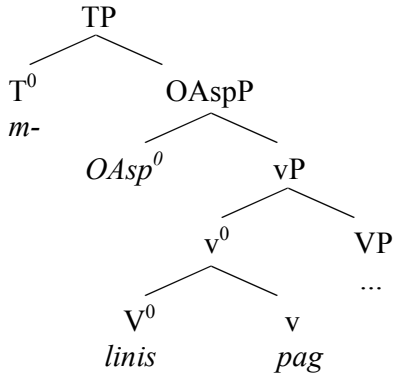
(51) a. mag-[**lii**]-linis
b. * [**maa**]-mag-linis
c. * [**maa**]-pag-linis

I propose that the ungrammaticality of the forms in (51b-c) is due to both phonological ineffability and syntactic restrictions. First, the Actor Topic morpheme is generated outside of the scope of reduplication, above OAsp. This is evident from those cases that contain the *-um-* form of the affix, which also may not be reduplicated, and indeed appears to be infixed after reduplication occurs:

(52) a. kain 'eat'
b. [**k**-[um]-**aa]**-kain 'is/are eating' (m/um - RED - kain)
c. * [**kuu**]-kumain (RED - m/um - kain)

(52c) shows that the reduplicant may not attach to the verb after the AT morpheme. I thus propose the following structure for a construction like (51a):

(53)



In the structure above, *m-* will never be within the scope of the reduplicant, thus ruling out the possibility of a form such as ***[maa]**-mag-linis* (*[**m-paa**]-m-pag-linis*), due to syntactic restrictions; recall that linearization/VI will occur from the bottom up, and so OAsp will receive its phonological features before the AT morpheme is coalesced with the transitivity marker *pag-*. As shown in (51a), lowering $OAsp^0$ to V^0 produces a grammatical output,

which is predicted under the proposed model. However, as (51b) shows, lowering $OAsp^0$ to v^0, which is also predicted to be possible under this model, derives an ungrammatical output ***[maa]**-pag-linis* (*[m-**paa**]-pag-linis*). I claim that this ineffability, similar to the case of reduplication of the object marker in Ndebele, is due to output constraints on phonological representations; namely, Tagalog also has an inviolable ANCHOR constraint that requires that the leftmost elements of the reduplicant and the base correspond phonologically:

(54) ANCHORLEFT(RED, BASE)
Any element at the designated periphery [Left] of S_1 [RED] has a correspondent at the designated periphery of S_2 [Base].

I follow McCarthy & Prince's (1995) model of nasal coalescence; however, note that there are additional factors that contribute to nasal coalescence which have been omitted for the sake of conciseness:

(55) $*NC_{[-VOC]}$
No nasal-voiceless consonant clusters.

(56) UNIFORMITY
No element in the output has multiple correspondents in the input.

Combining this with the CONTROL model, the unavailability of the surface form ***[maa]**-pag-linis* can be effectively accounted for via these constraints on phonological representations, even though the morphosyntactic derivation is possible:[42]

(57)

EVAL		
m_1-[**$p_2$aa**]-paglinis	$*NC_{[-VOC]}$	UNIFORMITY
a. m_1-[**$p_2$aa**]-paglinis	*!	
☛ b. [$m_{1,2}$aa]-paglinis		*

CONTROL	ANCHORL(RED, BASE)
✂	*!

The unavailability of reduplication of a coalesced AT marker is therefore explained straightforwardly, assuming that both syntactic and phonological factors play a role in disallowing the ungrammatical outputs. In the absence of such coalesced segments, as in the example ***[paa]**-pag-lagy-an* in (13b), neither syntactic nor phonological restrictions are

[42] The system must also disallow the possibility of backcopying of the form ***[maa]**-pag-linis* to ***[maa]**-mag-linis*, in which the *p* of *pag* is altered to satisfy AnchorL(RB). I suggest that backcopying is disallowed here due to morpheme correspondence issues. The resulting form would be indistinguishable from the surface form derived from ***[m-paa]**-m-pag-linis*, in which the *m-* prefix occurs within the scope of reduplication, and which is ruled out on syntactic grounds.

violated, producing a grammatical structure, since the inviolable CONTROL constraint ANCHORL(RED, BASE) is satisfied during the final stage of evaluation.

3.4.3 NDEBELE PASSIVES

Syntactic restrictions on reduplicative structures are not limited to the reduplicative unavailability of morphemes in the functional domain. Passive constructions in Ndebele applicatives illustrate that certain configurations disallow even some morphemes generated in the syntactic lexical domain from undergoing reduplication. It must first be noted that the applicative in Ndebele allows for two different argument structures:

(58) a. abantwana b-a-phek-el-w-a ukudla
children they-PAST-cook-APPL-PASS-FV food
'the children were cooked food'

b. ukudla kw-a-phek-el-w-a abantwana
food it-PAST-cook-APPL-PASS-FV children
'the food was cooked for the children'

Following Pylkkänen (2001), I attribute this difference to the existence of both high and low applicative projections, the low position corresponding to (58a) and the high position to (58b).[43] Curiously, when the verbs in these examples are reduplicated, a clear asymmetry arises:

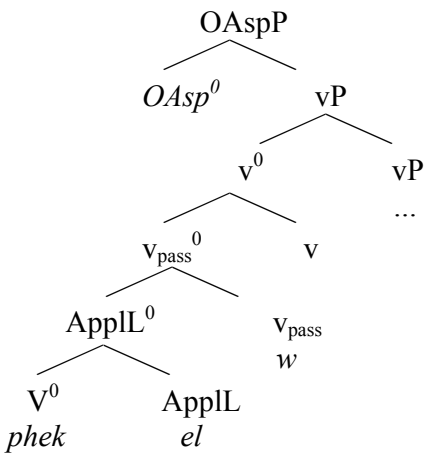
(59) a. b-a-[**phek-e**]-phek-el-w-a
b. b-a-[**phek-a**]-phek-el-w-a
c. * b-a-[**phek-w-a**]-phek-el-w-a
d. * b-a-[**phek-w-e**]-phek-el-w-a

(60) a, kw-a-[**phek-e**]-phek-el-w-a
b. kw-a-[**phek-a**]-phek-el-w-a
c. kw-a-[**phek-w-a**]-phek-el-w-a
d. * kw-a-[**phek-w-e**]-phek-el-w-a

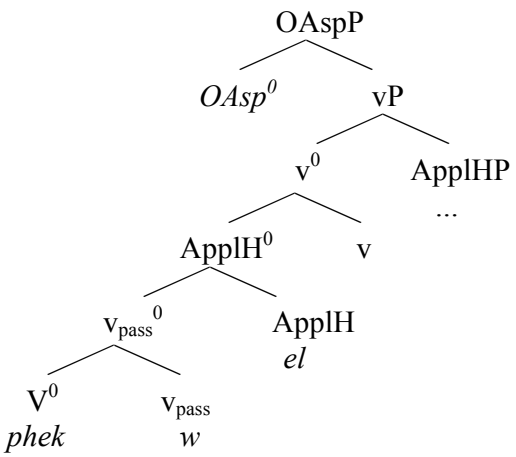
In the argument structure corresponding to the low applicative, the verb and the passive morpheme may not be targeted as a unit for reduplication (59c), whereas this is possible for the high applicative (60c). I argue that this is due to the placement of the applicative projections with respect to the passive morpheme:

[43] Unlike Pylkkänen, I will assume that both of these applicative projections are generated in the lexical domain. Pylkkänen generates ApplH above vP and ApplL below VP. However, as I have claimed, only morphosyntactic heads that are base-generated between (and including) v and V are available for reduplication. Since both high and low applicative morphemes are also possible targets of reduplication, I therefore include them within this domain. I refer the reader to her work for more on the semantic distinction between these two projections.

(61) a. *Low applicative*



b. *High applicative*



In the low applicative structure (61a), there is no X^0 that dominates just the verb root and the passive morpheme; therefore, $OAsp^0$ may not lower to a position in which it copies only that information, which accounts for the ungrammaticality of (59c). However, in (61b), such a position exists, namely $v_{pass}{}^0$, and so the reduplicative morpheme may copy phonological information from just the root and passive morpheme during linearization.

Crucially, however, the high applicative structure in (61b) predicts an incorrect ordering of morphemes. For example, it would be expected that this structure derives the order **[phek-w-el]*, which is never the case. Additionally, the reduplicative form ***[phek-e]*** would be predicted to be impossible under the high applicative structure. However, these problems are resolved if a Local Dislocation rule is posited for the passive morpheme in the high applicative structure during the process of VI. Note that both of these objects are classified as Subwords, and so may interact in a post-syntactic transformational process. I must also point out that the lowered reduplicative morpheme may only copy phonological information after this Local Dislocation movement operation, as OAsp may only be linearized subsequent to the complete linearization of its syntactic sister. In this way Local Dislocation is evaluated on each individual linearization cycle. For example, to derive ***[phek-e]**-phek-el-w-a* from (61b), first, $OAsp^0$ lowers to $ApplH^0$, deriving the following linearization cycles:

(62) Cycle 1: [phek * w]

Cycle 2: [phek * w * el]

Local Dislocation of w *and* el:
Cycle 2': [phek * el+w]

Cycle 3: [*OAsp* * phek * el+w]

Copying of phonological features into disyllabic template:
Cycle 3': [**pheke** * phek * el+w]

Above, Local Dislocation of *w* and *el* must occur before Cycle 3 may take place. Note that under the low applicative structure, no Local Dislocation is necessary, since the passive morpheme already follows the applicative morpheme.[44] Not only does this account for the invariable surface position of the passive morpheme, but it also explains why the form ****[kw-a-[phek-w-e]-phek-el-w-a]*** is impossible, since reduplicative copying would have to occur before Local Dislocation in order to derive this form. The availability of (60c) is also easily accounted for the in this manner, after lowering $OAsp^0$ to $v_{pass}{}^0$:

(63) Cycle 1: [phek * w]

Cycle 2: [*OAsp* * phek * w]

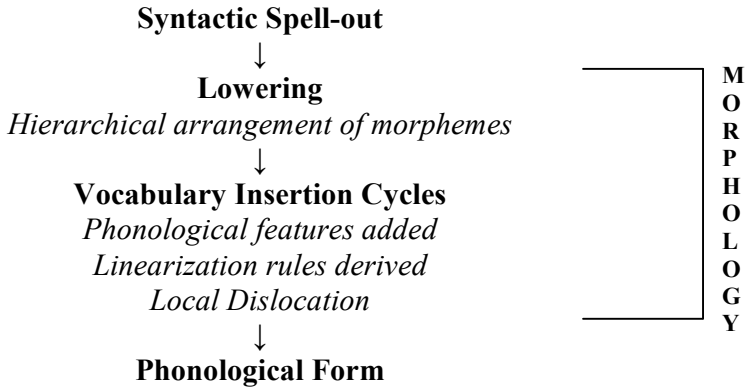
Copying of phonological features into disyllabic template:
Cycle 2': [**phekw** * phek * w]

Cycle 3: [**phekw** * phek * w * el]

Local Dislocation of w *and* el:
Cycle 3': [**phekw** * phek * el+w]

Crucially, these data support the hypothesis that Local Dislocation occurs during VI cycles, rather than after the entire process of VI is complete. This would require a (perhaps welcome) change to the post-syntactic architecture in (9), resulting in a system in which no transformational operations occur after all VI cycles are complete. I leave this question for future research, but illustrate the possible revised architecture as follows:

(64) *Post-syntactic operations*



[44] It may be the case that, in the low applicative construction, *[el * w]* undergoes a string vacuous Local Dislocation operation to *[el+w]*. The motivations for Local Dislocation of *w* are not entirely clear, but the evidence indicates that this morpheme always appears at the end of the lexical stem, regardless of the underlying argument structure. It can be conjectured that *w* is parasitic due to the fact that it is too small to stand on its own phonologically; i.e. morphemes that are subsyllabic must adjoin to an adjacent morpheme in order to be licensed. More evidence is needed to verify this requirement, however.

3.5 CONTRASTIVE REDUPLICATION IN ENGLISH

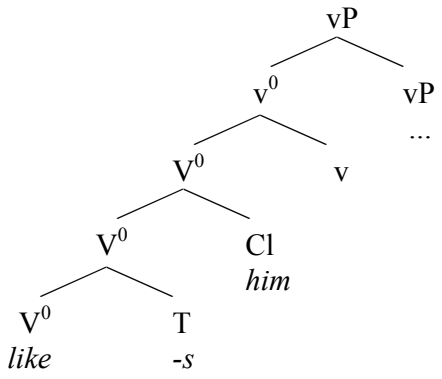
This section briefly looks at an additional possible application of the theory presented here, in order to show that it is not limited to the relatively few cases discussed so far.

English displays a morphological variation in its pattern of contrastive reduplication that is similar to the previous cases of Tagalog and Ndebele (Ghomeshi et al. 2004). Like the morphological variations observed in previous sections, the following grammatical constructions are all semantically identical:

(65) a. Mary [**like**]-likes him.
b. Mary [**likes**]-likes him.
c. Mary [**likes him**]-likes him.
d. *Mary [**like him**]-likes him.
e. ?*Mary [**likes Tim**]-likes Tim.

(65) shows that the contrastive reduplicant in English may copy just the verb root, the verb root plus tense morphology, or the verb root, tense morphology, and an object pronoun clitic. Similar to the reduplication of the object marker in Ndebele, the variations in examples (65a-c) can be easily accounted for by assuming that contrastive reduplication also lowers into the complex v^0 head in English. I propose a vP structure like the following before the reduplicative morpheme lowers:[45]

(66)



If contrastive reduplication in English is a morpheme that lowers, then it may attach to any intermediate projection of the root V to include the root and exclude tense and/or the clitic. Linearization and phonological copying into the reduplicant would then work identically as in Tagalog and Ndebele. While this theory seems to account sufficiently for the simple pattern observed above, more investigation would nevertheless be needed before it may be decided whether this model is applicable to all forms of contrastive reduplication in English.

[45] For the sake of conciseness, I will not address the order in which tense, reduplication, and the clitic adjoin to the complex v head, but merely propose that they are all generated in positions from which they are able to lower into v^0. As shown in our previous Ndebele examples, Lowering of these M-words to the complex head may derive all of the permutations necessary to account for the data. However, it must be noted that, in English, a restriction is required that disallows the order V-clitic-T, e.g. **like him-s*, although this is perhaps due to phonological ineffability. I leave this as an open question.

3.6 SECTION SUMMARY

In this section, I have argued for a theory of morphological variation that relies primarly on post-syntactic Lowering operations. The proposed modifications to the theory of post-syntactic movement not only account for both available and unavailable instances of morphological variation, but also do not overgenerate in terms of possible Local Dislocation transformations, due to the atomization of complex heads at VI. This theory of morphological variation has allowed data from widely distinct languages to be unified under a single explanatory process, without the need to devise any overly bulky theoretical machinery to account for the evident similarities and differences. An advantage to this theory is that the reduplicative morpheme may be base-generated in a consistent syntactic position, thus accounting for the lack of semantic effects, as the observed variations are derived in a component of language that does not affect the structure sent to LF. Additionally, this theory allows the reduplicative morpheme to target any level of the complex head, regardless of syntactic category. The following section will address some of the possible motivations for why these Lowering operations occur, and what consequences this theory has for other examples of morphological variation and/or Lowering.

4. DISCUSSION

4.1 WHY LOWERING INSTEAD OF RAISING?

Following the claims of the Minimalist Program (Chomsky 1995), I assume that morphemes that lower do so to satisfy an uninterpretable feature that they themselves carry, rather than to check a feature on the head to which they adjoin. This raises the question 'if upward head movement in the narrow syntax (i.e. Raising) is also motivated by the need of a c-commanding head to check a feature, why does post-syntactic Lowering sometimes occur instead of Raising?' This question becomes even more pertinent after recognizing the possibility that both Tagalog and Ndebele continue to raise the verb out of vP:

(67) *Tagalog*
Bumili siya ng aklat.
AT.buy he DET book
'He bought a book'

Tagalog is often considered to be a V-fronting language, in which the verb raises to T^0 or higher (Aldridge 2002; cf. Chung 1990). Furthermore, under the theory presented here, the fact that functional morphemes like tense and negation may not be reduplicated in Ndebele, yet appear as suffixes on the verb, suggests that these morphemes are adjoined via syntactic Raising of the verb into the functional domain, rather than via Lowering of these morphemes into the lexical domain (i.e. if these morphemes were to lower, they would then be within the scope of reduplication). Therefore, if the proposed placement of the aspectual reduplicant in these languages is correct, then why does this morpheme lower into a complex head that subsequently undergoes movement into the functional domain? I will briefly attempt to answer this question, though a much more thorough treatment of these issues will eventually be necessary.

I tentatively propose that Lowering occurs due to the interaction of atomization of a complex head and feature requirements of the simplex head that lowers. According to most current theories of cyclic syntactic Spell-out (Chomsky 2001, 2004, Fox & Pesetsky 2005), a phase (e.g. vP or CP) must undergo linearization before any element of that phase may be extracted, at which point only elements at the edge of that phase (e.g. the head projection corresponding to the phase head) may be targeted for subsequent movement operations (Phase Impenetrability Condition (PIC), Chomsky 2001).[46] As claimed earlier, atomization of a complex head under linearization retains only the category feature of the topmost projection of the complex head. Given this, I propose that a morpheme lowers into a complex head as a last resort when subsequent atomization of that complex head will delete the category feature that is uninterpretable on the Lowering morpheme. For example, under this rough theory, $OAsp^0$ in Tagalog and Ndebele carries an uninterpretable V-feature.[47] When the vP phase undergoes Spell-out and linearization, the complex head housing V loses this category feature due to atomization, retaining only the v-feature, and thus subsequent syntactic Raising of the atomized head will be unable to check the V-feature on OAsp. However, if $OAsp^0$ lowers into the complex head before Vocabulary Insertion, it will enter into a local relationship with V^0, and check its uninterpretable V-feature.[48,49] In short, if syntactic Raising

[46] There is a distinct difference between linearization in the terms of Fox and Pesetsky (2005) and Embick and Noyer (2001). Under Fox and Pesetsky, linearization at syntactic Spell-out creates precedence relations, which may not be altered. However, elements may intervene between other elements after Spell-out, as long as the original relation is preserved. For example, if Spell-out creates the relation [X < Y < Z] (where '<' indicates a relation of precedence), it's possible to later derive a relation of the form [X < Y < **W** < Z], as the original relation remains unchanged. However, under Embick and Noyer's view of linearization, adjacency is also encoded into this relationship. So, [X * Y * Z] !→ [X * Y * **W** * Z] (modulo string vacuous Local Dislocation), as Y and Z are no longer adjacent. This distinction is not crucial to the present analysis, as I adopt the view that Lowering occurs after syntactic Spell-out, but before linearization. However, the issue must be addressed in the future if these two theories are to be reconciled.

[47] There is evidence from Tagalog that allows the conjecture that this is indeed the case. For example, the form *ma-ka-pag-pa-**[hii]**-hintay*, in which the V root is reduplicated, is considered by native speakers to be the most 'elegant' form of reduplication (Raph Mercado, p.c.), perhaps because of the close structural adjacency of the reduplicant and V, thus most easily allowing for the reduplicant to check its uninterpretable V-feature (see fn. 49). It might be speculated that this supports the idea that verbal reduplication is inherently root-oriented, but further evidence is necessary.

[48] I assume that all head projections within a complex head are local enough to each other to enter into feature-checking operations. However, this is an uncontroversial assumption, as it is also necessary for feature-checking operations among heads in the narrow syntax. For example, it is assumed that V raises to v due to an uninterpretable V-feature on v. The feature-checking operation here is successful, despite the fact that V may pick up additional heads as it raises, due to the HMC.

[49] Furthermore, I tentatively suggest that the reason that a Lowering head with a V-feature may target any level of a complex head containing a deeply embedded V lies in the notion of *economic competition*. That is, Lowering to a deeply embedded position of a complex head (e.g. V^0 in the present examples) is less economical than Lowering to a less embedded position (e.g. v^0). However, checking the V-feature on OAsp from a v^0-adjoined position is more costly than checking this feature from a V^0-adjoined position. So, these two economy considerations are at odds, thus deriving a scenario in which Lowering to any X^0 position of the complex head is just as economical as Lowering to any other.

is unable to check the uninterpretable feature of an attracting head, due to atomization, Lowering occurs, if Lowering allows the head to check its feature.[50,51]

I merely suggest this scenario as a possible line of inquiry into the underlying distinction between Raising and Lowering morphemes. In the following section, I present some evidence that both supports this theory and helps to clarify the mechanics of phases/linearization domains.

4.2 CONSEQUENCES AND PREDICTIONS

The theory advocated here predicts an interesting paradigm for verb-raising languages like French and tense-lowering languages like English. Specifically, T^0 in English will carry an uninterpretable V-feature, while T^0 in French will carry an uninterpretable v-feature. Raising after linearization of the complex v^0 head in English will not be able to satisfy the uninterpretable feature on T^0, but in French such movement will be predicted.[52] Furthermore, intervening heads in English, such as negation, will prevent Lowering of T^0 into the complex head, requiring *do*-support as a rescue mechanism to check the uninterpretable V-feature on T^0 (cf. Embick & Noyer 2001).[53] This implies that Lowering of a head may only occur when the head of its complement contains an embedded head-projection that may satisfy its uninterpretable feature. This predicts a ranking of operations in English from most preferred to least preferred (or most economical to least economical) as follows: Raising >> Lowering >> *do*-support. This is most likely a universal ranking, as well. The following data from the Lule dialect of Sami, a Finno-Ugric language spoken in the northern regions of Scandinavia, suggest that Lowering only occurs when Raising cannot satisfy the necessary feature-checking operations (data from Vinka 2006):

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[50] Note that this may not be the only scenario under which Lowering occurs. For example, certain clitics appear to lower due simply to the fact that they cannot stand on their own, but they also do not contain an uninterpretable feature that will motivate Raising of a constituent. Further study in the field is necessary before a sufficient typology of Lowering morphemes can be created.

[51] Furthermore, I propose that a head that lowers post-syntactically leaves an unpronounced trace copy in its base position, as illustrated in previous examples. The uninterpretable feature on this head becomes inactive in the trace copy (i.e. it may not motivate further head-movement), since it has been checked in the morphology as a last resort. However, as in the case of T-Lowering in English, an uninterpretable EPP feature may still be active on this trace copy, deriving movement of a DP into SpecTP.

[52] It is also predicted that auxiliaries in English will maintain their V category if and when they undergo atomization, possibly due to a lack of articulated v structure above their VP projections. Thus, Raising of these heads will satisfy the uninterpretable feature on T^0.

[53] This analysis implies that the dummy verb *do* in English has the category V, the category of lexical verbs, rather than category v, as Embick & Noyer (2001) claim. I do not believe this is problematic, as *do* is simply the least semantically contentful lexical verb in English.

(68) *Tense-lowering in Lule Sami*

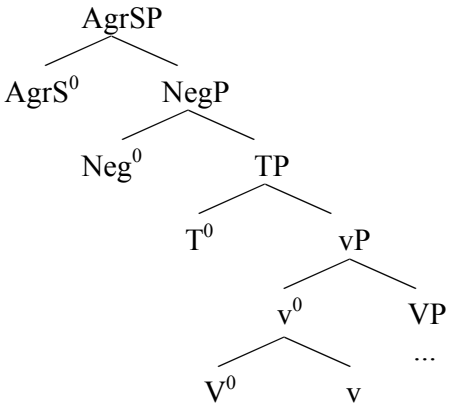
a. Máná agev båråjga gáhkov.
children always eat.PRS.3PL flat-bread
'Those two children always eat flat-bread.'

b. * Máná båråjga agev gáhkov.
children eat.PRS.3PL always flat-bread
'Those two children always eat flat-bread.'

The data in (68) show that, like English, Lule Sami does not raise the verb out of vP, and that T^0 lowers across the vP-adjunct into the lexical domain.

Negation in Lule Sami is an auxiliary verb, which presumably carries an interpretable V-feature. Additionally, there is evidence that suggests that this negative auxiliary takes TP as its complement, rather than vP (see Vinka, forthcoming), generating the following structure for negated verbs:

(69)



Like in English, in negated contexts, tense does not lower. However, in Lule Sami, T^0 instead raises to Neg^0, which subsequently moves to $AgrS^0$:

(70) Mån iv/ittjiv bora gáhkov.
I.NOM NEG.PRES/PST.1S eat sausage.ACC
'I don't/didn't eat sausage.'

Given the structure in (69), in which T^0 is equidistant from Neg^0 and the complex v^0 head, the data in (70) can only be accounted for by assuming that Lule Sami prefers Raising operations over Lowering operations. In the presence of the negative auxiliary, tense raises rather than lowers.[54]

These data have important implications for the order of linearization/Spell-out operations, which I will briefly address. Given that Neg^0 does not intervene between T^0 and

[54] Note that this creates an interesting situation in which a head (T^0) is Raising to satisfy an uninterpretable feature that it itself carries, in what appears to be an odd *upward* probing operation. However, more research into Lule Sami movement operations is necessary before such a scenario may be argued for sufficiently. I merely present it here as a possibility.

the complex v^0 head, it may not act as a 'blocker' for Lowering, as it appears to do in English. Rather, both Neg^0 and the complex v^0 head must be visible before the possibility of Lowering T^0 is evaluated. That is, if T^0 must satisfy its uninterpretable V-feature as soon as it is merged into the derivation, and extraction of v^0 from vP cannot satisfy this feature, then it is expected that T^0 will always lower. However, the presence of a higher head, namely Neg^0, affects the decision to lower or raise T^0. Thus, if Spell-out of the vP phase is the underlying motivation for a head to lower, then it cannot be the case that vP in Lule Sami is spelled-out before Neg^0 enters into the derivation. Again, if the vP were linearized before Neg^0 merges, then Lowering of T^0 would be predicted in all Lule Sami derivations, regardless of the presence or absence of Neg^0.

One possible solution to this problem is the following hypothesis from Embick & Noyer (2001):

(71) *Late Lowering Hypothesis*
All Lowering in Morphology follows all movement in syntax.

(71) requires that the entire syntactic derivation be constructed before any morphological operations occur. This hypothesis, however, has overly restrictive implications for the theory of morphosyntactic linearization. Most importantly, it is incompatible with a phase-based theory of syntactic derivation. In an embedded clause, a Lowering operation would potentially need to have access to deeply embedded syntactic structure long after it has been sent to Spell-out, possibly violating the PIC.[55] That is to say, in a sentence such as the following, where the numbered brackets indicate phase boundaries, (71) requires that T^0 lower from phase 2 into phase 1 only after phase 4 has been spelled-out, violating the PIC:

(72) $[_4$ John t_j $[_3$ think-s_j $[_2$ that Mary t_i $[_1$ like-s_i pie]]]]

I propose that the theories of cyclic Spell-out and Lowering can be modifed in such a way that the PIC is not violated and Lowering may still occur sufficiently 'late'. I first posit an informal late Spell-out hypothesis:[56]

[55] While most formulations of the PIC refer only to extraction from a phase, I assume that if phase Spell-out involves a process of atomization, Lowering into a phase that has already completed the entire Spell-out process would also incur a PIC violation, as the structure of an atomized phase may not be altered. This parallels the extraction limitations of the PIC; a phase *n+2* only has access to elements at the left edge of phase *n+1*, and has no access to any of the elements of phase *n+1* that do not lie at the edge, nor any of the elements of phase *n*. Thus, just as with head-raising out of a phase, head-lowering into a phase occurs only at the boundary of phase *n* and phase *n+1* during the derivation of phase *n+1*, and may not occur during or after the derivation of any higher phase.

[56] See Chomsky (2001) for a similar proposal, in which he argues that phase *n* is interpreted/evaluated only at phase *n+1* (cf. Svenonius 2001).

(73) *Late Spell-out Hypothesis*
A phase *n* is sent to Morphology either 1) only after all elements from the numeration of phase *n+1* are merged into the syntactic derivation, or 2) when phase *n* is the final phase in the derivation.[57]

Next, I propose the following modification to the *Late Lowering Hypothesis*:

(74) *Late Lowering Hypothesis (revised)*
Morphological Lowering occurs when the complement of the Lowering head is sent to Spell-out.[58]

Given these modifications, the Lule Sami data can be explained in the following manner: when negation is absent from the CP domain, T^0 and $AgrS^0$ will need to lower into the Spelled-out vP phase as a last resort to check their V-features, as there is no syntactic object in the functional domain that can satisfy this need. When negation is present, it has been added into the syntactic derivation before Spell-out of the lower vP phase, and, as such, is visible to T^0 before vP is sent to Morphology and linearized. Thus, since Raising to Neg^0 will check the uninterpretable feature on T^0, no last resort Lowering operation is necessary when vP is Spelled-out.

The above proposals should only be taken as a very first step towards formalizing the interactions between cyclic syntactic Spell-out and morphological transformations. Much additional research is needed, but I believe the system presented here is on the right track. In the following section, I briefly examine a problematic transformation in English, and illustrate how our proposed theory accounts for it.

4.3 vP-FRONTING IN ENGLISH AND THE LATE LOWERING HYPOTHESIS

Lowering of T^0 cannot occur in English when the target vP has been fronted:

(75) a. Bob said he would cook the turnips, and $[_{vP}$ cook the turnips$]_1$ he did t_1.
b. * Bob said he would cook the turnips, and $[_{vP}$ cook-ed the turnips$]_1$ he t_1.

Such examples are often used to argue for the original formulation of the Late Lowering Hypothesis in (73) (see Embick & Noyer 2001). However, if it is assumed that the entire fronted vP phase is targeted for movement to SpecCP before that vP phase is sent to Spell-out, then the revised versions of late Lowering and Spell-out may still be adopted. In other words, movement of the vP phase bleeds Spell-out of that phase to Morphology, as all that is left in the original position is a trace:

(76) $[_{SpecCP}\ [_{vP}$ cook the turnips$]_1\ [_C\ [_{TP}$ he $[_T$ –ed $t_1]]]]$

[57] Under this informal definition, I assume that phase boundaries correspond to the lexical vs. functional domain boundaries. I.e. stacked vPs do not constitute stacked phases, but rather a single phase. While this may be a strongly controversial claim, I must leave it to future research to investigate the effects of this passage from one domain into the next.

[58] Note that this definition allows for the possibility of phase-internal Lowering operations, although no evidence has been shown to indicate that this occurs.

Therefore, when it is fronted, the vP phase undergoes linearization only during the Spell-out cycle of CP.[59] If Lowering of tense is motivated by linearization of vP, movement of vP simply bleeds the environment in which Lowering may occur, since it bleeds the environment in which linearization of vP occurs in the complement position of T^0. Thus, it may be concluded that the order of operations allows for phrasal movement of a phase into the next highest phase before Spell-out, and a system of cyclic syntactic Spell-out can be maintained. In the case of multiply-embedded constructions, vP-fronting may thus occur cyclically through the edges of each individual phase, just as with other phrasal movements, without requiring that all syntactic movement in a derivation occur before linearization.

Note, however, that extraction of a head from a phase can only occur after that phase has been linearized. Extraction from a phase requires that the phase remain *in situ*, and thus it will be subject to the order of operations proposed in the Late Spell-out Hypothesis.[60] Because of this, the effects argued for earlier regarding atomization of a complex phase head before Raising still hold. Therefore, to summarize, a phase is not spelled-out until all syntactic elements in the next highest phase are merged; if a phase is left *in situ*, it must be linearized before any elements at its edge may be extracted into the higher phase; however, if the entire phase itself is moved into the next highest phase via phrasal movement, Spell-out of the moved phase is delayed. Assuming that this system is correct, it can be successfully argued that Lowering operations are the result of Spell-out of a target element in an adjacent linearization domain.

5. CONCLUSION

In this paper, several patterns of morphological variation in reduplication have been uniformly accounted for by appealing to a revised theory of post-syntactic Lowering, in which a head, when lowering as a last resort into a complex head, may adjoin to any one of many possible landing sites in that complex head. By analyzing these variations in this manner, I have been able to minimize extraneous language-specific stipulations, thus deriving a straightforward account of cases of multiple semantically identical surface realizations of reduplicated constructions. Additionally, ungrammatical examples have been ruled out through the limitations imposed by the proposed syntactic hierarchy and/or constraints on phonological outputs, and, in the process, we have moved one step closer to more adequately identifying the effects of conditions at the syntax-phonology interface. It is my hope that, with further research, this line of inquiry will not only help to shed light on

[59] Note that I conflate somewhat the notions of Spell-out and linearization. Spell-out is the operation that sends syntactic structure to Morphology, where it is ultimately linearized. However, Spell-out cannot occur without subsequent linearization, so they may be considered different parts of the same process, which also includes Lowering, Local Dislocation, and assignment of prosody.

[60] Crucially, I assume that a phase consists of a strong phase head and its complement. Thus, movement of the subject from SpecvP to SpecTP does not constitute extraction from a phase. Given the Late Spell-out Hypothesis, the subject may therefore be moved to SpecTP before Spell-out of the phase headed by v, or, of course, before vP-fronting occurs. Thus, vP-fronting is, not surprisingly, a case of remnant movement (Müller 1998), in which a constituent (e.g. the subject DP) is moved out of a phrase (e.g. vP) before that phrase is moved.

other cases of morphological variation beyond reduplication, but also that it lead us to a deeper understanding of the interaction of different linguistic modules.

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Tobin R. Skinner
Department of Linguistics
McGill University
1085 Dr. Penfield
Montreal, PQ H3A 1A7

Canada

tobin.skinner@mail.mcgill.ca