

Reduplication in Distributed Morphology

Author information

Jason D. Haugen
Department of Anthropology
Oberlin College
10 N. Professor St.
Oberlin, OH 44074

jhaugen@oberlin.edu

Abstract

The two extant approaches to reduplication in Distributed Morphology (DM) are: (i) the *readjustment* approach, where reduplication is claimed to result from a readjustment operation on some stem triggered by a (typically null) affix; and (ii) the *affixation* approach, where reduplication is claimed to result from the insertion of a special type of Vocabulary Item (i.e. a reduplicative affix—“reduplicant” or “Red”) which gets inserted into a syntactic node in order to discharge some morphosyntactic feature(s), but which receives its own phonological content from some other stem (i.e. its “base”) in the output. This paper argues from phonologically-conditioned allomorphy pertaining to base-dependence, as in the case of durative reduplication in Tawala, that the latter approach best accounts for a necessary distinction between “reduplicants” and “bases” as different types of morphemes which display different phonological effects, including “the emergence of the unmarked” effects, in many languages. I also defend a blended model of DM which incorporates a constraint-based Correspondence Theoretic vision of Phonological Form. In this model the syntax builds morphological structure as per standard DM assumptions, which in turn leads to local and cyclic restrictions on allomorph selection, as argued in Embick 2010. I argue contra Embick 2010, however, that the phonology must be an essential part of the grammar in order to account for surface form-oriented (or “output-centered”) prosodic morphology such as reduplication and mora affixation. The output of Morphological Structure thus serves as an input into PF, which I construe as Optimality Theoretic tableaux as in Correspondence Theory, thus accounting for surface-oriented phonological copying effects like base-dependence.

Keywords

reduplication, Distributed Morphology, allomorphy, reduplicative allomorphy, base-dependence, Hiaki (Yaqui), Tawala

1. Introduction

Most research from the framework of Distributed Morphology (DM, Halle and Marantz 1993, 1994; Harley and Noyer 1999; Siddiqi 2009; Embick 2010) has centered on issues in morphosyntax, with proponents of the theory taking a strong “piece-based” (or, in the classical terminology of Hockett 1958, “Item-and-Arrangement”) approach toward word-formation in natural language. Scholars working within this theory, however, have yet to come to a consensus on how best to approach the morphological phenomenon of reduplication, which as a canonical form of *prosodic* morphology does not obviously lend itself to the kind of piece-based analysis that is typical for work in DM.

We can identify two distinct approaches to reduplication within the DM framework: (i) the *readjustment approach*, wherein reduplication is claimed to emerge as a phonological readjustment operation triggered by a (typically null) syntactic affix (as proposed in Raimy 2000 and Frampton 2009), and (ii) the *affixation approach*, wherein reduplication itself is claimed to involve an affixal reduplicative morpheme (a “reduplicant”, or RED) which serves as a Vocabulary Item inserted to spell-out the phonological content of some terminal syntactic node (as proposed in Haugen 2008, following much other work utilizing an affixation approach to reduplication in other theoretical frameworks, including the autosegmental copying theory of Marantz 1982, the Prosodic Morphology framework of McCarthy and Prince 1986, and the Correspondence Theory of McCarthy and Prince 1995). The present paper compares and contrasts these two different DM approaches, ultimately arguing that the latter avoids some of the pitfalls of the former while also offering important advantages.

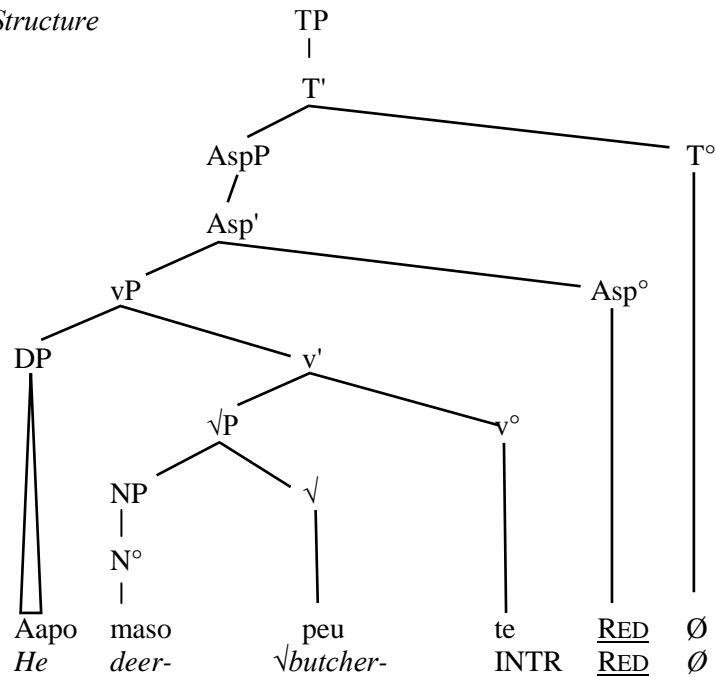
It is worth noting here in advance that, as far as I can tell, many of the major empirical predictions regarding the actual syntax of reduplication made by these two competing approaches are often equivalent. That is, both approaches can usually make the same claims with respect to the actual syntactic placement of either the RED morpheme (in the affixation approach) or the reduplication-triggering Ø-morpheme (in the readjustment approach). For example, Haugen and Harley (2010, henceforth H&H) address the issue of the syntax of reduplication in noun incorporation (and other compounding) contexts in Hiaki (a.k.a. Yaqui, Uto-Aztecan), where reduplication applies word-internally to the head of an N-V compound (cf. 1b) (reduplicants will appear underlined throughout this paper):

- (1) Hiaki (Yaqui) Reduplication + Compounding
- a. aapo maso-m peu-peu-ta
 3.sg deer-PL RED-√butcher-TR
 ‘S/he is always butchering deer’
- b. aapo maso-peu-peu-te
 3.sg deer-RED-√butcher-INTR
 ‘S/he is always deer-butcher’

H&H are particularly concerned with the special (verb)-*prefixal* status of aspectual reduplication in Hiaki, which is unlike other T/A/M affixes which are more typically verb *suffixes* in this head-final language. Following standard assumptions about phrase structure and the order of affixes in Hiaki, H&H propose the structure in (2) as the Deep Structure representation of (1b); note that H&H assume the affixation approach for reduplication, and thus place the RED morpheme as the exponent of the Aspect head (Asp°), which, like other aspect morphemes in the language, ought to occur between v° and T° in the surface syntax given this underlying structure. The post-head-movement tree representation is given in (3).

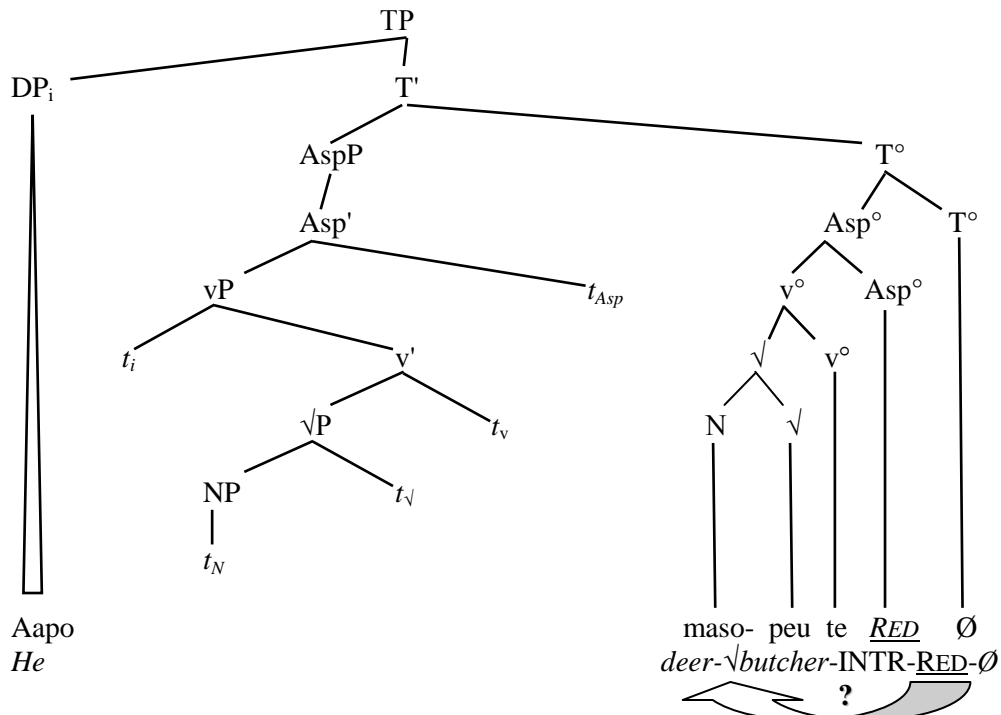
(2) The syntactic structure for Hiaki habitual reduplication (Haugen & Harley 2010)

Deep-Structure



An important question raised by this analysis is how the reduplication applies to the left edge of the verb Root $\sqrt{\text{butcher}}$ in the Surface Structure of (2). The problem is graphically illustrated by the tree in (3):

(3) The Expected Surface Structure



H&H propose that the answer to this problem lies in a morphological operation made available by the framework of DM, Local Dislocation (cf. Embick and Noyer 2007), as sketched in (4):

(4) One Approach to the Prefixal Status of RED:Local Dislocation (Haugen & Harley 2010)

- a. $[[N^{\circ} V^{\circ}]_{V^{\circ} Asp^{\circ}}]_{Asp^{\circ}}$ (Complex Asp° head — Output of syntax)
- b. $[[maso [peute-RED]]_{Asp^{\circ}}$ (Insertion of Vocabulary Items, Linearization)
- c. $[[maso [RED-peute]_{Asp^{\circ}}]_{Asp^{\circ}}$ (Local dislocation of RED and *peute*)
- d. $[[maso [peu-peute]]$ (Phonological content of RED computed by copying from the base.)

Another possible analysis of these data could be given from within the readjustment approach, however. Under a readjustment analysis the Asp° head could be realized as a null affix which somehow targets for reduplication the left edge of the verb Root, \sqrt{peu} ‘butcher’, specifically, as opposed to the left edge of the nominal root \sqrt{maso} or the left edge of the compound *[maso-peu]* as a whole—this latter possibility would lead, de facto, to reduplication at the left edge of the nominal Root.

The point to be emphasized here is that reduplication, whether as a Vocabulary Item in its own right or as an epiphenomenal result of zero-affixation-triggered readjustment, can be originated in or by the same syntactic head (here, Asp°) under both extant DM approaches to reduplication, whether affixational or readjustment-based. For this reason much of what I will have to say below rests on conceptual issues pertaining to the best approach to accounting for reduplicative morphology within DM, although of course important theoretical consequences (in other domains) will also be important in our discussion.

This paper is organized as follows. In section 2 I will outline the theoretical framework of DM as presented in the recent book by Embick (2010), since it is to his presentation of issues pertaining to allomorphy (both phonological and suppletive) that the rest of our discussion will be oriented. Section 3 and 4 then outline in some detail the two DM approaches to reduplication: the readjustment approach of Raimy 2000 (§3.1) and Frampton 2009 (§3.2) and the affixation approach of Haugen 2008 (§4). I will give an evaluation of the pro’s and con’s of each of these theories in light of considerations raised by Embick (2010). Section 5 will propose a tentative reconciliation of DM’s tenets (particularly as articulated in Embick 2010) with Haugen 2008’s integration of DM with an output-based theory of reduplication utilizing phonological copying, such as Correspondence Theory. Section 6 concludes.

2. The DM Framework

This section provides relevant background on two aspects of Embick 2010 which play an important role in the discussion to follow: Embick’s articulation of DM architecture and the generalizations about allomorphy, both phonologically-conditioned and suppletive, that he proposes therein (§2.1), and Embick’s more general discussion of ‘globalism’ and ‘localism’ in morphology (§2.2).

2.1. Embick (2010) on the Architecture of DM

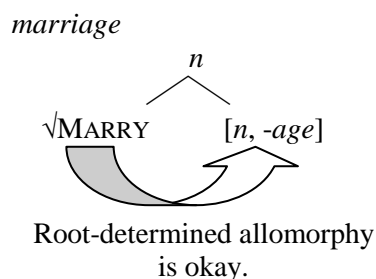
The version of DM addressed here is the framework as proposed in Embick 2010. I focus on Embick 2010’s discussion not only because it is the most thorough up-to-date version of the theory, but particularly because Embick presents a very explicit discussion of important conceptual and empirical issues pertaining to the issue of allomorphy, both phonologically-conditioned and suppletive, in DM, and because he also explicitly contrasts DM with “globalist” theories like Optimality Theory (OT). Embick adopts standard architectural assumptions for DM, such as the traditional Y-model of generative grammar; a “single-engine” (Anti-Lexicalist) architecture; underspecification; and “syntactic hierarchical structure all the way down” (in the sense of Harley and Noyer 1999).

Embick's primary focus is on locality restrictions for root-conditioned allomorphy. He proposes two conditions on contextual allomorphy: *cyclicity* and *linear adjacency*. The cyclicity condition, for Embick, maintains that outer cyclic heads cannot be sensitive to elements in the domain of inner cyclic heads; where "cyclic" is equated to category-defining heads (i.e. *n*, *v*, *a*, ...). Embick's linear adjacency condition holds that for contextual allomorphy to occur, overt morphemes should not intervene between the allomorphs and the triggers for those allomorphs.

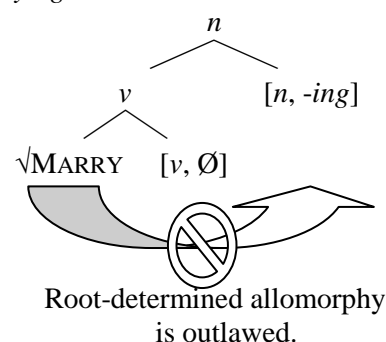
One consequence of Embick's cyclicity restriction is that outer cyclic (category-defining) heads cannot show Root-determined allomorphy, since Roots are already within the domain of a category defining head. This is supposed to explain the difference in behavior between "special nominals" (created by special, Root-specific "*n* heads" such as *-age*) and gerunds in English (where the *n* head deriving nominals from verbs cannot be Root-specific, but must be a default form such as *-ing*). This is shown in (5):

(5) Root-Triggered Allomorphy in English: "Special nominals" vs. Gerunds (Embick 2010: 16)

a. "Special nominals"

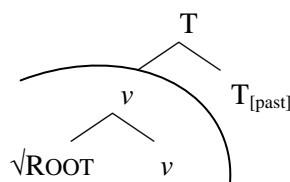


b. Gerunds



Non-cyclic heads in an outer domain *can* show contextual allomorphy, *iff* they are linearly adjacent to the relevant trigger for allomorphy (here, the Root); that is, if there is no *overt* morpheme between the two. Examples like this can be seen with the English past tense, as schematized in (6):

(6) English past tense (Embick 2010: 14)



Root-triggered allomorphy can be triggered on non-cyclic heads (e.g. *T*) in a later cycle in such examples because the category-defining cyclic head (here, *v*) happens to be null; so, allomorphy of the *T* head can be *√ROOT*-triggered in such contexts. That this is empirically necessary can be demonstrated by the fact that certain English Roots can take special past tense Vocabulary Items (e.g. *-t* or *-∅*, if *-d* is the default form):

(7) English Vocabulary Items for Past Tense (Embick 2010: 12)

$T_{[past]} \leftrightarrow -t$ / $_\$ { \sqrt{LEAVE} , \sqrt{BEND} , ...}
 $T_{[past]} \leftrightarrow -\emptyset$ / $_\$ { \sqrt{HIT} , \sqrt{SING} , ...}
 $T_{[past]} \leftrightarrow -d$

How does Embick’s discussion of cyclicity and linear adjacency apply to reduplication? Let us consider the case of Hiaki habitual reduplication which was introduced above (cf. 2). Hiaki has Root-triggered allomorphy for the expression of habitual aspect as well as other semantic functions (e.g. progressive aspect, to mark emphasis, etc.); we will consider here only the case of Hiaki habitual reduplication. The form of reduplication (habitual or otherwise) is not always entirely predictable based upon the morphological or phonological structure of the stem to which it applies—see Harley and Amarillas (2003); Haugen (2003); and Harley and Florez Leyva (2009) for detailed discussion of this suppletive reduplicative allomorphy in Hiaki.

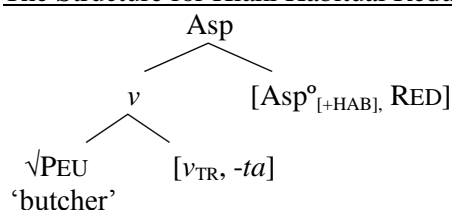
Some of the forms of reduplication in Hiaki are summarized by Harley and Leyva in (8):

(8)	<u>Hiaki Reduplicative Allomorphs</u> (Harley & Leyva 2009: 238)					
a. RED _S	<i>hi.nu</i>	‘buy’	→	<i><u>hi</u>-hi.nu</i>	RED ₁ =CV	
b. RED _{CL}	<i>čam.ta</i>	‘mash’	→	<i><u>čam</u>-čam.ta</i>	RED ₂ = ROOT? or RED ₂ = CVC?	
c. RED _{SS}	<i>či.toh.te</i>	‘slip’	→	<i><u>čito</u>-či.toh.te</i>	RED ₃ = ROOT	
d. RED _G	<i>ka.pon.te</i>	‘castrate’	→	<i>ka<u>p</u>.pon.te</i>	<<INSERT μ >>	
e. RED _{S+G}	<i>kii.mu</i>	‘enter’	→	<i>kik-ki.mu</i>	RED ₄ =C ₁ VC ₁	

The final column of (8) is my addition to Harley and Florez Leyva’s figure, which I add in order to summarize the actual form of reduplication involved in each of the allomorphs of the Hiaki habitual: a light vowel reduplicant (CV), a heavy syllable or Root reduplicant (CVC or $\sqrt{\text{Root}}$, depending on one’s morphological analysis of the stem—on which, see below); a bisyllabic Root reduplicant; a bare mora affix; and a CVC reduplicant wherein the second (coda) consonant is a copy of the first consonant of the stem; this last pattern has been dubbed “secondary reduplication” (Escalante 1990) or “marked heavy syllable reduplication” (Haugen 2003, 2008).

Regarding the syntax of reduplication in Hiaki, I will assume that the reduplication is triggered in Asp^o as proposed in H&H, as was discussed above. Ignoring subject and object positions (i.e. abstracting away from the DP vs. *n* complement of *v* and the external subject DP), the structure for Hiaki habitual reduplication should look something like what is shown in (9):

(9) The Structure for Hiaki Habitual Reduplication



Importantly, Hiaki seems to be unlike English in having an overt expression of the cyclic head *v*. Specifically, (at least in some cases) *v* in Hiaki is overtly expressed differently according to transitivity: i.e. *v*^o ↔ *-ta* in transitive environments (typically), while *v*^o ↔ *-te* in intransitive environments (typically).

With this in mind, we can propose sets of Vocabulary Items for the different reduplication forms in (8) according to both of the DM approaches to reduplication: readjustment as well as affixation. Under the readjustment approach, the VIs for the allomorphic reduplication patterns will be null VIs which somehow have to trigger stem readjustment of some kind on the verb Root; we’ll consider the details of how this might actually happen later in section 3. The later phonological process is indicated by the symbol “ \Rightarrow ” in (10):

(10) Vocabulary Items for the Hiaki Habitual I: The Readjustment Approach

$\text{Asp}_{[\text{HAB}]} \leftrightarrow \emptyset_1$	/	___	{... LIST OF $\sqrt{s}...$ }	\Rightarrow	RED $\sim \sqrt{\text{ROOT}}$
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \emptyset_2$	/	___	{... LIST OF $\sqrt{s}...$ }	\Rightarrow	RED $\sim \sigma_1$
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \emptyset_3$	/	___	{... LIST OF $\sqrt{s}...$ }	\Rightarrow	RED $\sim \sigma_{\text{GEM}}$
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \emptyset_4$	/	___	{... LIST OF $\sqrt{s}...$ }	\Rightarrow	$\llcorner \text{INSERT} \gg \mu$
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \emptyset_5$				\Rightarrow	RED $\sim \text{CV}$

Under the affixation approach, in contrast, the different patterns can be accounted for by the insertion of different RED morphemes as VIs for the Asp° head. This is shown in (11):

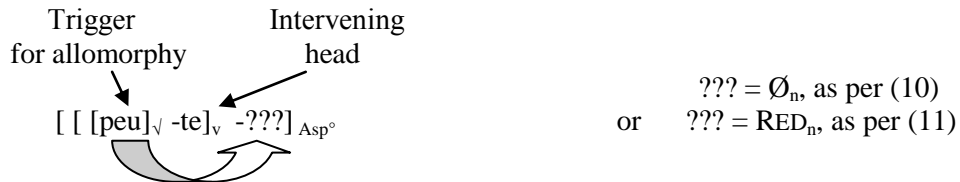
(11) Vocabulary Items for the Hiaki Habitual II: The Affixation Approach

$\text{Asp}_{[\text{HAB}]} \leftrightarrow \text{RED}_1 (\sim \sqrt{\text{ROOT}})$	/	___	{... LIST OF $\sqrt{s}...$ }
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \text{RED}_2 (\sim \sigma_1)$	/	___	{... LIST OF $\sqrt{s}...$ }
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \text{RED}_3 (\sim \sigma_{\text{GEM}})$	/	___	{... LIST OF $\sqrt{s}...$ }
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \text{HAB}_4 (\sim \mu)$	/	___	{... LIST OF $\sqrt{s}...$ }
$\text{Asp}_{[\text{HAB}]} \leftrightarrow \text{RED}_5 (\sim \text{CV})$			

Each of these RED VI's themselves would have some kind of specification for how much of the stem to copy—for details on how this might work, see section 4 below.

Crucially, under either one of these DM approaches we observe Root-triggered suppletive allomorphy—i.e. the Root triggers either the insertion of a suppletive null morpheme that in turn triggers a specific (and unique) pattern of reduplication (or mora affixation), as in (10), or it triggers the insertion of a suppletive reduplicant (RED morpheme) directly into Asp° , as in (11). Thus, the overt nature of an apparent intervening cyclic v head in Hiaki would seem to contradict Embick's linear adjacency condition on Root-triggered allomorphy—recall that Embick's strong claim is that root-triggered allomorphy on non-cyclic Asp° should not be possible unless v is null. I demonstrate this graphically in (12):

(12) Hiaki as a Counter-Example to Embick's Linear Adjacency Condition?



Is this a real exception to Embick's generalization, though? And, if so, is this an empirical problem for Embick's overall theory? If the $-ta/-te$ markers, which seem to correlate rather robustly (although not exceptionlessly) to transitivity, really are instantiations of v then it should be clear that the Hiaki data present an empirical exception to Embick's proposal that Root-triggered suppletion on external heads must be limited to null cyclic head environments. This might not be a major issue, however, if we allow for parameterized, language-specific notions of cyclicity and/or adjacency.¹

This discussion applies to the scenario in which the RED allomorph is a suppletive VI inserted into the Asp° head as triggered by the Root, as in the affixation approach of H&H. The identical issue is *might not* be raised in the readjustment approach, however, if it can be claimed

¹ A second possibility is that $-ta$ and $-te$ are not really instantiations of v , but instead are part of the verb ROOT itself. This possibility would have major implications for the nature of apparent "syllable-copying" in Hiaki reduplication. Harley and Leyva (2009) regard CVC reduplication in Hiaki as ROOT-copying on the grounds that the frequent word-final endings $-ta$ and $-te$ are instantiations of v , but Haugen (2003) regards CVC-reduplication as prosodically-driven syllable copying on the grounds that CVC reduplication may only apply if the first syllable of the base is also of the form CVC. If these apparent suffixes are really part of ROOT in Hiaki then the CV/CVC distinction in Hiaki reduplication *has to be* syllable-copying).

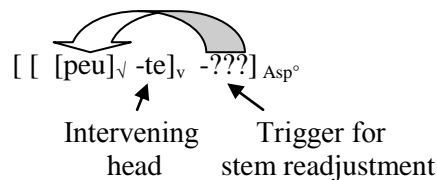
that an outer non-cyclic head (here, Asp°) triggers stem- or Root-readjustment, without that outer non-cyclic head itself being triggered by the Root. Such a case could fall under Embick's Readjustment Activity Hypothesis:

(13) The Readjustment Activity Hypothesis (Embick 2010: 101)

A readjustment rule triggered by the morpheme X can effect a Root- or morpheme-specific change only when X and the Root/functional head are in the same PF cycle.

Embick states that, by this hypothesis, “non-cyclic heads outside of the first cyclic head *can* trigger Root-specific readjustment rules, but outer cyclic heads cannot” (p. 101). At first blush, the same adjacency/cyclicity problem mentioned above seems not to exist the other way (i.e. downward) in the readjustment approach—the null exponent could be able to trigger readjustment on the stem. As Embick notes, “there appear to be cases in which a readjustment rule ‘skips’ intervening, overt morphemes” (p. 98). This might at first seem to give the readjustment approach a leg up over the affixation approach, since readjustment can be triggered by an outer, non-cyclic head (such as Asp°) even over an overt cyclic head (such as v —i.e. in Hiaki, the suffixes *-ta* and *-te*):

(14) Hiaki as a Non-Counter-Example to Embick's Cyclicity/Linear Adjacency Conditions for Readjustment?



However, according to Embick “it is in principle possible for phonologically-conditioned allomorphy at outer nodes to refer to a phonological matrix associated with a Root. A rule of this type could not, however, target certain Roots to the exclusion of others; it would have to apply to any phonological representation which met its structural description” (p.103, emphasis added). Hiaki reduplication is fundamentally Root-specific—i.e. different Roots take different reduplication forms for the same semantic functions (i.e. they exhibit Root suppletion). To make this latter account work there would have to be different kinds of Asp° heads triggering different effects on Roots independently of the morphophonological structure of those Roots. Since different prosodic forms of reduplications can serve different semantic functions in Hiaki while, conversely, those different semantic functions can be served by the various different forms of reduplication, reduplicative allomorphy in this language has to be to some extent suppletive. Hence, habitual reduplication in Hiaki does pose a problem for this angle after all.

In any event, an important empirical issue is raised by the Hiaki data for *either* of the DM approaches to reduplication: readjustment or affixational. On the one hand there is an intervening cyclic head which should block ROOT-conditioned allomorphy on an external head such as Asp° , and, on the other hand, Root-allomorphy triggered by an external head like Asp° should not be possible because that Root occurs in an earlier cycle.

I will leave these issues aside for future research, turning now instead to the heart of Embick 2010's discussion: a critique of “globalism” in favour of “localism” in morphology, where we will also discuss the crucial larger issue of how reduplication is to be most suitably treated in DM.

2.2. Embick (2010) on Globalism vs. Localism

The central focus of Embick 2010 is Embick's critique of globalism in favor of localism in morphology. DM, from Embick's perspective, entails *serial derivation*, with *local* conditions (and restrictions, etc.) on possible allomorphy. In such a framework there is no competition

among complex objects (e.g. word vs. word, word vs. phrase, or phrase vs. phrase comparisons—see also Embick and Marantz 2008). Thus, for any given syntactic or morphological input there should be only one syntactic or morphological output.

Embick maintains that theories like OT, conversely, are *globalist* in the sense that the (morpho)-phonology requires competition between multiple potential output expressions of a given input. In globalist theories any given single input can lead to multiple (infinite?) possible outputs, thus necessitating some kind of evaluation metric that assesses different candidates for optimality in regard to output constraints (e.g. faithfulness and/or markedness, etc.). A serious problem with this kind of approach is that it predicts many kinds of unattested possibilities for allomorphy, including what Embick terms *allomorphic vacillation*. As Embick puts it,

[g]lobalist theories predict that there should be cases in which the allomorph chosen for part of the paradigm of some Root differs from the allomorph chosen in another part of the paradigm. In such a case, different allomorphs are inserted for the same Root in a way that depends on the global phonological context....Crucially, these hypothesized effects could go beyond the local types of outward-sensitive allomorphy predicted by [Embick's theory] (Embick 2010: 156 [2b]).

To put it more succinctly, allomorphic vacillation would entail “a ‘switch’ in the selected allomorph for a particular ROOT, based on (phonological) properties of outer morphemes” (Embick 2010: 172, my emphasis).

In general, I am sympathetic to Embick's criticism of globalism and find his arguments for localism (in some form) to be compelling. In particular, I agree with Embick's insistence on *local* considerations for allomorph-selection in the morphology. My major concern with his particular actualization of DM is both conceptual and empirical, and pertains to what I will call *Black Box Phonology*. Black Box Phonology is, in essence, the idea that phonological generalizations need not be a part of the grammar per se. To clarify what is at issue, we can quote Embick himself, who in regard to his instantiation of DM states that:

...a localist theory cannot say that a pattern of allomorph selection arises *because of* some output property, phonological or otherwise. To the extent that there are generalizations to be made about surface forms, the localist theory can make them, but they must be derivative of another part of language in the broad sense. That is, the explanations cannot be part of the grammar in the narrow sense; instead, they are the result of diachrony, acquisition, and so on. (p. 21)

To increase this list we could also add, with Embick later in his book, “...phonetics, processing...” (p. 120), etc. Embick, in this way, thus proposes a version of DM which is “a theory of morphology without teleology” (p.8).

This kind of morphological theory entails that “regular phonology” falls outside the “scope of grammar”, which in Embick's view needs only to account for irregularity (e.g. suppletion). Consider, for example, Embick's discussion of the English plural, which requires some lexical specification for suppletive allomorph selection (15a-b):

(15) Suppletive Allomorphy: The English Plural (Embick 2010: 43)

- a. #[pl] ↔ -en / {√OX, √CHILD, }
- b. #[pl] ↔ Ø / {√MOOSE, √FOOT, }
- c. #[pl] ↔ -s (= /z/)
-

To account for the varying allomorphs of the English plural only one allomorph needs to be specified as the default variant, which Embick (reasonably) proposes to be *-s* (cf. 15c). Of course, the English default plural morpheme /-s/ has three phonologically-determined allomorphs: [-s], [-z], and [-iz]. For Embick 2010 this phonologically-conditioned allomorphy is not suppletive, so there is no competition for insertion among these allomorphic variants. So

far so good, but how (and, just as crucially, *where*) do the phonologically regular allomorphs actually get selected?

On the one hand, Embick holds that “the (morpho)phonology derives from this single exponent the different surface forms seen above” (p.43). So, as is generally assumed by most theories, the (morpho)-phonology does it, which, *prima facie*, is quite a reasonable position to maintain. But, on the other hand, Embick also proposes that the localist theory that he presents “does not make any profound claims about the surface properties of the various phenomena that happen to exist in the languages that happen to exist. Put slightly differently, it provides a mechanical account of a system that generates sound-meaning connections; beyond placing formal conditions on what languages *could* exist in this way, it does not specify a theory of the outputs that it derives” (p.190, emphasis added).

To return to the focus of the present paper, i.e. the treatment of reduplicative morphology in DM, my issue with Embick’s Black Box Phonology approach is that reduplication and other types of prosodic morphology *really do* need a theory of phonological outputs. One simply cannot do prosodic morphology without some kind of theory of (morpho)-phonology. Just like the garden-variety phonologically-conditioned allomorphy found in the default English plural /-s/, we see very clear regularities and systematicities with cross-linguistic cases of prosodically-based morphology.

Consider, for example, the two allomorphs of Hiaki habitual *mora affixation*, which is unlike allomorphy in Hiaki habitual *reduplication* in that the prosodic morphological process of mora affixation creates the habitual allomorph by lengthening a segment *within* the actual Root itself (cf. 16). This morphological process involves word-medial consonant gemination in the usual case, but it can also involve word-medial vowel-lengthening instead in just those cases wherein the Root already contains a word-medial consonant cluster; the usual process of word-medial consonant gemination in such cases would lead to an illicit word-medial consonant cluster. Contrast (16a) and (16b):

- (16) Hiaki Mora Affixation (Haugen 2003)
- | | | | | | |
|-------------|-----------|---|--------------------|--|--------------------|
| a. ma.ve.ta | ‘receive’ | → | ma <u>y</u> .ve.ta | $\mu \rightarrow C / _ V]_{\sigma} \dots$ | (the default case) |
| b. yep.sa | ‘arrive’ | → | ye <u>p</u> .sa | $\mu \rightarrow V / _ C]_{\sigma} \dots$ | |

If the concatenation of a bare mora affix in such cases as these is merely a mechanical process with no concern for output goals, we would hardly expect to see the apparent result wherein the realization of the bare mora seems to be precisely dependent upon the overall context of the output phonology of the word to which the process of mora augmentation actually applies.²

A more serious problem with the Black Box Phonology approach comes from reduplication itself, and involves what Inkelas and Zoll (2005) have called “base-dependence”. Base-dependence arises when the determination of the phonological form of one copy in a reduplication construction (i.e. the “reduplicant”) is dependent upon some aspect, morphological *or* phonological (prosodic), of the output form of the other copy in the construction (i.e. the reduplicant’s “base”) (cf. Inkelas and Zoll 2005: 92-7).

The theory of reduplication developed by Inkelas and Zoll (2005), Morphological Doubling Theory (MDT), is a theory that does not allow “phonological copying” in reduplication and for this reason it prohibits base-dependence. See Haugen and Hicks Kennard (HHK) (2011), however, for arguments that Tawala durative reduplication necessitates base-dependence in precisely this sense. The essence of the argument presented by HHK is that Tawala durative reduplication is entirely predictable and dependent upon the output phonological form of the base. Consider the forms of the variant allomorphs of the Tawala durative presented in (17)a-c, where the reduplication is indicated with underlining. Cases of *non*-reduplication in the durative, illustrated in (17-d), is also phonologically predictable:

² A possible way around this particular problem might be to assert that the different realizations of the moraic affix are suppletive rather than phonologically-driven, with the phonological regularity of the pattern being an accident of diachrony or some such.

vowel-lengthening occurs in lieu of reduplication when (and only when) a verb Root is already composed of two identical syllables at its left edge.

(17) Allomorphs of the Tawala Durative (data originally from Ezard 1997)

a. i. ge.le.ta	<u>ge.le</u> -ge.le.ta	‘to arrive’	RED = CVCV
ii. ho.pu	<u>ho.pu</u> -ho.pu	‘to go down’	
iii. hu.ne-ya	<u>hu.ne</u> -hu.ne-ya	‘to praise’	
b. i. a.pu	<u>a.p</u> -a.pu	‘to bake’	RED = VC
ii. a.tu.na	<u>a.t</u> -a.tu.na	‘to rain’	
iii. o.to.wi	<u>o.t</u> -o.to.wi	‘to make an appointment’	
c. i. be.i.ha	<u>bi</u> -be.i.ha	‘to search’	RED = CV₂
ii. ga.e	<u>ge</u> -ga.e	‘to go up’	
iii. to.u	<u>tu</u> -to.u	‘to weep’	
d. i. to.to.go	to. <u>o</u> .to.go	‘be sick’	“RED” = V₁V₁
ii. gu.gu.ya	gu. <u>u</u> .gu.ya	‘preach’	
iii. ta.ta.wa	ta. <u>a</u> .ta.wa	‘tremble’	
iv. te.te	te. <u>e</u> .te	‘cross (bridge)’	
v. ki.ki	ki. <u>i</u> .ki	‘strangle’	

The varying forms of durative reduplication in Tawala depends on the output form of the verb stem, as follows. When the first two syllables of the verb stem are of the prosodic form CV.CV, the reduplicant is a CV.CV, as in *geleta* ‘to arrive’ → *ge.le-ge.le.ta* (17a). When the first two syllables of the verb stem are of the form V.CV, the reduplication is of the form V.C-, as in *a.tu.na* ‘to rain’ → *a.t-a.tu.na* (17b). When the first two syllables of the verb stem are of the form CV₁.V₂, the reduplication is of the form CV₂-, as in *be.i.ha* ‘to search’ → *bi-be.i.ha* (17c) and **be-be.i.ha*.

Crucially, *non-reduplication* also occurs in the Tawala durative, as in (17-d), and the non-application of reduplication is also predictably dependent upon the phonological form of Root to which it applies. Specifically, when the first two syllables of the verb stem are already identical (i.e. of the form C₁V₁.C₁V₁), then vowel-lengthening occurs and the expected pattern of reduplication does not apply (i.e. *to.to.go* ‘be sick’ → *to.o.to.go*, and not **to.to-to.to.go* or **to-to.to.go*). Hicks Kennard (2004) argues that each of the allomorphic variants of the Tawala durative can be given a straightforward analysis based on a standard emergence of the unmarked effect (TETU, McCarthy and Prince 1994), where an output markedness constraint, *REPEAT_[σ] which is proposed to be a species of the Obligatory Contour Principle, bans the surface appearance of adjacent identical syllables. HHK show that this restriction is reduplication-specific, since other examples of morphological concatenation in the language, e.g. compounding and regular affixation, allow the marked appearance of adjacent identical syllables (cf. such examples as compounds like *nu.go-go.ho.la* heart-jump ‘surprised’ (Ezard 1997: 278); **nu.go.o.ho.la*).

Unlike the allomorphy exhibited in Hiaki habitual reduplication which was discussed above, the reduplicative allomorphy of the Tawala durative is crucially phonologically-conditioned (rather than suppletive). I think that the upshot of this is that base-dependence is a very real possibility in reduplication, and everybody’s theory needs a way to account for it. If the output phonological form of a stem is crucial for the definition of a pattern of reduplication, as base-dependence suggests, then Black Box Phonology is not an adequate approach to such phenomena.³

³ It should also be mentioned here that TETU effects in general necessitate placing the phonology back into the grammar, contra the Black Box approach. TETU is therefore another issue for Black Box Phonology beyond the specific issue of base-dependence.

2.1.1. A Quasi-Word-&-Paradigm Approach?

A more minor potential conceptual objection to Embick 2010 is that it could lead to a quasi-Word-and-Paradigm view of morphology, contra the intended goal of most practitioners of DM who more typically favor an Item-and-Arrangement view of morphology. As long as we allow the syntax to build structures using morphosyntactic features, though, then perhaps we could just post-syntactically insert the right paradigmatic form (“Vocabulary Item”) into the relevant terminal node? Embick anticipates something along the lines of the general conceptual objection raised here:

- (18) “...on the globalist view, stating distributions is not enough; what is needed is a statement *within the grammar* of why allomorphs appear where they do.”
(p.121, original emphasis).

Embick refers to conceptual arguments of this type as “putative loss of generalization”, or PLG, which he elaborates as follows:

- (19) Putative Loss of Generalization (PLG) (Embick 2010: 121 [8])
Localist theories are inadequate because in the cases in which allomorph selection optimizes the output according to some metric, the allomorph selection procedure does not explicitly state the fact that the distribution is driven by global or output properties of the phonology.

Once again, though, my claim here is that you can’t even do prosodic morphology such as reduplication without the referencing the phonology. This is a conceptual issue which does have major empirical consequences. What are the possible analyses of reduplication within DM?

3. Contrasting Approaches to Reduplication within DM I: The Readjustment Approach

This section sketches and contrasts the first of the two competing extant approaches to reduplication within DM: the readjustment approach. Under a readjustment approach the reduplication process results from a *readjustment operation* applied to a stem as triggered by a (typically null) affix. There are two theories about how this happens: the Precedence-Based Phonology (PBP) theory developed by Raimy (2000) (§3.1), and Frampton (2009)’s theory of Distributed Reduplication (DR) (§3.2).

One central theoretical mechanism which is shared as a fundamental tenet of both of these theories is the use of readjustment operations, and this immediately makes such theories potentially problematic in the first place. Readjustment rules have always been standard in DM research (cf. Halle and Marantz 1993 et seq.), although they remain conceptually problematic. Two major issues with such operations are: (i) that they invoke process-based analyses within the piece-based theory of DM (as when, for example, the vowel in the English Root \sqrt{run} is said to be changed by rule in the context of the feature [+past] to yield the form *ran*); and (ii) such rules are difficult to contain in principle. The problematicity of this second aspect should be particularly salient in versions of the theory which invoke Black Box Phonology, as in Embick 2010.

Not all practitioners of DM utilize readjustment operations, however. Siddiqi (2009) utilizes Root suppletion rather than readjustment operations on particular Roots, thus claiming that the output form \sqrt{ran} is a Root which competes with \sqrt{run} for insertion into the syntactic context of *v* and [Past]. If Siddiqi 2009’s approach to DM is anywhere close to being on the right track, and if we can really eliminate readjustment rules altogether, then both of the readjustment approaches to reduplication within DM would obviously be undermined from the get-go.

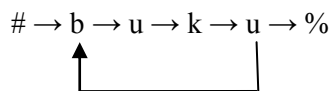
Nevertheless, Siddiqi’s approach is not universally adopted, and in the meantime it is important to consider readjustment approaches as one possible way to account for reduplicative morphology within the theory of DM. We will consider the proposals of Raimy (2000) and Frampton (2009) in turn in sections 3.1 and 3.2, respectively, in light of our discussion of base-dependence in the Tawala durative.

3.1. Raimy (2000): Precedence-Based Phonology (PBP)

Raimy (2000) proposes that reduplication occurs as a result of a readjustment operation involving re-linearization, where a (typically null) affix alters the precedence relationships between the phonological segments of a given stem. Raimy’s crucial mechanism, *linearization*, is a phonological rule that can be ordered with respect to other phonological rules to yield under- and over-application effects.

Reduplication in PBP is derived by inserting a looping mechanism into the linear structure of a stem. For example, in (20) the hypothetical reduplicated form *bukubuku* is derived via a rule that places a precedence loop from the final vowel of a string back to the first consonant of the stem *buku* (in Raimy’s notation, # marks the beginning of a string, and % marks the end of the string):

(20) Full reduplication of the hypothetical phonological string: *b-u-k-u*



Linearizes to: # → b → u → k → u → b → u → k → u → %

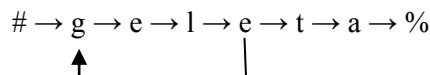
Infinite loops are ruled out by economy—once a loop is followed it is “satisfied”.

A major issue for PBP theory, at least as articulated in Raimy 2000, is that it is prosody-free. As Frampton (2009) notes, “Segmental phonology can be extended to [“Raimy Representations”], but prosodic morphology cannot be. Raimy doesn’t even attempt it. This makes it impossible for an RR analysis of reduplication to incorporate insights of Prosodic Morphology that are central to many reduplicative processes” (p. 197). See also Haugen (2008: 60-66) for related discussion on the necessity of referring to prosodic structure to account for reduplication in DM.

3.1.1. An empirical problem for the PBP Theory: Reduplicative allomorphy in the Tawala durative

Beyond the issue of prosody, PBP faces an empirical challenge in that it also seems unable to account for the phonological regularity of Tawala durative reduplication without ad-hoc or otherwise stipulative mechanisms. Following Ezard (1997), Hicks Kennard (2004), Inkelas and Zoll (2005), and Haugen and Hicks Kennard (2011), we can consider the unmarked pattern of reduplication in the Tawala durative to be a full copy of the first two syllables (i.e. foot) of the stem, as in *ge.le-ge.le.ta* ‘to arrive’. This kind of pattern can be straightforwardly accounted for in PBP by having a readjustment operation add a jump link from the second vowel of the word back to the first consonant, in parallel to the hypothetical *buku-buku* case mentioned just above. This is demonstrated in (21):


(21) A correct prediction for the Tawala durative in PBP




Linearizes to: g-e-l-e-g-e-l-e-t-a

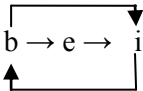
So far so good, but the other allomorphs, which are phonologically-predictable variations on this pattern, will be highly problematic because the structural description for the application of different jump link specifications must be based on the segmental content of the slots in the representation. Consider the vowel-initial and CV.V- initial cases from (17-b and -c) above. The readjustment operation adding a jump link from the second vowel back to the first consonant would wrongly predict forms like **a-t-u-t-u-n-a* and **b-e-i-b-e-i-h-a*, respectively:

(22) Incorrect predictions for other cases of the Tawala durative in PBP

a. $\# \rightarrow a \rightarrow t \rightarrow u \rightarrow n \rightarrow a \rightarrow \%$

Linearizes to **a-t-u -t-u-n-a*

b. $\# \rightarrow b \rightarrow e \rightarrow i \rightarrow h \rightarrow a \rightarrow \%$

Linearizes to **b-e-i-b-e-i-h-a*


The structural descriptions that would have to be added for these cases would need to be different than those which account for the usual CVCV case; namely: something along the lines of “add a jump link from the first consonant back to the first vowel” (in the cases where the word is vowel-initial; cf. *a-t-a-t-u-n-a*); and, quite oddly in light of the architecture of PBP theory, “add a jump link from the first consonant to the *second* vowel, then back to the first consonant” (in those cases where there are two vowels in sequence after the first consonant). The oddness of this latter possibility is shown in (23):

(23) $\# \rightarrow b \rightarrow e \rightarrow i \rightarrow h \rightarrow a \rightarrow \%$

Linearizes to: *b-i-b-e-i-h-a*


This case also raises the issue of which link from the initial consonant should be followed first, to rule out potential forms like **b-e-i-b-i-h-a*.

The final allomorph of the Tawala durative, where a sequence of two identical syllables fails to reduplicate (as in *totogo* ‘be sick’ \rightarrow *tootogo*), would require some kind of mechanism to identify the word-initial adjacent identical syllables, and require some kind of repair operation or some such, because the default readjustment of “add a link from the second vowel back to the first consonant” should yield unattested forms such as *t-o-t-o-t-o-t-o-g-o*:

(24) Another incorrect prediction using PBP

$\# \rightarrow t \rightarrow o \rightarrow t \rightarrow o \rightarrow g \rightarrow o \rightarrow \%$

Should linearize to: *t-o-t-o-t-o-t-o-g-o*

The actual surface form, *tootogo*, *can* be derived via the addition of a self-directed, reflexive link added to the first vowel, as follows:

(25) $\# \rightarrow t \rightarrow o \rightarrow t \rightarrow o \rightarrow g \rightarrow o \rightarrow \%$

Linearizes to: *t-o-o-t-o-g-o*

However, merely stipulating that the durative form of some Roots readjusts through this kind of addition to the linearization of the Root would miss the phonological regularity of the pattern. Thus, while PBP was proposed to be a theory of phonology-morphology interaction within DM (contra Embick's Black Box approach), it does not easily lend itself to a non-ad-hoc account of cases of base-dependence involving prosodic information such as syllable structure.

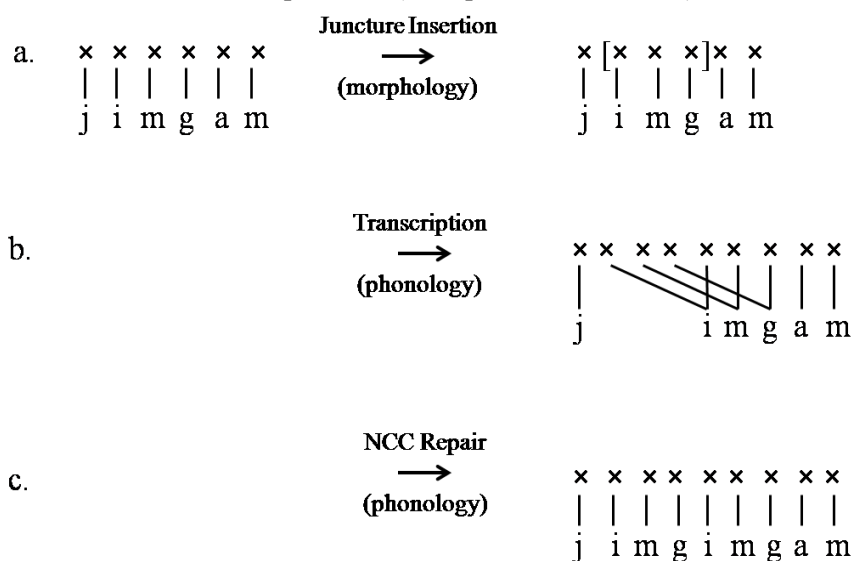
In sum, the point here has been that the Tawala durative, which expresses reduplicative allomorphy of a completely phonologically predictable nature, cannot be given a straightforward and unified analysis within PBP as presented in Raimy 2000. We now turn to a more recent DM-based readjustment theory of reduplication, DR, where we will see that it too runs afoul of the Tawala durative reduplication data.

3.2. Frampton (2009): Distributed Reduplication (DR)

Frampton's DR is an improved DM-based theory which actually makes use of prosody, but only in certain cases (e.g. particularly when certain prosodic constituents can also serve as morphological constituents, e.g. prosodic feet which can serve as prosodic words).

In DR, the stem-readjustment operation does not involve relinearization as in Raimy's theory, but instead involves the insertion of 'transcription junctures' into the timing tier of the stem, ultimately resulting in multiple links to the segmental material of the stem (i.e. "long-distance geminates"). Transcription can involve *duplication* junctures (illustrated with square brackets), or *truncation* junctures (illustrated with angled brackets). Thus, the morphology adds junctures into the post-syntactic, post-morphological phonological structure to yield the effect of reduplication. An example of how this process works is shown in (26):

(26) Distributed Reduplication (Frampton 2009: 5, ex. 3)



The creation of long-distance geminates results in a violation of the No-Crossing Constraint (NCC), as shown in (26-b), but this can be rectified later in the derivation, through what Frampton refers to as "NCC Repair", or NCCR. This is shown in (26-c). Various phonological rules can apply before NCCR so that they can affect either or both of the twins in the long-distance geminate.

The insertion of duplication junctures delimits which potential sub-portion of a stem is able to be copied in the reduplication process. This can be either a *morphological* or a *prosodic* constituent, but Frampton stipulates that prosodic constituents must be limited to "sub-words" of the stem, such as feet (p.11, p. 40). Thus, prosodic constituents can be targeted *iff* they can also be morphological constituents, e.g. feet, which can serve as Minimal Words. This accounts for the well-known pattern of reduplication in Yidiny where reduplication fully copies the first

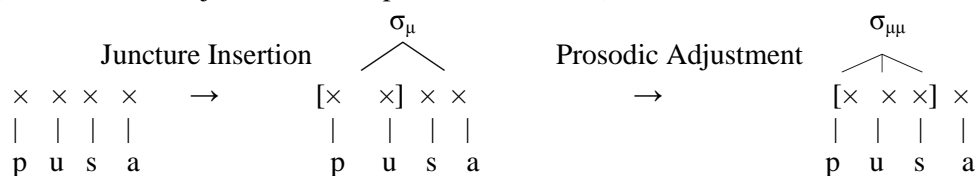
two syllables (i.e. foot) of the stem, and segments beyond that are beyond the domain for copying:

- (27) Yidin^y Disyllabic Reduplication (Dixon 1977, cited in McCarthy and Prince 1986)
- | | | | | |
|---------------|-----------------|---|----------------------------|-----------------------------|
| a. kin.tal.pa | ‘lizard sp.’ | → | <u>kin.tal</u> .kin.tal.pa | * <u>kin.ta</u> .kin.tal.pa |
| b. mu.la.ri | ‘initiated man’ | → | <u>mu.la</u> .mu.la.ri | * <u>mu.lar</u> .mu.la.ri |
- (28)
- | | | | |
|-----------------|---|----------------------------|-----------------------------|
| a. [kin.tal].pa | → | <u>kin.tal</u> .kin.tal.pa | * <u>kin.ta</u> .kin.tal.pa |
| b. [mu.la].ri | → | <u>mu.la</u> .mu.la.ri | * <u>mu.lar</u> .mu.la.ri |

Frampton “proposes that landmarks in the stem that can be used to define juncture insertion sites do not include prosodic constituent boundaries, but are restricted to notions like ‘before/after the leftmost/rightmost vowel’ and ‘leftmost/rightmost edge’” (pp. 10-11). See Haugen (2010) for discussion of potential problems with this perspective, since it is designed to rule out “syllable copy” effects that may actually exist in some languages, including Hiaki.

Frampton accounts for syllable weight effects in reduplication, e.g. light vs. heavy syllable reduplicants, with the process that he terms *prosodic adjustment*. With prosodic adjustment one edge of a duplication juncture (i.e. “[“ or “] ”) is shifted to the left or right in order to create a desired output goal, e.g. a heavy syllable reduplicant as in Ilocano *pu.sa* ‘cat’ → *pus.-pu.sa* ‘cats’. This is shown in (29):

- (29) Prosodic Adjustment (Frampton 2009: 7, ex. 7)



It is crucial to note here that, contra Embick’s proposal that DM should be “a theory morphology without teleology”, such output goals, whether prosodic or otherwise, crucially must involve “morphology *with* teleology”! It is not clear, then, that DR as proposed in Frampton 2009 is readily compatible with the model of DM with Black Box Phonology as envisioned in Embick 2010.

As discussed in more detail in Haugen (2010), DR is a chimerical theory incorporating a range of mechanisms from both derivational phonology (in the sense of Chomsky and Halle 1968) and constraint-based approaches, and it may therefore vastly over-generate unattested reduplication patterns. The mechanisms of DR include at least the following: the previously mentioned juncture insertion rules, where junctures of both duplication and truncation types may be inserted into a representation (without a typology of possible interactions between the two); transcription rules; adjustment operations; conditions and/or constraints on possible outputs (e.g. “Onset Permanence”, see Haugen 2010 for discussion and critique), with no mention of whether these are conceived to be universal, rankable, and/or violable (a la Optimality Theory); cycles of derivation; rule schema which may contain unordered rules and/or ranked rules; overtly teleological goal-driven rules (with output goals such as “heavy syllable”, “C-finality”, etc.); and some unexplained Evaluation Metric to measure potential output candidates for their ‘optimality’ with respect to their obeisance to the rule-ranking (cf. Frampton 2009: 91-92, 143).

On the conceptual level, I would suggest that a theory which can account for reduplication without the use of the many ad-hoc mechanisms invoked by Frampton should be preferred to one which necessitates them. On an empirical level, like Raimy’s PBP, DR as currently configured also seems to be unable to offer a unified analysis of phonologically-based reduplicative allomorphy in the Tawala durative. We now turn to see why this is the case.

3.2.1. An Empirical Problem for DR: Reduplicative allomorphy in the Tawala durative

Inkelas and Zoll (2005) propose an account of the Tawala durative without base-dependence wherein the apparent “reduplicant” is a stem which is a sister to a semantically identical stem in a compounding construction, but where the former stem, the “Doppelgänger” (i.e. the “reduplicant”), is subject to its own truncation-inducing co-phonology. This special co-phonology reduces the Doppelgänger, but not its sister, to a foot-sized output.

We can apply a similar approach in DR by attempting to derive the variant Tawala durative reduplication forms from the standard disyllabic case. In DR, following standard assumptions presented by Frampton 2009, we can add a duplication juncture to the right edge of the first foot of the stem, thus delimiting the first two syllables as the domain for reduplication-inducing transcription, as in (30), which abstracts away from the X-slot representation since that will not be relevant here:

(30)	<u>Stem</u>		<u>Juncture Insertion</u>		<u>Expected Output</u>	<u>Actual Output</u>
a.	ge.le.ta	→	[ge.le].ta		<u>ge.le</u> .ge.le.ta	<u>ge.le</u> .ge.le.ta
b.	a.tu.na	→	[a.tu].na		* <u>a.tu</u> .a.tu.na	<u>a.ta</u> .tu.na
c.	be.i.ha	→	[be.i].ha		* <u>be.i</u> .be.i.ha	<u>bi</u> .be.i.ha
d.	to.to.go	→	[to.to].go		* <u>to.to</u> .to.to.go	to. <u>o</u> .to.go

This approach captures the default CVCV cases like *gele-geleta* quite well, but with no other phonological processes being invoked it wrongly predicts incorrect forms for the other allomorphs, cf. (30b-d). What sorts of additional processes might yield the actual output results? And can these lead to a unified analysis of the four different durative allomorphs within DR?

Inkelas and Zoll account for the (30-b) cases by positing a rule of vowel elision: when there is a sequence of two vowels V_1V_2 , V_1 deletes in favor of V_2 —thus, the compounding of the truncated stem *atu* with the non-truncated full stem *atuna* would yield an intermediate stage of *atu-atuna*, and the Elision rule would then reduce that to the attested form *atatuna*. DR, which is fundamentally derivational, could easily posit a similar rule of Elision as an operation applying after transcription to yield the same result.

A problem for the DR account arises, however, for the 30-c forms like *beiha*. Given 30-c above, the expected output form should be *be.i-be.i.ha*. The Inkelas and Zoll-esque Elision rule would rightfully reduce the reduplication form to the attested output *bi-*, but there is nothing to prevent this same elision from happening in the *unreduplicated* stem, *beiha* (which, by Elision, ought to be **bi.ha*; the final reduplicated word should therefore be **bi-biha*).

The fundamental problem here is that the Elision rule in Tawala actually only applies to the reduplicant in this situation, it does not apply to the base. This will remain a problem for any theory which does not privilege a distinction between a base and its reduplicant, a trait shared by PBP, DR, and even MDT. The crucial insight of the unified analysis of the Tawala durative posited by Hicks Kennard (2004) is that the different forms of reduplication emerge as a result of the emergence of the unmarked (TETU), where base-reduplicant faithfulness is not as important as avoiding the violation of a markedness constraint (here, $*REPEAT_{\sigma}$, which is violated by sequences of identical syllables); input-output faithfulness, on the other hand, is more important (i.e. is ranked higher) than this markedness constraint, so violations are allowed to occur in that environment in stems which get their identity from correspondence to the input (cf. the existence of stems like *totogo* and similar examples in 17-d above), in contrast to the ban on such outputs within reduplicants, which get their identity from correspondence to their base. That is, elision in the Tawala durative, and TETU effects generally, necessitate the recognition of “reduplicant” as a type of morpheme which is differentiable from, and able to undergo different morphological processes than, stems (“bases”), which get their identity through an input-output relationship rather than a surface-oriented base-reduplicant relationship.

Finally, beyond this, note that the transcription of the first foot with a duplication juncture would not lead to any natural account for stems like *totogo* in 30-d, where only if there is already a sequence of two identical syllables reduplication fails to apply at all, and vowel-lengthening occurs instead.⁴ Like the PBP account, and the MDT account as well for that matter, the DR account does not seem to be able to account for the Tawala durative in a unified manner. This puts it at a disadvantage to the Correspondence Theoretic approach provided by Hicks Kennard (2004), who accounts for the data as standard-issue TETU with no new stipulations or mechanisms being invoked.

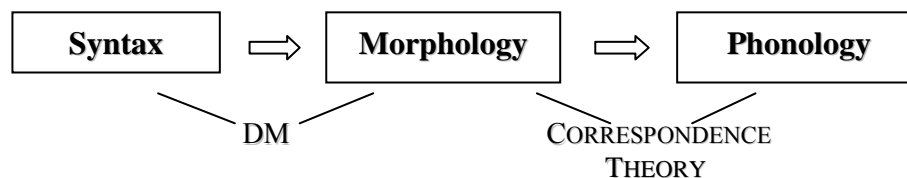
How would a Correspondence Theoretic account like Hicks Kennard's be compatible with DM, though? We turn to address this important question in the next section.

4. Contrasting Approaches to Reduplication within DM II: The Affixation Approach

Following Marantz (1982), McCarthy and Prince (1986, 1995) and much other work from a variety of differing frameworks, Haugen 2008 proposes an affixation-based approach to reduplication for DM, wherein the reduplicative copy of a stem is taken to be an affixal morpheme in its own right, i.e. "RED". Haugen 2008 proposes a model of DM where RED is a special type of VI which gets its phonological content via correspondence with some morphological base, as is standardly assumed in Correspondence Theory (McCarthy and Prince 1995/1999). The base itself, in contrast, gets its phonological identity from an input representation.

The basic approach of Haugen 2008 is to derive morphological representations via syntactic derivation via standard DM assumptions, while letting the morpho-phonological expression of VI's, which takes place after Vocabulary Insertion occurs as a result of Spell-Out, be worked out at the PF interface via input-output correspondence as in Correspondence Theory. Put slightly differently, the idea is that Correspondence Theory needs a systematic account of possible inputs to OT-tableau, and that these inputs are created via syntactic derivation, which could include localist and cyclic restrictions on allomorph-selection as proposed in Embick 2010. Thus, Morphological Structure, which in standard DM architecture mediates (i.e. serves as an interface between) syntactic structures and Phonological Form, gets its own structure from syntactic derivation (so-called "morphosyntax"), receives its phonological make-up via Vocabulary Insertion once Vocabulary Items (VIs) are inserted into syntactic nodes to discharge syntactic features ("Spell-out" and "Late Insertion"), and then allows phonological processes, including the expression of prosodic morphology like mora affixation and reduplication, to interact with the morphology at the level of PF (so-called "morphophonology"). The general picture illustrating the domains of the two theoretical architectures which I propose to integrate is provided in (31):

(31) Morphology at the Interfaces: Blending DM with an OT-based model of PF



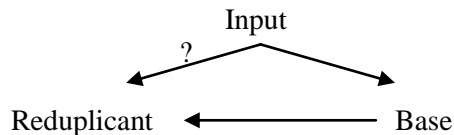
The upshot of this blended model is that this integration of theoretical frameworks presents Correspondence Theory with an overt but delimitable theory of possible morphosyntactic inputs (including the mechanics of allomorph selection nicely clarified by Embick 2010), while providing DM with a theory of output relations that includes a "horizontal" (i.e. base-

⁴ Note also that Hicks Kennard's constraint *Repeat_σ also serves to help *explain* the variation in the other different reduplication types as well, since each of the different reduplication types could logically result in identical adjacent syllables but each fails to do so: e.g. **ge-ge.le.ta* **be-be.i.ha* **a-a.pu*, etc.

reduplicant) relationship in order to account for surface form-oriented morphological processes such as reduplication (and other prosodic morphology, e.g. mora affixation, etc.).

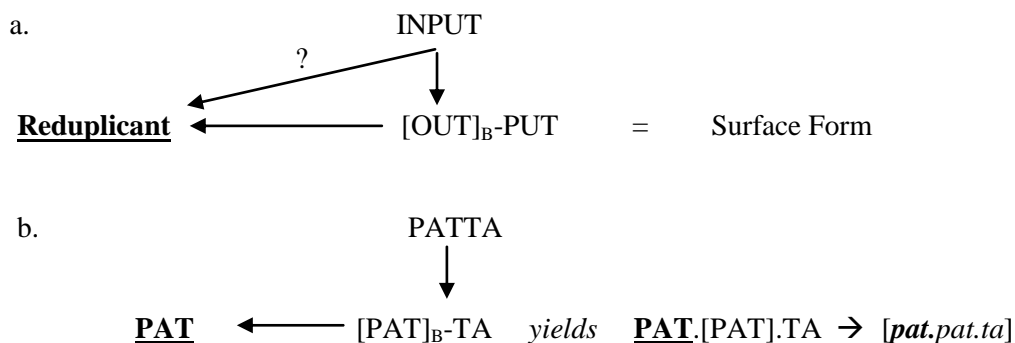
One area where Haugen 2008 differs from standard work in Correspondence Theory is that the received version of the theory maintains that the Input-Output relation is one wherein the “base” for reduplication is (usually only assumed to be) the entire output in correspondence with an input, as per the “Full Model” of McCarthy and Prince (1995):

(32) The McCarthy and Prince (1995) “Full Model”



Recent work, however, suggests that a sub-set of a given output may serve as the base for reduplication, so Haugen 2008 presents the following as the “Modified Full Model”, where “B” equals a delimited sub-portion of the stem delimited as the base for copying (the constraints MAX_{BR} and DEP_{BR} check for faithfulness between the RED morpheme and this delimited base rather than with the entire stem):

(33) The Modified “Full Model” (Haugen 2008: 80)



See discussion in Haugen 2009 on different approaches to and definitions of the notion “base for reduplication”, where it is argued that Shaw 2005’s definition of the base as being some constituent, either morphological *or* prosodic, best accounts for cross-linguistic cases of reduplication. Shaw allows for the grammar itself to define the Base for reduplication, by utilizing standard Anchor constraints wherein the reduplicative morpheme is anchored to some (phonological or morphological) constituent of the output. Shaw’s proposal is given in (34):

(34) The Constituent Base Hypothesis (Shaw 2005: 167 [6])

The Base in a Reduplicant-Base correspondence relation is a constituent, i.e.

- | | |
|------------------|--|
| a. MCat: | Word, Stem, Root |
| b. PCat: | Prosodic Word, Foot, Syllable, Nucleus, Mora |
| c. PHead: | HeadFoot, σ = FootHead, Nuc = σ Head, Head μ |
| d. CanonicalCat: | Canonical Root = [CVC]
Canonical Stem = [CVCV] |

In Haugen 2008’s instantiation of DM, the output of Morphology is the input to Optimality Theoretic tableaux. In this manner base-reduplicant correspondence is worked out in accordance with the language-specific ranking of universal constraints and candidate evaluation to ascertain the optimal output, as per standard Correspondence Theory. Thus, the RED VI is evaluated for identity with respect to a base (cf. MAX_{BR} and DEP_{BR}). The advantages of this approach include at least the following.

First, it must be recognized that reduplication seems, cross-linguistically, to be a special type of VI, since reduplicants often exhibit different phonological properties than those of non-reduplicative VIs. We saw this above with the restriction against identical adjacent syllables being applied to reduplication forms in the Tawala durative, but not in other cases of morphological concatenation (e.g. compounding or affixation) in Tawala. Similar remarks could also be made by drawing from a wide variety of cases of cross-linguistic TETU effects; see Kennedy (2008) for a recent review and defense of TETU effects, which are largely confined to reduplication contexts.

Second, in contrast to theories which do not distinguish morphological bases from morphological reduplicants (a class which includes DR, PBP, and MDT), given Shaw's Constituent Base Hypothesis cases of base-dependence, both morphological and phonological, should be expected in those languages which have a sufficiently highly-ranked constraint MAX_{BR} . This seems to accord well with the facts—see Haugen and Hicks Kennard (2011) for discussion and examples. Theories without “reduplicants” and “bases”, which by definition preclude cases of base-dependence, are therefore at a disadvantage in their empirical coverage of the cross-linguistic facts, including those of the Tawala durative.

Finally, in my view, an OT-style approach which involves language-specific rankings of universal faithfulness and markedness constraints, interleaved with language-specific instantiations of generalized constraints such as ALIGN and ANCHOR, provides actual *explanations* for a wide variety of important issues in phonology, including at least the following: (i) cross-linguistic typology (e.g. universal markedness constraints); (ii) diachronic change (via constraint re-ranking); and (iii) acquisition (via the language-specific setting of the constraint-ranking); see Haugen (2008) for more detailed discussion of these points and comparative evidence from reduplication and other phenomena in the Uto-Aztecan language family that suggests that diachronic changes in constraint-ranking are reflected in the synchronic grammars of the Uto-Aztecan languages.

In essence, the very things that Embick defers to his “Black Box” in his version of DM, which regards phonology as being extragrammatical, actually *constitute* the phonology in the model presented in Haugen 2008. In this way reduplication can be accounted for in DM with minimal costs beyond what is already necessary and/or standard in Correspondence Theory: i.e. constraints such as ANCHOR, ALIGN, FAITHFULNESS, MARKEDNESS, etc.

Are the theories of DM and Correspondence Theory really compatible, though?

5. A Blended Model—Dogs and Cats Living Together?

The major drawback of the approach outlined in Haugen 2008, given the discussion of Embick 2010, would seem to be that this approach entails at least some degree of globalism, in that different possible outputs have to be evaluated with respect to their obeisance to the language-specific constraint-ranking.

On the other hand, though, I think it is possible that Embick 2010 understates the issue of generating potential, yet ungrammatical, outputs within his own theory. For example, to take a very simple case like the phonologically predictable allomorphs of the English plural *-s*, what prevents speakers from producing outputs like *[*cat-z*] instead of [*cat-s*]? Embick's answer would probably be that the grammar mechanically produces the input /*cat-s*/, so that's what emerges as the output. An OT account, in contradistinction, could say one of two things: (i) that there is a constraint of some type enforcing voicing assimilation among adjacent stops and fricatives, thus ruling against possible candidates which would have the voiced allomorph of the plural attach to a word with a word-final voiceless consonant (which would be a kind of globalist argument); or, (ii) that if the grammar produces an input like /*cat-s*/, with the voice quality of the plural allomorph mechanically selected for as suppletion (or some such) as Embick claims, then the output could simply be a straightforward correspondence between the input and its output given a high-ranking $FAITH_{IO}$ constraint. Globalism in the latter case would be involved, to be sure (non-faithful candidates like **cat-z* would still have to be ruled out, after all), but globalism itself would not be the *cause* of the voicing assimilation.

In other words, I think it is the case that, with the phonology being relegated to an extra-grammatical Black Box, it is possible to stack the deck in favor of an “anti-globalist” approach by means of assuming straightforward Input-Output faithfulness where very little alternation occurs between inputs and their outputs. What is not clear to me is how one would rule out the possibility of a global analysis occurring anyway even in a localist theory, though, where the phonology seems to need to rule out candidates which may not be faithful to their inputs. That is to say, even in a supposedly localist theory there are unfaithful, non-optimal potential output candidates that need to be disregarded because they are not fully faithful to what is derived via Vocabulary Insertion—thus, **cat-z* and **cat-ɪz* are possible outputs of an input like *cat-s*, and it’s not clear to me what principle would prevent a grammar from producing them in lieu of *cat-s*, although it is obvious that *cat-s* is a better (i.e. more “optimal”) output because of its complete faithfulness to the input.

The cases that tip the scales toward a more globalist orientation, at least as far as I can see at present, are those involving surface form-oriented prosodic morphology as discussed above. For example, take the case of morphological mora augmentation (mora affixation) as in Hiaki (cf. 16 above). In these instances, following the original proposal of Samek-Lodovici 1992 and argumentation in Haugen 2008, the Vocabulary Item inserted to spell out the aspectual head would be a bare mora affix, which is inserted (infix) into a stem to lengthen a segment. Which segment gets lengthened, however, is an entirely predictable matter of the “global” context, because it is dependent on the surface prosody (specifically, the syllable structure) of the stem to which it applies. If the syllable is of the form CV then gemination is induced, where the onset of the second syllable will form a coda for the first syllable: cf. *ma.ve.ta* ‘receive’ → *mav.ve.ta* ‘receive habitually’. If the initial syllable is of the form CVC, however, then gemination is impossible (an illicit consonant cluster would result, cf. **yepp.sa*, **yeps.sa*, etc.), so vowel-lengthening occurs instead: cf. *yep.sa* ‘arrive’ → *yeep.sa* ‘arrive habitually’. There is no sense in which the grammar produces an “allomorph” or the moraic affix independently of the surface prosody of the stem to which the affix is infix.

This is a clear case where one morphophonological process is general and preferred, but a secondary process will apply under certain phonological conditions. This is easily accounted for in an OT-style system, but not so much in a mechanically-based system that does not take heed of the output of phonology. Disregarding such phenomena as “extra-grammatical” or as the result of mysterious Black Box phenomena is not an encouraging solution to the problem.

The reconciliation of syntactically-driven word-formation processes, as provided by DM, with output-based morphology to account for prosodic morphology, as per OT, is intended to maximize the beneficial results of each approach by recognizing that each theoretical orientation is operating over separate domains of grammar. My claim is that the RED-as-an-affix approach is not inconsistent with Embick’s localist goals—specifically, RED is a VI that competes for insertion into syntactic terminal nodes just like other functional VIs. I support Embick’s general insistence on locality and cyclicity in morphology, and have proposed that an operative constraint on “base-delimitation” may well be adjacency: see Haugen 2008 for a distinction between the notions *target* and *base*. In the framework of Haugen 2008 the former alone, which is a morphosyntactic unit, is assumed to be in a morphological sisterhood relation (i.e. adjacent to) the RED morpheme (see also Travis 1999, 2000). The *base*, on the other hand, can be a prosodically- or morphologically-defined subset of the morphosyntactic *target*.

Here I would like to elaborate upon the general proposal of Haugen 2008 with the following specific proposal for the blending of the two theoretical models at hand. Specifically, I think that the constraint-ranking as given by Correspondence Theory, which serves as the interface between Morphological Structure (itself derived via syntax, as per DM) and the “sensory-motor system” (i.e. actual vocal articulation given the morphosyntactically-driven input), can be regarded as a *Filter*. As such, it contains a language-specific ranking of universal markedness constraints interleaved with language-specific faithfulness constraints as well as, possibly, other language-specific morphological constraints (e.g. *Double *-ing*, cf. Ross 1972, etc.).

In short, the morphosyntax derives a representation which needs morphophonological instantiation, which it receives via Spell-Out and Vocabulary Insertion. PF is the constraint

ranking which takes the output of the morphosyntax (i.e. spelled-out VI's) to produce the PF output—i.e. the “optimal” output given the input and the language-specific constraint-ranking. We do not need to propose that there is any kind of “infinite candidate evaluation”, but some kind of evaluation must occur to determine the best morphophonological output given the morphosyntactically-constrained input, which is constrained because it obeys locality, adjacency, etc. as Embick 2010 insists.

In sum, in my view one minimal task of the acquirer of a given language, whether a child at L1 acquisition or an adult picking up an L2, is to set the language-specific ranking of the universal markedness constraint set, along with language-specific morphological constraints (such as figuring out which constituents can be delimited as bases for reduplication). All the while, the possible inputs to the morphophonology are themselves constrained by localist considerations being driven by the morphosyntax, in terms of allomorph-selection, etc.

6. Conclusion

In this paper I have contrasted the two competing approaches to reduplication within the theory of DM. Using both conceptual considerations as well as empirical arguments particularly from base-dependence in Tawala durative reduplication, I have argued that the affixation approach has advantages over extant readjustment approaches. In my discussion I have tried to show, contra Embick 2010, that phonology needs to be re-integrated into the grammar of DM. I have proposed to do this by adopting a blended model wherein Morphological Structure is derived via syntactic operations, leading to localist restrictions on allomorph selection due to considerations of adjacency and cyclicity, as proposed in Embick 2010. In my model, though, the output of the morphosyntax, which serves as the input to PF, is somewhat globalist in character, as required by considerations from output-based prosodic morphology like reduplication and mora affixation. Frampton (2009) also countenances a kind of chimerical theory of reduplication within DM, wherein cyclic derivations are combined with an evaluation metric of some kind which selects one optimal output over competing non-optimal outputs given certain conditions and/or constraints. The claim here is that phenomena such as base-dependence, where the form of a reduplicative morpheme hinges on morphological and/or phonological properties of the surface form of another stem (its base), necessitate a distinction between morpheme types along the lines of “base” vs. “reduplicant”, as well as a way of inducing phonological copying of the base to instantiate the phonological form of the reduplicant. This is straightforwardly accomplished using base-reduplicant correspondence in Correspondence Theory but has proven to be problematic for other theories.

Embick 2010 may have provided some compelling arguments against globalist approaches (including serial or stratal globalist approaches) in certain aspects of morphology, including allomorph-selection in particular. However, I have tried to show here that Correspondence Theory gives us important insights into the nature of the relation between the output of the morphology (which is the “input” to PF) and its ultimate surface form (i.e. the “output”) of that PF input. We can, I think, thus re-open Embick’s phonological Black Box and reveal that what lies therein are language-specific rankings of faithfulness and markedness constraints, among other things, which seem to be necessary for an adequate account of aspects of prosodic morphology such as mora affixation and reduplication.

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