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Yidinʸ Apocope and Vowel Lengthening: Phonological Processes without Phonological Rules

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0. Introduction

This paper discusses two phonological processes in the Australian language Yidin^{y}: a rule of apocope, or final vowel deletion, and a rule of penultimate vowel lengthening. I will argue that these processes should be viewed as "repair strategies" triggered by constraints on metrical well-formedness, and that their manner of application follows from principles of constraint conflict, in the spirit of recent work by Carole Paradis--an approach which I will call Constraint-Based Phonology. In contrast, a rule-based account obscures the connection between these phonological processes and metrical well-formedness in Yidin^{y}.

In Constraint-Based Phonology, as proposed in Paradis (1988), context-sensitive language-specific rules are eliminated from the core phonology.[1] Instead, the bulk of phonological processes are viewed as universal, context-free "repair strategies" which seek to preserve language-specific as well as universal phonological constraints on representation. These processes are simply insert α and delete α (where α is any phonological

[1]Paradis allows, however, that morphologized processes, such as velar softening in French and English, must still be stated as context-sensitive language-specific rules.

material, including an associ line).[2]

Constraints in Paradis' ry derive from principles of Universal Grammar and from ne e parameter settings, and usually function as filters i familiar sense, i.e. they rule out ill-formed representatior d block any phonological process which would result in an ill- d representation. Nevertheless, constraint violations, which er the repair strategies, may arise from (a) ill-formed und ng representations, (b) morpho- logical operations which yiel -formed representations, and (c) a conflict between two constr . In Paradis' theory, conflicts between constraints are resol cording to a principle of constraint precedence, such t ot-level constraints are preserved at the expense of s e-level constraints are preserv the expense of skeletal or moraic constraints, etc. How I will reject this idea of constraint precedence in favo principle of "information preservation," which I motiva tentatively formalize in section 3.

1. Data.

The source of these data .M.W. Dixon's Grammar of Yidiny (1977). As can be seen in (1) ds containing an odd number of syllables, whether underlying in the roots in (1a), or by suffixation, as in (1b), under ocope or final vowel deletion, with compensatory lengthening e previous vowel.

(1)	a.	/gindanu/	-->	:n	'moon'
		/dʸambula/	-->	u:l	'two'
		/waŋari/	-->	waŋa:r	'youth'
	b.	/bunʸa-ni/	-->	bunʸa:n	'woman-genitive'
	c.	gindanu-ni			
		dʸambula-ni			
		waŋari-ni			

(1c) suffices to show both that the forms in (1a) must be underlyingly trisyllabic (the additional vowel cannot be epenthetic since its quality would be unpredictable), and that apocope does not occur with even-syllabled words. For both roots and affixed forms, however, the syllable undergoing apocope must be an open syllable beginning with a sonorant, and the previous syllable must also be open, as seen in (2).

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[2]In addition, Paradis allows for the existence of parametrized processes, such as nasal spreading, along the lines of Piggott (1988). That is, UG has a parameter, spread nasal (on/off); if "on" then nasal is spread freely, to the extent otherwise permitted by the grammar.

(2)

a.	/gudaga/	-->	guda:ga	'dog'
			*guda:g	
b.	/bagiram/	-->	bagi:ram	'tea tree'
			*bagi:rm	
			*bagi:r	
c.	/guygal-ni/	-->	guyga:lni	'bandicoot-genitive'
			*guyga:ln	
			*guyga:l	

It should be noted in this regard that in Yidin^{y}, the coda position of the syllable may not contain an obstruent, nor may it contain a consonant cluster.

This brings us to the second kind of alternation found in odd-syllabled words. As may be surmised from (2), when they do not undergo apocope, odd-syllabled words undergo penultimate lengthening, i.e. the vowel in the penult becomes long. The pattern of long vowels in the partial paradigms in (3) suffices to show that this penultimate length cannot be underlying.

(3)

absolutive	genitive	'fear' case
guda:ga	gudaga-ni	gudaga-yi:da
guygal	guyga:l-ni	guygal-yida

2. A Rule-Based Account

To exemplify the rule-based approach, I will briefly discuss the analysis of Yidin^{y} given in Hayes (1982).[3] Hayes' analysis of these data is linked to his analysis of stress assignment in Yidin^{y}. Stress in Yidin^{y} is trochaic, unless there is an even-numbered syllable with a long vowel anywhere within the word, in which case the word is iambic. Hayes posits a stress rule which initially constructs iambic feet over each word, as shown in (4):

(4)

a.	b.	c.
/\ /\ /\	/\ /\	/\ /\
w s w s w s	w s w s	w s w s
d^{y}ambula ŋaln^{y}unda	ga liŋa:d^{y}iŋ	gu lugulu:y

In the event that a strong node dominates a long vowel anywhere within the word, as in (4c), the iambic labelling is preserved. Otherwise, a rule of Stress Shift applies, changing the iambic feet to trochaic feet, as shown in (5).

(5)

a.			
/\ /\ /\		/\ /\ /\	
w s w s w s	-->	s w s w s w	
d^{y}ambula ŋaln^{y}unda		d^{y}ambula ŋaln^{y}unda	

[3] A similar analysis appears in Hayes (1980).

b. /\ /\ --> /\ /\
w s w s s w s w
ga liŋa:d^{y}iŋ ga liŋa:d^{y}iŋ

c. /\ /\
w s w s --> (no change)
gu lugulu:y

Hayes does not formalize the rule of Stress Shift, but it is obvious that such a rule must be quite global, in that it requires examination of the entire word to determine whether any feet contain heavy right daughters.

Hayes' (1982) statement of the penultimate lengthening process is given in (6):

(6) Penultimate Lengthening

$$V \rightarrow V: \; / \; \underset{|}{s} \; \_\_ \; (C)\; X\; \#$$ (where X is a syllable)

The rule is crucially ordered after the initial iambic stress rule, but before Stress Shift, and before apocope, or Final Syllable Reduction as Hayes calls it.

(7) Iambic Stress Assignment
Penultimate Lengthening
Final Syllable Reduction
Stress Shift

Given iambic labelling, the only way a penult can be stressed is if it occurs in an odd-syllabled word, as illustrated in (8):

(8) a. /\ /\
w s w s
gu da ga ni

b. /\
s \
/\ /\ \
w s w s w
gu da ga yi da

Likewise, the only way an ultima can be unstressed is in an odd-syllabled word; hence apocope can be stated as shown in (9).[4]

(9) Final Syllable Reduction

$$V \rightarrow \emptyset \; / \; V \begin{bmatrix} C \\ +son \end{bmatrix} \; \underset{|}{w} \; \#$$

[4]I have simplified Hayes' statement of the rule slightly, to eliminate complications stemming from Dixon's misanalysis of prenasalized stops as clusters, and the bilabial fricative as the glide [w]. See Nash (1979).

Now, let us consider the status of odd-syllabled words in Yidin^{y}. Of the vocabulary items listed in Dixon's grammar, roughly seventy-five percent are even-syllabled; and Dixon notes that eighty-five percent of the words occurring in Yidin^{y} texts are even-syllabled.[5] Odd-syllabled words are made even-syllabled by apocope, if syllable structure so permits; and the remainder undergo penultimate lengthening. These facts certainly suggest that there is a conspiracy surrounding odd-syllabled words in this language. Despite Hayes' indirect reference to metrical structure to simplify the statement of these two rules, the rule-based account has no way of tying these facts together to explain the conspiracy. Furthermore, in Hayes' account, it appears to be an arbitrary fact about the apocope rule that the consonant preceding the deleted vowel must be a sonorant. Thus, Hayes fails to capture the generalization that apocope is blocked when the resulting representation would be syllabically ill-formed. In short, Hayes' analysis provides little insight into <u>why</u> Yidin^{y} has processes of this sort, and how these processes interrelate.

3. A Constraint-Based Account

3.1. <u>Preliminaries</u>. In the following analysis, I will assume the language-specific constraints on mora and syllable structure shown in (10)

(10) a. No obstruents in coda

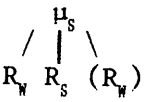
$$* \; R \;]_{\mu}$$
$$-son$$

b. Only vowels are sonorous enough to 'head' mora (i.e. no moraic codas)

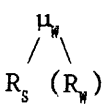
$$* \; R_{S}$$
$$+cons$$

c. Moraic templates (one and only one onset consonant; at most one coda consonant):

i. Head mora



ii. Non-head mora



I assume that moraification, syllabification, and foot construction are all instantiations of the rule <u>insert α</u>, where α is a mora, syllable, or foot, respectively. The insertion process is invoked to repair the "violation" of Prosodic Licensing (Itô 1987) in underlying forms.

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[5]The latter figure is not as meaningful as the former because it includes underlyingly odd-syllabled words which are made even by apocope.

(11) Prosodic Licensing (PL)
All phonological units must be prosodically licensed, i.e., belong to higher prosodic structure (modulo extraprosodicity).

Following Zec's (1988) claim that PL of certain constituents may apply later than PL of other constituents, I propose that, for Yidin^{y}, PL is split up as shown in (12):

(12) a. Cyclic Stratum -- PL of root nodes (mora-ification)
b. Post-Cyclic Stratum -- PL of moras and syllables (syllabification and foot construction)

I further assume that the process of constraint-checking in Yidin^{y} operates from left to right, to account for the manifestation of alternations at the right edge of words.

The starting point of my analysis is the question, Why are odd-syllabled words disfavored in Yidin^{y}? If we assume that the foot template for Yidin^{y} is strictly disyllabic (i.e. no unary feet and no adjunction to feet), it is immediately apparent why this is so: odd-syllabled words cannot be exhaustively parsed into binary feet. A number of considerations support this assumption. First, there are no monosyllabic words in Yidin^{y}: all words have at least two syllables. If, as McCarthy and Prince (1986) have claimed, the minimal prosodic word of a language must be a foot, and if the Yidin^{y} foot is strictly disyllabic, the disyllabicity of these affixes follows. Furthermore, Yidin^{y} has a class of affixes which constitute a separate prosodic word from the stem, and which are uniformly disyllabic. Finally, we must reject the alternative hypothesis that foot construction is a mora-counting process in this language, since even-syllabled words with a long vowel in an odd-numbered syllable (13a) exhibit the same stress pattern as even-syllabled words with no long vowel (13b).

(13) a. wúŋabá:d^{y}in^{y}ú^{n}da 'hunt-antipassive-dat. subord.'
b. d^{y}ámbuláŋaln^{y}ú^{n}da 'two-tr. vblsr.-dat. subord.'

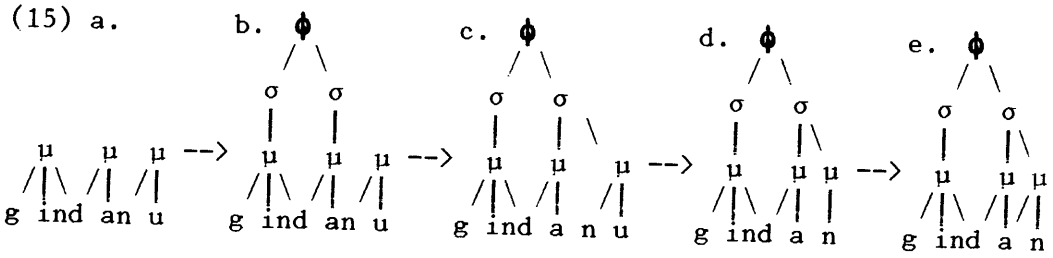
Furthermore, penultimate lengthening occurs even where there is already a long vowel in a previous syllable, as shown in (14).

(14) /burwa-:li-ŋal-na/ --> burwa:liŋa:lna
'jump-going-comitative-purposive'

If penultimate lengthening is related to foot structure, and if foot construction counts moras, we would incorrectly predict such forms to pattern differently from odd-syllabled words without any underlyingly long vowels.

3.2. Apocope. Let us first consider the apocopating forms, such as ginda:n.

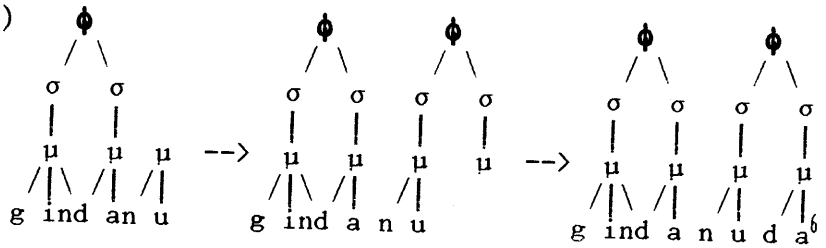
(15) a. b. c. d. e.



The underlying form is moraified on the cyclic stratum (15a), and assigned syllabic and foot structure post-cyclically (15b). The problem is how to license the final mora without violating the strictly disyllabic foot template. Let us assume that the final mora is licensed by linking it to the preceding syllable (15c). But this violates the template for a non-head mora, since its sonority is rising rather than falling. This violation is repaired by deleting the final vowel (15d), i.e. apocope. But now the final mora lacks a head, so it is linked to the preceding vowel (15e), i.e. compensatory lengthening, yielding a well-formed representation.

But why does the grammar choose this set of repair strategies over, e.g. a derivation that inserts an extra syllable, as in (16)?

(16)



The answer lies in the notion of information preservation, which I will formalize as the following principle:

(17) Information Preservation
Given a conflict between two constraints, choose the set of repair strategies involving the least loss of information from the representation.

I propose that information loss is calculated as follows:

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[6] I am supposing that the inserted syllable consists of /da/ simply for the sake of concreteness. The same arguments would hold no matter what the featural content of the CV sequence.

(18) A set of repair strategies is assigned an information loss value of:
a. 2 for each mora deleted or inserted;[7]
b. 1 for each melodic feature deleted or inserted.

I assume that linking and delinking, as well as deletion or insertion of prosodic constituents higher than the mora, are cost-free for purposes of the information loss calculus.[8]

Now, the derivation shown in (15) has the net result, for purposes of this calculus, of deleting the final vowel /u/. I will assume, along the lines of Selkirk (1988), the following featural representation of this vowel:[9]

(19)


Thus, this set of strategies is assigned an information loss value of two: one for deletion of the root node feature [-consonantal] plus one for deletion of the place feature [labial]. Let us compare this with the set of strategies shown in (16). I assume

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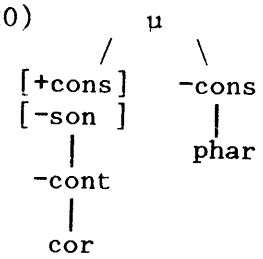
[7]Note that information loss may result from insertion of phonological material as well as deletion. Consider a language in which there are the contrastive underlying forms CVC and CVCa. A rule of final /a/ insertion for consonant-final forms would neutralize this contrast. Thus, a piece of information, the contrast between these two underlying forms, would be lost as a result of this insertion.

[8]This formulation of the information loss metric should be understood as merely an initial stab at the problem. It seems obvious to me that, in some manner, phonological derivations are constrained by the need to preserve information from the underlying representation (cf. Kiparsky's (1973) notion of "opacity"); but I should not be surprised if further research reveals that the details of the calculus worked out here must be elaborated or altered to accommodate the facts of other languages.

[9]Note that Selkirk generally represents the high vowels /i/ and /u/ as containing the primary place feature [dorsal], with [coronal] and [labial], respectively, as dependents. However, in a simple /a,i,u/ system such as Yidiny, there is no evidence that the high vowels function as a natural class; consequently, it is possible in this language to characterize /u/ as a simple labial.

that the inserted material, /da/, has the following representation:[10]

(20)



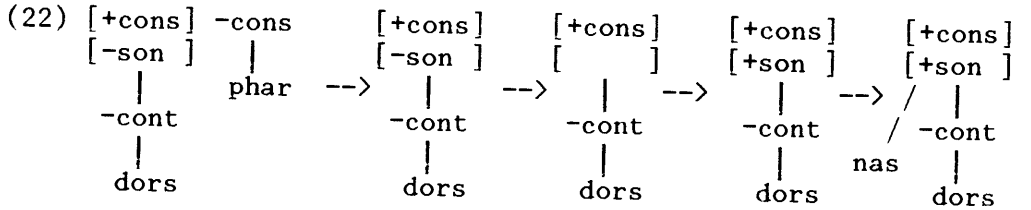
This set of strategies would receive an information loss value of eight: two for the inserted mora plus one for each of the six inserted features. By the Information Loss Principle, a derivation resulting in an information loss value of two (15) is preferred over a derivation resulting in a value of eight (16). Thus, apocope is the correctly predicted result.

3.2. Penultimate Lengthening. In contrast, in the case of the non-apocopating forms, final vowel deletion does not result in well-formed representations:

(21) /gudaga/ --> *guda:g

Recall that (21) is ill-formed, since it contains an obstruent in coda position. One could, of course, imagine further strategies to repair this ill-formedness: the final obstruent could become a sonorant, incorrectly yielding guda:ŋ. As is shown in (22), the information loss value for such a set of strategies is five.

(22)



Instead, let us suppose that the ill-formedness of these non-apocopating words is repaired, as shown in (23), by creating a disyllabic foot, inserting a mora to head the extra syllable, and linking the mora to the penultimate vowel, resulting in penultimate lengthening.

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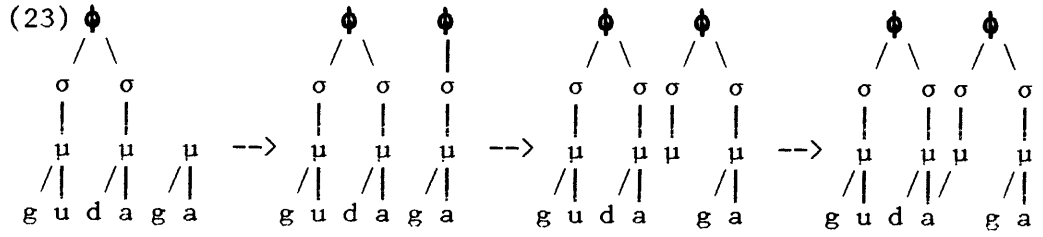
[10]Note that in Dixon's transcription, /b,d,g/ represent voiceless unaspirated stops.

(23)

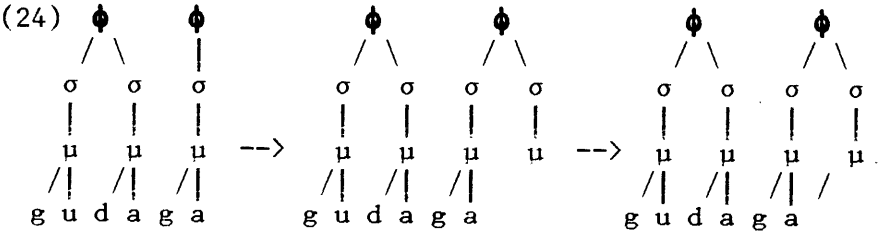


This set of strategies has an information loss value of two (the net effect is the insertion of one mora), and is therefore preferred over the deletion strategy analyzed above.[11]

Note that the resulting representation is not perfectly well-formed, since the additional syllable lacks an onset, in violation of the head mora template. But in fact, I want to claim that this solution is not ideal, since the grammar obviously prefers to resort to apocope when syllable structure constraints so permit, as in (15). That is, the slight ill-formedness of these representations explains why penultimate lengthening is the repair strategy of last resort. And though it initially seems somewhat disconcerting that the grammar could allow the representation to remain ill-formed, if we consider the nature of the onset requirement cross-linguistically, it seems to be inherently a relativized rather than an absolute constraint: a head mora takes an onset consonant if available; if not, a glottal stop is inserted, if the language permits glottal stops; if not, the head mora simply remains without an onset.

One might also wonder why the additional syllable node and mora are not inserted word-finally, as shown in (24).

(24)



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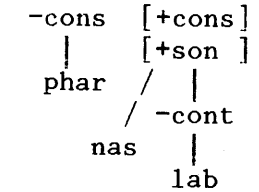
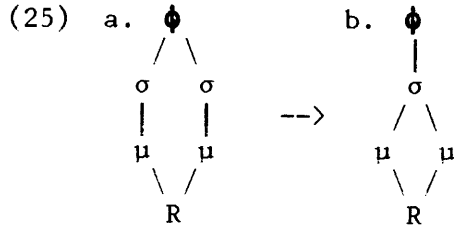
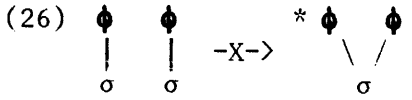
[11] A similar analysis could be made of the other non-apocopating forms. E.g., /bagiram/ --> *bagi:r would involve an information loss value of seven, assuming the following representation of the deleted material:



I assume that the final structure in (24) is ill-formed in that it violates the principle of syllable maximization: that is, given a language which permits syllables with long vowels, the structure in (25a) will necessarily simplify to the structure in (25b).

(25) a. 

in which case the representation still ends up with an ill-formed unary foot. Note that this "collapsing" of two monomoraic syllables into one bimoraic syllable is blocked in (23), since the two syllables in question belong to different feet:

(26) 

I.e., (26) would violate the (presumably universal) prohibition on ambipodal syllables.

Further note that these non-apocopating examples allow us to test the predictions of Information Preservation versus Paradis' (1988) theory of constraint hierarchy and precedence. Paradis' theory predicts that the disyllabic foot template would be preserved at the expense of the moraic templates, and that the moraic templates would then be repaired by deletions of or changes to the melodic material. That is, the constraint precedence theory incorrectly predicts the set of strategies shown in (22), rather than the correct derivation, (23).

4. Apocope and Verbal Forms

The previous discussion has been limited to nominal forms. These generalizations concerning apocope and penultimate lengthening are equally true for the verbal forms, except for the requirement that the syllable preceding the apocopating syllable be open. Curiously, the conjugation class markers, -n, -l, -ṛ, which appear at the end of all verbal roots and derivational verbal suffixes, seem to be disregarded for purposes of this condition on the apocope process, as seen in (27):

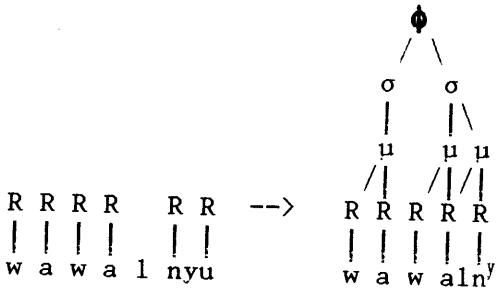
(27) /wawa-l-n^{y}u/ --> wawa:l 'see-past'
/gali-n-n^{y}u/ --> gali:n^{y} 'go-past'
/bad^{y}a-ṛ-n^{y}u/ --> bad^{y}a:ṛ 'leave-past'

Rather, it seems that these forms undergo apocope, and then the

resulting coda cluster is simplified. Note that Hayes' analysis did not attempt to account for these facts.

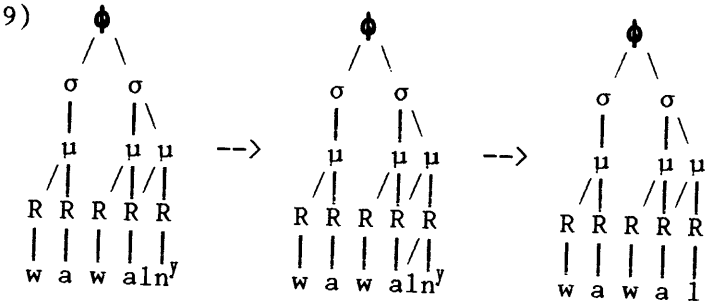
I propose that these conjugation class markers underlyingly lack a root node, and that melodic material does not need to be prosodically licensed by a root node until the post-lexical stratum.[12] Thus, the prosodic constraints and processes behave as though the conjugation class markers were absent during the cyclic and post-cyclic strata.

(28)



On the post-lexical stratum, insertion of a root node to license the conjugation class marker /l/ is blocked by the prohibition on coda clusters. The melodic material of the /l/ is therefore linked to the root node of the following palatal nasal, and the features of the nasal assimilate to the /l/, yielding wawa:l, as shown in (29).

(29)



In a representation which does not undergo apocope, of course, insertion of a root node would not be blocked, since the consonant following the conjugation class marker would belong to a different mora.

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[12]It may be objected that, without a root node to "hold the features together," the floating features of the conjugation marker might dock onto the wrong segment(s) prior to insertion of the additional root node. Of course, this result depends upon one's assumptions about the featural content, geometry, and underspecification of these segments, which in the case of liquids are still poorly understood, and which I will not attempt to resolve in this brief article.

6. Exceptional Non-Apocopating Roots and Affixes

There remain a handful of trisyllabic roots and certain affixes which fail to undergo apocope, instead undergoing penultimate lengthening, even though they appear to meet the syllable shape requirements which characterize the apocopating forms.

(30) a.
mulari	-->	mula:ri	'initiated man'
gud^{y}ara	-->	gud^{y}a:ra	'broom'
galgali	-->	galga:li	'curlew'

b.
-na 'purposive'
-^{n}da 'dative'

/burwa-:li-ŋal-na/	-->	burwa:liŋa:lna	
/gali-n-na/	-->	gali:na	'go-purposive'
/bimbi-^{n}da/	-->	bimbi:^{n}da	'father-dative'

I propose that these exceptional non-apocopating roots and affixes end in a daughterless root node, as shown in (31).[13]

(31) a.
```
R R R R R R R
| | | | | | |
m u l a r i
```
b.
```
R R R R   R R R
| | | |   | | |
g a l i n n a
```

Assuming that this empty root node consists of the features [+consonantal, +sonorant], the information loss value assigned to the set of strategies resulting in apocope would be four rather than two: therefore, by Information Preservation, penultimate lengthening is preferred in these cases over apocope.

7. Conclusion

The foregoing analysis demonstrates that it is possible to take a set of processes which, in a rule-based approach, appear to be quite arbitrary and unrelated, and to derive their effects from the interaction of a relatively small set of constraints on representation, which are independently needed to characterize the mora, syllable and foot structure of the language. This analysis is particularly significant because it overcomes a frequently stated objection to Constraint-Based Phonology: namely, that it is impossible to predict what sort of repair strategy a given constraint violation will trigger, particularly when a single constraint is credited with triggering more than one type of repair

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[13] I am not assuming coronal underspecification; therefore, the empty root node will not receive a default place feature during the course of the derivation. Diachronically speaking, I assume that this empty root node is the remains of a decayed consonant. The general absence of /ŋ/ from underlying root-final position suggests that this may be the consonant in question.

strategy in the same language, therefore phonological processes must still be stated as context-sensitive rules. Rather, I have shown that it is possible to predict the repair strategies by appealing to the notion of Information Preservation.

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