

Ablaut and reduplication in Dakota: Revisiting the phonology-morphology relationship

Jesse Saba Kirchner

University of California, Santa Cruz

1 Introduction

In this paper I present a solution for two intertwined puzzles in the morphophonology of Dakota.¹ There is an active ablaut process in Dakota; this process is lexically conditioned in ordinary circumstances, but just in reduplicative contexts the process becomes partially phonologically conditioned. Another challenge that arises from consideration of this ablaut puzzle is that epenthetic vowels appear to “inherit” arbitrary lexical characteristics from adjacent morphemes – something that is impossible according to mainstream theories of morphophonology. I propose an analysis which expands the power of the morphophonological component of the grammar by allowing such inheritance. Such an analysis allows the ablaut and reduplication facts to fall out straightforwardly. It also deepens our understanding of ablaut and reduplication in Dakota, two of the most important phonological processes in that language.

2 Data

Dakota morphology includes a rich inventory of prefixes, suffixes and infixes; in this paper it is suffixes which are most relevant. Suffixes are also the largest and best-understood class of affixes. Suffixes can be divided into (at least) two classes on the basis of morphological and phonological evidence. In particular, phonological properties of the class of suffixes which occur closest to the root do not hold for suffixes which occur further from the root, and vice versa. For example, suffixes close to the root exhibit *ik* → *ič* palatalization but no palatalization of *ek*. Those further from the root exhibit palatalization of derived *ek* sequences, but no palatalization of *ik* (Shaw, 1980).

I analyze these classes in terms of stem-level and word-level phonology, in the framework of Lexical Phonology (Pesetsky 1979, Kiparsky 1982, Kiparsky 1985). This follows previous attempts to analyze Dakota in LP (e.g. Kiparsky 1986), but I make some crucially different assumptions about the classification of certain morphemes and the analysis of certain phonological processes. My analysis in this paper follows Saba Kirchner (2007), q.v. for more discussion of the different assumptions. I begin here only by claiming simply that all suffixes must belong to the stem-level or word-level, and that different phonologies may hold at those levels. The phonology at any

level will be analyzed in terms of Optimality Theory (OT; Prince and Smolensky 1993/2004, Kiparsky 1997).

A fundamental distinction divides roots into two classes: consonant-final (C#) and vowel-final (V#) (Boas and Deloria, 1941). This distinction is effaced at the surface by a stem-level epenthesis process that adds *a* to C# roots. However, the status of a root as to its underlying form can be distinguished by several means, e.g. stress. Stems built from V# roots exhibit peninitial stress (the default pattern in Dakota), while stems built from C# roots exhibit aberrant initial stress:²

- (1) a. V# words exhibit standard peninitial stress:
 /ap^ha/ → [ap^há] ‘to strike’ (140)
 /t^hǫni/ → [t^hǫní] ‘to be old’ (35)
- b. C# words exhibit initial stress:
 /šuk/ → [šúka] ‘dog’ (32)
 /puz/ → [púza] ‘to be dry’ (32)

See Shaw (1980) for more diagnostics to classify roots, and the various consequences of this distinction in the morphophonology of Dakota.

2.1 Ablaut

An ablaut process changes low vowels *a* or *ǫ* to mid front vowels *e*.³ Ablaut is most often triggered by the addition of a word-level suffix to an *a/ǫ*-final stem, as shown in the examples below. (The following abbreviations are used for glosses throughout this paper: ADV, adversative; HAB, habitual; INT, intensifier; NEG, negative; OPT, optative; PL, plural; REP, distributive/plural inanimate.)

- (2) Ablaut examples:
- | | |
|---|---|
| <p>a. /ap^ha + k’eš/
 strike OPT
 ap^heč’eš ‘would that he struck it’ (131)</p> | <p>c. /sapa + šni/
 black NEG
 sapešni ‘not black’ (129)</p> |
| <p>b. /yatka + xča/
 drink INT
 yatkečča ‘indeed, s/he drank it’ (129)</p> | <p>d. /yuza + šni/
 take.hold NEG
 yuzešni ‘s/he didn’t
 catch it’ (154)</p> |

However, the process is quite restricted. Ablaut can be said to be doubly lexically conditioned, i.e. it occurs only in cases when a suffix from the lexically determined ablaut-triggering class is attached to an stem from the lexically determined ablaut-target class. Neither class can be defined phonologically, as shown by the examples below. In the following chart, suffixes in the first column trigger ablaut, while the (phonologically similar) suffixes in the third column do not:

(3) Unpredictability of ablaut triggerhood: (130 - 134)

<i>Triggers:</i>		<i>Non-triggers:</i>	
-k'eš	'OPT'	-k ^h eš	'but always; whenever'
-šni	'NEG'	-šna	'HAB'
-ʔ	'TERM'	-š	'ADV'

Suffixes which can trigger ablaut may be referred to as triggers, while those that never trigger ablaut may be referred to as non-triggers. The following data illustrate the different behavior of these two classes of suffixes:

(4) Only affixes from the trigger class induce ablaut:⁴

<i>Triggers:</i>		<i>Non-triggers:</i>	
/ap ^h a + k'eš/	→ ap ^h eč'eš	/ap ^h a + k ^h eš/	→ ap ^h ak ^h eš *ap ^h eč ^h eš
/sapa + šni/	→ sapešni	/sapa + šna/	→ sapašna *sapešna

Although not all suffixes trigger ablaut, it is only suffixes which can trigger ablaut. Roots, prefixes and infixes never trigger ablaut.

Similarly, the ability of a particular root to undergo ablaut or not when an appropriate trigger is present is idiosyncratic. The roots in the first column in (5) can undergo ablaut, while those in the third column never can:

(5) Unpredictability of ablaut targetability: (145 - 149)

<i>Targets:</i>		<i>Non-targets:</i>	
ap ^h a	'to strike'	paza	'to part, separate'
sma	'to be deep'	ska	'white, clear'
yatkā	'to drink'	yut ^h ā	'to touch, feel'
kağa	'to make'	čağa	'to freeze'
yahota	'to choke'	ayuta	'to look at'

The susceptibility to ablaut of these two classes (targets and non-targets) is shown by the following data:

(6) Only affixes from the target class allow ablaut:

<i>Targets:</i>		<i>Non-targets:</i>	
/yatkā + k'eš/	→ yatkeč'eš	/yut ^h ā + k'eš/	→ yut ^h ak'eš *yut ^h eč'eš
/kağa + k'eš/	→ kağeč'eš	/čağa + k'eš/	→ čağak'eš *čağeč'eš

Shaw (1980) offers convincing evidence that triggerhood and targethood are completely unpredictable properties (at least within the synchronic grammar of Dakota). There is no phonological generalization that allows morphemes to be predictably assigned to one class or another. There is also no correspondence between ablaut behavior of roots and the status of roots as underlyingly C# or V#. It is not surprising that V# roots would behave idiosyncratically, but it is more interesting that the behavior of C# roots is also unpredictable. In the case of these words, it is the final epenthetic vowel which does or does not undergo ablaut. And not all of these

epenthetic vowels behave the same, as shown in the following data:

(7) C# roots exhibit arbitrary ablaut classification:

	<i>Root</i>	<i>Underlying</i>	<i>Surface</i>	<i>Gloss</i>	
Allow:	$\sqrt{\text{sap}}$	/sapa + šni/	[sapešni]	‘it is not black’	(129)
	$\sqrt{\text{škat}}$	/wo + škata + g/	[woškateg]	‘the game’	(308)
Reject:	$\sqrt{\text{t}^{\text{h}}\text{ak}}$	/t ^h aka + šni/	[t ^h akašni]	‘it is not large’	(121)
	$\sqrt{\text{čax}}$	/čağa + s’e/	[čağas’e]	‘as if frozen’	(153)

Note that this gives further evidence that the conditioning for ablaut is lexical and not phonological. If the conditioning were phonological, and if all epenthetic vowels are phonologically and phonetically equivalent (something that appears to be true in Dakota), then all epenthetic vowels should behave the same way with regard to ablaut.

2.2 Reduplication

There is one reduplicative affix in Dakota with several functions. It may mark distributive aspect on a verb, or agreement with a plural inanimate subject. Following Saba Kirchner (2007) (and contra Kiparsky 1986), I claim that the reduplicative suffix belongs to the word level. Reduplication typically occurs with verbs and deverbal nouns. Some examples are shown in (8) (underlining indicates the position of the reduplicant):

(8) Typical examples of reduplication:

	<i>Root</i>	<i>Stem</i>	<i>Reduplicated</i>	<i>Base gloss</i>	
a. V#:	$\sqrt{\text{uspe}}$	uspe	uspespe	‘to be good’	(329)
	$\sqrt{\text{yamni}}$	yamni	yamnimni	‘three’	(329)
b. C#:	$\sqrt{\text{zuk}}$	zuka	zuku <u>zuka</u>	‘to hang in mucous strings’	(331)
	$\sqrt{\text{ptus}}$	ptuza	ptu <u>ptuza</u>	‘bent over’	(332)

As we can see in these data, the behavior of the reduplicative affix depends on the shape of the stem to which it is added. Specifically, reduplicative patterns differ for V# and C# roots. When added to a V# words, reduplication copies the final syllable of the base form, and is suffixed to the root, e.g. /uspe/ → [uspespe]. With C# words, reduplication acts as if the epenthetic final vowel were not present and copies the final (C)CVC of the root. This copy is infixing within the stem, occurring between the root and the epenthetic vowel, e.g. /zuka/ → [zukuzuka].⁵

The claim that reduplication is infixing in some cases and suffixing in others is not self-evidently true. In particular, in a LP framework, a much simpler alternative appears to be available: treat the reduplicant as a stem-level process. Then the reduplicant can always suffix directly to the stem. Exactly such a proposal is made

Kiparsky (1986), and a similar suggestion is made in Shaw (1980). However, this analysis cannot be correct.

As shown in Albright (2004), reduplication creates codas, which are allowed at the word level but actively avoided at the stem level. Epenthesis occurs only in order to relieve codas, which are disallowed at the stem level but allowed at the word level (as seen from the fact that many consonant-final word-level suffixes surface with no epenthesis). Therefore if reduplication occurred before or at the same level as epenthesis, the codas created by reduplication should be repaired by epenthesis as well.

Furthermore, the reduplicant can occur outside word-level suffixes, e.g. the negative morpheme *šni*:

- (9) /kaḡi + šni + RED/
 hinder NEG distributive
kaḡišnišni ‘not hindered’ (325)

Thus reduplication cannot belong to an earlier level than the word level. (More arguments concerning this claim are given in Saba Kirchner 2007.)

2.3 Interaction of ablaut and reduplication

Ablaut is typically lexically controlled, that is, it occurs only in the presence of a particular class of morphemes. But when reduplicated words are considered for their ability to undergo ablaut, the story changes, and ablaut becomes partially phonologically predictable. V# reduplicated words never undergo ablaut, even if the root belongs to the ablaut target class, and an ablaut trigger is present. For example, the roots *ap^ha* ‘to strike’ and *ḡaska* ‘to be tall’ normally allow ablaut, but reject ablaut when reduplicated:

- (10) V# ablaut target roots do not allow ablaut when reduplicated:

<i>Word level UR</i>	<i>Surface form</i>	
/ap ^h a + RED + šni/	→ [ap ^h ap ^h ašni]	cf. ap ^h ešni (351)
/ḡaska + RED + ?/	→ [ḡaskaskaʔ]	cf. ḡaskešni (351)

By contrast, C# roots retain lexical control over ablaut. Thus the ablaut behavior of words based on these roots remains idiosyncratic, and the presence of reduplication does not affect the possibility of ablaut occurring for a given root:

- (11) C# roots retain lexical control of ablaut targethood:

	<i>Word level UR</i>	<i>Surface form</i>
<i>Root is target:</i>	/√sāpa + RED + šni/	→ [sapsapešni] cf. sapešni
<i>Root is non-target:</i>	/√čaḡa + RED + šni/	→ [čaxčaḡašni] cf. čaḡašni

We are left with two puzzles to solve. First, why is ablaut lexically controlled in some cases and phonologically controlled in others? We need an analysis of the processes of ablaut and reduplication that will allow us to explain the behavior they exhibit separately and when they co-occur, as summarized in the following table:

(12) Ablaut and reduplication:

<i>Root type</i>	<i>e.g.</i>	<i>Ablaut:</i>	
		<i>in simple forms</i>	<i>with reduplication</i>
V# – target:	ap ^h a	✓	*
– non-target:	paza	*	*
C# – target:	kača	✓	✓
– non-target:	čača	*	*

We also have the puzzle of epenthetic vowels that seem to “inherit” idiosyncratic lexical information from adjacent morphemes. We must explain why and how the susceptibility to ablaut of a given root is transferred to the epenthetic vowels which follow them, even sometimes following at a distance (in cases of reduplication).

3 Analysis

As mentioned previously, I claim that epenthesis is a stem level process. Ablaut and reduplication occur at the word level.⁶

3.1 Ablaut

A key insight of Optimality Theory is that phonology should change underlying structures only when under pressure to avoid particular marked structures. When we encounter a phenomenon like Dakota ablaut, we therefore consider whether the process serves to preserve underlying structure, or whether it serves the interests of avoiding a marked structure. In this case the process actually yields a more marked structure than we appear to have begun with – we have exchanged a (less-marked) low vowel for a (more-marked) mid vowel.

Such a situation might appear paradoxical. We can resolve it by treating ablaut as a faithfulness effect rather than a markedness effect. (Though cf. Klein (2000) for a view that attributes lexically-conditioned ablaut in Chamorro to markedness rather than faithfulness.) More specifically, we can analyze trigger suffixes as morphemes whose underlying phonological representation includes an unassociated [-back] feature. The phonology will realize this unassociated or “floating” [-back] by changing a stem-final (low) back vowel into a (mid) front vowel when such a vowel is available; otherwise the feature will be unable to be realized.

It may be objected that this analysis is arbitrary, but in fact it is no more arbitrary than the behavior of the language itself. The fact that the class of triggers and the class of non-triggers cannot be phonologically established means that no

general phonological analysis that avoids lexical stipulation will be possible. This analysis does make use of general phonological devices as far as possible, such as the [-back] feature and the use of general constraints to motivate its behavior. The only stipulation that occurs is the assignment of [-back] to an arbitrary group of suffixes. But this stipulation is therefore taking place in the lexicon: exactly the place where idiosyncratic arbitrary stipulation should occur.

Having analyzed ablaut as essentially a resolution of competing faithfulness claims (changing the quality of a segment to prevent an underlying floating feature from disappearing entirely), we must consider which faithfulness constraints are at play in these cases. The most important constraint that loses out is IDENT[back]:

- (13) IDENT[back]: The specification of a segment for [+back] or [-back] is identical in the input and output.

The most important winning constraint is *FLOAT:

- (14) *FLOAT: No floating features. (cf. Wolf 2006)

Of course many more constraints must be invoked to ensure the proper outcomes here: we need to prevent the floating feature from docking in the suffix or anywhere in the stem except on the final segment; to prevent non-low back vowels from undergoing ablaut; to foreclose Richness of the Base-inspired problems from other floating features causing rampant unattested ablaut-like effects on stem-final vowels; etc. In Saba Kirchner (2007) I lay out the constraints and rankings required to obtain the attested results; here I will simplify matters by only considering IDENT[back] and *FLOAT, which stand in for a block of “losing” and “winning” constraints respectively. (See also Wolf (2006) on the theory and practice of floating features more generally.)

Our basic ranking fact is that *FLOAT must dominate IDENT[back], causing a floating feature to dock on the stem-final low vowel and change its quality. The following tableau shows the core of our analysis of ablaut in Dakota:

- (15) Ablaut occurs when an appropriate suffix is present: *ap^hešni* ‘does not strike’ (underlined segment is linked to underlying floating [-back])

ap ^h a + šni [-back]	*FLOAT	IDENT[back]
a. ap ^h ašni [-back]	*!	
☞ b. ap ^h <u>e</u> šni		*

This analysis (when fleshed out) will account for non-reduplicative cases where ablaut does occur. But what are we to make of the cases where a trigger suffix meets a non-target stem and ablaut fails to occur? Just as with the analysis of triggers, the distinction between targets and non-targets is completely arbitrary. One of these classes should be defined by some common characteristic in the underlying form of

the morphemes that belong to it.

Since ablaut will occur whenever the right environment is present according to the constraint ranking established above, what we need to define is the class of morphemes which do not allow ablaut. Using similar logic to that which we used in the case of triggers, we can analyze these non-targets as morphemes that bear a particular underlying feature. Unlike in the case of the triggers, however, non-targets are best analyzed as having a morphological feature rather than a phonological one. As a mnemonic we can call this feature [-ABL]. (Note that this does not imply the existence of a feature [+ABL]. [-ABL] is a privative feature, and in its absence ablaut will occur whenever the conditioning environment is present.)

Through an indexed constraint IDENT[back]_[-ABL], the phonology is able to make use of this diacritic. This constraint must be ranked as shown in (16). (This is similar to proposals for analyzing lexical strata, e.g. Fukazawa *et al.* 1998, Ito and Mester 1999.)

$$(16) \quad \text{IDENT[back]}_{[-ABL]} \gg *FLOAT \gg \text{IDENT[back]}$$

This ranking yields the attested forms for ablaut-rejecting V# roots:

(17) Ablaut is blocked when root is lexically specified [-ABL]:

pazašni ‘does not part’

paza _[-ABL] + šni [-back]	ID[back] _[-ABL]	*FLOAT	ID[back]
☞ a. pazašni [-back]		*	
b. pazešni	*!		*

A suppletive analysis has been proposed for similar cases of allomorphy, both from the morphosyntactic side (Perlmutter 1988) and the morphophonological (Mester 1994; Mascaró 2007). We might try extending such an analysis to Dakota, to avoid having to make use of morphological diacritics and constraints indexed to them. But the Dakota ablaut process cannot be analyzed as suppletion, for several reasons.

On a suppletive analysis, ablauting roots have two distinct underlying forms. But recall that C# words do not behave predictably under ablaut; their epenthetic final vowel arbitrarily may or may not allow ablaut. C# roots would therefore require three suppletive forms: an *a*-final form for most contexts, an *e*-final form for ablaut contexts, and a consonant-final form for some other contexts like compounding, where no epenthetic vowel is present. This analysis would fail to capture many of the generalizations related to epenthesis in Dakota, and it would trade the stipulation of a morphological diacritic for a huge increase in the number of root forms that speakers must learn. (Additional arguments against a suppletive analysis are presented in Saba Kirchner 2007.)

3.1.1 Morphological affiliation and C# ablaut targets

We are now equipped to consider a basic puzzle that confronts us in these data. It is often assumed that affiliation of phonological material to morphemes is invariable. This is made explicit in OT under the name Consistency of Exponence (CoE; Prince and Smolensky 1993/2004):

- (18) Consistency of Exponence: No changes in the exponence of a phonologically-specified morpheme are permitted.

A corollary to CoE is that epenthetic segments have no morphological affiliation. But this assumption leads directly to incorrect predictions about C# roots. These words surface with a final vowel which does not belong to the root. With no morphological affiliation, these vowels should always behave in the same way, and either all allow ablaut or all reject ablaut.

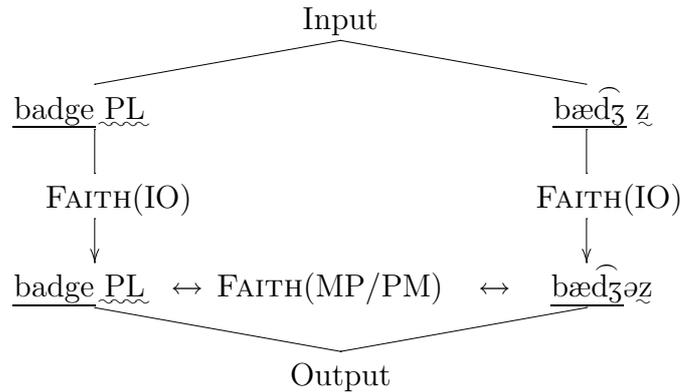
But in fact C# roots determine whether the following epenthetic vowels will allow ablaut or not: e.g. $\sqrt{kag\tilde{a}}$ ‘to make’ is a target, while $\sqrt{cag\tilde{a}}$ ‘to freeze’ is a non-target.

To explain the facts in Dakota, it is necessary to reject CoE. I propose an analysis of Dakota in which morphological affiliation of phonological material is susceptible to manipulation by the phonology (by GEN, in OT terms).

This work joins other analyses which have questioned or rejected CoE, including Walker and Feng (2004), Lubowicz (2005) and McCarthy and Wolf (2007). These authors challenge CoE for different reasons and consequently develop different alternative models. For concreteness, I here follow the “ternary model” of Walker and Feng (2004). The basic tenets of this model can be summarized as follows: Morphemes and phonological structures exist as discrete entities in both input and output. They are affiliated with one another at each level by correspondence, similar to input-output correspondence relations. The input-output (IO) and morphology-phonology (MP) relations are formalized as in standard OT, and governed by the same kind of constraints (although some particular constraints may only exist for one relation and not the other).

The model is exemplified by diagram (19), showing the derivation of the English word *badges*. Note the following typographic conventions, which I will continue to use below: Root, Affix, *unaffiliated segments*. These conventions are used simply as a convenience and they are not a formal part of the representation.

- (19) Correspondence in the morphophonology of *badges*:



It is morphemes, not phonological structures, which bear features like [-ABL].⁷ In order for the phonology to determine whether a particular segment is affiliated with a morphological feature, MP correspondence relations are examined to see if the segment in question corresponds to a morpheme with the appropriate feature.

Walker and Feng (2004) propose a constraint which can compel morphological incorporation of unaffiliated segments, MAX-PM:

- (20) MAX-PM: Every phonological element in the output is indexed with some morpheme in the output.

When this constraint is ranked high enough to be active, it will favor the affiliation of epenthetic segments with some morpheme. In Dakota, it motivates the affiliation of epenthetic stem-final vowels to the roots that they sit adjacent to. Those roots are the bearers of the [-ABL] feature, so when the epenthetic vowel affiliates to them, it will share their behavior: allowing ablaut if no feature is present, but blocking ablaut if the root is specified as [-ABL].

The attested patterns emerge from the ranking in {MAX-PM, *CODA} ≫ DEP, as shown in (21):

- (21) Root affiliation spreads to epenthetic material at stem level: *čaǵa* ‘to freeze’

M: <u>freeze</u> _[-ABL] P: <u>čax</u>	MAX -PM	*CODA	DEP
☞ a. <u>čaǵa</u>			*
b. <u>čaǵa</u>	*!		*
c. <u>čax</u>		*!	

3.2 Interaction of ablaut and reduplication

We turn then to the remaining puzzle about Dakota ablaut. V# words never allow ablaut when reduplicated, while C# words retain lexical control over whether or not ablaut occurs. To explain the behavior of V# words, we can rely on the insight of McCarthy and Prince (1995). They noted that in the case of these words, the reduplicant itself is the morpheme adjacent to an ablaut-triggering suffix. To account for the non-target nature of these stems, it is only necessary to assume that the reduplicant itself has a [-ABL] feature. This is not unreasonable, since all suffixes (or at least all of those which can satisfy the phonological preconditions for ablaut to occur) must be assigned to the target or non-target class, just like roots. The behavior of reduplicated V# roots is straightforward from that point. The failure of ablaut in these words is not due to underapplication: it is due to the ordinary interaction of ablaut triggers and ablaut non-targets.

The underlying form of the reduplicative morpheme is $\left/ \begin{array}{l} \text{M: } \underline{\text{REP}}_{[-\text{ABL}]} \\ \text{P: } \underline{\text{RED}} \end{array} \right/$. The morphological form REP simply points to this particular lexical item. This is distinct from the phonological form, RED, whose output form will be made concrete through the interaction of FAITH-BR constraints (McCarthy and Prince (1995), Spaelti (1999), etc.; though see Raimy and Idsardi (1997), Inkelas and Zoll (2005), and Saba Kirchner (forthcoming) for various theories of reduplication in OT without RED or FAITH-BR.) The constraint rankings we have already motivated will yield the attested outcome, as shown in (22).

(22) Ablaut does not occur with reduplicated V# words:

ap^hap^hašni ‘they do not strike’

M: <u>strike</u> <u>REP</u> _[-ABL] <u>NEG</u> P: <u>ap^ha</u> <u>RED</u> <u>šni</u> [-back]	ID[bk] [-ABL]	MAX -PM	*FLOAT	ID [bk]
☞ a. <u>ap^hap^hašni</u> [-back]			*	
b. <u>ap^hap^hešni</u>	*!			*
c. <u>ap^hap^hašni</u> [-back]		*!	*	
d. <u>ap^hap^hešni</u>		*!		*

The final problem is the C# roots, which retain lexical control even in reduplicative environments. Recall that in these words, reduplicants infix in order to be adjacent to footed material. This sets up quite a different situation from that of the V# words, where the reduplicant sits next to the trigger. In these cases the segment adjacent to the trigger is the epenthetic vowel which became morphologically affiliated with the root at the stem level.

We must consider whether that morphological affiliation is now in jeopardy, because the final vowel has become phonologically non-adjacent to the remainder of the

morpheme. This creates a situation like that shown in the following representation, for the word *čaxčagašni*:

$$(23) \quad / \underline{\text{ča}}\underline{\text{ga}} + \underline{\text{RED}} + \underline{\text{šni}} / \rightarrow \underline{\text{čaxčagašni}}$$

Such a structure is marked in that it includes a discontinuous morpheme. This violates a constraint called MORPHEMELOCALITY (Łubowicz (2005), q.v. for a formal definition):

$$(24) \quad \text{MORPHEME LOCALITY (M-LOC): No discontinuous morphemes.}$$

Along with this constraint are others which exert contradictory forces, such as the previously-introduced MAX-PM. If MAX-PM dominates M-LOC, then the stem-final vowel will retain its affiliation, despite being separated from the rest of its morpheme. (Of course more constraints must also be invoked to give a comprehensive account of this interaction.)

Therefore the presence or absence of [-ABL] in the specification of the root will control ablaut behavior for these forms, just as in the simple forms. Thus we derive the attested behavior for C# reduplicative forms:

$$(25) \quad \text{C\# targets allow ablaut in reduplicated words:}$$

sapsapešni ‘they are not black’

M: <u>black</u> REP NEG [-ABL]	ID[bk] [-ABL]	MAX -PM	*FLT	ID [bk]	M- LOC
P: <u>sapa</u> RED <u>šni</u> [-back]					
a. <u>sapsapašni</u> [-back]			*!		*
☞ b. <u>sapsapešni</u>				*	*
c. <u>sapsapešni</u>		*!		*	

$$(26) \quad \text{C\# non-targets reject ablaut in reduplicated words:}$$

čaxčagašni ‘they do not freeze’

M: <u>freeze</u> REP NEG [-ABL] [-ABL]	ID[bk] [-ABL]	MAX -PM	*FLT	ID [bk]	M- LOC
P: <u>ča</u> ga RED <u>šni</u> [-back]					
☞ a. <u>čaxčagašni</u> [-back]			*		
b. <u>čaxčagešni</u>	*!			*	
c. <u>čaxčagešni</u>		*!		*	*

4 Conclusion

In this paper I offered a solution to two puzzles in the morphophonology of Dakota, namely the apparent inheritance of morphological information by epenthetic segments, and the fact that a lexically-conditioned phonological process becomes phonologically conditioned in certain circumstances. The core insights were formalized in an analysis which dovetails with our understanding of other aspects of Dakota morphophonology, such as the C#/V# distinction.

The major theoretical significance of this analysis is that it calls for the abandonment of Consistency of Exponence, joining other work which has raised the same slogan. This analysis is therefore one in which the phonological component of the grammar has much more power than in standard theories. In this analysis phonology not only can see morphemes, but also can manipulate the relationship between phonological and morphological structures.

This analysis also deepens our understanding of Dakota morphophonology. Ablaut and reduplication are active and very important processes which intersect with many other aspects of Dakota phonology. An analysis of ablaut and reduplication therefore has significant implications for any analysis of those processes. Those implications remain to be investigated.

Notes

¹ Many thanks are due to linguists at UC Santa Cruz who helped me improve this work, including Armin Mester, Junko Ito and Jaye Padgett. All errors in this work are the responsibility of the author.

² Generalizations in this section about Dakota grammar are due to Shaw (1980) except where otherwise noted. All data citations correspond to Shaw (1980).

³ In some dialects, a few suffixes trigger ablaut from low vowels to *i*. In a subset of these dialects, two suffixes trigger ablaut from *a* to *i*. I do not analyze these cases in this paper, but the analysis presented here should be extensible to these cases as well.

⁴ Forms in the non-trigger column of (4) and all forms in (6) and (11) are constructed based on the data and analysis of Shaw (1980).

⁵ Two further sub-patterns occur in the reduplication of C# words, involving the location of primary stress. See discussion in Boas and Deloria (1941), Shaw (1980), and Saba Kirchner (2007). This alternation is orthogonal to the reduplicative properties of interest here.

⁶ There are also two constructions in which ablaut appears to occur at the stem level. They are outside the scope of our interests here, since reduplication never occurs at the stem level and I am not aware of any data bearing on the interaction between reduplication and stem-level ablaut. See Saba Kirchner (2007) for discussion of these facts, and further argumentation for the level assignments of particular phonology and morphology.

⁷ The usefulness of this model is not limited to morphological diacritics. It also offers a principled manner to inform the phonology of morphological information such as whether a morpheme belongs to a particular lexical stratum, and whether it is a root, stem or suffix. See Walker and Feng (2004) and subsequent work for more on the advantages and uses of this model.

References

- Albright, Adam (2004) “The Emergence of the Marked: Root-Domain Markedness in Lakhota.” Handout for talk at LSA.
- Boas, Franz and Ella Deloria (1941) *Dakota Grammar*. United States Government Printing Office.
- Fukazawa, Haruka, Mafuyu Kitahara and Mitsuhiko Ota (1998) “Lexical Stratification and Ranking Invariance in Constraint-based Grammars.” In M. Catherine Gruber, Derrick Higgins, Kenneth Olson and Tamra Wysock, eds., *Proceedings of CLS 34*.
- Inkelas, Sharon and Cheryl Zoll (2005) *Reduplication: Doubling in Morphology*. Cambridge University Press.
- Ito, Junko and Armin Mester (1999) “The Phonological Lexicon.” In Natsuko Tsujimura, ed., *The Handbook of Japanese Linguistics*. Blackwell.
- Kiparsky, Paul (1982) “Lexical Morphology and Phonology.” In I.-S. Yang, ed., *Linguistics in the Morning Calm*. Hanshin Publishing Co.
- Kiparsky, Paul (1985) “Some Consequences of Lexical Phonology.” *Phonology* 2: 85–138.
- Kiparsky, Paul (1986) “Dakota.” Unpublished manuscript.
- Kiparsky, Paul (1997) “LP and OT.” Handout from LSA Summer Linguistic Institute, Cornell University.
- Klein, Thomas (2000) *Umlaut in Optimality Theory: A Comparative Analysis of German and Chamorro*. Niemeyer.
- Lubowicz, Ania (2005) “Morpheme Absorption of Infixes.” Handout for a colloquium at the University of California, Santa Cruz, December 2, 2005.
- Mascaró, Joan (2007) “External Allomorphy and Lexical Representation.” *Linguistic Inquiry* 38(4): 715–735.
- McCarthy, John and Alan Prince (1995) “Faithfulness and Reduplicative Identity.” In Laura Dickey Jill Beckman and Suzanne Urbanczyk, eds., *University of Massachusetts Occasional Papers in Linguistics*.
- McCarthy, John and Matthew Wolf (2007) “Less Than Zero: Correspondence and the Null Output.” In Curt Rice, ed., *Modeling Ungrammaticality in Optimality Theory*.

- Mester, Armin (1994) “The Quantitative Trochee in Latin.” *Natural Language & Linguistic Theory* 12(1): 1–61.
- Perlmutter, David (1988) “The Split Morphology Hypothesis.” In Michael Hammond and Michael Noonan, eds., *Theoretical Morphology: Approaches in Modern Linguistics*. Academic Press, 79–100.
- Pesetsky, David (1979) “Russian Morphology and Lexical Theory.” Unpublished manuscript, Massachusetts Institute of Technology.
- Prince, Alan and Paul Smolensky (1993/2004) *Optimality Theory*. Blackwell.
- Raimy, Eric and William Idsardi (1997) “A Minimalist Approach to Reduplication in Optimality Theory.” In K. Kusomoto, ed., *Proceedings of NELS 27*.
- Saba Kirchner, Jesse (2007) “Is Any Theory Enough? Building a Comprehensive Analysis of Dakota Morphophonology.” Unpublished manuscript, University of California, Santa Cruz.
- Saba Kirchner, Jesse (forthcoming) *Minimalist Reduplication*. Ph.D. thesis, University of California, Santa Cruz.
- Shaw, Patricia (1980) *Theoretical Issues in Dakota Phonology and Morphology*. Garland Publishing.
- Spaelti, Philip (1999) *Dimensions of Variation in Multi-Pattern Reduplication*. Ph.D. thesis, University of California, Santa Cruz.
- Walker, Rachel and Bella Feng (2004) “A Ternary Model of Morphology-Phonology Correspondence.” In Vineeta Chand, Ann Kelleher, Angelo J. Rodríguez and Benjamin Schmeiser, eds., *Proceedings of WCCFL 23*. Cascadia Press.
- Wolf, Matthew (2006) “For an Autosegmental Theory of Mutation.” ROA 754-0705.