



1972

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Recommended Citation

Rhodes, Richard (1972) "Cheyenne vowel devoicing and transderivational constraints," *Work Papers of the Summer Institute of Linguistics, University of North Dakota Session*: Vol. 16, Article 7.

DOI: 10.31356/silwp.vol16.07

Available at: <https://commons.und.edu/sil-work-papers/vol16/iss1/7>

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Cheyenne Vowel Devoicing
and
Transderivational Constraints

Richard Rhodes

This brief paper is largely an exercise in lily-gilding, building upon Frantz's insightful analysis of Cheyenne phonology.¹ What I will attempt to do in this paper is to rework some of his rules relating to the devoicing of vowels and raise some questions as to whether these rules confirm the need for a controversial device in the theory of grammar.²

In the feature system that I will use here, Cheyenne has the following specifications for systematic phonemes (given here are only the relevant features for the purposes of this paper).

The Systematic Phonemes of Cheyenne³

	ʔ	h	a	o	e	m	n	p	t	k	s	x	w
syllabic	-	-	/	/	/	-	-	-	-	-	-	-	-
consonantal	-	-	-	-	-	/	/	/	/	/	/	/	/
obstruent	-	-	-	-	-	-	-	/	/	/	/	/	-
nasal	-	-	-	-	-	/	/	-	-	-	-	-	-
continuant	-	/	/	/	/	-	-	-	-	-	/	/	/
voiceless	/	/	-	-	-	-	-	/	/	/	/	/	-
high	-	-	-	/	/	-	-	-	-	/	-	/	/
back	/	/	-	/	-	-	-	-	-	/	-	/	/
apical	-	-	-	-	-	-	/	-	/	-	/	-	-
labial	-	-	-	/	-	/	-	/	-	-	-	-	/

Now there are essentially three principles governing the devoicing of vowels in Cheyenne.

$$(1) \quad \check{V} \rightarrow [/\text{vls}] / \{ [/\text{cons}], / \} \text{ — } \left[\begin{array}{l} -\text{cont} \\ / \text{obs} \end{array} \right] \text{e}$$

(Unaccented vowels devoice before pe, te, and ke if they are the first segment of a morpheme, or if they follow a true consonant.)

$$(2) \quad \check{V} \rightarrow [/\text{vls}] / \text{pre-pause}$$

(An unaccented vowel devoices before a pause.)

(3) $\dot{V} \rightarrow [/\text{vls}] / [/\text{cons}] \text{ — } \begin{bmatrix} -\text{syl} \\ / \text{cont} \end{bmatrix}$

(An unaccented vowel is devoiced before an s, x, or h if it follows a true consonant.)

As these rules stand, they are slightly too strong. For example, it is not totally clear whether rule (1) should not be constrained to apply only when the e in the environment is the last segment of a morpheme or not. At the moment, however, clear counterexamples are lacking in my data, so I leave the rule as is. Examples of the action of these rules is given below.

(4) Rule (1)

tapéno	[tApéNO]	'flute'
ná- <u>o</u> ke-mésehe	[náOk ^y emēseE]	'I regularly eat'
móte <u>ke</u>	[mótsék ^y E] ⁴	'knife'
men- <u>o</u> te	[meNOtsE]	'chokecherries'

(5) Rule (2)

ná-mét- <u>o</u>	[námētO]	'I give it to him'
cf.		
ná-mét- <u>o</u> móteke	[námétomōtsék ^y E]	'I give him (the) knife'

(6) Rule (3)

ko <u>s</u> án-e	[kOsáNE]	'sheep (obj.)'
ne-xé-o ^o	[NEšéyo ^o O]	'your uncles'
é-nót <u>a</u> x-ewe	[^o énótAxepE]	'he is (a) scout'
ma <u>h</u> ta ^o sóoma	[MAta ^o sóoMA]	'shadow'

Notice, however, that the forms in (7) fail to undergo the rules as expected; namely, they do not undergo rule (3).

(7) (a) ko <u>s</u> a	[kosA]	'sheep'
ne- <u>x</u> e	[nešE]	'your uncle'
ma <u>h</u> pe	[maApE]	'water'
(b) ha <u>t</u> ehke	[hatšešk ^y E]	'ant'
óko <u>h</u> ke	[^o ókoxk ^y E]	'crow'
(c) a <u>e</u> noho	[^o aénoO]	'hawk'
ná <u>h</u> kohe	[náAkoE]	'bear'

From these examples it appears that we can simply remedy that by ordering (2) before (3), and adding onto (3) the condition

(3') Rule (3) does not apply unless there is a voiced vowel in the following syllable.

So, for example, in the derivation of kosa (from (7a)) rule (3) could not apply.

(8) UF kosa
 (2) kosA
 (3) does not apply
 Surface kosa

Now then, to get a form like na-htahtoóno [NAtAtoóNO] 'my spine' we have to specify rule (3) as

(3'') Rule (3) applies iteratively from left to right.

But this doesn't mean much, since there is ample reason to believe that all phonological rules apply either iteratively from left to right or iteratively from right to left. So all we've done is to figure out which of these two kinds of rules this one is.

(9) UF na-htahtoóno
 (2) nahtahtoóno
 (3) 1st application nAhtahtoóno
 2nd application nAhtAhtoóno
 Other rules NAtAtoóNO

However, there are several serious problems with the approach. For example, two syllable words, like those in (7a) still do not undergo rule (3) even if they fail to undergo rule (2) because they are not pre-pause. In fact, it is true of all the words in (7) that they do not undergo rule (3) even if they fail to undergo rule (2).

(10) mape éwoohta [maApe[?]éwooQtA] 'he sees the water'
 toxeha o[?]he[?]e [tOx^Weha[?]o[?]he[?]E] 'near the river'

And condition (3') will not derive héhtohkoxe [héstoxkOx^WE] 'his axe' correctly.

(11) UF	héh-tohkoxe
(2)	héhtohkoxE
(3) 1 st application	héhtOhkoxE
2 nd application	does not apply
Other rules	*héstOkox ^{WE}

There are a large number of forms which have the second last syllable voiceless by virtue of the application of rule (3) like this last form. Then even if there were some way to get the vowel in the second last syllable to devoice correctly, condition (3") would run amuck as (11) also shows.

But the situation is worse yet. Consider the forms in (12).

(12) aénoho	[ʔaéno0]	'hawk'
aénohó	[ʔaénNó]	'hawk (obj.)'

This seems to confirm our original hunch that the devoicing of the final vowel is somehow involved. In the form aénoho the final o may be devoiced by rule (2) so the o in the previous syllable may not be devoiced. But in aénohó the final o may not be devoiced by rule (2) and so the o in the previous syllable may be. So I will propose the following notion for Cheyenne.

- (13) A vowel is devoiceable if it is unaccented and is the last vowel of a word, i.e. if in some derivations of the word it will be devoiced by rule (2).

We will adjust the conditions on rule (3) as follows.

(3''') Rule (3) is iterative from right to left.

(3''''') (i) Rule (3) does not apply unless there is a voiced, non-devoiceable vowel in an adjacent syllable, i.e. does not apply in two syllable words.

(ii) Rule (3) does not apply if the following two vowels are both voiceless, or if one is devoiced and the next devoiceable.

(iii) Rule (3) does not apply to vowels before h if the following vowel is either devoiced or devoiceable.

The following derivations show the effect of these constraints when the words are derived a though they were phrase medial and rule (2)

is therefore not applicable. The words are hohkoxe 'axe', hohkoxete 'axes', héhtohkoxe 'his axe', héhtohkoxewa 'with his axe', aénoho 'hawk', aénohó 'hawk (obj.)', toxeha 'near', hatehke 'ant', mahpe 'water', mahpete 'waters', mahpewa 'in (the) water'.

(14) UF	hohkoxe	hohkoxete	héhtohkoxe	héhtohkoxewa
(1)	--	hohkoxEte	--	--
(3) 1 st	hohkOxe	d.n.a.(ii)	héhtohkOxe	héhtohkOxewa
(3) 2 nd	--	--	d.n.a.(ii)	héhtOhkOxewa
Other rules	hoxkOx ^W e	hoxkox ^W Etse	héstoxkOx ^W e	héstOkOx ^W eə
UF	aénoho	aénohó	toxeha	hatehke
(1)	--	--	--	--
(3) 1 st	d.n.a.(iii)	aénOhó	d.n.a.(iii)	d.n.a.(iii)
(3) 2 nd	--	--	tOxeha	--
Other rules	ʔaénoho	ʔaénNó	tOx ^W eha	hatšešk ^Y e
UF	mahpe	mahpete	mahpewa	(d.n.a. = does not apply, (i) means because of (3''')(i), likewise (ii), and (iii))
(1)	--	mahpEte	--	
(3) 1 st	d.n.a.(i)	d.n.a.(ii) or (iii)	MAhpewa	
(3) 2 nd	--	--	--	
Other rules	maApe	maApEte	MApeə	

At this point it is worth pointing out that a devoiced vowel and a voiceless vowel act identically in all three of the constraints on rule (3) expressed in (3'''). This appears to be an excellent instance of a transderivational constraint. Here the effect of a rule is felt in a derivation where the rule does not apply, but it is felt because there are other similar derivations of the same morpheme in which the rule must apply.

Footnotes:

1. Frantz, Donald G. "Cheyenne Distinctive Features and Phonological Rules" IJAL 38.1 pg.6-13.
2. I would like to thank Don Olson for making available to me his Cheyenne data.
3. Space does not permit me to argue that x and ǰ are the same underlying phoneme, more than to say that they never contrast in stems. However, the argument of this paper does not depend on this assumption.
4. I have left out a late rule of s-gobbling for clarity's sake.