ON LIMITING ORGANIC DEVOICING IN COMANCHE

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In this paper, which extends and refines some of my earlier work, I want to show that reasonable promise is shown by a relatively superficial approach to the major unresolved problem in the analysis of Comanche's voiceless vowels. The problem is one of opacity created by a simple change in the consonant system while part of the Shoshoni dialect chain was splitting off to become Comanche. To the present, Shoshoni's voiceless vowels remain predictable at a fairly shallow level of representation compared to those of Comanche (Miller 1973). The old controversy over Comanche's vowels need hardly be referred to except to emphasize that much of it had to do with the appeal of "novel" phonological data and tacit assumptions about the type and interplay of formal mechanisms for expressing regularity (Jakobson, Fant and Halle 1952:26; Canonge 1957).

In Shoshoni, voiceless vowels are intimately related to an extensive pattern of consonant gradations conditioned by a preceding voiced vowel, /n/, /h/, or voiceless stop indeterminate for point of articulation (Miller 1972). (Morphemes ending in these segments are referred to as spirantizing, nasalizing, aspirating and geminating, respectively, terms that are also applied to Comanche despite little synchronic rationale for their use.) Under certain conditions the /h/ redundantly devoices a preceding vowel, with about half a dozen morphemes also showing devoicing between a geminate and /s/ (Wick R. Miller, p.c.). In word-final position, and in certain other contexts, the three consonants listed above do not surface.

Comanche exhibits a very restricted version of Shoshoni's consonant gradation system. At the same time, however, there has been a great expansion of the contexts in which voiceless vowels are predictable. In a less striking way, the pattern of [ʧ]/zero alternation has shifted as well.

Current understanding does not allow unequivocal statements about Comanche's underlying segments and their relationship to the roughly systematic phonetic transcription used here and found, for example, in Canonge's *Comanche Texts*.[1] For the purpose of this paper I assume the following systematic phonemes:

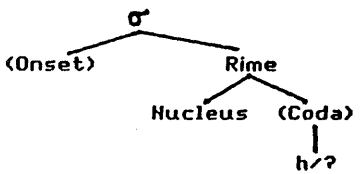
1)

p	t	c		k	k^w	?
	s					h
m	n					
			y		w	
			i	ɨ	u	
			e	a	o	

Surface [β] and [ɾ] are here assumed to be predictable spirantized versions of /p/ and /t/, respectively.

Underlying vowels may cluster to a maximum of three segments. Clusters of two identical vowels are realized phonetically as a long vowel; the only three-vowel clusters are /aai/ and /ooi/, both quite infrequent. There are no surface consonant clusters of any type except for those having [h] or [?] as the first element. Surface syllables therefore have the structure given in (2), where the rime and nucleus are obligatory and the onset and coda are optional.

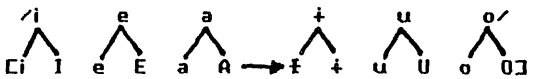
2)



The simplest assumption is that (2) holds not only for the surface but also for the deepest level at which the syllable structure of each morpheme is represented. In the overwhelming number of cases this assumption appears to be justified, although there are a few exceptional grammatical morphemes such as the nominalizing suffix /?/ and the definitizing prefix /s/. A small number of important nominal and verbal suffixes with /CCV/ structure will be discussed below.

The inventory in (1) implies that all voiceless vowels are predictable, a reasonable working hypothesis given the known history of the language. The voiced/voiceless alternations to be discussed here are schematized in (3). Capitals represent voiceless vowels.

3)



Each underlying vowel regularly has two surface manifestations differing only in voicing. However, it should

be noted that [A] regularly raises to [ɨ] except following a glottal (e.g. ['nakɨci] 'having heard' but ['mi?Aci] 'having gone'). I will not comment further on an insignificant number of forms with voiceless vowels of unpredictable timbre.

The vast majority of words are predictably stressed on the first syllable, excluding proclitics:

4) tai='nakɨci 'having heard us'
ta='na?ɾenahpɨ? 'one's male relative'
'suhka taa='tɨhkaɾu?Iha 'when we will eat that'

A number of words, some native and others borrowed, have lexical stress on a noninitial syllable. Regardless of the location of primary stress, an older alternating stress pattern exhibited in one way or another by Shoshoni and closely related languages has virtually disappeared in Comanche.

There are two types of vowel devoicing, commonly referred to as organic and inorganic. Inorganic devoicing, which will not concern us here, is optional and affects only prepausal vowels. Organic devoicing is obligatory and conditioned by a following voiceless continuant within the same word, giving rise to the voiceless vowels noted in (3). It does not affect vowel clusters of any type, nor does it affect vowels protected by stress. Examples of conditioning by /s/ and /h/ are given in (5) and (6), respectively. Note that the larger contexts are virtually identical in the two sets, differing only as constrained by the syllable structure given in (2).

5)	'?omo-ma 'by foot'	'?omo-mɨ-sɨ 'still by foot'
	'kasa 'wing'	'ka-kɨsa 'wing (REDUP)'
	'tosa 'white'	'to-tOsa 'white (REDUP)'
	'pɨmɨ 'themselves'	'pɨmɨ-su?a 'themselves also'
	'tɨkɨ-noo 'to carry food'	'tɨkɨ-sona 'to spread a foodcloth'

6)	'tɨ-hoɾa 'to dig'	'ku-tɨ-hoɾa 'to dig a firepit'
	'?ɨhɨ 'blanket'	'wana-?ɨhɨ 'cloth blanket'
	'caka 'to lead'	'cakɨ-hu-yɨka 'to round up'
	'kohno 'cradle'	'haβi-kOno 'night cradle'
	'nakIh-a 'ear (OBJ/POSS)'	's-u-kɨh-u '(to) there'

The data suggest a rule along the lines of (7).

7) $\begin{bmatrix} V \\ -\text{stress} \end{bmatrix} \rightarrow [-\text{voice}] \; / \begin{bmatrix} V \\ +\text{voice} \end{bmatrix} C_1 \_\_\_\_ \begin{bmatrix} +\text{cont} \\ -\text{voice} \end{bmatrix}$

The consonant(s) on the left in the environment will prevent application to clustered vowels; as noted above, these do not devoice. The preceding vowel in the environment guarantees nonapplication to irregularly stressed forms such as the following:[2]

8) ʔu'suni 'always' wa'saasiʔ 'Osage'
pih'naaʔ 'sugar' pi-sikʷa'nuuʔi 'to slide sitting'

With this brief overview of organic devoicing, I now turn to the principal defect in the analysis as so far presented. In contrast to (6), note that devoicing is not conditioned by the following continuant in data of the following sort:

9) 'na-ɾɨhka-ʔ 'groceries' 'tena-hpɨʔ 'man (ABSOLUTIVE)'
'ʔɨ-tuhka 'under you' 'woβi-hta 'wood (OBJ/POSS)'
'tɨ-cih-kaʔa 'to cut off' 's-i-tɨ-hciʔ 'this one (DIMINUTIVE)'

The /h/ of [ˈkohno] 'cradle', which conditions devoicing in (6), is from a different historical source than those in (9), which have no effect on a preceding vowel. Specifically, the Shoshoni form for 'cradle' is identical to the Comanche while the forms for 'under', for example, are [tukka] and [tuhka] respectively. Similarly, the Shoshoni suffix corresponding to that on the form for 'wood' in (9) is [tta]. We see here the effect of the diachronic change hinted at earlier, namely a rule changing geminates into clusters of glottal continuant plus stop.

There are a number of logically possible phonological solutions to this problem of opacity. Among others, one might distinguish two sources for surface [h] in an analysis involving ordered rules and absolute neutralization. For example, one could hypothesize a loosening of underlying syllable structure to allow stop codas of all types in addition to /h,ʔ/. In particular, Comanche might have underlying geminates parallel to the historical sources, giving derivations such as the following (Miller 1973). (The deeper source of [β] and [ɾ] is ignored here. I discuss h-deletion below.)

		'night		
10)	/haβi-kohno/	cradle'	/na-ɾɨkka-ʔ/	'groceries'
stress	'		'	
devoicing (7)	0		- - -	
degemination	- - -		h	
h-deletion	0			
	[ˈhaβikOno]		[ˈnaɾɨhka?]	

On the other hand, one might wish to maintain the original constraint that a glottal is the only possible coda. We could do this while increasing the inventory of underlying segments to include the voiced counterpart of /h/, namely /ɦ/. Then the forms in (10) would have the following derivation:

11)	/haβi-kohno/	/na-ɾɨɦka-ʔ/
stress	'	'
devoicing (7)	0	- - -
/ɦ/ devoicing	- - -	h
h-deletion	0	- - -
	[ˈhaβikOno]	[ˈnaɾɨhka?]

Ignoring substantive questions concerning absolute neutralization and relative lack of motivation, for present purposes we can assume that derivations such as (10) and (11) are at least made possible by general linguistic theory. That is, let us say that (10) and (11) are available to us on condition that we cannot find another analysis that does not raise these or similar questions. With this in mind, I wish to turn now to a third type of phonological solution to the problem posed by the data considered here. It may turn out in the long run that the following analysis cannot be maintained. Nevertheless, it deserves attention at least and should not be dismissed out of hand.

Returning to an examination of data exhibiting organic devoicing in contrast to other data in which vowels are voiced, it may be noted that in (6) the /h/ that triggers devoicing is followed by either a sonorant or a morpheme boundary. In (9), however, which exhibits no devoicing in the relevant locations, surface [h] is followed by an intramorphemic stop. The conditions are therefore complementary, and we might hypothesize that devoicing is sensitive to conditions on the right of the triggering voiceless continuant. Thus devoicing rule (7) may be reformulated as (12).

12) $$\begin{bmatrix} V \\ -\text{stress} \end{bmatrix} \rightarrow [-\text{voice}] \; / \begin{bmatrix} V \\ +\text{voice} \end{bmatrix} C_1 \_\_\_\_ \begin{bmatrix} +\text{cont} \\ -\text{voice} \end{bmatrix} \begin{Bmatrix} [+\text{son}] \\ \# \end{Bmatrix}$$

Illustrating with the forms considered immediately above, the derivation will now proceed as follows:

13)	/haβi-kohno/	/na-ɾ+hka-ʔ/
stress	'	'
devoicing (12)	0	- - -
h-deletion	0	- - -
	[ˈhaβikOno]	[ˈnaɾ+hka?]

This analysis has obvious advantages over the alternatives sketched above and would without doubt be selected on general principle if it were the case that all possible data conformed to what has been considered to this point. Disregarding certain apparent or real exceptions that I have discussed elsewhere (Armagost 1986 and in press), however, there are three additional problems that must be resolved. I will turn to these after briefly filling out the present analysis by characterizing the conditions under which /h/ fails to surface.

Consider the following in which [h] alternates with zero:

14)		
	'tɨhka 'to eat'	'tɨkɨ-ci 'having eaten'
	'tunehcɨ 'to run'	'tunecɨ-ci 'having run'
	-kuhpa 'inside'	-kupɨ-sɨ 'still inside'
	'cah-toʔi 'to pull up (SG)'	'ca-pɨhe 'to take off (SG)'

The first three lines show loss of a morpheme-medial coda /h/ conditioned by a following voiceless vowel.[3] The last line illustrates similar loss of /h/ from an instrumental prefix ('by hand'). This again appears to be loss of an underlying coda; we return to this point below. In all these cases it can easily be shown that we have loss and not insertion of /h/, i.e. [ˈnakɨci] 'having heard' but [ˈnaka], not *[ˈnahka], 'to hear'. I therefore formulate the following rule of h-deletion ordered after devoicing.

15) $h \rightarrow 0 \; / \_\_\_\_ \; C \begin{bmatrix} V \\ -\text{voice} \end{bmatrix}$

But /h/ is also deleted in the following forms:

16) 'kohno 'cradle' 'haβi-kOno 'night cradle'
'kahni 'house' 'soo-kɨni 'village'
'kuhma 'husband' 'ku-kUma 'husband (REDUP)'
'yahne 'to laugh (SG)' 'na?-yɨne 'to laugh (PL)'

I will account for this loss of /h/ by rule (17), which again must obviously follow devoicing.

17) $h \rightarrow 0 / \begin{bmatrix} V \\ -voice \end{bmatrix}$ ____ [+son]

Finally, the following forms show an additional environment in which /h/ fails to surface:

18) 'nakI 'ear' 'nakI-nɨkʷɨ 'ears (DL)'
'nakI-ma 'with the ear' 'nakI-kuhpa 'inside the ear'
'nakI-ka 'at the ear' 'kahni-kɨ 'at the house'
'nakIh-a 'ear (OBJ/POSS)' 'kahni-kɨh-u 'into the house'

Morpheme-final /h/ deletes under all circumstances, whether having triggered devoicing or not, except before a following vowel (compare prevocalic morpheme-initial and -medial /h/ in (6), which also surfaces). Rule (19), again following the devoicing rule, expresses this loss of /h/.

19) $h \rightarrow 0 /$ ____] (CC)

In what follows I will refer to (15), (17) and (19) collectively as "h-deletion".

Returning now to the general discussion of conditions under which voiceless vowels are predictable, I will briefly discuss three types of problematical data and argue that two minor readjustment rules are capable of resolving most if not all the difficulties raised.

Consider first the behavior of ten so-called "alternating suffixes" (see Table 1, next page). To illustrate with the dependent clause suffix seen in (14), we have:

20) 'naka 'to hear' 'nakɨci 'having heard'
'maka 'to feed' 'makahci 'having fed'

Lexically, verb stems have no final codas: the citation forms all end in voiced vowels. As strongly suggested by (20), these stems must be lexically marked in virtually

a. Motion

-hki 'come	-kʷai 'move about, come
-kʷa 'go'	and go'

b. Other

-hci DEP CL (same subj.)	-hka DEP CL (diff. subj.)
-hkat+h TEMPORARY STATE	-hka STATIVE
-hp+ni INTENSIVE	-ht+ki INCEPTIVE
-htai 'finally, for good'	

Table 1. Alternating suffixes

every synchronic grammar to select one form or the other of the alternating suffixes.[4]

Note that one alternate of the suffix in (20) has a surface [h] that fails to induce devoicing of the stem-final vowel. Given the above analysis of devoicing and h-deletion, this alternate must be /hci/, a nonproblematical form except in that it is one of a very small number of morphemes that violate the severe restriction on the deepest representation of syllables discussed at (2).

The other alternate gives rise to forms that are phonetically comparable to those in (18). The correct surface form in this case would follow directly from the present analysis if the /h/ of the suffix were on the other side of the morpheme boundary, e.g. /nakah-ci/ 'having heard'. I therefore hypothesize the following readjustment rule sensitive to some lexical feature [A] that represents the subcategorization of verb stems mentioned above. (Let us arbitrarily say that /naka/ is a [+A] stem and /maka/ is a [-A] stem.)

21) . . .] [h → . . . h] [0
[+A] [+A]

Given readjustment rule (21), derivations will proceed as follows:

22)	/naka-hci/	/maka-hci/
	[+A]	[-A]
rule (21)	h-	- - -
stress	ˈ	ˈ
devoicing (12)	ǂ	- - -
h-deletion (19)	0	- - -
	[ˈnakǂci]	[ˈmakahci]

Similar to the righthand column of (22), derivations involving the three nominal suffixes seen in (9) and repeated in (23) will procede in a straightforward manner. These suffixes have a partially unpredictable underlying syllable structure just like the alternating verbal suffixes, but no rule affects their /h/.

23) /hpǂ?/ ABSOLUTIVE, e.g. [ˈtenahpǂ?] 'man'
/hta/ OBJ/POSS, e.g. [ˈwoβihta] 'wood (OBJ/POSS)'
/hci?/ DIMINUTIVE, e.g. [ˈsitǂhci?] 'this one (DIMINUTIVE)'

Turning now to the second class of forms that are problematical for the general analysis of devoicing presented here, attention must be focused on the old geminating morphemes mentioned earlier. A fairly small number of morphemes are of this type, including most of the instrumental prefixes (see Table 2, next page).[5] Part of the problem is illustrated by the following forms having an instrumental prefix 'by hand':

24)

'cah-paki 'to cling'	'ca-yaa 'to carry (SG)'
'cah-ka?a 'to cut'	'ca-hima 'to carry (PL)'
'cah-tǂki 'to set down (SG)'	'ca-su?ne 'to scrape'
	'ca-?ika 'to enter carrying (SG)'
'cah-cu?ma 'to finish up'	'ca-wekʷi 'to enter carrying (PL)'
'cah-niǂa 'to lift'	'ca-nua 'to move'

In general, the historically geminating forms show a surface [h] before any noncontinuant obstruent and no [h] before sonorants and /s/. (I will ignore the situation before nasals, which present difficulties even beyond that seen here.) The possibility of accounting for lack of [h] in the righthand column by h-deletion is illusory: none of the h-deletion rules considered above is capable of correctly sorting out the two columns in (24).

a. Instrumental prefixes

kɨ- 'with mouth, teeth'	sɨɨ- 'with feet'
ci- 'with sharp point'	mu 'with mouth'
to- 'with violent hand'	ta- 'with foot, leg'
ni- 'with speech'	pi- 'with buttocks'
ku- 'with fire, heat'	wɨ- 'with body, sideways'
ca- 'with inward, upward hand'	
(but not /ma/ 'with hand')	

b. Other

pasa 'to dry'	(only in compounds)
waci 'to be out of sight) (")	
nana- 'collective kinship, in-group'	
tɨkɨ- 'for food, eating'	
waa 'cedar'	caa 'good'
tosa 'white'	ʔeka 'red'
etc. (an unknown number)	

Table 2. Geminating morphemes

In fact, it is easy to see that there would be an ordering problem if we were to pursue the possibility of accounting for (24) by h-deletion, which must follow the devoicing rule. Since devoicing is blocked by stress in (24), however, we must examine other forms such as [ˈwacih-puni] 'to watch from hiding' in order to appreciate the difficulty posed by the geminating morphemes. We must account for the fact that this form is not pronounced *[ˈwacɪ-βuni], with devoicing and h-deletion (and spirantization, not discussed here).

The surface [h] in [ˈwacih-puni] acts like the [h] of (9) or (23), and in a sense presents a problem opposite to that posed by the alternating suffixes. To account for such data I hypothesize a second readjustment rule sensitive to a lexical specification [+B] of the geminating morphemes, thus in effect treating them as a (presumably) small but arbitrary class of all morphemes ending in a vowel. Rule (25) inserts /h/ on the far side of a morpheme boundary followed by a noncontinuant obstruent.[6] (In this analysis relevant surface forms cited above therefore have the morpheme boundary marked in the wrong place, surely a moot matter in most conceptions of phonetic representation.)

$$25)\ 0 \rightarrow h \ / \ \ldots]_{[+B]} [\ \_\_\_\_ \ \begin{bmatrix} -son \\ -cont \end{bmatrix}$$

Illustrating, the form for 'to watch from hiding' is derived as follows:

26)	/waci-puni/
	[+B]
rule (25)	-h
stress	ˈ
devoicing	- - -
h-deletion	- - -
	[ˈwacihpuni]

The /h/ inserted by (25) is like any other /h/ in that its subsequent effects and realization depend on wider phonological contexts. Thus [ˈwacihpuni] is phonetically comparable to [ˈtenahpɨʔ] 'man', etc. in (23), but the /h/ inserted in /nana-hkʷɨhɨ/ 'married couple' undergoes regular h-deletion (15) triggered by the following voiceless vowel (i.e. deep /nana-kʷɨhɨ/ ⟶ intermediate nana-hkʷɨhɨ ⟶ 'nana-hkʷɪhɨ ⟶ surface [ˈnanakʷɪhɨ]).

A third type of problem for my general analysis is illustrated by the following instrumental prefix data:

27)

'ci-hkaʔa 'to cut'	'tɨ-ci-hkaʔa 'to cut up (SG)'
'kɨ-hkupa 'to kill by bite'	'na-kɨ-hkupa 'to kill by bite (REFL)'

28)

'ca-hpaki 'to cling'	'ma-cɨ-βaki 'to stick, glue (SG)'
'ta-hkiʔne 'to press by foot'	'ma-tɨ-kiʔne 'to flatten by foot'

While (27) exhibits the expected effects of rule (25), surface [h] and no vowel devoicing, (28) shows a discrepancy. The forms on the left are comparable to those in (27), but those on the right have undergone vowel devoicing and subsequent h-deletion.

These nonparallel effects in the environment of the two 'unspecified object' prefixes /ma/ and /tɨ/ could be accounted for by rule (21) if the instrumental prefixes were given the specification [+A] in the environment of /ma/. Rule (21) would attract the /h/ just inserted by the [+B] instrumental prefixes, pulling it to the left side of the morpheme boundary where it would then act like a normal "devoicing" /h/. Or, perhaps preferably, it may be

necessary to stipulate lexical doublets in such cases, e.g. /ca - paki/ 'to cling' but /ma - cah - paki/ 'to stick, [+B] glue (SG)'.

Finally, a few additional alternations again suggest the need for complications in the lexicon. Consider the following forms:

29)

't+hpe 'full'	't+-t‡βe 'full (REDUP)'
'wihte 'to peep'	'to-wIte 'to peep' (/to/ 'by hand')
'p+hca 'to burst'	'ca-p‡ca 'to rip open'
'?+hp+i 'to sleep (SG)'	n+mi-'ca-?‡β+i-k+-?e-t+ 'ether' (lit. 'puts people to sleep')

The stems in the righthand column have no motivated internal morpheme boundary or sonorant, which would be necessary for predicting voiceless vowels and subsequent loss of /h/. These forms, again, may simply have to be given their own lexical entries.

In conclusion, I have tried to show the considerable extent to which a relatively superficial account of voiced/voiceless vowel alternations and [h]/zero alternations can account for the surface facts. I claimed that the notion "/h/ (and /s/) before a sonorant or morpheme boundary" is significant in Comanche phonology. Two simple readjustment rules are needed in order to preserve the widespread generality of this notion, which claims that an underlying or inserted voiceless continuant will have no effect if it is followed by an intramorphemic obstruent. A relatively small number of recalcitrant forms, whose surface shape contradicts the general analysis, presumably require lexical doublets. Admittedly a complication, these are nevertheless to be expected when considering phenomena exhibiting such a long history as vowel devoicing.

NOTES

[1]This paper is a slightly revised version of that presented at the 1987 meeting of the Friends of Uto-Aztecan (Armagost to appear), which builds on my previous work on voiceless vowels (especially Armagost in press and 1986).

[2]The data on which this paper is based come from Canonge 1958, copies of some of his unpublished texts (Canonge n.d.), and an early draft of Wistrand Robinson's dictionary (forthcoming). The latter incorporates all of Canonge's fileslips from extensive SIL fieldwork conducted some thirty years ago.

[3]Two further details concerning orgnic devoicing deserve mention (see Armagost 1986 and in press for additional comments). First, there is a condition on the stridency of the flanking consonants that prevents application to the underlined vowels in [ˈnahu̲-hu-tu?ɪ] 'will happen', [ˈtɨasɨ̲-se?] 'also (CONTRASTIVE)', and similar forms. Second, the rule shows rightward iterative effects in forms such as [ˈpɨecɨ-ku-sɨ-se?] 'early morning (CONTRASTIVE)' from /pɨecɨh-ku-sɨ-se?/, where devoicing of /u/ is blocked by specification of a preceding voiced vowel in (7).

[4]The observant reader will note what appears to be exceptional devoicing before the dependent clause suffix [ci]. This and similar suffixes will be discussed below.

[5]This is equally true of Shoshoni, where selection is between /hci/ and /cci/, etc. (Miller 1972). In both languages the choice is partially predictable. For Comanche, all stems having a penultimate coda /h/ are like /naka/, e.g. [ˈtunehcɨ] 'to run', [ˈtunecɨci] 'having run' (note h-deletion); all stems ending in vowel clusters are like /maka/, e.g. [ˈcayaa] 'to carry (S6)', [ˈcayaahci] 'having carried (S6)' and [ˈcaai] 'to hold', [ˈcaaihci] 'having held'.

[6]I have not attempted a rigorous count of these morphemes, but examination of Canonge's materials shows them to be quite small in number. Several geminating forms in Shoshoni have been reshaped as spirantizing in Comanche, e.g. /tua?/ 'son', /meeku/ 'now', /puhi/ 'leaf', and perhaps others. There are no known examples of other types of morphemes reshaped as geminating.

[7]This analysis of geminating morphemes differs slightly from that given in oral presentation of this paper.

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