Tahltan Consonant Harmony[1]

Margaret F. Hardwick
University of Toronto

0 Introduction. Tahltan is an Athapaskan language spoken in Northern British Columbia.[2] Recently collected Tahltan data[3] shows a consonant harmony process involving the features [strident] and [anterior]. The harmony occurs within the three coronal, non-lateral affricate series, Dð, DZ, and DŽ[4] with Dð assimilating to DZ and DŽ and with DZ assimilating to Dð and DŽ. The relevant distinguishing features are outlined in (1):

(1)

	coronal	strident	anterior
Dð	+	−	+
DZ	+	+	+
DŽ	+	+	−

The consonants in these three series appear in stems, prefixes, and a formative.

In section 1 I will give data from a number of prefixes to show the extent of the assimilation. Section 2 will characterize the harmony in a metrical framework parallel to Halle and Vergnaud's (1981) account of the Navaho harmony and section 3 will argue against this analysis. Section 4 will present an autosegmental account of the harmony.

1.0 Affected Prefixes. The Athapaskan verb is composed of a stem (root + suffix) and a series of prefixes. Noun stems may also be preceded by prefixes. The prefix consonants assimilate to either the stem-initial or stem-final consonants with earlier verbal prefixes on the left assimilating to later ones on the right. Five prefixes with assimilating segments are discussed below. The chosen underlying forms are clearly supported by historical, distributional and phonological evidence and are not argued for here.

1.1 /s/ First Person Singular Subject Pronoun. This pronoun surfaces as [s] before stems containing a wide variety of consonants as shown in (2)a. It may also surface as [θ] and [š] when preceding stem consonants in the appropriate affricate series as in (2)b and c.

(2)a /s/→[s]

i.	ʔidisɮin	'I'm angry'
ii.	ʔast'e	'I am'
iii.	esdan	'I am drinking'
iv.	dasbeɮ	'I'm floating'
v.	naʔesʔa	'I'm gambling'
vi.	esk'a·	'I'm gutting fish'
vii.	esɣe·ǯi	'I'm itchy'

b /s/→[θ]

i.	niθɮit	'I got hot'
ii.	diθkʷθ	'I coughed'
iii.	ʔededeθt'ʌθ	'I cut myself'
iv.	taθtθaɮ	'I'm dead'
v.	naʔadede·θtθa	'I dried myself'
vi.	eθtθetθ	'I'm eating'
vii.	hod'ediθtθ'et	'I fell down'
viii.	neθtθeɲ	'I'm fat'
ix.	diθtθ'ɪk	'I heard'
x.	θeθɮɪt	'I'm hot'
xi.	eθʔeθ	'I'm itchy'
xii.	hot'aθdetθ	'I rolled myself...'
xiii.	tedeθtθ'et	'I'm tired'
xiv.	ʔedeniθdɮil	'I warmed myself'
xv.	eθduθ	'I whipped him'

c /s/→[š]

i.	ɮeneštɬɪš	'I'm folding it'
ii.	dištša	'I love you'
iii.	nedeneždits	'I moved... a body part'
iv.	ninaneždžʌ	'I moved camp'
v.	eǰyaʔe	'I'm sick'
vi.	yesdžɪn	'I sung'
vii.	yaǰtɬ'etš	'I splashed it'

1.2 /θid/[5] First Person Plural Subject Pronoun. [θid] occurs widely with a majority of stem consonants, [sid] occurs with stem DZ and DŽ series consonants and [šid] occurs with stem DŽ series consonants only as shown in (3) a, b and c respectively.

(3)a /θ/→[θ]

i.	dedeθidih	'we waved'
ii.	meneθidleʔ	'we wanted it'
iii.	tɬ'anθit'aʔ	'we turned around'
iv.	deθigɪtɬ	'we threw it'
v.	ne·θibin	'we were swimming'

b /θ/→[s]

i.	dadenesidʊs	'we're boiling it'
ii.	ɮasit'ʌs	'we (2) came'
iii.	tɬ'andesit'ʌs	'we (2) are walking around'
iv.	nasit'ats	'we (2) went on a trip'
v.	nesitets	'we (pl) went to bed'
vi.	edžidesit'ats	'we're going hunting'
vii.	tinesit'ats	'we (2) are going away'
viii.	desidzel	'we (2) hollered'
ix.	xasidis	'we're plucking it'
x.	ʔededesits'ɪt	'we scratched ourselves'
xi.	sigʊse	'we're tickling him'
xii.	desit'ʌs	'we (2) are walking'
xiii.	hogaʔasit'as	'we're working'
xiv.	desidžih	'we're breathing'
xv.	meʔesit'otš	'we're breastfeeding'
xvi.	lesitštɬtš	'we tied it'
xvii.	lenesitšuž	'we folded it'

c /θ/ → [š]

i.	isicotɣ	'we blew'
ii.	usiɑze	'we're called...'
iii.	te edenesidzut	'we chased it'
iv.	me a esits l	'we combed it'
v.	sitsut	'we grabbed it'
vi.	ledesitsa	'we loved each other'
vii.	gadesiye	'we (2) are running'
viii.	esiya e	'we are sick'
ix.	esidza e	'we were sick'
x.	siaz a	'we sang'
xi.	kasidz	'we (pl) took pl. obj. out'

1.3 /θe/ Conjugation Marker.[6] The data in (4) shows the wide distribution of [θe] and the predictable distribution of [se] before stems with the DZ and DŽ consonant series and [še] before stems with the DŽ consonant series. Forms (4)b vi. through xi. show that assimilation can be triggered by a prefix consonant, in this case the first person singular subject pronoun, /s/.

(4)a /θ/ → [θ]

i.	θi un	'I shot it'
ii.	θilih	'I tasted it'
iii.	θike	'I was sitting down'
iv.	me anaθitin	'I dreamed'
v.	ne·θibin	'I swam'
vi.	θit' θ	'I cut it'

b /θ/ → [s]

i.	sesdzan	'I'm old'
ii.	sindzan	'you're old'
iii.	ɬesitsɪts	'I tied it'
iv.	sihtsan	'I smelled it'
v.	sibets	'I'm stretching'
vi.	sesten	'I froze up'
vii.	ʔedeseʔesgin	'I killed myself'
viii.	sesda	'I was sitting down'
ix.	nesesbin	'I swam'
x.	tɮ'angesʔa	'I turned around'
xi.	medagasesda	'I waited for a long time for'

c /θ/ → [š]

i.	dʌšetšuš	'it's hanging on a pole'

1.4 /ts'e/ Inspecified Subject Pronoun. This pronoun is used to represent an unspecified subject. The wide distribution of [ts'e] as well as the predictable distribution of [tθ'e] and [tš'e] are shown in (5)a–c.

(5)a /ts'/ → [ts']

i.	naʔats'eʔa	'Tahltan gambling game'
ii.	nahts'ibatɬ	'one's hanging it'
iii.	ts'edeɣʷəɬi	'one's scraping it'
iv.	kasets'its'et	'someone scratched me'
v.	mekadats'eɣots	'one is shouting at him'
vi.	ts'ekan	'it tastes bad'

b /ts'/ → [tθ]

i.	tθ'eθeyehθe	'one tans;tanning'
ii.	tθ'et'aθ	'one cuts;cutting'
iii.	tatθ'edet'aǰ	'one fleshes;fleshing'

c /ts'/ → [tš']

i.	tedahutš'edenešyut	'one chased them away'

1.5 /es/ First Person Singular Possessive Pronoun. One nominal prefix, /es/, is affected in the same way as the four preceding verbal prefixes.[7] The underlying form occurs widely with a majority of the stem consonant inventory and is the exclusion form for speakers who do not harmonize with this morpheme. [eθ] occurs regularly before stems with the DǰǴ series consonants. While [eš] occurs, [es] is the dominant form before alveopalatal stem consonants. With this morpheme, there is clearly strident harmony while anterior harmony is less common. Data in (6)a–c show the three forms of this pronoun.

(6)a /s/ → [s]

i.	eslede	'my smoke'
ii.	esxohe	'my grizzly'
iii.	esɣuʔ	'my tooth'
iv.	esǰele	'my trap'
v.	eszʌse	'my bear'
vi.	esʔedž	'my dress'
vii.	esǴʌndže	'my goose'

b /s/ → [θ]

i.	eθθae	'my sand'
ii.	eθtθe·	'my rock'
iii.	eθtθeɳ'	'my meat'
iv.	eθθon'e	'my star'

c /s/ → [š]

i.	ešťš'ɪde	'my gristle'
ii.	ešyatɬ'ule	'my rainbow'
iii.	ešťšiɣe·de	'my pillow'

2.0 Characterizing the Harmony. The consonant harmony demonstrated by the data in section 1 shows a right (R) to left (L) effect with the consonant of a stem or prefix to the right triggering assimilation in a prefix to the left. Such a unidirectional harmony is one characteristic, according to Halle and Vergnaud (1981), of harmony that is best captured metrically. In this section I will consider a metrical analysis of the Tahltan data. The account will be similar to that of metrical assimilation of Navaho given by Halle and Vergnaud (henceforth H and V).

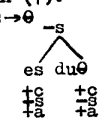
2.1 The Metrical Analysis. H and V (1981) propose that metrical harmony processes can be accounted for by specifying values for the following parameters:

Terminal Nodes: the segments involved in the projection required for the harmony. In Tahltan, the [+coronal, -lateral] series.

Direction of Propogation: the direction, R→L or L→R, that the harmony proceeds. For Tahltan the direction is R→L.
Opaque Elements: segments which are opaque to the harmony. There are no opaque elements in the Tahltan harmony.
Pruning Rules: rules to eliminate nodes from a tree if necessary. This is not necessary in Tahltan.
Harmony Process: describes which feature is copied to the root of the metrical tree. In Tahltan, [strident] and optionally [anterior] is copied by rule to the root of the tree.

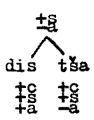
This metrical account of Tahltan harmony can account for the four changes exhibited in the data: s→θ, s→š, θ→s, θ→š. An example of each is given in (7).[8]

(7)a. s→θ



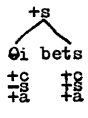
eθduθ 'I whipped him'

b. s→š



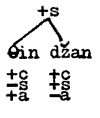
dištša 'I love you'

c. θ→s



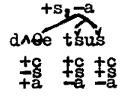
sibets 'I'm stretching'

d. θ→s



sindzan 'you're old'

e. θ→š



dʌsetšuš 'it's hanging on a pole'

In (7)b both the strident and anterior value is copied to the root of the the tree while (7)d shows that the anterior value need not be copied.

3.0 Word Formation and Directionality. According to the above account, the rightmost consonant of the projection must be specified as the dominant consonant. Here I will show that this need not actually be stipulated but that this directionality is a direct consequence of word formation. I am assuming a lexical phonology framework as in Kiparsky (1982) where the phonological rules occur in conjunction with the morphology.

In Athapaskan languages, prefixes are added from the right to the left to a stem. This unidirectional word formation predicts that features from the stem would spread only to the left onto prefixes as affixation occurs. If the apparent unidirectionality of the harmony is a consequence of word formation and not of the harmony itself, then this would predict that in a situation where word formation is not directional then the features could spread either R→L or L→R. There are two kinds of evidence suggesting that feature spreading can take place L→R as well as R→L. The first is from stem internal assimilation and the second is from compounds.

3.1 Stem Internal Data. Within some stems, the harmony appears to proceed from the stem-final to the stem-initial consonant;spreading form R→L. The stem xʌθ 'snow' in Tahltan has only a stem-final dental in Slave, yaθ.[9] Proto-Athapaskan stem *xəs 'bear'[10] is sʌs in Tahltan where the predicted form would be [çəs]. In other stems the initial consonants acts as a trigger causing L→R spreading to the final consonant. Stems such as -tšuž 'fold', -tšoš 'feathers, be soft' (Slave -tšod), and -tθetθ 'eat' exemplify this spread.[11]

3.2 /s/ Compound Formative. A compound formative, /s/, is found between two stem elements in many Tahltan compounds. Data in (8) a-c show the three possible forms of the formative: [s] with a variety of stem consonants, [θ] and [š] with consonants from the appropriate series.

(8)a /s/→[s]

i. tsisgɪdle	'bald (head + ?)'
ii. k'astone	'adams apple (? +?)'
iii. kesgʊt	'ankle knob (foot + knee)'
iv. k'asba?e	'ptarmigan (? + grey)'
v. tuste	'snipe (water + ?)'

b /s/→[θ]

i. laθtθ'ege	'mid 3 fingers (hand + ?)'
ii. nuθtθ'eɲ'	'cheek (? + flesh)'

c /s/→[š]

i. kəštšo	'big toe (foot + be big)'
ii. lastso	'thumb (hand + be big)'
iii. etšištšo	'blueberries (berry + be big)'
iv. tšašyane	'ram (? + ?)'
v. yošdidže	'womb (? + ?)'

The data in (8)b and (8)c i and ii show clear R→L spread. In (8)c iii-v, the direction of spread is unclear because the formative has stem consonants on either side which could trigger the harmony. While these data, thus, tell us nothing about directionality of harmony, the data in (9) show that harmony can indeed be L→R in compounds.

(9)a	tθa'θke'	'shin (? + foot)'
b	tθeθtɪ'untega	'store bought rope (? + rope + ?)'

It is clear that if the left most stem contains a potential trigger then the harmony can be L→R.

These two types of evidence from compounds and from historical and comparative stem internal information show that in a situation where the apparent R→L directionality of word formation is obscured, the harmony can work in either direction. H and V (1981:1) call this dominant (as opposed to directional-metric) harmony and state that "... the facts of dominant harmony are best described with the devices of autosegmental phonology." This kind of data can not be handled in a metrical framework. It appears then, that Tahltan may require both types of harmony if H and V's proposals are adopted. In H and V's metrical analysis of Navaho, no data is given to suggest that L→R spreading can occur. There is no reason, therefore, to dissociate the directionality of word formation from the harmony process itself and to necessitate an autosegmental analysis. If directionality follows from word formation and need not be stipulated then this simplifies the grammar.

4.0 Autosegmental Theory. In autosegmental theory, the following must be stipulated according to H and V (1981); In Tahltan the three series Dð, DZ and DǯZ make up the class of segments to which the autosegments may attach. All meaningful units, stems and prefixes containing these consonants will have an unlinked [strident] and [anterior] autosegment associated (though unlinked) with them in the lexicon.[12] Because the stem formative is not a meaningful unit and appears to be lexically frozen I will assume that it has no autosegment associated with it. A set of conditions on the linking of autosegments to the core in harmony processes have also been adapted by H and V (1981:4 (mine)) from Goldsmith's (1974) proposed conditions for tonal autosegments. These conditions are shown in (10).

(10)a. Each (consonant) slot is linked to at most one autosegment
b. Floating autosegments are linked to all accessible (consonant) slots
c. unlinked autosegments are deleted at the end of the derivation.

There has been a lot of discussion about the specific claims of autosegmental characterizations of vowel harmony. These can be generalized to deal with consonant harmony as well. Authors (Clements, H and V, Kiparsky and Anderson) have suggested a number of controversial properties that warrant discussion.

Clements (1976) discusses a number of properties common to vowel harmony systems, the most interesting of which is the notion of bidirectionality. It is crucial to note that while linking may occur unidirectionally as in tone assignment (L→R following Goldsmith 1976), spreading may be in both directions.

H and V (1981) make two interesting claims in dealing with harmony, one related to core specification and one to constraints on linking.

In discussing Akan vowel harmony, H and V (1981:5) assume that all vowels are specified in the core as the unmarked value, [-ATR].

This means that when an autosegment is linked to a vowel, the autosegmental value takes precedence over the core value but when no autosegment is linked, the core value of the vowel surfaces.

For Finnish vowel harmony, H and V (1981:7-8) further stipulate a language specific constraint such that "...autosegments on the tier for the feature [back] may be linked only with vowel slots which are either [+round] or [+low]." This accounts for the fact that only vowels which are [+round] or [+low] participate in the harmony. This type of language specific constraint can be dealt with more generally. The constraints on linking rules follow from a principle of Structure Preservation such that no rule may introduce lexically non-distinctive feature specifications within the lexical component of the grammar (Kiparsky 1983:12).

4.1 An Autosegmental Solution. Following H and V, I will assume that in underlying representations (UR) that all consonants are redundantly specified for the features [strident] and [anterior]. This is necessary so that prefixes in verbs where the stem has no associated autosegment from a Dð, DZ or DǯZ segment will be phonetically realized with their core values. Because there are both underlying dental and alveolar prefix consonants, these core values cannot be left unspecified to later be filled by default rules.

I will also assume that a [-strident] and [-anterior] autosegment may not link to a [-anterior] or [-strident] segment respectively. As seen in (1), no [-strident, -anterior] segments occur. This linking constraint follows automatically given structure preservation and need not be stipulated in an ad hoc fashion in the grammar.

One further assumption is necessary. I will follow Goldsmith and Anderson in proposing a statement of directionality such that autosegments link Right-to-Left. This R→L linking is unusual and interesting in that it is the marked direction of association.[13]

Several underlying representations are shown in (11).

(11) a. [+a] [+a] / [+s] [-s]

nis ðit

'I got hot'

b. [+a] [+a] / [-s] [+s]

θid ɬʷsə

'we're tickling him'

c. [+s] [+s] / [+a] [-a]

dis tš̌a

'I love you'

d. [-s] [+s] / [+a] [-a]

meʔeθid t'otš̌

'we're breastfeeding'

e. [+a] [+a] [−s] [+s]

tθa· ske

−s +a +s +a

'shin'

f. [−a] [+a] [+s] [−s]

edžɪnʌst'eθ

+s −a +s +a −s

'mossberry'

In (11)a and b, the [strident] autosegment associates R→L to all available slots as in the derivations in (12) a and b.

(12)

a.

[+a] [+a] [+s] [−s]

UR nis ʒit

+a +a +s −s

link [−s]

spread nis ʒit

delete +a +a +s −s

output niθʒit 'I got hot'

b.

[+a] [+a] [−s] [+s]

θid ɣʊsɔ

−s +s +a +a

[+s]

θid ɣʊsɔ

−s +s +a +a

output θigʊse 'we're tickling him'

The derivation of (11) c shows a palatal stem consonant where the [anterior] autosegment spreads, (11) d shows where it does not. Derivations are as follows.

(13)

c.

[+š] [+s] [+a] [−a]

UR dis tša

+s −s +a −a

link [−a]

spread [+s]

delete dis tša

+s −s +a −a

output dištša 'I love you'

d.

[−s] [+s] [+a] [−a]

me?eθid t'otš

−s +s +a −a

[+s]

me?eθid t'otš

−s +s +a −a

me?esit'otš 'we're breastfeeding'

The form in (11) e shows a compound where the feature from the left stem spreads to the right onto the compound formative which has no autosegments associated with it. The derivation is shown in (14).

(14)

e.

[−s] [+s] [+a] [+a]

UR tθa· ske

−s +s +a +a

[−s]

link

spread tθa· ske

delete −s +s +a +a

output tθa·θke 'shin'

Unlike the derivations in (12), (13) and (14), where directionality was unimportant (association could have been R→L or L→R giving the same results) the derivation of the UR in (11) f provides a rationale for proposing the directional association rule and shows the effect of structure preservation. The derivation is shown in (15).

(15)

f.

[−a] [+a] [+s] [−s]

UR edžɪnʌst'eθ

−a +s +s +a −s

[−a] [+a] [+s] [−s]

link * edžɪnʌst'eθ

spread −a +s +s +a −s

[+s] [−s]

link

delete edžɪnʌst'eθ

−a +s +s +a −s

output edžɪnʌθt'eθ 'mossberry'

* at this point in the derivation further spread is blocked by structure preservation because [dž] is [−a] in the core

Another case where direction is crucial is in a compound with no compound formative where both stems have autosegments. The compound tθaʒeθ 'beaver skin' (tsa? beaver, ʒeθ skin) must be derived as in (16).

(16)

[+a] [+a] [+s] [−s]

UR tsa? ʒeθ

+a +s −s +a −s

[−s]

link

spread tsa? ʒeθ

delete +a +s −s +a −s

output tθaʒeθ 'beaver skin'

5.0 Conclusion. Several conclusions can be drawn from this analysis. Firstly, H and V's claim that the core can be redundantly specified for features that are autosegmentalized is supported in the Tahltan data. Secondly, the language specific constraints on linking rules proposed by H and V are better handled by Kiparsky's Principle of Stucture Preservation. This allows otherwise ad hoc constraints to follow from a more general principle. Thirdly, by adopting an autosegmental analysis despite the apparent metrical nature of the harmony, we can treat the facts as a unified process.

Notes

[1] I must thank Keren Rice for critical comments on an earlier draft of this paper. All errors and ommissions are, of course my own.

[2] Tahltan is spoken in the vicinity of Telegraph Creek, Dease Lake and Iskut of the Stikine River.

[3] This data was collected in the summers of 1981-83 by Dr. P. A. Shaw and myself. The project was funded by the National Museum of Man, the B.C. Provincial Museum and a UBC Social Science and Humanities Research Grant.

[4] The notation used is as follows where capital letters designate a series as a whole and others represent the phonetic values: The dental series D[ð] includes [dð, tθ, tθ' (ejective), θ, ð], the alveolar series DZ includes [dz, ts, ts', s, z] and the alveopalatal series DŽ includes [dž, tš, tš', ç (š), y (ž)].

[5] The final [d] in this pronoun may not be apparent in the surface forms because of the D-Effect rule whereby the final [d] interacts with the stem-initial consonant, for example θid + ʔa → θit'a.

[6] The term conjugation marker is used here to refer to a prefix separate from and occuring between an aspect and mode prefix. This is not a commonly used term in the literature.

[7] There is some evidence to suggest that possession in compound nouns may act differently in that there is an adjacency requirement. I will not deal with this problem here.

[8] ±c is [coronal], ±a is [anterior] and ±s is [strident].

[9] Slave forms were provided by Keren Rice.

[10] Proto-Athapaskan forms are from Krauss and Leer 1979.

[11] The future stem of at least one of these verbs provides a view of the stem initial consonant alone because the stem final consonant is lost when the future suffix [-ɬ] is added: -tθɛɬ 'eat fut.'. The initial consonant is still a dental even when the final is deleted.

[12] It is obligatory that the feature [strident] link and spread but the feature [anterior] may link and spread optionally. Because these two features operate independantly I will assume that they are on separate tiers.

[13] This likely follows from the position of the head in Athapaskan languages.

References

Anderson, S.R. 1980. Problems and Perspectives in the Description of Vowel Harmony. In: R. Vago (ed.), Issues in Vowel Harmony. Amsterdam.

Clements, G.N. 1976. The Autosegmental Treatment of Vowel Harmony. In: W.U. Dressler and O.E. Pfeiffer (eds.), Phonologica 1976. Innsbruck.

Goldsmith, J. 1974. English as a Tone Language. ms. MIT.

_____. 1976. Autosegmental Phonology. Distributed by IULC. Ph D. dissertation, MIT.

Halle, M. and J.-R. Vergnaud. 1981. Harmony Processes. In: W. Klein and W. Levelt (eds.), Crossing the Boundaries in Linguistics. Dordrecht: Reidel, 1-23.

Kiparsky, P. 1982. Lexical Phonology and Morphology. ms. MIT.

_____. 1983. Some Consequences of Lexical Phonology. ms. MIT.

Krauss, M.E. and J. Leer. 1979. Athapaskan, Eyak and Tlingit Sonorants. Alaska Native Language Centre, Fairbanks.