Classifiers and Subject Prefix Alternation in Athapaskan

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1. Introduction

1.1 The Verb Complex

The basic sentence structure in Athapaskan is subject-object-verb, as illustrated in Hare.[1]

1. dene tu   hedon
   man water drinks   'The man is drinking water.'

The verb is inflected for aspect and subject agreement. If the object of a transitive verb is not stated as an independent NP and the subject is third person, the verb is also inflected for object agreement.

2. dene   yedon   < ye_6 don
   man it drinks   'The man is drinking it.'

Because the subject is third person the object is expressed by the 'obviative' or 'fourth person'.[2]

The verb has three major parts: a) the _stem_, which combines with b) _derivational prefixes_ to form a base with lexical meaning and c) _inflectional prefixes_ for person and aspect. Each prefix occupies a specific position in the verb complex as illustrated for Hare in Table I. The relationship of the prefixes for Hare is illustrated in Table II (after Cook 1974:33). Table III sets out the verb prefixes in Hare. The adverbial lists are incomplete.

Table I: Internal structure of the Hare verb

Position	The verbal base		Paradigmatic prefixes
	Theme	Adverbial prefixes	
DISJUNCT 9.	Thematic	Adverb	
8.			Iterative
CONJUNCT 7.		Distributive	
6.			Object
5.			Deictic subject
4.			Mode
3.			Aspect
2.			Subject
1.	Classifier		
0.	Stem		

Table II: Basic morphological structure of the Hare verb

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                          VERB
              Inflection              Base

     Aspect-Mode   Person      Adverb            Theme
                                Distributive
                  Object  Subject      Thematic Classifier  Stem

       3,4,8         6      2,5    7,9      9        1        0
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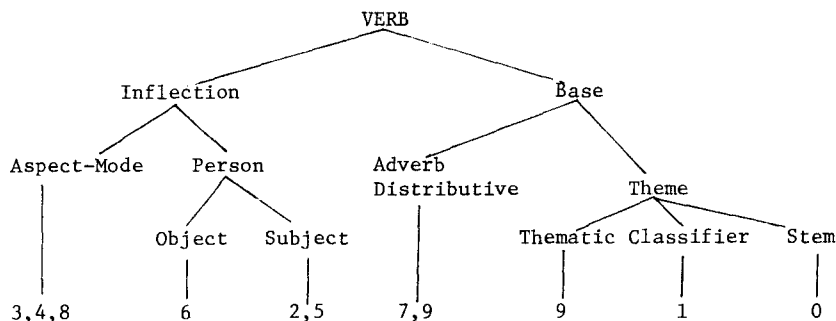
Table III: Verb Complex Prefixes in Hare (from Rice 1977:96a) (see below)

1.2 Prefix variation

Many of the prefixes undergo assimilation and alternation according to specific phonological rules. There are, however, allomorphs of some prefixes which must be explained on morphosyntactic grounds. Most notable are the subject prefixes which seem to be constrained by both phonological and syntactic conditions. The subject prefixes are examined in section 3 and the factors influencing their behaviour in section 4. In section 5 I will summarize these factors and propose several historical motivations which may be opaque synchronically and psychologically.

2. Subject prefixes

2.1 Subject prefix position

Subject prefixes are found in two positions. The deitic subject is found (depending on the language) in position 4 to 10 before the verb stem. The position for first and second persons is invariably position 2,preceding the classifier.

Table IV sets out the subject prefixes for a number of Athapaskan languages, for reconstructed Proto-Athapaskan, and for several related languages in the Na-Dene phylum. It can be seen from Table IV that the subject prefixes are remarkably similar throughout the languages despite geographical distances and historical time depth. This feature of Athapaskan makes it possible to analyze one language and anticipate a similar solution for each of the others in the family. Conversely, a family universal may be expected to apply in a hitherto unanalyzed member language.

In the Northern Athapaskan group Hare seems to have the most variety in its subject prefixes. A close examination of the factors which determine these variations will illustrate several Athapaskan characteristics.

Table III: Verb Complex prefixes in Hare (from Rice 1977:96a)

Prefix
 position:

9 Adverbial	8 Iterative	7 Distributive	#	6 Direct object	5 Subject	4 Adverbial	3 Mode	2 Subject	1 Classifier	0 Stem
rá-	ra-	yá-		se-	ke-	de-	imp. ∅	1sg.h-	∅	
'óné-				ne-	ts'e-	she-	ne-	i-	H	
ts'e-				ye-	go-	ne-	pf.ye-	∅	D	
ri-				raxe-		.	we-	2sg.ne-	L	
.				ku-		.	ne-	n-		
.				'e-			fut.wo-	3sg.∅		
				de-			prog.ye-	n-		
				go-				1pl.íd-		
				le-				2pl.ah-		

Table IV: Subject prefixes in Athapaskan and related languages[3]

	1 sg.	2 sg.	3 sg.	1 pl.	2 pl.	3 pl.
Northern						
Babine	s, k	n	$\emptyset$	ded	x^w	he$_8$
Carrier	es	in	$\emptyset$	íd	ah	hu$_8$
Chilcotin	s, i	in,n	$\emptyset$, n	íd	ah.h	dže$_5$
Dogrib	h	ne	$\emptyset$	wi	ah	gé$_5$
Hare	h,i,$\emptyset$	n, ne	$\emptyset$, n	id, ts'e$_5$	ah	ke$_5$
Kutchin	š, i	né	$\emptyset$	dixón(?)	naxón(?)	--
Sarcee	s	ni, v́	$\emptyset$	aad	as	gi$_7$
Tanaina	eš	n, i	$\emptyset$	tš'e$_{10}$	eh	qe$_{10}$, k'e$_{10}$
Southern						
Navajo	š̌, é	nì, v́	$\emptyset$	iid	oh, o	da$_8$
Pacific Coast						
Hupa	w,e,y	n,y,$\emptyset$	$\emptyset$	di, y	oh	yi, tš'i$_8$
Tututni	š,ʔes, i		ʔe	id, ʔid	oʔ, ʔ	xe$_5$, ya$_5$
Athapaskan-Eyak						
Eyak	x̲	i, $\emptyset$	$\emptyset$	da˙	lax̣	$\emptyset$
Na-Dene						
Tlingit	x̣	i	$\emptyset$	tu	--	--
Proto-Athapaskan (reconstructed)	*š̌	*nə	*$\emptyset$	*də	*α-xK	*xə

3. Subject prefixes in Hare

The subject prefixes for Hare are set out below.

Table V: Subject prefixes in Hare

	1st person	2nd person	3rd person
singular	h, i, $\emptyset$	n, ne	$\emptyset$, n
dual-plural	íd, ts'e$_5$	ah	ke$_5$

3.1.1 First person singular

        The first person prefixes are $\underline{h}$, $\underline{i}$, ϕ. $\underline{h}$ is the Hare reflex of PA $\underline{\check{s}}$ whereas $\underline{i} < \underline{\vartheta}$. The conditions which determine the surface form are complex. The underlying form may be considered to be $\underline{h}$ (ex.3) which becomes $\underline{i}$ in the perfective[4] with a ϕ or H_1 classifier (cf. sec. 4.4).

        3. ráhze < rá$_4$ h$_2$ ϕ_1 ze   'I hunt.'

        4. wida   < we$_3$ h$_2$ ϕ_1 da   'I sat down.'

The $\underline{we}$ perfective and $\underline{h}$ reduce to ϕ when preceded by a conjunct prefix[5] and followed by ϕ, H_1.

        5. demi < de$_4$ we$_3$ h$_2$ mi   'I started to swim.'

These may be written as rules R1. R2.

        R1. we$_{3pf}$ h$_2$ ---> ϕ / # CV ___ $\left\{ \begin{matrix} \phi \\ H_1 \end{matrix} \right\}$

        R2a. h$_2$ ---> i / Ce$_{3pf}$ ___ $\left\{ \begin{matrix} \phi \\ H_1 \end{matrix} \right\}$

          b. e ---> ϕ / ___ i

        A phonotactic requirement demands that $\underline{h}$ change to $\underline{heh}$ after a disjunct boundary.

        6. hehjen < h$_2$ jen   'I sing'

This is expressed by rule R3.

        R3. ϕ ---> he / # ___ h$_2$

R3 is obviously very ad hoc and will be revised below in section 4.2.

        The above is only a descriptive analysis of the prefix alternation. The underlying motivation is more complex and its analysis will not be discussed until the variations and their factors in the other subject prefixes have been examined.

3.1.2 Second person singular

        Second person in Hare is n$_2$ (< PA *nə which is realized as nasalization of the preceding vowel (ex.7). If the preceding vowel is $\underline{e}$ the vowel is raised to $\underline{i}$ (ex.8) except in the $\underline{we}_3$ perfective preceded by another conjunct prefix, and followed by ϕ, H_1.

        7. shéwontin   < shé$_4$ wo$_3$ n$_2$ tin   'You will eat.'

        8. dinjen   < de$_4$ n$_2$ jen   'You start to sing.'

9. denjen   < de_4 we_3 n_2 jen   'You started to sing.'

$\underline{n_2}$ becomes $\underline{ne}$ in the perfective with ϕ, H_1 (ex. 10, 11) or following a disjunct boundary.

10. yene'a   < ye_3 n_2 ϕ_1'a   'You ate.'

11. weneda   < we_3 n_2 ϕ_1 da   'You sit down.'

12. ránegwe   < $rá_9$ # n_2 gwe   'You live, stay.'

These rules can be written as R4-R7.

R4. we_{3pf} ---> ϕ / # CV ___ n_2 $\begin{Bmatrix} \phi \\ H_1 \end{Bmatrix}$

R5. n_2 --->   ne / Ce_{3pf} ___ $\begin{Bmatrix} \phi \\ H_1 \end{Bmatrix}$

R6. n_2 --->   ne / # ___

R7. e --->   i / ___ n[(Condition: R4 has not applied.)

([represents classifier + stem)

3.1.3 Third person singular

The third person singular is unmarked (ϕ) (ex.12) except in the $\underline{ye}$, $\underline{ne}$ perfectives with ϕ, H_1 where it is realized as nasalization of the preceding vowel which, if $\underline{e}$, is raised to $\underline{i}$.

12. ráweya   < $rá_9$ # we_3 ϕ_2 ya   'He went.'

13. ráwoya   < $rá_9$ # wo_3 ϕ_2 ya   'He will go.'

14. yin'a   > ye_{3pf} ϕ_2 'a   'He ate.'

The $\underline{we}$ perfective and ϕ_2 combine to raise the tone on a preceding conjunct prefix when followed by ϕ, H_1.

15. déya   < de_4 we_3 ϕ_2 ya   'He started.'

After a disjunct boundary an epenthetic 'peg' $\underline{he}$ is inserted, if there is no conjunct prefix.

16. hejen   <   # ϕ_2 jen   'He sings.'

These are written as rules R8 through R11.

R8. V we_{3pf} ϕ_2 ---> $\acute{v}$ / # C___ $\begin{Bmatrix} \phi \\ H_1 \end{Bmatrix}$

R9. $\phi_2 \longrightarrow$ n / $\left\{\begin{matrix} ye \\ ne_{3pf} \end{matrix}\right\}$ —— $\left\{\begin{matrix} \phi \\ H_1 \end{matrix}\right\}$

R10. e ———> i / ___ ·n [

R11. ϕ ———> he / # ___ ϕ_2

Note that R10 = R7.

3.2.1 First person dual-plural

In Hare the dual and plural are only differentiated by verb stem alternation. Henceforth they will be called simply 'plural'.

The first person plural is $\underline{íd}$ < PA $*\underline{də}$

17. hidze < $íd_2$ ze   'We shout.'

$\underline{íd}$ combines with the following classifier or stem consonant to produce the 'D-effect' (cf. sec. 4.3).

18. he'a   < ϕ_2 'a   'He eats.'

19. hít'a < $íd_2$'a   'We are eating.'

$\underline{íd_2}$ has a prefixed $\underline{h}$ when preceded by a disjunct boundary.

20. hidon ◄ id_2 don   'We drink.'

R12. ϕ ———> h / # ___ $íd_2$

In some other Athapaskan languages $\underline{íd}$ causes the tone of the stem vowel to raise. One example is Chilcotin.

21. ní?íl < ne_3 $íd_2$ 1_1 $?i\underset{\circ}{l}$ 'We have swum.'

22. nəɬ?il < ne_3 ah_2 1_1 $?i\underset{\circ}{l}$ 'You (pl) have swum.'

In Hare, $ts'e_5$ 'someone' is sometimes used for polite 1 pl., similar to French $\underline{on}$ 'On y va?' 'Let's go.'

23. ts'e'a < ts'e$_5$ 'a   'Let's eat.'

3.2.2 Second person plural

The second plural is $\underline{ah_2}$. When followed by ϕ, H_1 and a voiced fricative stem initial, the fricative is devoiced.

24. rínighe < rí$_9$ # ne_3 n_2 ghe   'You sg. carry it.'

25. rírahxe < rí$_9$ # ne$_3$ ah$_2$ ghe   'You pl. carry it.'

R13. $\begin{bmatrix} \text{+voice} \\ \text{+fricative} \end{bmatrix}$ ---> [-voice] / ah$_2$ $\left\{ \begin{matrix} \phi \\ H_1 \end{matrix} \right\}$ ____
       stem initial

After a disjunct boundary ah$_2$ is preceded by epenthetic h.

26. hahdon   <   # ah$_2$ don   'You pl. drink.'

R14. ϕ ---> h / # ___ ah$_2$

3.2.3 Third person plural

The third person pluralizer prefix is ke$_5$ with ϕ_2.

27. keyin'a < ke$_5$ ye$_3$ ϕ_2 ϕ_1 'a   'They ate.'

3.3 Stem alternation

Some verbs in Hare, as in other Athapaskan languages, employ verb stem alternation for subject number: singular-dual vs plural; singular vs dual-plural; singular vs dual vs plural. ke$_5$ employs the appropriate dual or plural stem, as do íd$_2$ and ah$_2$.

28. shéhtin   < shé # h$_2$ tin   'I eat.'

29. shéhítin < shé # íd$_2$ tin   'We du. eat.'

30. shéhíye < shé # íd$_2$ ye   'We pl. eat.'

31. shotin   < shu # ϕ_2 tin   'He sleeps.'

32. shukinya < shu # ke$_5$ ye$_3$ ϕ_2 ya   'They sleep.'

33. wida   < we$_3$ h$_2$ da   'I sit.'

34. wíke   < we$_3$ íd$_2$ ke   'We du. sit.'

35. dawíw'i < da$_4$ we$_3$ íd$_2$ w'i   'We pl. sit.'

4. Variation factors

As was seen in section 3 a number of factors influence the final forms of the pronoun prefixes. In this section we will examine each of these factors separately. The factors are of two types, phonological and syntactic. Cook (1971c) discusses several examples of phonological constraints on syntactic rules. We have seen that syntactic or morphological rules also constrain some phonological processes. There is a close relationship between these two rule types in Athapaskan and a rule of one

class will frequently feed or bleed a rule of the other class. Because the two rule types are interspersed in this manner it makes it difficult to write formal rules based strictly on phonological features or syntactic elements.[6] Because of the lack of adequate formal analyses for most Athapaskan languages, no attempt is made here to express rules strictly in formal terms.

4.1. Assimilation

Athapaskan phonology is rife with assimilation rules and we will only point out a few which are relevant. The reflexes of the subject prefixes combine with the following classifiers and stem initials and with preceding prefixes to produce an array of surface forms which are not always readily identifiable with the underlying elements. One of the factors which constrains assimilation is the disjunct boundary. Classifiers also influence assimilation. One particular assimilation rule is the D-effect Rule. Adjacent segments of similar phonological features frequently coalesce. Some morphemes such as we_3 perfective seem very susceptible to assimilation or deletion. In the following sections we will consider some of these factors in more depth.

4.2 Disjunct boundary

The concept of the disjunct boundary goes back at least as far as Li (1932) and has been extensively discussed in Kari (1975). In essence, there is a point in the prefix positions (indicated here by $\#$) which prevents certain rules from operating. Naturally if no prefix at all occurs left of the boundary the stronger word boundary ($\#\#$) is in effect and subsumes all the $\#$ restrictions. This boundary has no phonetic reality except as a morphological trigger for phonological rule feeding or bleeding.

In Hare this disjunct boundary affects 1sg.h_2, 3sg.ϕ_2, 1pl.$íd_2$ and 2pl.ah_2, none of which are of the canonical form CV. In this environment an epenthetic $h(e)$ is introduced to produce a CV conjunct prefix. This type of 'peg' is widely used in Athapaskan. R3, 11, 12, and 14 may now be written as R 15, R 16.

R15. ϕ ---> he / $\#$ ___ $\left\{\begin{array}{c} h \\ V \\ \phi_2 \end{array}\right\}$

R16. e ---> ϕ ___ $\left\{\begin{array}{c} i \\ a \end{array}\right\}$

Notice that this phonotactic rule R16 also subsumes R2b.

4.3 D-effect

Another phonological rule is the D-effect rule (DER) (Howren 1971) The DER causes changes in the stem initial segment when the classifier is D and these lead to further changes in the prefixes, particularly 1sg. These changes are phonologically predictable. Similar changes result from /d/ of 1pl. $íd_2$.

A historical question is whether the rule was originally restricted to one of these morphological environments (D classifier or 1pl. $\underline{id}_2$) and extended by phonological analogy to the other instance, or whether it was originally phonological. Work on Chilcotin presently being conducted by Cook, deWaard and Henry at The University of Calgary may lead to clarification of this issue, but at this time no conclusions can be drawn.

4.4 Classifiers

Athapaskan languages all have a prefix morpheme called the <u>classifier</u> which appears in position 1, immediately before the verb stem. The function of the classifier is not clear, though frequently classifier alternation is associated with an active-passive shift. The classifiers are represented by PA *ø, ɬ, L, D. The Hare reflex of ɬ is H. In his 1969 monograph on the classifiers Krauss proposed that the classifiers each contain three components which can be traced back to Proto-Athapaskan-Eyak and even to Na-Dene, the parent of PAE and Tlingit, a non-Athapaskan language. The reconstructions of the classifier components are set out in Table VI (after Krauss 1969:54).[7] (Minus elements (-) are null.)

Table VI: Classifier component reconstruction

Na-Dene	PAE	PA	Hare
ø -d $\underline{+y}$	*ø	*ø	ø
ɬ -d $\underline{+y}$	*ɬ	*ɬ	H
ø +d $\underline{+y}$	*d	*D	D
ɬ +d $\underline{+y}$	*ɬ	*L	L

This analysis of the classifiers enables us to see ø, H_1 contrast with D,L_1 in Hare in the phenomenon of pronoun alternation in the perfective. ø, H have $\underline{-d}$ in common where D, L have $\underline{+d}$. This $\underline{d}$-component also seems to have the effect of voicing or devoicing preceding elements. One question which arises is whether 1pl.PA* $\underline{de}$ is from the same source since the DER applies in both conditions (see also Krauss 1969:67).

The $\underline{d}$-component seems to block subject prefix alternation in the perfective. If this is in fact the case, rules R2, 4, 5, 8, 9, 13 can be written such that [0, H_1] classifiers are replaced by [$\underline{-d}$ classifier] or more basically [-voice classifier]. Why this [-voice] element should initiate a prefix alternation is not yet clear.

Kari (1976:218) notes that the $\underline{+y}$ element in the classifier moves leftward past the $\underline{ɬ}$ element when the $\underline{d}$ component is null. He also analyses the Navajo perfective as having a '$\underline{+i+}$' aspect prefix and suggests that this may be a reflex of the $\underline{y}$ component of the classifier which has moved leftward past the subject position but which still initiates subject prefix alternations. This analysis, if correct, explains why in Hare the alternations only occur a) in the perfective and b) with ø, H classifiers.

Rules R2a, 5, 9 might then be written so that the environment is simply

$[_{aspect}^{i}]$.

However this would restrict all perfectives to ϕ, H classifiers even though
such is not the case. An alternate source for perfectives with [+voice]
classifiers would then have to be proposed. Synchronically, the y and d
components are too abstract to be useful, although historically this analy-
sis would seem valid. As will be seen below, the concept of the classifier
components provides a diachronic explanation for alternations constrained
by some of the aspect prefixes.

4.5 Perfective aspect

It is not clear whether the perfective prefix is exclusively modal
or aspectual or a combination. Cook (1974) considers the perfective to be
purely aspectual while Kari (1976) analyzes the perfective as a combination
of one of three mode prefixes with a +i+ perfective aspect. Rice (1977) has
labelled the perfective as 'mode'.

The origins of the perfective prefixes are not well established.
The ne₃ and ye₃ prefixes are considered to be derived from *nən terminative
aspect and *γʷən progressive (Krauss 1969:81-82, Hoijer 1971:138-140).
These two prefixes are quite regular in their use. They contrast with we₃
which is derived from PA *sə. In Eyak this prefix follows the subject
pronoun and in Tlingit it appears in the classifier (Krauss 1969:24). In
addition, it seems that in Navajo at least, only si perfective (*<sə) can
occur with a derivational prefix in conjunct position (Kari 1976:220). The
ye and ne perfectives are restricted to co-occurrence with disjunct prefixes.

The analysis of we₃ as we plus y component moved leftward can explain
several variations. y in any position is considered to reinforce we. If y
moves to classifier initial position, it is absorbed by the subject prefix.
I will refer to these processes as Y-movement (R17) and Y-absorption (R18).

R17. +i+ -d +y ---> y +i+ -d

R18. a. h₂ +y ---> í
     b. y ---> v́/ ϕ_2 ____
     c. y ---> ϕ/ ah₂ ____

By R18 then, 1sg. h₂ becomes í and 3sg. ϕ becomes v́. DER blocks a change
in 1pl. íd₂, and y is absorbed by 2pl. ah₂ by phonotactic rules.

These changes only occur with ϕ, H₁ (-voice) classifiers, which
trigger Y-movement. we₃ then assimilates with a preceding conjunct prefix
as described in section 3.

If the y component is not absorbed by the vowel of the subject pre-
fix, it continues to reinforce we₃ which as a consequence is not absorbed
either. Hence the apparently complicated changes in the subject prefixes

are shown to have relatively simple motivations. The lack of prefix vari-
ation (other than assimilation) in languages like Carrier may be due to
levelling whereby the reflexes of *š, *ne have become the only forms avail-
able. Alternately, it may be that Y-Movement is no longer productive, that
is, the y component does not move leftward and Y-absorption, which produces
the prefix alternations, cannot therefore apply.

5. Summary

The motivations of the various alternations in the Athapaskan subject
prefixes have long been problematic. The multiple rules in an Item and
Process grammar (e.g., Rice 1977) can, with the help of comparative and dia-
chronic data, be shown to involve a relatively limited number of factors.
For instance, Rice (1977:72-73) explains some of the alternation for 2sg. n_2
in the following manner:

> "The second person singular is marked by ne- ... [with] zero, h
> classifier, perfective word initial or after a disjunct morpheme...
> [F]ollowing a conjunct morpheme...the second person is marked by
> nasalization (but not raising)...[and] the morpheme we- is completely
> lost in the we- perfective in this position."

Do native speakers internalize this type of rule? The principle of economy
suggests that underlying these surface forms are a few widely applying form-
al rules. We have seen how some of the rules I proposed initially were
collapsed to bring out underlying similarities. Y-movement and Y-absorp-
tion generalized several of the factors constraining prefix alternation.
With the addition of further phonological rules such as He-peg (R 15), the
D-effect rule, and several phonotactic assimilation rules, the entire set
of subject prefix alternations is accounted for.

This examination of a number of Athapaskan subject prefix series
has shown that a limited number of formal rules have a wide range of appli-
cation in each of the Athapaskan languages. Assimilation, disjunct bound-
ary and D-effect are already known for their influence on the surface forms
of the verb prefixes. It has been shown that the classifiers and perfective
prefixes constrain subject prefix alternations based on an underlying recon-
structed y component. This analysis seems to explain otherwise complex
constructions in languages as widely separated as Hare and Navajo. Further
examination of other Athapaskan languages will, it is hoped, present a
fuller picture of the verb prefixes in the Athapaskan family.

[1]Hare is spoken around Fort Good Hope, N.W.T.   ´ indicates high tone.

Hare citations are in an adapted orthography. sh = /š/, j = /dž/, gh = /γ/. Following Cook (1978) nasalized vowels are indicated as Vn, which has considerable justification in reconstructed underlying forms. Numerical subscripts indicate prefix position (cf. section 2.1). I would like to give special thanks to Ed Cook and Dave Pentland for their help and constructive comments in the development of this paper.

[2]For a discussion of object prefix agreement in Sarcee see Cook 1974.

[3]Prefixes are in position 2 unless otherwise noted by subscript. '--' indicates not available. v́ indicates tone raising on the preceding syllable. Sources: Babine: Story 1978. Carrier: CCDC 1974, Cook 1977, Story 1978. Chilcotin: Cook 1976a, 1976b, 1977, deWaard 1979, Krauss 1975. Chipewyan: Li 1932, 1946, Richardson 1963. Dogrib: Davidson 1963. Hare: Rice 1977. Kutchin: Scollon 1975 (Scollon's c = š). Sarcee: Cook 1971a, 1971b, 1972b, 1974, 1977. Tanaina: Kari 1975 (Kari's ch = tš), Navajo: Kari 1975, 1976, Young and Morgan 1942, Hoijer 1945, 1946, 1963, Sapir and Hoijer 1967. Hupa: Golla 1970. Tututni: Golla 1976. Eyak, Tlingit and Proto-Athapaskan: Krauss 1964, 1965, 1969, Pinnow 1970.

[4]In Athapaskan the perfective is marked by several methods: stem alternation, subject prefix alternation, and position 3 prefixes. It is proposed that e.g. ne_3 is somehow marked as either perfective or imperfective. In this paper when the distinction is required, a subscript CV_{3pf} is used. See also section 4.5.

[5]Following Kari (1975) I employ three boundaries in the verb complex: word initial and final, ##; disjunct-conjunct, #; morpheme, unmarked. See also section 4.2.

[6]Kari (1975) frequently has to express rules with reference to syntactic forms, e.g., p. 245: Ni-absorption CV + ni [---> CV̆.

[7]I fail to understand why Krauss did not reduce this further to: ±ɨ ±d ±y.

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