

SOME CONCEPTS IN AHTNA ATHABASKAN WORD FORMATION

James Kari

INTRODUCTION

The Athabaskan languages of western North America are a homogeneous family of about thirty-five languages. A verb in an Athabaskan language consists of a stem, at least one suffix, and a series of rigidly sequenced prefixes. Athabaskan languages seem to be among the world's most elaborate prefixing languages. Some of the languages, such as Ahtna of Alaska's Copper River area, have twenty-seven distinct prefix positions in the verb complex, with an inventory of about 150 prefixes and suffixes, as well as a slot for incorporates (Kari 1989; 1990).

Athabaskan languages are now attracting increasing attention because of the challenges they provide to theories of word formation and to mechanisms for the linearization of morphemes. To begin a study of Athabaskan morphology and word formation, one should review standard sources in the field, including works by Morice, Jetté, Sapir, Hoijer, and Young and Morgan. Krauss (1973) provides an excellent overview of this literature. In the 1970s Leer's work on the historical phonology of the Athabaskan root (Leer 1979) gave a firm basis for distinguishing canonical root structure and verb stem alternations in the modern languages. Coordinate with Leer's work was my 1979 study on the nature of verb themes and verb theme categories, and the structure of the suffixation system for aspect. In the 1980s documentation and research in the language family has expanded with the massive Navajo dictionary by Young and Morgan (1980; 1987), several analyses of Navajo pho-

nology and word formation (Speas 1984; 1986; 1987; Wright 1984; 1987; Hargus 1986), grammars of Sarcee (Cook 1984) and Slave (Rice 1989), a lexical phonological analysis of Sekani (Hargus 1988), an analysis of Halfway River Beaver morphology and phonology (Randoja 1989), a computerized dictionary of Ahtna (Kari 1990), and a recent functional grammar analysis of the Koyukon verb (Fortescue 1990).

In this paper I will summarize the conceptual framework I have applied to the Ahtna verb. Since 1973 I have been involved with a number of concurrent lexicographic projects in Alaska on Ahtna (Kari 1990), Dena'ina, Lower Tanana, and Koyukon (Jones, Axelrod, and Jetté forthcoming) and have done parallel field work in several other Athabaskan languages. My approach has developed in stages, and is a descendent of the approach to the Athabaskan verb launched by Sapir in the 1920s and advanced by Hoijer in the subsequent generation (e.g., Hoijer 1974). My approach is lexicographic in the sense that the theory and terminology have been shaped by the many interesting practical problems of representing the Athabaskan verb in dictionary formats.

Athabaskan linguistic history is interesting in itself (see Krauss 1986, for example). While there may be no consensus on certain points (such as what constitutes derivation vs. inflection), and serious flaws with some inherited terminology (e.g., *classifier prefixes*, or *deictic prefixes*), there is a general approach to the Athabaskan verb that has endured from earlier work. Table 1 presents some basic concepts that pertain to the Athabaskan verb.

Due to the pervasive positional rigidity of the affixes in the Athabaskan verb complex, the recent literature shows an intensification of interest in the templatic nature of Athabaskan languages. The abstract verb theme is the minimal specification of the verb as template (cf. Randoja 1989). On the other hand, the verb complex, once it is thoroughly explored, can be viewed as the maximally specified templatic expression of surface morphemes (cf. Kari

Table 1
Basic Terms Pertaining to the Athabaskan Verb

verb complex: a complete inventory of verbal affixes, with an explication of the linear order of morphemes (see table 2)
verb theme: the abstract lexical specification of a verb, including thematic prefixes, abstract root, transitivity, and theme category
verb base: a derivation of a verb theme, in abstract form, without full specification of inflectional affixes
verb composite: the fully specified abstract structures that underlies the phonetic verb form
derivative: a derived form of a verb theme
phonetic verb form

NOTE: This table follows, for example, Hoijer 1945, Sapir and Hoijer 1967, Hoijer 1974, Kari 1974, and Young and Morgan 1980.

1989). Furthermore, the verb phonology can be broken into several contrasting domains: For example, prefixes versus roots versus suffixes, or conjunct (inner) prefixes versus disjunct (outer) prefixes. Aspects of verb phonology can be treated coherently in terms of constraints on syllable structure within domains of the verb, (cf. Hargus 1988, Rice 1989, Randoja 1989). Leer (1989a) has recently extended the templatic analogy further by pointing out templatic properties of nouns that are partly congruent with verb structure. Also the abstract structure of the small set of directionals is a pared-down version of the verb complex, with a prefix slot, a root, and a set of suffixes (Leer 1989b).

In the course of integrating verbal affixes with roots in the *Ahtna Athabaskan Dictionary*, I tried to account for the relative position of the verbal affixes and the surface structure of fully inflected verbs (Kari 1989; 1990). The position class model for Ahtna in Kari 1989 and 1990 distinguishes twenty-seven distinct prefix positions before the root and four suffix positions after the root. (See table 2 in section 3 below.) I divide the prefixes into five zones. These zones allow for flexibility in characterizing the precise order of prefixes, which can vary in interesting ways in the daughter languages, as well as some new rubrics that are either more accurate as to function (e.g., a pronominal zone rather than a chimerical and misleading deictic position that has been ensconced in the Athabaskan literature, Kari 1989, 443, 447-48), or that are neutral to function (e.g., a qualifier zone).

Kari (1979, 58-62) presented a preliminary model of Ahtna word formation that sets forth some ideas about dynamic properties and derivational levels in the verb, from abstract verb theme to phonetic verb form. This model of Ahtna word formation is refined in Kari (1990:38-60) and is discussed here in sections 1 through 6. In the final section I summarize this approach and how it can be compared to and integrated with Young and Morgan's 1987 treatment of derivation and aspect in Navajo.

1. A MODEL OF AHTNA WORD FORMATION

The model of Ahtna word formation tries to address several general facts about the Ahtna (and Athabaskan) verb. We routinely see enormous derivational and inflectional productivity in sets of verbs. With practice, the linguist can assign derivatives to abstract verb themes. The underlying structure of the verb theme with thematic prefixes before a root and an abstract meaning is a recognizable template. Word composition is of the type called the interrupted synthesis (Sapir's term; see also Whorf 1932; 1956, 133; Kari 1989, 428)¹ of discontinuous strings of prefixes, a stem, and a suffix. These strings apply simultaneously and are, in the terms of Bauer (1988), synaffixes. In multiply derived verbs there has been a stacking of discontinuous strings, with precise interdigitation of the prefixes within the templatic structure of the verb theme.

There is adherence to a basically rigid linear surface ordering of the prefixes. The most frequently occurring prefixes appear as cumulative morphs. Zero morphemes and zero derivations are common and essential ingredients, while reduplication is not present as a grammatical process.

Figure 1 is a model of Ahtna word formation expressed as a flowchart. Twelve steps are distinguished, ordered from the abstract verb theme to the actual phonetic form. A single derived verb form, *nik'a'sngi'aas* 'we used to lift it up (n-class object such as ball or coiled rope)', is presented at the right to illustrate nine of the steps of the model.

Symbols on the flowchart are as follows: the abstract representation of verb theme, base, and underlying form are in parallelograms on the vertical line; obligatory derivations are in boxes on the vertical line; optional derivations are in circles to the right of the vertical line.

This model posits that affixes are added to verb themes in nine hierarchically ordered cycles (steps 1–9). Steps 2, 5, and 6 can optionally apply more than once and thus have a second line returning to the circle. The term *phonology* is placed to the right of steps 7 through 9 to symbolize cyclic alternation between morpheme insertion and the application of phonological rules (see (11) below).

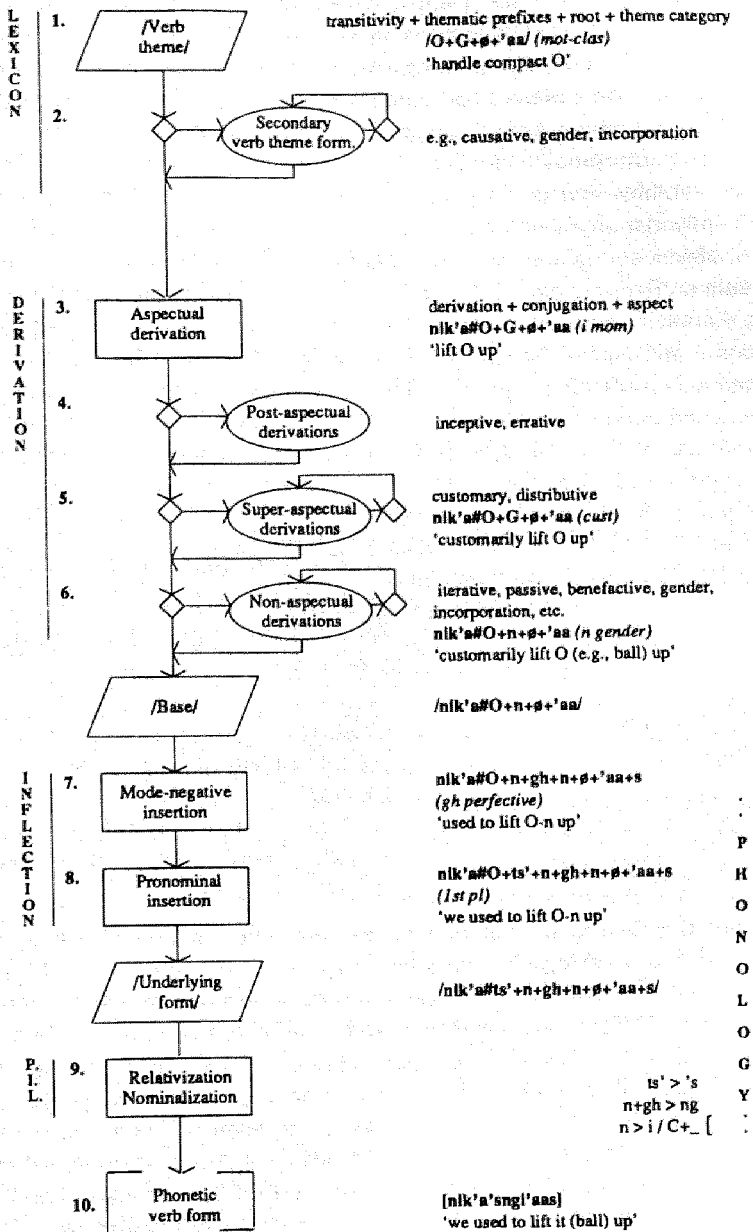
There are four general divisions in the model, *lexicon* (steps 1–2), *derivation* (3–6), *inflection* (7–8), and *postinflectional lexicon* (PIL) (9). The Ahtna dictionary contains all the verb themes recorded to date (a total of 1386), but only a selection of the many possible derivatives of each theme. In addition, the dictionary contains all verbal affixes that are entered both as single morphemes and also, as is characteristic of Athabaskan morphology, as they occur in *strings*, in combination with other affixes. For example, the string in figure 1, *ni + k'a#* (i mom) 'up vertically' is listed under *ni* 1 in the dictionary. (Entries in the *Ahtna Athabaskan Dictionary* are alphabetized by the initial phoneme of a root or an affix.)

The symbol # denotes the disjunct boundary. The symbol + represents a morpheme boundary (also see table 2 in section 3 below). Verbal complements and postpositions that appear as separate words in a theme are separated by a space (word boundary). The symbol G indicates that the theme can take gender marking prefixes. An assumption of this approach is that at steps 1 or 2, there is an abstract notation for transitivity ($\pm O$), incorporation (inc), gender (G), but that specific derivational or inflectional prefixes are inserted in verbs at one of the later steps.

2. VERB THEMES AND THEME FORMATION

A verb theme entry consists of a root, a listing of thematic prefixes, and a marking for transitivity. Each theme also has a theme category label and a translation. Ahtna verb themes are assigned to twelve verb theme categories

Figure 1. A Model of Ahtna Word Formation



(Kari 1979). A verb theme category is a broad group of verb themes that has an identifiable semantic relationship and a common structure in the most basic derived verb forms. Verb theme categories have characteristic derivational potential—that is, the most homogeneous and productive theme categories, such as motion, successive, and extension, have sets of productive derivational strings common to that category. The Ahtna conjugation patterns and aspects are partly predictable from the categorization of the theme.

The symbols and prefixes cited before the root in verb theme entries convey information about thematic prefixes, transitivity or valence, the presence or absence of gender marking, and the relative order of these elements. Thematic prefixes are part of the structure of the theme and thus must be listed in the dictionary entry of the verb theme. They occur in all derived forms of the theme and cannot be explained as having been added by a productive derivational or inflectional process. The four classifiers— \emptyset , t, D, and l—are always cited before the verb root.

To illustrate these concepts, consider one operative theme and one motion theme with two derivatives.

[1] O + D + naan ²	'(op) drink O'
yatnaan'	'(durative) he drank it'
	/y + gh + n + 0 + D + naan + ' /
	/3ob + mode + perf + 3sb + cls +
	root + vsf/
l + tset (mot)	'(sg) runs'
'iltset	'(n momentaneous) he arrived
	running'
	/n + n + 0 + l + tset + n/
	/ mode + perf + 3sb + cls + root
	+ vsf/

Operative themes are marked by a zero derivation in the durative aspect, which means something like 'verb performed over a span of time'. Motion themes are marked by a zero derivation in the momentaneous aspect, which means 'arrive'. There are interesting and significant distributional patterns with certain derivations: for example, motion themes can never take the durative aspect; the zero derivation 'arrive' cannot apply to operative themes. In addition to the categorized verb themes, uncategorized verb themes are posited to occur at step 3 of figure 1. The theory of Athabaskan verb theme categories has proved to be useful for grouping sets of derived verb forms, for determining the structure and meaning of the abstract verb theme, as well as for understanding Ahtna verb stem variation and aspect. See also Axelrod 1990, a detailed study of verb theme categories and aspect in Koyukon.

Frequently more than one verb theme is derived from the same root. A

step for secondary verb theme formation is presented in step 2 in figure 1. In the terms of Fortescue (1990, personal communication) theme formation represents "true derivation." It is usually possible to recognize that one theme is more basic—that is, it is simpler in structure and broader in meaning, while other themes are more marked in structure and more restricted in meaning. Some attempt has been made to order themes in an entry to show theme/cotheme and theme/subtheme relationships. For example, subthemes with an incorporated subject or object (*inc*) are always placed after a more basic theme without an incorporate. The ordering of larger sets of themes, however, is not clear-cut. For example, with *(y)aa*^o ('sg goes') are listed eighteen themes, the first of which is the most productive and general in meaning. The other themes are more restricted in meaning. Some are subthemes derived from the basic theme, while others are not derivable by any general rule of theme formation. In this case, the order of the eighteen themes conveys only a general notion of relationships between themes.

In the dictionary the abbreviation *ts* is used for theme formation strings. These are productive or semiproductive strings of prefixes that form predicates. My preliminary search has yielded fifty-four theme formation strings in Ahtna. For example, a half dozen transitive themes meaning 'follow O' (themes that include 'swim after O', 'paddle after O', 'chase O', '(sg) goes following O') are derived from intransitive themes and contain the *n*-qualifier prefix. Thus, a theme formation string, *O + n* 'follow O', can be extrapolated and entered in the dictionary as a theme formation string.

Some productive theme formation strings can become lexicalized in a subset of verb themes. For instance, in Ahtna a theme marked with *G* has gender prefixes inserted at step 6 in figure 1. The *d*-qualifier prefix is used to mark the gender of nouns such as wood, fire, spans of time, and words. On the other hand, certain themes in Ahtna have a lexicalized gender prefix. All verbs referring to smoke or fire have a thematic *d*: *d + Ø + let* 'fire smolders, smudge fire burns'. This *d* is inserted by a theme formation string: *d* 'thematized gender'.

Valence alternations and transitivity play an important role in theme formation. The causative is the single most prominent theme formation string. Hundreds of subthemes with the string *O + †* are found, for example:

<i>G + Ø + taan</i>	'elongated object is in position'
<i>O + G + † + taan</i>	'keep elongated O in position'

Conversely, passive changes a transitive theme to intransitive. A typology of twenty-six patterns is presented in Kari (1990:47–49).

A theme marked with *O* is transitive; a theme without *O* is intransitive. By convention the abbreviations *O*, *P*, *I*, *comp*, and *inc* are cited in both the theme structure and the theme gloss. Both transitive and intransitive themes can occur with a thematic postposition or with a complement. The *k'* ('indefi-

nite') prefix can appear as an inflectional direct object (in themes with O), or as an indefinite subject (symbolized as *I*), or it can be thematic. Similarly, *qo* 'area' can be a direct object, a subject, or it can be thematic.

Incorporated stems occur in a position in the disjunct portion of the verb complex, apparently in all Northern Athabaskan languages. In Ahtna about 13 percent (177) of all verb themes take one or more incorporated stems in this position in the verb complex. In [2] seven theme formation strings for verbs with an incorporated stem are illustrated. Each has a different transitivity pattern. Each example has a theme formation string, a theme, a derivative, the underlying form of the derivative (including zero morphemes), and an approximate gloss of the underlying morphemes.

- [2] a. inc # \emptyset (*ts*) derived intransitive with incorporate as subject
 ta # d + \emptyset + taan 'water drips'
 natadghitaan 'water dripped down'
 /na + ta # d + gh + n + \emptyset + \emptyset + taan + n/
 /down + water # thematic + mode + perf + 3sb + cls + root + vsf/
- b. inc # \emptyset (*ts*) derived intransitive with incorporate of manner or instrument
 ti # \emptyset + yaa^o '(sg) goes hunting with dogs'
 titiniyaa 'he went out hunting with dogs'
 /ti + ti # n + n + \emptyset + \emptyset + yaa + n/
 /out + dog # mode + perf + 3sb + cls + root + vsf/
- c. P + inc # (*ts*) derived intransitive with thematic instrumental incorporate and thematic postposition
 P + qe # t + qay 'strike P with the foot, kick P'
 iqetqas 'he kicked him once'
 /y + qe # z + \emptyset + \emptyset + t + qay + ?/
 /3pob + foot # perf + mode + 3sb + cls + root + vsf/
- d. inc # \emptyset (*ts*) derived transitive with incorporated object (regular O is absent)
 inc # G + \emptyset + taan 'handle (inc) elongated object'
 nixaŋnitaan 'he stopped the sled'
 /ni + xaŋ # n + n + \emptyset + \emptyset + taan + n/
 /stop + sled # mode + perf + 3sb + cls + root + vsf/
- e. P + inc # t (*ts*) derived transitive with incorporated object and thematic postpositional object
 P + na + se # t + k'el 'tear skin off P'
 inasetk'el 'he tore the skin off of it'
 /y + na + se # z + \emptyset + \emptyset + t + k'el + n/
 /3ob + ? + skin # mode + perf + 3sb + cls + root + vsf/

- f. inc # O + G + Ø (*ts*) derived transitive with incorporated subject
 inc # O + G + Ø + taan '(inc) causes elongated O to move'
 qetaydeztaan 'water caused it (y, log) to drift ashore'
 /qe + ta # y + d + z + Ø + Ø + Ø + taan + n/
 /ashore + water # 3ob + gender + mode + perf + 3sb + cls + root
 + vsf/
- g. inc # O + † derived transitive with incorporate of manner or instrument
 †i # O + † + tae 'hunt O with dogs'
 niti'nittaen 'he cornered something with dogs'
 /ni + †i # k' + n + n + Ø + † + tae + n/
 /stop + dogs # indef + mode + perf + 3sb + cls + root + vsf/

Verb theme formation is a promising area for future research in Athabaskan languages. I anticipate a better understanding of the "syntax of lexical word formation" (Hale 1989) or "true derivation" (Fortescue 1990)—for example, the ways in which valence changes and incorporation intersect with other theme formation processes; refinements in the morphological and semantic relationships between sets of themes, and a better understanding of the relationship between productive and lexicalized derivations.³

3. FOUR PATTERNS OF DERIVATION

As noted in figure 1, the abstract verb theme lacks mode and aspect marking and other derivational and inflectional material. Information is supplied to verb themes by the addition of prefixes and suffixes in a series of derivations. This powerful feature of Athabaskan word formation is what Fortescue (1990) terms extended derivation; he also suggests a principle of the "centrifugal application of expression rules." In my model I distinguish four types of derivation in Ahtna that give form to the underlying verb base: aspectual, postaspectual, superaspectual, and nonaspectual. This results in the verb base, which is defined as the derived word, without the array of inflectional prefixes that mark mode, subject, and object. Note that the verb base is employed in the entry structure of Young and Morgan (1980; 1987) and is alphabetized by the leftmost morpheme. The verb base can be thought of as a boundary between derivation and inflection.

A verb theme must take one aspectual derivation to gain some specific meaning. This derivation adds a set of prefixes and stem suffixes that mark mode and aspect. If we compare, for example, a theme and some of its possible derivatives, the distinctions between theme, derivation, verb base, and derived verb form (or derivative) can be isolated.

- [3] verb theme: O + G + Ø + 'aa 'handle compact O'
 (mot-clas)

derivation1:	ni + k'a#i (<i>ads: i mom</i>)	'up vertically'
verb base:	/ni + k'a#O + G + i + (i mom) + Ø + 'aa/	
verb form:	nik'ayi'aan	'he lifted it (hat) up'
derivation2:	P + la + q'e# (<i>ads: gh mom</i>)	'into the hand of p'
verb base:	/P + la + q'e#O + G + (gh mom) + Ø + 'aa/	
verb form:	ilaq'eyghi'aan	'he handed it (hat) to him'

The examples in [3] have as inflectional prefixes a third person singular subject (\emptyset = he, she, it) and the perfective mode, which is marked differently in each verb. Several basic distinctions in derivational processes in Ahtna have been found. Most derivational strings are mutually exclusive—that is, it is not possible to combine 'up vertically' and 'into the hand of P' into a single derivation. Furthermore, most (but not all) derivational strings require the same mode and aspect prefixes in all derivatives. In [3] 'up vertically' always has an *i*-perfective prefix and the momentaneous aspect and 'into the hand of P' always has a *gh*-perfective prefix and the momentaneous aspect.

The momentaneous is one of twenty-two morphologically distinct aspects in Ahtna that are detected in Athabaskan languages by the analysis of suffixation patterns in verb stem sets—the verb stems that occur in the four modes: imperfective, perfective, future, and optative (Kari 1979; 1990; Hardy 1979).⁴

If we experiment further with the first of these examples, we can find more derivative verbs without changing these inflectional prefixes:

[4]	nik'anayi'aan	'he lifted it (hat) up again' (<i>iterative</i>)
	nik'aytez'aan	'he started to lift it up' (<i>inceptive</i>)
	nik'aynest'aan	'he mistakenly lifted it (hat) up' (<i>errative</i>)
	nik'aydit'aan	'he lifted it (hat) up for his own benefit' (<i>benefactive</i>)
	nik'anyiz'aan	'he lifted them (hats) up one at a time' (<i>distributive</i>)
	nik'ayghi'aas	'he used to lift it (hat) up' (<i>customary</i>)
	nik'aydi'aan	'he lifted it (block of wood) up' (<i>d-gender</i>)
	nik'ayni'aan	'he lifted it (berry, coiled rope) up' (<i>n-gender</i>)
	nik'aqu'aan	'he lifted it (house) up' (<i>qo-gender</i>)
	nik'a'it'aan	'it (hat) was lifted up' (<i>passive</i>)

Each of the above derivatives has combined the derivation *nik'a* 'up vertically' with one other derivation. Moreover, it is possible to form other derivatives with 'up vertically' as well as combinations of two and three other derivations, which are noted herewith:

[5]	nik'anaydi'aan	'he lifted it (block) up again' (<i>iterative, gender</i>)
	nik'anaydit'aan	'he lifted it (block) up again for his own benefit' (<i>iterative, benefactive</i>)

nik'anayghi'aas	'he used to lift it (hat) up over and over' (<i>iterative, customary</i>)
nik'anaydghi'aas	'he used to lift it (block) up over and over' (<i>iterative, gender, customary</i>)
nik'aniidez'aan	'he lifted them (blocks) up one at a time' (<i>distributive, gender</i>)
nik'aniidest'aan	'he lifted them (blocks) up one at a time for his own benefit' (<i>distributive, gender, benefactive</i>)
nik'anaynest'aan	'he mistakenly lifted it (hat) up again' (<i>iterative, errative</i>)

Thus we find enormous derivational productivity that we must address in the model as well as the format of a dictionary. Young and Morgan (1980) demonstrate that it is possible, in a noncomputerized book, to list a large selection of verb bases in an Athabaskan language.

These facts have led us to posit that the first obligatory derivation that applies to a verb theme is an aspectual derivation (step 3 in figure 1). An aspectual derivational string, such as *nik'a # (i mom)* 'up vertically', is a bundle (or formula) of discontinuous prefixes and suffixes. The disjunct derivational prefixes *ni* + *k'a* are added, and the set of potential inflectional affixes for mode and aspect is indicated by the *i*-momentaneous marking—that is, there will be an *i*-prefix in the conjugation zone and a bundle of four aspect suffixes. In other words, stem sets reveal aspect and from these we can recognize the bundle of underlying suffixes that attach to the root. The two momentaneous suffixation patterns in Ahtna are shown here:

[6] CVV roots:	s	n	†	†	
CV(V)C roots:	L	n	†	L	(L = vowel lengthening)

More than 250 of these mutually exclusive aspectual derivational strings (ADS) have been found in Ahtna to date. Most of these strings contain one to four prefixes, and there are a few with six and seven prefixes. There are six zero derivations in Ahtna with no prefix. The ADSs are listed at least once in the main entries by the initial sound of the leftmost prefix in the string as well as in an appendix. Aspectual derivational strings are marked [ads], and the aspect the string takes is given in parentheses: for example, *nik'a # (ads:i mom)* 'up vertically'. Many of the derivational strings are typically found with specific theme categories. For example, 'up vertically' and 'into the hand of P' can be added to many motion themes. Also the productivity of a verb theme can be measured by the number of ADSs that can apply to it. For example, the theme 'handle compact O' (in figure 1) is one of the most productive themes in any Athabaskan language.

The simplest aspectual derivational strings, the six that have no prefix plus several others, are fundamental to the typology of aspects. These primary

aspectual strings (PAS) (Kari 1979, 64–76) are diagnostic of some of the theme categories and form links between the semantics of groups of verb themes, the distribution of morphemes for conjugation and aspect, and fundamental meaning contrasts between aspects such as durative, conclusive, and momentaneous. (Two of these PASs were illustrated above in [1].)

Another feature of this theory is the status of the uncategorized verb theme. These are defective themes in that they have a specific ADS for mode and aspect in the underlying form. Referring back to figure 1, an uncategorized theme is at step 3 in its underlying form. About 12 percent of the 1368 Ahtna verb themes are treated as uncategorized, and a similar percentage has been found in Koyukon. For example, *O + u + Ø + niik* 'grab O' is treated as *u:s mom*, an uncategorized *s*-momentaneous. All derivatives are *s*-momentaneous, and other ADSs are not possible. Since theme categories are general morphosemantic classes of verbs, this type of theme represents a lexicalization of the ADS as a word formation mechanism.

Two strings in Ahtna, the inceptive and the errative, have a slightly different status than the ADS. I have termed these postaspectual derivational strings.

- [7] *nik'aytez'aan* 'he started to lift it up'
nik'aynest'aan 'he mistakenly lifted it (hat) up'

In these two cases *t* (*s*) and *n* (*s*) *D* are added after an ADS. The tense-mode prefixes shift, however, stem suffixation is not altered. (In Kari 1979, 92–93 I termed these supermomentaneous strings.)

It is relevant here to compare a single cognate string in Ahtna and Navajo, the inchoative. In Ahtna the inchoative is a string *P # d + n* (*i mom*). It is found only as an ADS (e.g., *qetnibaen* 'he is beginning to swim', *k'etnitnaan* 'he is beginning to drink something'). It is not postaspectual like the inceptive and errative because it cannot be combined with another ADS. However, according to Young and Morgan (1987, 187–88), the Navajo inchoative string, which is quite close to the Ahtna string in structure and in meaning, *P # 'i + n* (*ii mom*), is what they call a subspect. The Navajo inchoative can co-occur with other ADSs (e.g., *habi'niigeed* 'I started to dig it out'). This form is built on a more basic momentaneous derivation, *háágeed* 'I dug it out'. Thus the Navajo inchoative offers comparative support for a step of postaspectual derivation. We see cognate strings applying at different steps in two daughter languages, which sheds light on the stacking of derivations.

The term *superaspect* was first presented in Kari (1979, 93–99) with discussion of the customary, distributive, and progressive in Ahtna and with reference to the multiple and the conative in Koyukon.

A layering of three strings can be shown in the following four examples. Note that verb stem sets are listed in the four modes:

- [8] a. *diighitl'iit'* 'he poured it (tea) into a container'
 /di # y + gh + n + Ø + † + tl'iit' + n/
 /into # 3ob + mode + perf + 3sb + cls + root + vsf/
 (*gh momentaneous*) tl'iit tl'iit' tl'et tl'iit
- b. *dinyitl'iit'* 'he poured it into (pl) containers'
 /di + n # y + z + Ø + Ø + † + tl'iit' + n/
 /into + dist # 3ob + mode + perf + 3sb + cls + root + vsf/
 (*distributive*) tl'iit tl'iit' tl'iit tl'iit
- c. *diighitl'et* 'he customarily poured it into it'
 /di # y + gh + n + Ø + † + tl'iit' + s/
 /into # 3ob + mode + perf + 3sb + cls + root + vsf/
 (*momentaneous-customary*) tl'et tl'et tl'et tl'et
- d. *diniighitl'iit* 'he customarily poured it into containers'
 /di + n # y + gh + n + Ø + † + tl'iit' + s + E/ (E = vowel
 expansion)
 /into + dist # 3ob + mode + perf + 3sb + clas + vsf + vsf/
 (*mom - dist - cust*) tl'iit tl'iit tl'iit tl'iit

The verbs in [8b] and [8c] have one superspect added on top of the ADS. The example in [8d] is doubly derived—by both the distributive and the customary. Each example has a different stem set, which is an indication of distinct stem suffixation in each aspect or superspect.

On the other hand, when the *na-* 'iterative, again' prefix is introduced, the tense-mode prefixes do *not* change (e.g., *nik'anayi'aan* 'he lifted it (hat) up again', *ilaq'enayghi'aan* 'he handed it (hat) to him again'). *Na-* 'iterative' does not require its own perfective prefix. Thus, the 'iterative' can be viewed as a *nonaspectual derivational string* (NDS) (step 6 in figure 1) in that it does not alter conjugation and aspect. These strings are marked as [nds] in the main entries.

Fifteen nonaspectual derivational strings have been found in Ahtna. As shown in [4] and [5] above, many of these NDSs can co-occur, which can create numerous derived verb bases. Indeed, the principle seems to be that lack of selection of conjugation prefixes and aspect suffixes facilitates this recursion. The NDSs are illustrated in table 2. At the top of this table is a list of the affix positions and zones in the Ahtna verb complex, with their abbreviations. Each prefix in the NDS is placed on table 2 in its position to convey how the prefixes can interdigitate or accumulate within the linear order of the verb complex. The insertions of incorporated stems and gender prefixes are also treated as nonaspectual derivations. Some other derivations such as the passive and reciprocal have been treated as NDSs, but might also be argued to be inflectional processes. Also I should point out that I can't make any

Table 2 (continued)
Ahtna Nonaspectual Derivational Strings

	##	word boundary
	+	morpheme boundary
11B	3p ₂	second third person plural subject
11A	pob	postpositional object
10C-A	der/th	derivational/thematic
9	iter	iterative
8	dist	distributive
7	inc	incorporate
6	th	thematic
	#	disjunct boundary
5F	3y	third person plus y
5E	dob	direct object
5D	1p	first person plural subject
5C	indf	indefinite object-subject
5B	th	thematic
fA	3p ₁	first third person plural subject
	=	pronominal-qualifier boundary
4F	area/qual	areal subject-object/q-qualifier
4E	con	conative
4D	icp	inceptive
4C	qual	d-qualifier
4B	qual	n-qualifier
4A	qual	gh/z-qualifiers
	%	qualifier-conjugation boundary
3D	trn	transitional
3C	spn	s-perfective-negative
3B	mode	mode
3A	prf	perfective
2	subj	subject
	[(C)STEM boundary
1	clas	classifier
0	root	root
1-3	vsf	verb suffixes 1-3

NOTE: This table follows Kari (1989; 1990, 40-41).

particular case for the ordering of steps 4 through 6 of figure 1 internal to one another.⁵

4. INFLECTION

In the Athabaskan literature there is no consistent and precise policy regarding the parameters of inflection. In Ahtna I analyze twenty-four distinct prefix-

suffix combinations to mark mode negativity (e.g., s-perfective, i-perfective, perfective-negative, optative, optative-negative). Intransitive verbs inflected for six subjects and mode can typically appear in forty-eight-member paradigms. Transitive verbs can take up to thirteen objects and can read out to paradigms of over five-hundred members. Through the course of steps 3 through 5 in figure 1 there is a filtering or winnowing down of sets of conjugation prefixes and aspect suffixes to give rise to the myriad of inflectional choices that we can assume are specified by the phrase structure.

I have separated mode-negative insertion and subject-object insertion into two steps in figure 1. I treat mode negativity in Ahtna as being marked by eight prefixes that occur in six positions as well as by nine suffixes in two suffix positions. Mode-negative conjugations are marked by discontinuous strings of prefixes and suffixes that I assume apply simultaneously, as in the following third person progressives:

- [9] *prog* *gh* + † *aqae†* 'he is going in a boat'
 prog-neg *z* + *gh* + † + *e* *asquaele* 'he is not going in a boat'

Subject and object inflection (including postpositional objects) is marked in Ahtna by thirty-two prefixes in nine distinct positions. Many of these prefixes are the same abstract morpheme occurring in separate positions. Most of the subject-object affixes are single autonomous prefixes. (However a discontinuous pronoun can be found in some languages—e.g., Sekani *s-id* '1st dual'; Hargus 1988). Also in Northern Athabaskan languages the '3rd pl' subject occurs in a "floating position" depending on the presence or absence of the *y* '3 sg object', a very interesting problem in the linearization of surface morphemes (Kari 1989, 443).

It might be suggested for Ahtna that mode-negative and pronominal prefixes are added at a single step. However, in many Athabaskan languages, such as Navajo, there is radical allomorphy in the subject pronoun sets in perfective versus nonperfective paradigms. For this allomorphy I am attracted to the idea of assigning mode at one step and then adding the appropriate form of the pronoun at a later step. For example, a first person singular nonperfective and perfective of 'dig O' in Navajo might be derived thus:

- [10] 1 O + Ø + *geed* (mot) 'dig O'
 3 *ha#O* + (*gh*) + Ø + *geed* 'dig O out' *gh-mom*
 7 *ha#Ø* + Ø + *geéd* O-imperf *ha#Ø* + *gh* + *n* + Ø + *geed* *gh-perf*
 8 *ha#sh* + Ø + *geéd* 1sg *ha#gh* + *n* + *í* + Ø + *geed* 1sg
 haashgeéd 'I am digging it out' *háageed* 'I dug out'

Here two different first person singular pronouns (*sh* or *l*) are added at step 8, eliminating what I treated as a nonphonological pronoun readjustment rule (or *sh*-deletion rule; Kari 1976, 172–73). Fortescue (1990) attaches inflectional affixes and gender agreement via "expression rules."

5. POSTINFLECTIONAL LEXICON

Rice (1985) has observed that nominalized verbs in Slave must be formed by a word formation process that applies after regular inflection. This holds true for Ahtna nominalized and relativized verbs as well.

From these examples of 'cut O' we find that verb suffixes that relativize or nominalize (-i 'nonhuman', -en 'sg human', -ne 'pl humans') can be built on virtually any multiply derived form, in various aspects and inflections.

- [11] k'et'aasen 'the one who is cutting' (*relativized durative*)
 'ele' k'est'aazen 'the one who isn't cutting' (*relativized durative, negative*)
 k'et'asne 'the ones who customarily cut' (*relativized customary*)
 st'asi 'that which has been cut once' (*relativized passive, semelfactive*)
 at'aats'i 'that which has been cut repeatedly' (*relativized passive, durative*)
 'ele' qay'tnit'asi 'that which you did not cut into pieces' (*relativized momentaneous, perfective-negative*)
 tl'ogh u'eł t'aasi 'scythe; lit. 'with it grass is cut' (*nominalized durative, passive*)
 dinaat'aats'i 'diced meat; lit. 'that which has been repeatedly cut into (container)' (*nominalized momentaneous, passive*)

A level of postinflectional lexicon (PIL) in step 9 of figure 1 addresses the fact that nominalization/relativization can occur following various preceding routes of derivation and inflection. This reflects Fortescue's (1990) term, *recycling back into the fund*, a process that is notoriously flexible in Eskimo languages, and that occurs in Athabaskan under more delimited circumstances.

There is also a phonological argument that relative suffixation follows negative suffixation in Ahtna. Contrast the first two examples in [11] 'cut O' with the basic positive and negative in [12].

- [12] k'et'aas 'he is cutting'
 'ele' k'est'aaze 'he isn't cutting'

The negative suffix *e* triggers voicing of the stem final fricative *s*, whereas the relative suffix *i* does not. Derivations of the first two examples of 'cut O', a positive and a negative, attest to level ordering of these processes: (1) *e* (negative) insertion and (2) fricative voicing, followed by (3) *i* (relative) insertion and (4) *e* (negative) deletion.

[13]	/k' + t'aas/	/k' + t'aas/
neg insert	—	k' + s + t'aas + e
fric voic	—	k' + s + t'aaz + e
rel insert	k' + t'aas + en	k' + s + t'aaz + e + en
e-del	—	k' + s + t'aaz + en
ultimately	[k'et'aasen]	[k'est'aazen]
	'the one who is cutting'	'the one who isn't cutting'

6. REVIEW OF THE MODEL OF AHTNA WORD FORMATION

Table 3 is a summary of the formal distinctions in steps and types of strings presented in figure 1.

To review the model, I present in tables 4 and 5 several sample derivations. In table 4 the separate steps are contrasted. The numbers on the left of the table refer to the steps in figure 1. The table has four derivatives of four different verb themes with the root *taan* 'classify elongated object'. Morphemes that have been added at a step are underlined.

The themes in columns A and B at step 1 are the basic intransitive stative-classificatory and transitive motion-classificatory themes, both of which can occur in many thousands of derivatives. Secondary theme formation is illustrated in column C at step 2 by a subtheme with an incorporated stem (*inc*) as direct object, 'handle (*inc*) elongated object'. Also at step 2 in column D, the theme 'steer O' has three thematic prefixes beyond that of the basic transitive theme. It has a theme formation string of the shape $x \# gh$ that applies to themes that are held, attached, constrained, or tethered at one end (Kari 1989, 441–42).

Each of the themes has an aspectual derivation apply at step 3. The theme in A has a zero derivation (with no overt derivational prefix) and the *s*-neuter aspect whereas the three other themes have derivations with a disjunct prefix and a specific aspect. In this model I posit that derivational prefixes and an array of prefixes and suffixes for conjugation and aspect are added at step 3, but that a specific set of prefixes and suffixes for mode is not selected until step 7. The theme in column B is shown at step 4 taking a postaspectual derivation, the inceptive. This adds *t* (*s*-perfective) to the verb while the aspect remains momentaneous. The theme in column C is altered at step 5 to illustrate a superaspectual derivation, the customary. In this case, customary stem suffixation will supplant the momentaneous suffixation that had been added to this verb at step 3. Three nonaspectual derivations are presented at step 6. In column A, a *d*-prefix is added because a subject that is wooden and takes *d*-gender is presumed (e.g., 'stick is . . .'). In column C, the stem *xat* 'sled' is used here to illustrate one of a list of potential incorporated stems ('stick', 'gun', 'cane', 'snowshoe') that could appear in this subtheme. In

Table 3
Properties of Strings of Morphemes

<i>Step</i>	
1-2	Theme formation strings (TS) a. create predicates, assign valence/transitivity b. lack specific prefixes/suffixes for mode/aspect c. some recursion is possible
3	Aspectual derivational strings (ADS) a. obligatory derivation b. assigns a set of prefixes/suffixes for mode/aspect c. all ADSs are mutually exclusive d. primary aspectual strings, the simplest ADSs, are diagnostic of theme categories e. uncategorized verb themes are ADSs that have been lexicalized
4	Postaspectual derivational strings (PDS) a. inherit an ADS b. add one or more derivational prefixes and shift mode prefix but do not alter the aspectual suffixation of the ADS
5	Superspectual derivational strings (SDS) a. inherit an ADS b. add zero or one derivational prefix, shift the mode prefix, and supplant the suffixation of the ADS c. recursion of SDS is possible
6	Nonaspectual derivational strings (NDS) a. inherit an ADS b. add one or more derivational prefixes or an incorporated stem, but do not shift mode prefixes or aspectual suffixes assigned by ADS, PDS, or SDS. c. recursion of NDS is possible
7-8	Inflectional strings a. insert strings of mode-negative prefixes and aspect suffixes appropriate to ADS and other strings and to phrase structure b. insert individual subject-object pronouns appropriate to phrase structure
9	Relativization/nominalization (postinflectional lexicon) a. inherit and recycle all derivational affixes by ADS and other strings as well as inflectional affixes and phonology appropriate to inflection b. add a suffix in one of the rightmost positions in the verb complex

column D, the iterative derivation is shown, which introduces a disjunct prefix, *na*. The underlying verb bases for the four verbs are given between steps 6 and 7. Here all derivational prefixes are specified, and the aspects have been assigned, but the particular prefix-suffix selections for mode and person have not yet been determined. Specific prefixes and suffixes for mode are added to each verb at step 7. Note that a negative form is shown in column C. At step 8 subject and object pronoun prefixes are selected. In step 9, after

Table 4
Four Verb Themes and four Derivatives

<i>Step</i>	A	B	C	D
1.	/G+Ø+taan/(stat-clas) 'elongated-O is'	/O+G+Ø+taan/(mot-clas) 'handle elongated O'		
2.			/inc+Ø+taan/ (mot) 'handle inc. elongated O'	/x#O+n+gh+Ø+taan/ (mot) 'steer O'
3.	G+Ø+Ø+taan (s neu) 'elongated O is'	na#O+G+Ø+taan (gh mom) 'put elongated O down'	ni+inc#Ø+taan (n mom) 'stopping inc'	ɬu+x#O+n+gh+Ø+taan (per) 'steer O around'
4.		na#O+ɬ+Ø+taan (inceptive, s-perf) 'start to put elongated O down'		
5.			ni+inc#Ø+taan (customary) 'customarily stop inc'	

6.	d+Ø+taan (d. gender) 'elongated d-O (wood) is' /d+Ø+taan/	ni+xat#Ø+taan 'sled' 'cust. stop sled'	tu+na+x#O+n+gh+Ø+taan (iterative) 'steer O around again'
7.	d+z+Ø+taan+n (s-imperf. neuter) 'elongated d-O is' /d+z+Ø+taan+n/	na#O+t+z+Ø+taan+n (s-perf) 'started to put elongated O down' /na#O+t+z+Ø+taan/	ni+xat#z+Ø+taan+s (O-imperf -neg) 'not cust. stops sled' /ni+xat#z+Ø+taan/
8.	d+z+Ø+Ø+taan+n (3 sg.) 'it d-O is' /d+z+Ø+Ø+taan+n+i/	na#k'+t+z+i+Ø+taan+n (indef + 2 sg.) 'you started to put something down' /na#k'+t+z+i+Ø+taan+n/	tu+na+x#y+t+n+gh+gh+Ø+Ø+ taan+t (3y + 3 sg) 'he will steer it around again' /tu+na+x#y+t+n+gh+gh+Ø+Ø+ taan+t/
9.	d+z+Ø+Ø+taan+n+i 'that which is' /d+z+taan+n+i/ e Ø	/na#k'+t+z+i+taan+n/ y'i Ø	/tu+na+x#y+t+n+gh+gh+taan+t/ ii ng a tiit
10.	{deztaani}: 'that which is (wood)' [deztāni:]	[nay'tizitaan] 'you started to put something (gun) down' [naxat̪iistiige]	[tunaxiitngatiit] 'he will steer it around again' [tunaxiitngatiit]

Table 5
Three Derivatives of 'steer O'

Step	A	B	C
1.		/O + Ø + taan/	
2.		/x#O + n + <u>gh</u> + taan/	
3.	<u>t</u> u + x#O + n + gh + Ø + taan	<u>st</u> a + x#O + n + gh + Ø + taan	<u>q</u> e + x#O + <u>u</u> + n + gh + Ø + taan + <u>gh</u>
4.		sta + x#O + n + gh + <u>D</u> + taan + <u>n</u>	
6.	<u>t</u> u + <u>na</u> + x#O + n + gh + Ø + taan	sta + <u>na</u> + x#O + n + gh + <u>D</u> + taan	qe + <u>na</u> + x#O + u + n + gh + Ø + taan
7.	<u>t</u> u + na + x#O + n + gh + <u>n</u> + <u>i</u> + Ø + taan + n	sta + na + x#O + n + gh + <u>z</u> + <u>D</u> + taan + <u>n</u>	qe + na + x#O + u + n + gh + <u>z</u> + Ø + taan + <u>n</u>
8.	<u>t</u> u + na + x# <u>ts'</u> + n + gh + n + i + taan + n	sta + na + x# <u>ts'</u> + n + gh + z + <u>D</u> + taan + n	qe + na + x# <u>ts'</u> + u + n + gh + z + taan + n
10.	[<u>t</u> unax'snginitaan] 'we were steering it around again'	[<u>st</u> anax'sngestaan] 'we got lost steering it again'	[<u>q</u> enaxts'ungeztaan] 'we managed to steer it to a place again'

inflection has taken place, an *i*-relative suffix is added to the verb in column A. The underlying forms and output of phonological rules are given between steps 9 and 10.

By way of further review, table 5 presents three other derivatives of the theme 'steer O'. In this table three different ADS apply at step 3, one PDS applies at step 4, and the same derivations apply at steps 6, 7, and 8. The morphemes added at each step are italicized.

Since 'steer O' has three thematic prefixes plus an object slot, this is an appropriate theme with which to illustrate the twofold principles of interdigitation and accumulation. We assume here that 'steer O' is based on a simpler transitive theme shown here at step 1 and that *x # gh* are added at step 2. However, the *n*-prefix in the theme 'steer O' is not accounted for by a productive theme formation string. At step 3 three different ADS are exemplified. In columns A and B prefixes are added only in the leftmost position. In column C the string *qe # u + gh* (ss mom) 'arriving with difficulty at a destination' contains a disjunct prefix and two conjunct prefixes. The *u* (conative) prefix is placed between the object slot and *n*. However, both the theme and the string have the same prefix, the *gh* 'qualifier', which occurs in position 4A of the verb complex. Only one *gh* is overtly marked, a typical example of a cumulative morph. Similarly, at step 4 in column B, the errative string *n + D* contains an *n*-qualifier prefix, whereas the theme already contains the same *n* prefix. The three subsequent steps, 6, 7, and 8, are the same: iterative, perfective-positive (A is an *n*-perfective, whereas B and C are *s*-perfectives), and first person plural subject.

Although it is not relevant to this paper, details about the phonology of the three forms in table 5 could be presented. For example, the *s*-form of the mode prefix in column B is a sure test that the errative derivation has applied at step 4. In this case the *n* is cumulative, the *z*-mode prefix has devoiced before *D*, and the *D* has been deleted. In Athabaskan languages circuitous accounts of arcane phonetic or morphological detail are routine. It also appears that several boundaries internal to the verb complex are needed to account for certain morphophonemic alternations (Kari 1989; 1990, 650–69).

7. DISCUSSION

There is no space here to discuss the recent literature on Athabaskan word formation. Briefly, the model presented in Kari (1990) for Ahtna treats several aspects of the Athabaskan verb complex and word formation that have not been addressed in the early or recent sources.

It seems that the most appropriate characterization of word formation for an Athabasakan language involves the stacking and interdigitation of strings of affixes within the underlying verb theme. Access to the underlying template of the verb complex must be available. Strings of morphemes, either

verb themes or derivational or inflectional strings, are entered in the lexicon to reflect their mutual order, just as in *Ahtna Athabaskan Dictionary*.

The verb complex is treated as a fully specified morphological template. The surface and underlying order in the Ahtna verb complex has been analyzed to a greater degree than in other languages, and specific subpositions in the verb complex are explicitly pursued and formalized. If consistent criteria are applied, most Athabaskan languages have twenty and more distinct prefix positions. Morpheme insertion rules can't waffle when it comes to the interesting ordering relationships within, for example, the qualifier zone. We need to recognize all distinct positions and subpositions in the verb complex to account for stringlike morpheme insertion with accuracy and flexibility.

The stringlike nature of Athabaskan word formation is formally recognized and is present at most steps of the model. Prefixes and suffixes are assumed to apply simultaneously and to interdigitate or, if they are repeated, to accumulate as cumulative morphs. In contrast, Randoja (1989) treats most morpheme insertion by means of the addition of individual positions of prefixes (although not in a strict right-to-left order) with some allowance for co-occurrence by links between positions.

An attempt is made to define and then to research the hierarchical ordering of classes of derivations and morpheme insertion cycles based on several facts about the stringlike derivations, such as effect on suffixation and prefixation, and co-occurrence versus mutual exclusivity. Evidence has been presented for some distinct tiers of morpheme insertion with recursion at some steps. The morpheme insertion cycles do not directly correspond to the linear order of affixes. Here the model has a number of gray areas. It might be said that this Ahtna model has too many distinct steps—for example, inflection occurs at a single step. Also refinements in the internal ordering of steps 4 through 6 may be possible (see note 6).

The distinctions in the model—theme formation, aspectual, postaspectual, superaspectual, nonaspectual derivations, and postinflectional word formation—seem to be valid for other Athabaskan languages, such as Navajo. The Young and Morgan grammar and dictionary of Navajo (1980; 1987) provides a vast data base for the study of word formation processes. I note the following points for comparison:

1. Many of the most common theme formation strings are the same in Ahtna and Navajo. The Navajo verb lacks incorporation either in theme formation or as a derivational process.
2. Navajo has a larger battery of aspectual derivational strings, some of which are directly cognate in northern languages. The aspect system, especially as described in Hardy 1979, is probably 80 percent congruent with those in northern languages.
3. The Navajo distributive is a superaspect and is secondary to an ADS, just as in northern languages. The Navajo usitative is cognate with the custom-

ary superaspect in the north, but since it is not inflected in a full paradigm, it can be treated as a fifth mode in Navajo.

4. Navajo has several more postaspectual derivations and nonaspectual derivations than has been attested for Ahtna—for example, the seriative and inchoative (PDS) and semeliterative (NDS).⁶

5. Navajo inflection is very similar to Ahtna, but neuter verbs are inflected only in one paradigm and verb internal negative morphology is absent.

6. Navajo has a tier of postinflectional word formation for nominalizations and relativizations.