

Design Issues in Athabaskan Dictionaries*

Sharon Hargus

University of Washington

Athabaskan (Dene) verbs present two main problems for the lexicographer. First, in their most basic form, verbs are often discontinuous, an unpronounceable, non-word object. Secondly, the headword of the verb is the final syllable of the verb. In this article I survey a variety of published and unpublished dictionaries of Athabaskan languages, presenting and critiquing the different choices that have been made with respect to the representation of discontinuity and headword choice.

1 Overview

In this article I discuss two issues which arise in the construction of lexical entries for verbs in bilingual dictionaries of Athabaskan languages: the representation of discontinuity, and the choice of headword.

The discontinuity problem may be summarized as follows. The most basic form of an Athabaskan verb can consist of pieces, which are not pronounceable. If lexical entries for verbs aim to be linguistically accurate, then they will present the structure of the verb as a collection of pieces, but these may seem unfamiliar and challenging because they are not words.

The second issue that arises with lexical entries for verbs in Athabaskan languages is headword choice. This is essentially the decision about what the organizing point of the lexical entry should be. In the case of Athabaskan verbs, the most logical headword is the final syllable of the verb (or close to it). This runs counter to the expectation that headwords should be the beginnings of words.

2 Discontinuity

2.1 *Some sample entries for verbs*

Consider a sample of ways in which the verb 'steal' is represented in Athabaskan dictionaries shown in (1). In all Athabaskan languages which I am aware of, 'steal' consists of not only a root (the final syllable in the verb) but also a prefix *n-*, a 'thematic' prefix, as such prefixes are generally known in Athabaskan linguistics (see e.g. [Rice 1989](#)). In fact, [Leer 1987:277](#) reconstructs Proto-Athabaskan **n+0+'i:* for 'steal'. A linguistically faithful lexical entry for the verb 'steal' in any Athabaskan language should therefore show that both pieces of the verb, root

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and prefix, are associated with the meaning ‘steal’. Of the lexical entries shown in (1), only the first two—Ahtna and Navajo—represent the discontinuous nature of the verb.

- (1) ‘steal’ in several languages¹
- a. Navajo (Young and Morgan 1992, 252 ff.)
... ni-(0/si)... ‘to steal or pilfer O’. Nish’i̱h/né’íí’²
 - b. Ahtna (based on Kari 1990: 92)
O+n+0+’ii ... steal O. inez’iin he stole it
 - c. Carrier (based on [Antoine et al. 1974](#): 38)
’undunut’ih (v); (-t’ih): he is stealing [for himself]
 - d. South Slavey (based on [Howard 1990](#))
ets’ene?i̱h / zhené?i̱ / enuúí h³
ena?i̱
 - e. Deg Xinag (based on MacAlpine, Taff et al. 2007)
Gini’eyh^{JD+ED} lit. S/he steals.
Ni†treth dangan xa† ye gini’eyh.^{JD+ED} Wolverine steals from the trap.
Dlen yeno’eyh.^{JD+ED} The mice will steal it.

The problem with linguistically adequate entries for verbs in Athabaskan dictionaries, as noted above, are the difficulties they pose for non-linguist users. Patrick Marlow (p.c.) notes that users of the *Koyukon Dictionary* ([Jetté & Jones 2000](#)), which also posits abstract lexical entries for verbs, have difficulty looking up words in the Koyukon-English section, and it is not uncommon to find users’ dictionaries littered with post-it notes marking favorite lexical entries. It is perhaps significant that the Carrier dictionary, which lacks a skeletal representation of the verb, was compiled by a group of non-linguist native speakers of Carrier (with two linguist-missionary advisors).⁴ The entry for ‘steal’ in the South Slavey dictionary, like the Carrier dictionary just mentioned, also fails to show the pieces, and thus what all forms of this verb have in common.⁵

¹ [Kari 1988](#) provides an excellent and detailed classification of various types of Athabaskan dictionaries compiled as of 1988. He distinguishes first of all between (1) English (etc.)-Athabaskan dictionaries and word lists, (2) Athabaskan-English dictionaries, and (3) comparative word lists and dictionaries. Category (1) subtypes are “alphabetical” or “topical”. Category (2) subtypes consist of those with (a) “word initial alphabetization”, (b) “mixed word initial-stem initial alphabetization”, (c) “stem initial alphabetization, separate sections for word categories”, (d) “stem initial alphabetization, integrated word list”.

²The first form is first person singular imperfective ‘I’m stealing it’, and the second form is first person singular perfective ‘I stole it’.

³The Slave forms shown in the entry are described by Howard (p. v) as ‘present tense / past tense / intentive tense’. The ‘present’ (usually called imperfective in Athabaskan linguistics) form includes ‘the impersonal prefix’ *ts’e-*, and the ‘past’ (usually called perfective) form includes the third person singular direct object prefix *zhe-*.

⁴The dictionary teams for the Carrier and Koyukon dictionaries are fairly different. The second author of the *Koyukon Dictionary*, Eliza Jones, is a native speaker of Koyukon and holds a Ph.D. from the University of Alaska Fairbanks. The Koyukon dictionary was also edited by a linguist, James Kari.

⁵The compiler, Phil Howard, is described on the SSILA web site (<http://linguistics.buffalo.edu/ssila/books/indbook/b431.htm>) as follows: ‘Howard spent 35 years in the area, first as a missionary and later as a Canadian civil servant...’

2.2 Discontinuous verbal entries

Consider another example of discontinuity from Witsuwit'en, a dialect of Babine-Witsuwit'en, which is spoken in western central British Columbia. In [Hargus in preparation](#), a portion of the lexical entry for 'pick berries while stationary' in Witsuwit'en is given in (2):

- (2) Current lexical entry for 'pick berries while stationary' in Witsuwit'en
O+u+yïñ *v.* pick O (berries) while stationary. (*commonly occurs with n- round object*)

The 'O' in the lexical entry and the gloss in () abbreviates 'Object', as is customary in some recent dictionaries of Athabaskan languages (e.g. Ahtna ([Kari 1990](#)), Koyukon ([Jetté & Jones 2000](#))), essentially showing that 'pick berries...' is a transitive verb. The 'O' in the Witsuwit'en lexical entry also shows the position of object inflection with respect to other obligatory verbal elements, in the case of prefixal object inflection. (What the entry in () does not represent is the systematic (predictable) variation between **u-** and **o-**, common to all verbs with the prefix **u-**.) Many entries for verbs in Athabaskan dictionaries choose to show the pieces in some way. In addition to the Ahtna and Koyukon dictionaries mentioned above, the [Young, Morgan & Midgette 1992](#) dictionary of Navajo also presents verbs as discontinuous entities.

While (2) is a linguistically adequate entry, a possible problem with (2) is that the entry is not a word but an unpronounceable string. Not only does the entry in (2) contain non-word linguistic elements, it also contains the symbol '+', which has no linguistic content. Consequently, in a dictionary of an Athabaskan language that seeks to include audio or video recordings of headwords, the linguistically most adequate verbal lexical entries, unlike lexical entries for other parts of speech perhaps, cannot be recorded as such.

Some alternatives to (2) are shown in (3). All of the lexical entries in (3) contain hyphens instead of the plus sign separating linguistic formatives—the hyphen seems less prominent than the plus sign and therefore perhaps less intimidating to dictionary users than the plus signs. (3)a. is identical to (2) except for hyphens instead of plus signs. (3)b. contains more unpronounceable information, the symbol 'G' (for 'gender') instead of the linguistic element **n-**. This would be a linguistically more adequate option than (2) or (3)a. if it turns out that **d-** as well as **n-** are possible verb prefixes.⁶ (3)c. (or possibly **O-u-(n/d)-yïñ**) is an alternative to the comment included with (3)a. (3)d. (or possibly **u-(n/d)-yïñ**) contains fewer unpronounceable symbols, leaving out the O and expressing the transitivity of this verb via lexical category designation, *vt*, rather than simply *v*. But (3)d. also contains less information than (3)a. in that by leaving out the 'O', it does not show the position of object inflection when prefixal.

- (3) Some alternative lexical entries for 'pick berries while stationary' in Witsuwit'en
 a. **O-u-yïñ** *v.* pick O (berries) while stationary. (*commonly occurs with n- round object*)
 b. **O-u-G-yïñ** *v.* pick O (berries) while stationary.
 c. **O-u-(n)-yïñ** *v.* pick O (berries) while stationary.
 d. **u-(n)-yïñ** *vt.* pick (berries) while stationary.

2.3 Non-discontinuous verbal entries

An alternative to the entries in (2) and (3) is to ignore discontinuity and therefore sidestep unpronounceability. That is, instead of showing the pieces of a verbal lexical entry, the dictionary

⁶**d-** perhaps in 'pick leaves' (Jim Kari, p.c.).

might provide a real word citation form from which all other forms can be predicted, perhaps the first person singular perfective or first person plural perfective. But which form or forms should be selected? As discussed in [Hargus 2007](#), Witsuwit'en verbs contain much productive morphology. Every regular verb can be inflected for (a) each of four 'modes' (imperfective, perfective, future, and optative), (b) one of seven subjects (six non-null), and (c) one of two polarities (positive or negative). This means that every regular verb has 56 derived forms.

Consider some forms of the Witsuwit'en verb 'pick berries while stationary', shown in (4).⁷

- (4) Some forms of 'pick berries while stationary'
- | | |
|------------------------------------|---------------------------------------|
| a. c'oniyin, c'oyin | 'she's picking berries' |
| b. so' tsalhtsë uniyin | 'she's good at picking cranberries' |
| c. uninyin | '(you) pick berries' |
| d. digī ts'oniyin | 'we're picking huckleberries' |
| e. wec'its'oniyil | 'we didn't pick berries' |
| f. digī ts'ontayilh | 'we're going to pick huckleberries' |
| g. c'onudityin' wika'dit'ah | 'we (du.) are trying to pick berries' |

Despite the seemingly great variety in the forms given in (), they all have a common denominator. In the sentences containing 'pick berries', there are certain obligatory elements: (1) an object, which, in these examples, is variously **c'**- unspecified, **digī** 'huckleberry', **tsalhtsë** 'cranberry'; (2) a prefix having the form **o-** or **u-**; (3) a verb stem of some form, **yin, yin', yil, yilh**. Some of the forms in () also contain an optional element, the noun class prefix **n-** round. The prefix **o/u-** may be separated from the stem, as in (f), where not only **n-** 'round' but also **ta-** future intervene. (And the prefix **ta-** itself is actually discontinuous, consisting of **t-** future/inceptive and **ai-** future.) The object, if prefixal, may be separated from the prefix **o/u-** by other elements, as in (e), where the intervening prefix is **ts'-** 1pS.

The collection of 56 forms of every regular verb only represents those forms generated by the most productive inflectional morphemes just mentioned, and not other morphemes such as the iterative prefix, inceptive prefixes, pronominal prefixes, noun class prefixes, etc. The question then arises as to which of these 56 forms should be included in the dictionary. This issue was raised by [Munro 2002](#):87, who noted that "a language like Navajo, in which ten or more separate prefixes may often be added to a root to produce a pronounceable verb, has so many possible words that the decision of how to list them in the dictionary raises innumerable problems for the lexicographer."

In the case of Witsuwit'en 'pick berries...', the first person plural perfective form would allow a sophisticated user to predict the other forms of the paradigm:

- (5) Alternative to discontinuous lexical entries: citation form
c'its'oninyin' ~ c'its'onyin' 'we picked berries'

The form **c'its'oninyin'** by itself could be an n-perfective verb, but the inclusion of the variant **c'its'onyin'** shows that the medial **n-** in syllable onset position is **n-** qualifier, and that this must be an e-perfective verb. However, for Witsuwit'en as a whole, there is no single inflectional form from which all other subject/mode-inflected forms can be predicted across all verbs. Of course, information

⁷Witsuwit'en forms are cited in current orthography (see Hargus 2007 on the evolution of this writing system): **i** = [ə], **ī** = [i], **ē** = [ɛ], **lh** = [ʎ]; **g c c'** are palatal stops, **gg k k'** are uvular stops.

about conjugation class in the perfective can and probably should be provided in some other way, such as via one of the alternatives in (6):⁸

- (6) Including information about conjugation class in lexical entry
- discontinuous lexical entry **u-(n-)yīn (e-)** *vt.* pick (berries) while stationary.
 - citation form lexical entry **c'its'onīnyīn' ~ c'its'oniyīn' (e-)** 'we picked berries'

Another type of alternative to representing the verb in its pieces in an Athabaskan dictionary is to provide a random, representative form of 'pick berries', as in (7), in which a third person singular imperfective form is embedded in a sentence:

- (7) Representative form as lexical entry for 'pick berries while stationary'
so' tsalhtsē uniyīn 'she's good at picking cranberries'.

This latter approach to lexical entries for verbs in Athabaskan languages is very common in dictionaries with no Athabaskan-English section (e.g. [Elford & Elford 1998](#) dictionary of Dene Sų́tíné, or [Deacon et al. 2007](#) online dictionary of Deg Xinag dictionary).

2.4 *Linguistic adequacy vs. second language learning*

Consider the plight of a learner of Witsuwit'en who wanted to say some form of 'pick berries'. The user would turn to the English-Witsuwit'en section, and might find something like what is shown in (8):

- (8) Entry under 'pick' in English-Witsuwit'en section of [Hargus in preparation](#):

pick

berry pickers: **nididīlhni** (<ye).

pick O (berries) while stationary: **O+u+yīn** (<yīn).

pick up P, go back for P: **P+k'i+ne#D+ye/'as/dīlh** (<ye).

sg./du./pl. go berry picking, go look for berries: **d+D+ye/'as/dīlh** (<ye).

The learner might well wonder how to pronounce **O+u+yīn**. Traditionally, the expectation is that the learner would use '<yīn)' in the above list to find 'pick berries...' in the Witsuwit'en-English section of the dictionary and find out more about **O+u+yīn**. (9) shows what the Witsuwit'en-English section contains for **O+u+yīn**.

⁸ Or conjugation class in the perfective could be shown in some other, less direct fashion, such as by grouping derivatives under the heading 'durative', which entails **e-** conjugation in the perfective.

- (9) Current entry for ‘pick berries...’ in [Hargus in preparation](#)

O+u+yï̄n v. pick O (berries) while stationary. (*commonly occurs with n- round object*)

dur **c’onīyï̄n, c’oyï̄n** she’s picking (berries); **c’its’onīyï̄n** we’re picking berries (*impf*)

1s **c’onīsyï̄n**, 2s **c’onīn-**, 3s **c’oni-**, 1d **c’onīdit-**, 1p **c’its’oni-**, 2p **c’oniwh-**, 3p **c’ooni-** ...

pass **’usa bï̄ c’otyï̄n** berries are picked in pots (LM/DR)

dist **’et ’awet nik lha’ts’idit’iyh. Ts’iyewh nit’ay nts’onīyï̄h. Ts’iyewh digï̄ nts’onīyï̄h ’et ’awet nekhë̄lh c’iztildilh** now we were done up there. We had picked all the berries. We had picked all the berries and were starting to pack back down (ET)

cust **ggin ’et digï̄ ts’onīyï̄h** we used to pick huckleberries there; **dï̄ndze tl’a digï̄ ’elhikhin zeh hanenityekh. Dï̄ndze digï̄ binis tsoyilnï̄h ’aw wik’ë’t ’inï̄lco. ’Et wilegh ts’ah digï̄ winis lhay ts’oyï̄h** high-bush blueberries and huckleberries grow back in the same place. Blueberries are sweeter than huckleberries but they’re smaller. That’s why we pick more huckleberries (LM/DR); **digï̄ ts’onīyï̄h, tl’a tsët nik hats’idilh ’et digï̄ tah ts’iyewh lha’aaydilh’iyh** we’d pick huckleberries. When we first got up there we’d finish all the huckleberries (ET)

Bik’it Digï̄ Ts’oyï̄h *pn.* unnamed hill south of Moricetown. (*lit.* on it we pick huckleberries) (*Ut’akhgï̄t territory*)

(9) contains plenty of pronounceable forms of ‘pick berries...’, including forms embedded in sentences, some from texts (‘LM/DR’, ‘ET’), and an imperfective paradigm. But the entry also contains the perhaps intimidating abbreviations *dur* (durative), *pass* (passive), *dist* (distributive), *cust* (customary), used to group derivatives of ‘pick berries’ and provide some structure to the entry. Of course, these terms are defined in the introduction to the dictionary, and summarized in a list of abbreviations. But they are terms which are likely to be unfamiliar to the non-linguist user.

An alternative to presenting discontinuity (= unpronounceability) in the English-Athabaskan section, which I explored at one point in [Hargus & Abou in preparation](#) (dictionary of Fort Ware or Kwadacha Tsek’ene), was to include two English-Tsek’ene sections in the dictionary, a ‘Main index’, which contained only real words or sentences, and an ‘Index of verbs and verb prefixes’, which contained references to potentially discontinuous, linguistically faithful lexical entries. Adapted for Witsuwit’ën, the entries for ‘pick berries’ in the two types of index would be as shown in (10)–(11). The form of ‘pick berries...’ shown in the Main index is a first person plural perfective, whereas the form of ‘pick berries...’ shown in the Index of verbs and verb prefixes is the discontinuous verb as mentioned above.

- (10) Possible entry for ‘pick’ in Main index

pick

we already picked berries: **c’its’onīnyï̄n’** (<yï̄n).

- (11) Possible entry for ‘pick’ in Index of verbs and verb prefixes

pick

pick O (berries) while stationary: **O+u+yï̄n** (<yï̄n).

Note that if the English-Athabaskan section in the dictionary consisted only of an index similar to the Main index of the dictionary shown above, it would not be satisfactory as a guide to the basic meaning of the verb, unless the example shown above were translated more fully (but more

cumbersomely) as ‘we already picked berries while stationary’. The semantic inadequacy of the Main index alone is more apparent in the case of a verb with a range of meanings, such as that shown in (12):

- (12) Another lexical entry in [Hargus in preparation](#) (Witsuwit’en)
(sa) -’a v sun, moon goes, compact, abstract goes.

If the Main index contained the example in (13) as a sample representative derivative of this verb, it would provide no clue as to the range of meanings found in the basic verb:

- (13) Sample derivative of (12)
hīnic ī’alh the message is coming

Another problem with the two-index approach is that the second index adds to the length and hence expense of the dictionary. (This is a problem only in a print dictionary.) Generating a second index requires extra time of the lexicographer and/or programmer. Finally, a friendlier index might cause users to avoid the Athabaskan-English section altogether, and if so, they would miss important information about the range of meaning found in the verb, as well as other derivatives. For these reasons, while the two-index approach seemed promising at one point, I have returned to the more traditional indexing approach, which lists the lexical form of the verb in its pieces.

One comment that can be made at this point is that it seems an unavoidable conclusion that Athabaskan languages are simply ‘harder’ than many other languages (Jeff Leer, p.c.), and that part of the price of learning one of these languages is coming to grips with understanding discontinuity. But Athabaskan languages are not the only languages which exhibit the discontinuity problem, and it is worth taking note of the solutions adopted for other languages. [Munro 2002](#):104 explains the solution used in [Munro, Fixico & Iron Teeth 1999](#) (Lakhota dictionary):

...we use a * to mark the position of inflection...and we write ablaut verbs with a final *a/e*... This type of entry is thus rather abstract, since * and “*a/e*” are not sounds of Lakhota. This degree of abstraction seems useful, but it remains to be seen whether it would be appropriate for a dictionary to be used extensively by native speakers and other nonacademics.

(14) presents some sample verbs with the asterisk-marking convention used in Lakhota:

- (14) Some verbs from Munro, Fixico and Iron Teeth 1999
- | | |
|------------------|---------------|
| <i>a*phá/é</i> | ‘to hit’ |
| <i>ina*xma/e</i> | ‘to hide’ |
| <i>i*tómni</i> | ‘to be drunk’ |

2.5 *Discontinuity summary*

To sum up the discontinuity issue, it is an inescapable fact of Athabaskan linguistics that Athabaskan verbs may consist of pieces. Dictionaries vary in how they represent verbal discontinuity, in either the Athabaskan-English or English-Athabaskan sections, not necessarily adopting the same approach in each section. In general, the more faithfully the dictionary represents linguistic structure as linguists currently understand it, the more abstract the dictionary entries are and presumably the more difficult it is for a non-linguist to use the dictionary.

3 Headwords

The headword of an entry in the dictionary is the element that is alphabetized with respect to other entries. Decisions about headword choice are to some extent tied up with decisions about whether and how to represent discontinuity.

Consider more complete versions of the five sample lexical entries for ‘steal’ which were presented above in (1) without headword. (15) adds the headword that was used in each of the dictionaries to the entries.

(15) ‘steal’ in several languages, with headwords

a. Navajo (Young and Morgan 1992, 252 ff.)

’íí’²

... ni-(0/si)... ‘to steal or pilfer O’. Nish’ííh/né’íí’

b. Ahtna (based on Kari 1990: 92)

’ii⁴

O+n+0+’ii ... steal O. inez’iin he stole it

c. Carrier (based on [Antoine et al. 1974](#): 38)

’undunut’ih (v); (-t’ih): he is stealing [for himself]

d. South Slavey (based on [Howard 1990](#))

?íH

ets’ene?íh / zhené?í / enu?íh
ena?í

e. Deg Xinag (based on MacAlpine, Taff et al. 2007)

STEAL Gini’eyh^{JD+ED} lit. S/he steals.

Ni†treth dangan xa† ye gini’eyh.^{JD+ED} Wolverine steals from the trap.

Dlen yeno’eyh.^{JD+ED} The mice will steal it.

The entries in (15) reflect a range of the design decisions made by Athabaskan lexicographers.⁹ One decision is whether there will be an Athabaskan-English section at all. Some dictionaries give up on attempting to represent an Athabaskan language via some Athabaskan element. The Deg Xinag dictionary is an example of this type. Here the headword used to organize the Deg Xinag forms is an English word, ‘steal’. The other dictionaries represented in (15) select an Athabaskan element as headword. For the Navajo, Ahtna, and S. Slavey dictionaries, the headword is an Athabaskan root. For the Carrier dictionary, the headword is an Athabaskan word.

Each of these headword choices comes with its own set of pros and cons. Here I focus mainly on the cons associated with each choice.

3.1 Athabaskan root as headword of verbal entry

For the Athabaskan root as headword choice, the chief problem for the linguist/lexicographer is how to recognize a root, and implement that decision consistently across entries. Roots are normally the final and/or stressed syllable in a verb; e.g. **yīn** in Witsuwit’en **c’oni’yīn** ‘she’s picking berries’. However, in

⁹See [Kari 1988](#) for a more complete classification, as discussed in footnote Error: Reference source not found.

some cases the root is smaller or bigger than the final stressed syllable in an actual verb word. For example, in (16)a. the root **yīn** is smaller than the final syllable **yīn'**. In (16)b., an element of the root is deleted before a suffix. In (16)c., the root **stl'i** is larger than the final syllable **tl'i**.

- (16) Root not coextensive with final syllable
- | | | |
|--|-------------|---|
| a. Root (yīn) a subset of final syllable | Witsuwit'en | wec'onisyīn' 'she hasn't picked berries' |
| b. Root (yīn) not contained in final syllable | Witsuwit'en | wec'onīyīl 'she didn't pick berries' |
| c. Root (stl'i) larger than final syllable | Deg Xinag | ngistl'i 'it's small' |

Another class of problem with the root as headword approach to verb entries is the possible lack of consistency with non-verb lexical entries. In [Hargus in preparation](#) (Witsuwit'en), the headwords of entries belonging to lexical categories which either do not take prefixes (or for which the prefixation possibilities are much more limited than verbs) are basically unanalyzed. Some examples are shown in (17)–(19):

- (17) Noun
'a¹
'a *n.* fog, mist. **'a hozdli'** it got foggy; **'a welew** it's not foggy

dinī *n.* man, male, person.
- (18) Number
tak'iy *num* three. **tak'iy k'iy** three birches; **tak'iy yikh 'et wit'iy** she has three houses; **ndu nek biynilts'ilh? Tak'iy 'ey nek biynilts'ilh** what comes after two? Three comes after two (LM/DR)
- (19) Verb prefix
ho
ho# *vpf.* (*mom* **0,e**) out, forth.
mot **dic'ats honye** he went out on the territory...
ho#n- *vpf.* (**0,e**) start to. (*mom*) *this prefix is not used with ordinary motion verbs; it is not compatible with continuative aspect.*
clf-mot **'usa hontinilts'it** the pot started to tip...

Note that in two cases above, the headword is two syllables. The final syllable in **dinī** is stressed, which, in the case of a verb, is an indicator of the root. But I have argued elsewhere ([Hargus 2005](#)) that some roots in Athabaskan languages are polysyllabic, with predictable stress. In the case of **dinī**, there are no related forms that could justify an entry for this word which is anything smaller than **dinī**.¹⁰

On a related note, ideally a meaning should be assignable to a root if it is a valid linguistic construct. But some verbal roots have very abstract meanings, even more so than that given in (12), and for some verbs or denominal derivatives, the verbal root can really only be recognized on the basis of formal patterning with other verbs. Consider the entry for the Witsuwit'en root **'a³** given in (20). Three of the verbs based on this root are listed in (20).

¹⁰There is a suffix **-nī** 'human plural, non-human singular', but the synchronic semantic connection does not seem strong enough to warrant grouping **dinī** and **-nī** in the same entry.

(20) A lexical entry for the root 'a³ (Witsuwit'en)

'a³

neu 'a 'a' 'alh' 'a'

neuneg 'ah' 'al' 'atl' 'a'

-'a v. linear object is. *some objects which require this root are: ts'o spruce (if standing), lho glacier, tiy trail.*

neu ts'o hodin'a the spruce is standing; *ts'o howedi'ah* the spruce is not standing;
gwe'ilh nts'oon'a? where's the bag? *lho tan'a* a glacier flows into the water ...

lh+'a v. vegetation is.

neu ggit dicin halh'a the bush is thick there; *'et hayilh'a* a bush is sticking up there;
talh'a it (tree) is growing in water

lh+'a v. body part is.

neu dekw'ëts nis yilh'a he's sticking his lower lip out; *tetsenich'a* I'm sticking my head out; *hotl'awdielh'a* I'm sticking my butt out; *tse'alh hiyik'it tsenilh'a* people put their heads on pillows (LM/DR)

The noun 'atan'a 'bay' is also listed as a derivative of -'a 'linear object is', but a literal (or even etymological) meaning cannot be given at this time.¹¹

The chief problem for the root-as-headword approach for the non-linguist user is the lack of familiarity with the notion 'root'. Native speakers are probably more comfortable with the choice than learners. Speakers seem to be aware of roots on some level as evidenced by playful, mixed language forms such as those in (21) In (21)a., a bilingual speaker of Witsuwit'en and English has produced a word with Witsuwit'en prefixes but an English verb as root. In (21)b., an offhand remark by a bilingual speaker, a Witsuwit'en verb root has been substituted for an English verb.

(21)

a. *tinec'itaswash* (cf. regular Wit. *tinec'itasggis* 'I'm going to wash (something)' (example noted in Hargus 2007))

b. "I'm going to go outside and t'it." (cf. regular Wit. *c'itast'it* 'I'm going to smoke (something)')

Along similar lines, note that Fort Ware Tsek'ene has borrowed the English verb *jump* as -jùm ([tʃʌm]). A third person singular future inflected form of this verb is given in (22):

(22) English verb borrowed as Tsek'ene verb root
k'idajùme 'he's going to jump around'¹²

¹¹Thanks to the programming skills of Bob Hsu, a cross-reference to 'atan'a can be generated in the glottal stop initial headword section in the expected alphabetical order for 'atan'a. This cross-reference instructs users to find 'atan'a under a³. (Cross-reference generation was not originally part of Lexware (Hsu 1985), but part of the custom programming that Hsu has provided.)

¹²Proto-Athabaskan *lə-tlaxd "spring, leap, jump up" (Leer 1987) has two reflexes in Fort Ware Tsek'ene: **l+tlah** 'go fast, walk fast, walk on trail', **n+l+tlah** 'fly, slide'.

These examples suggest the congruence of Athabaskan verb roots with English verbs in the minds of native speakers. This observation, like many others made in Athabaskan linguistics, should be considered a hypothesis to be tested.

3.2 Athabaskan word as headword of verbal entry

As mentioned above, some Athabaskan dictionaries contain Athabaskan verb words as headwords. One example of this type of dictionary is [Antoine et al. 1974](#), a Carrier dictionary. [Phone et al. 2007](#), a recent dictionary of Jicarilla Apache, also has Athabaskan verb words as headwords.

Using (23) as an example of this type of headword, let us consider some of the problems with this approach.

- (23) A Carrier verb word as headword of verbal lexical entry
'undunut'ih (v); (-t'ih): he is stealing [for himself]

In [Antoine et al. 1974](#), the entry in (23) is alphabetized under its word-initial ' (glottal stop), along with other glottal stop-initial words, some root-initial and some prefix-initial. The form of 'steal' selected for inclusion in the dictionary just happens to be glottal stop-initial. Another form of it might be y-initial, and that form would have been listed under the word-initial y. There is thus the potential for much disorganization if more than one form of 'steal' is included in the dictionary (because the forms of 'steal' would not all be listed in one place). For example, in [Wall & Morgan 1958](#), a Navajo dictionary, we find **'ádin** 'there is nothing, none' on p. 3 and **'ádaadin** 'there are none of them' on p. 1. Or we find **ʔibá** 'gray' on p. 41 and **dinilbá** 'light gray' on p. 29.

Also, alphabetizing verbs by their word-initial segment doesn't help the native speaker or the learner find the entry for the Carrier translation of 'steal' in the dictionary, unless verbs are consistently entered under one or the other verb prefix (which is not the case in this dictionary).

A further problem with this approach is the failure to show the relationship of **'undunut'ih** to verb words that share the same root **-'ih**, such as 'sneak'.

3.3 English word as headword of verbal entry

The final type of verbal lexical entry found in dictionaries of Athabaskan languages is the type found in bilingual dictionaries with no Athabaskan-English section. There is a single English-Athabaskan section, and verbs are alphabetized under an English verb. A recent example of this type of dictionary is [Deacon et al. 2007](#). Let us consider the Deg Xinag entry in (24) for discussion in this section.

- (24) An English verb as headword of Athabaskan verbal lexical entry

STEAL Gini'eyh ^{JD+ED} lit. S/he steals.

This entry is alphabetized under S in what is, in all fairness, a "learners' dictionary" of Deg Xinag, meaning one that is presumably oriented for native speakers of English. In this approach, like that of the Athabaskan verb as headword, relationships between Athabaskan words are not shown; for example, the relationship of words translated as 'steal' to those of 'sneak' is not shown. This could have been provided by showing the root of the word, or by providing a cross-reference.

3.4 *Headword summary*

Each of the three approaches to headwords of Athabaskan verbal lexical entries has its own problems. Organizing dictionary entries under the word-initial segment of a verb can lead to disorganization within the dictionary, if multiple forms of the same verb are listed in the same dictionary, as well as lead to obfuscation of the relationships between related words. Organizing lexical entries for verbs using only a non-Athabaskan word fails to represent the language on its own terms. Organizing lexical entries for verbs under roots avoids these problems, but can lead to its own problems, chief among them lexical entries which may be overly abstract.

4 **Conclusions**

In this article I have discussed two issues in Athabaskan verbal lexicography, the treatment of discontinuity and the choice of headword. As seen, a variety of solutions to these two problems can be found in recent dictionaries of Athabaskan languages. In the dictionaries of Athabaskan languages which I myself am currently preparing, I lean more towards the approaches found in [Kari 1990](#), [Young, Morgan & Midgette 1992](#), and [Jetté & Jones 2000](#): organize verbal entries under a verbal root; and show the discontinuity in a verbal lexical entry (but minimize unpronounceable symbols).

Athabaskan dictionaries raise other issues only briefly touched on in this article, such as how much nesting should be contained within lexical entries, where nesting shows linguists' hypothesized relations between words. [Beavert & Hargus 2009](#) is a dictionary not of an Athabaskan language, but of Sahaptin, a Sahaptian language. It is the result of collaboration between myself and Virginia Beavert, a native speaker of the Yakima (Yakama) dialect of Sahaptin. This dictionary contains comparatively little nesting of entries, as Virginia felt that this led to too much abstractness. For the same reason, the Sahaptin-English portion of the dictionary is not organized by root. (However, to show relatedness of words, the dictionary contains many cross-references, as well as an entire index of roots.)

Ideally, the decisions about these issues should not be made by linguists alone, but by the lexicographical team, usually a linguist working with one or more linguistically trained or exceptionally talented native speakers, as just described for Sahaptin. The linguist could provide mock-ups or alternative ways of presenting the same linguistic information for other members of the team to decide between.

In [Hargus 2008](#) I mentioned some of the reasons why descriptive/documentary linguists do not engage in lexicography: lexicography is time-consuming work with no immediate pay-off; current lexicography requires computational skills above and beyond that of the average linguist even if the lexicographer leaves the main programming to a computer programmer. Another reason that must be given is that, unlike grammars, much of the linguistic analysis involved in preparing dictionaries is implicit rather than explicit. This means that dictionaries are particularly fruitful places for what computational linguists call 'data mining'. It thus requires a certain kind of courage to spend years of one's life preparing a dictionary that may be mined by other linguists.

In this article I have used examples from traditional printed dictionaries with Athabaskan-English and/or English-Athabaskan sections. These issues do not vanish by selecting a different kind of media for presentation: they still arise (or should) in an online dictionary.¹³

¹³As pointed out by [Poser 2002](#) and [Taff & MacAlpine 2002](#), electronic dictionaries have some advantages over print dictionaries, chief among them rapid location of information via search, and ability to hyperlink text and/or media.

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