

Blackfoot prominence: insights from morpho-phonology

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1 Introduction

Blackfoot is a Plains Algonquian language spoken by about 4,315 speakers (Russell and Genée 2006) in southern Alberta and northwestern Montana. It has a system of syllabic prominence primarily correlated with an increase in F_0 (Van Der Mark 2003), as well as increased duration and amplitude. This prominence has been referred to in the literature as stress (Taylor 1969), pitch accent (Frantz 1997; Frantz and Russell 1995; Kaneko 1999), or tone (Stacy 2004). Although previous studies have noted various characteristics of Blackfoot prominence (Kaneko 1999; Stacy 2004), none have resulted in a complete analysis of word-level prominence. This study is a first step towards such a motivated and predictive analysis. We investigate how paradigmatic forms of Blackfoot nominals affect the pattern of prominence in a phonological word and make inferences about the morpho-phonology of Blackfoot.

Motivation for this study came from several observations. Though rare, there are contrastive pairs of words that differ solely in the placement

of prominence. Some examples of contrastive pairs are noted in [Frantz \(1997:3\)](#). However, these pairs always differ in morphological composition, and we suspect that these underlying morphological differences lead to different surface patterns of prominence.

Morph	Surface	Gloss
aohkii	aohkíí	‘water’
á-ohkii	áóhkii	‘he is barking’

Furthermore, there are numerous examples where accent of a phonological word does not seem to be a fixed property of the nominal stem, but changes depending on the prefixes it combines with. In the example below, accent falls on the first, second, or third syllable of the stem *imitaa* ‘dog’¹, or not at all, suggesting the accent cannot be a lexical property of the stem itself.

Prefix	Stem	Gloss
	imitáá	‘dog’
kaak-	omítaa	‘just a dog’
pok-	ómitaa	‘small dog’
ómahk-	omitaa	‘big dog’

2 Previous investigations

Previous grammars and descriptive studies of Blackfoot referred to the prosodic prominence as a ‘stress’ or ‘accent’ system ([Uhlenbeck and Cornelius 1978](#); [Taylor 1969](#); [Frantz 1971](#)). Later investigations of Blackfoot describe

¹See section 4.1 for an explanation of the vowel change *i* to *o* in the stem.

it as a ‘pitch accent’ system and assume a simple distinction of accented versus unaccented syllables; the accented syllables are usually marked in the orthography by an acute accent (for example, [Frantz 1971, 1997](#); [Frantz and Russell 1995](#)). In recent years there have been three masters theses ([Kaneko 1999](#); [Van Der Mark 2003](#); [Stacy 2004](#)) which deal specifically with aspects of Blackfoot prominence. These are discussed in more detail below.

[Kaneko \(1999\)](#) was the first to look at Blackfoot pitch accent in depth. She noted that the pitch accent of nominal roots tended to be attracted to heavy syllables and relied on a metrical stress analysis to accommodate Blackfoot’s quantity-sensitive system. She found that the surface pitch accent of nominal compounds (multimorphemic nominals) did not depend on principles of metrical stress, but is predictable based on whether the components are bound or free, and whether or not they have a lexically-specified accent.

[Van Der Mark \(2003\)](#) and [Stacy \(2004\)](#) both focused on categorizing the language as a ‘pitch accent’, ‘tonal’, or ‘stress’ system. [Van Der Mark \(2003\)](#) investigated the acoustic correlates of Blackfoot pitch accent, and found that it was strongly correlated with higher pitch, as well as length and duration to a lesser degree. She found that vocal fold tension, which occurs in stress languages such as English and Dutch, was not a variable associated with Blackfoot pitch accent, leading [Van Der Mark](#) to conclude that Blackfoot may be categorized as a pitch accent, but not as a stress language.

[Stacy \(2004\)](#) addressed individual claims made by [Kaneko \(1999\)](#) and showed examples of how each generalization is violated in Blackfoot, as well as how Blackfoot violates most features normally associated with metrical stress systems. She argued that since Blackfoot does not exhibit rhythmic or accentual metrical properties, it cannot be a stress or pitch accent language.

She concluded it must be tonal in nature and offers a few observations of tonal behavior in Blackfoot, including alternation of coda glottal stops with a falling tone, and accent spread.

3 Methodology

Over the course of numerous elicitation sessions, we prompted our informant—a native speaker of Kainai Blackfoot from Alberta—with English bare nouns and prefix-noun phrases². In order to control for any free variation or speaker memory errors, most tokens were requested during at least two different elicitation sessions. The following prefixes were used to form the nominal compounds we elicited:

omahk- ‘big’	kaak- ‘only, just’
sik- ‘black’	ksikk- ‘white’
pok- ‘small, young’	inno- ‘long’
naapi- ‘white’	apo- ‘white’
saahk- ‘young, short’	

4 Orthography

All Blackfoot forms in this paper follow Frantz’s orthographic conventions (Frantz 1978, 1997), laid out in Tables 1 and 2. Blackfoot contrasts both long and short vowels and long and short consonants.

The segment /s/ may be syllabic (Derrick 2007; Denzer-King 2009), and short vowels before a velar fricative (*ah*, *ih*, *oh*) are devoiced. Blackfoot phonotactics are highly restricted. In general, the only non-syllabic segments

²In future elicitations we will be evaluating the usefulness of image pairs as prompts.

	Labial	Coronal	Dorsal	Glottal
Stops	p pp	t tt	k kk	' /ʔ/
Fricatives		s ss	h /x/	
Affricates		ts	ks	
Nasals	m mm	n nn		
Glides	w	y /j/		

Table 1: Blackfoot orthography

which can occur as the first consonant in a cluster are a glottal stop (<'>) or velar fricative (<h>).

	Front	Back
High	i i:	
Mid		o o:
Low		a a:

Table 2: Blackfoot vowel system

4.1 Nominals

Many noun stems exhibit morphologically-conditioned allomorphy. One allomorph (which we refer to as α) always occurs word-initially and frequently also compound-internally. The other (β) is only found compound-internally, and usually differs from the first in partially predictable ways: while a subset of stems allomorphs are suppletive, most reflect phonotactically-motivated segmental changes. These β forms are typically distinguished by vowel epenthesis or consonant loss, but may also reflect an initial vowel change, or historical gemination (Thomson 1978). Table 3 illustrates the stems found in this paper. We assume that β forms have the same lexical accent as α

α	β	Gloss	Note
aakii	-aakii	‘woman’	No change
apí’si	-apí’si	‘coyote’	
poos	-ohpoos	‘cat’	Epenthetic <i>oh</i> .
pokon	-ohpokon	‘ball’	
kiááyo	-ohkiááyo	‘bear’	
píítaa	-ipíítaa	‘eagle’	Epenthetic <i>i</i> .
pookaa	-ipokaa	‘child’	
akkssin	-okkssin	‘bed’	Initial vowel change.
imitaa	-omitaa	‘dog’	
apáni	-opáni	‘butterfly’	
nínaa	-ínaa	‘man’	Initial nasal loss.

Table 3: Forms of elicited Blackfoot nominal stems

forms.

Our analysis of the epenthetic *oh* and *i* as belonging to the stem allomorph—rather than to the prefix allomorph or as material inserted late in the phonological derivation—relies on the observation that a given stem will always select for the same epenthetic vowel regardless of the choice of prefix. Although our consultant will occasionally offer forms with the atypical epenthetic vowel, prompting her with the form including the typical vowel invariably causes her to remark that she prefers the form with the typical vowel.

Of the atypical vowels that our consultant offers, we have not noticed a tendency to supply either *oh* or *i* more often than the other. However, in some cases she seems to have reanalyzed the epenthetic *oh* as part of the prefix, so that [Prefix + *oh*] is used as an allomorph of [Prefix]. This forms

a separate phonological word from the following stem, as evidenced by the fact that she forms consonant clusters that are otherwise not found word internally, such as <h> in *sikoh'apáni* ‘small butterfly’.

5 Findings

Four generalization arose from comparisons of segmental and accentual differences in the nominal paradigms we elicited. These four generalizations capture the majority of compound accents patterns found. As described below, two of those generalizations pertain to distinct lexical subclasses, while the other two describe segmentally-conditioned accent shift.

5.1 Two stem classes

A novel generalization to come from our examination of Blackfoot compounds relates to the status of lexicalized accent among nominal stems. We analyze each nominal stem as belonging to one of the following two classes:

- (1) Class 1: Bears no lexical accent.
- Class 2: One syllable is associated with an accent.

All Blackfoot nominal stems uttered in isolation have a local pitch maximum on one of the syllables. For some nominal stems, this local pitch maximum is correlated with a phonological lexical accent. However, a subset of stems whose final syllable bears a local pitch maximum does not pattern like other stems in various nominal compounds. Prefixes like *pok-* ‘small’ act as a noun class litmus test: accented nouns (Class 2) keep their lexical accent when *pok-* is prefixed to them, while the accent of other nouns (Class 1) is determined by the prefix. Specifically, accent will fall on the first or second

syllable of the compound, in accordance with generalizations to be discussed later.

Accented

Root	‘small’ + Root	Gloss
ipíítaa	poks-ipíítaa	‘eagle’
apáni	pok-apáni	‘butterfly’

Unaccented

Root	‘small’ + Root	Gloss
aakii	pok-ááki	‘woman’
omitaa	pok-ómitaa	‘dog’
ohpokon	pók-ohpokon	‘ball’

This discrepancy between words like *aakii* and those whose accent location does not change upon prefixation leads us to believe that members the noun class described above differ from other nouns in lacking lexically-specified accent.

Two other facts encountered in our elicitations support this claim. First, the local pitch maximum of unaccented stems is realized as a sharp pitch fall pre-pausally, when the word is uttered in isolation or at the end of a syntactic phrase. Three examples of such nouns are given below with diacritics to indicate their pitch contours:

(2)	aakii	→	aakíi	‘woman’
	pokon	→	pokón	‘ball’
	imitaa	→	imitáa	‘dog’

Phrase-medially, these stems exhibit only a gradual pitch rise and no fall, as would be expected of unaccented lexical items. Moreover, the Class 1

stems ending in a long vowel are the only cases in the language of a pitch fall across a long syllable; elsewhere, the entirety of the long syllable is pronounced with a steady or rising high pitch. Given these data, we conclude that this word-final pitch fall is due to a phrasal-level accent rather than being associated with any particular morphology.

Additionally, although these Class 1 stems bear no lexical accent, there does exist at least one final-accented stem in Class 2, *owái* ‘egg’.

Although the addition of a prefix generally does not affect the location of accent on Class 2 nominal stems, we are still faced with the task of describing the distribution of accent locations among Class 1 stem compounds. At this point the number of paradigms we have collected is still too small for a conclusive analysis, and in some cases multiple theoretically distinct hypotheses make the same predictions about accent placement, but the three claims will make below do together describe a significant majority of the observed forms.

5.2 Three prefix classes

Blackfoot nominal prefixes divide naturally into three distinct classes. Specifically, positing prefix classes based on which syllable of a compound they target for accent insertion has allowed us to account for nearly all the forms we have encountered. While two categories of predictable and phonetically-grounded exceptions will be discussed in the subsections below, we use the following conventions to describe these classes:

(3) Class 1: Accents the compound’s *first syllable*.

Class 2: Accents the compound’s *second syllable*.

Class 3: Accents the compound’s *third syllable*.

Among the prefixes we elicited, the ones that pattern as Class 1 types are *omahk-* ‘big’, *ap-* ‘white’, and *naapi-* ‘white’. Example compounds are given below.

Class 1

Prefix	Prefix + Root	Gloss
omahk-	ómahk-omitaa	‘big dog’
ap-	áp-inaakii	‘white woman’
naapi-	náápi-aakii	‘white woman’

There is no reason related solely to these data to describe the Class 1 prefixes as adding an accent to the first syllable of the compound, rather than simply bearing initial lexical accent, e.g. as *ómahk-*, *áp-*, and *náápi-*. Indeed, it may emerge during future research that this analysis is preferable. For the sake of having symmetrical classes, however, we are assuming that the mechanism by which these prefixes add accent parallels those used by the other two classes, which as described below are more accurately described by reference to syllable count within a compound.

Class 2 prefixes add accent to the second syllable of compounds formed from unaccented stems:

Class 2

Prefix	Prefix + Root	Gloss
pok-	pok-ómitaa	‘small dog’
inno-	innó-ómitaa	‘long dog’
<i>also</i>		
pok-	pok-áákii	‘small woman’

It happens to be the case that all Class 2 prefixes we found are either monosyllabic (e.g. *pok-*) or V-final disyllabic (e.g. *inno-*), and so since word-

internal β stems are always V-initial, we are unable to state conclusively that Class 2 prefixes add accent to the second syllable of the compound rather than the first syllable of the stem. For example, in cases like *inno-* + *ohpoos*, the final *o* of the prefix and the initial *o* of the stem fuse together into a long *o*, which then expresses the accent as a continual high pitch across the entire V: span.

Based on our small set of morphemes, Class 3 prefixes appear to be fewer in number than the first two classes: we found only two, *kaak* ‘only/just’ and *ksikk* ‘white’.

Class 3

Prefix	Prefix + Root	Gloss
kaak-	kaak-omítaa	‘just a dog’
ksikk-	ksikk-omítaa	‘white dog’

We have analyzed these prefixes as causing accent to fall on the third syllable of the compound, but another valid analysis of these data would be that it accents the second syllable of the stem.

So far we have been unable to identify phonological or semantics patterns that can predict which class a given prefix will belong to.

5.3 Syllable weight

We have also found that in some cases, unaccented stems with Class 3 prefixes have an accent on the peninitial syllable rather than the expected third-syllable accent. In all these compounds, however, this second syllable is phonologically heavy—either (C)VV or (C)VC.

Root	‘just’ + Root	Gloss
aakii	kaa.káá.kii	‘just a woman’
i’towaaki	kaa.kí’.to.waa.ki	‘just a chicken’

Based on these forms, we propose a principle of weight-based accent attraction. It is remarkable that only the accents derived from Class 3 prefixes appear to be affected by syllabic weight. We speculate that this discrepancy could be due to the fact that the accent created by Class 3 stems is segmentally and syllabically farther from its source (the prefix)—perhaps this distance causes instability in the accent location, rendering it susceptible to influence from factors like syllable weight.

5.4 Voiceless syllables

Blackfoot has voiceless syllabic segments, including <s> as well as devoiced vowels before the velar fricative <h>. Since Blackfoot prominence is signalled primarily by a higher F_0 , accent cannot fall on a voiceless syllable. Stacy (2004) found that accent which is predicted to fall on a voiceless syllable is realized one syllable to the left, and our study confirmed this.

The prefix *pok-* normally accents the second syllable of a word, exemplified in the table below.

Root	‘small’ + Root	Gloss
issk	poksíssk	‘small bucket’
aakii	pokáákii	‘small woman’
omitaa	pokómitaa	‘small dog’
i’towaaki	pokí’towaaki	‘small chicken’

However, when the second syllable is voiceless, accent shifts left to fall on the first syllable of the word (in this case, on the prefix itself).

Root	‘small’ + Root	Gloss
ohpoos	pó.koh.poos	‘small cat’
ohpokon	pó.koh.po.kon	‘small ball’
ohmokoyi	pó.koh.mo.ko.yi	‘small wolf’

6 Conclusion

We have presented evidence that Blackfoot nominal stems may be divided into two classes (accented and unaccented) which interact with prefixes in different ways. Prefixation does not affect the accent of an accented stem. In contrast, the choice of prefix determines the pattern of prominence of a nominal compound when combining with an unaccented stem. We also noted two phonological factors that influence accent placement: voicing and syllable weight. This analysis offers new insights into Blackfoot morpho-phonology and is an important contribution to an understanding of Blackfoot prominence.

7 Future research

A full analysis of Blackfoot prominence would account not only for the word-level prominence of nominals which we investigated here, but would examine the prominence of those words in phrasal contexts. From preliminary observations, it seems that not every word-level prominence is also prominent during natural speech. Which accents remain in all contexts and which can be influenced by the phrasal prosody is the subject of future research.

We are also interested in exploring a footed analysis of Blackfoot. In such an analysis, footing in Blackfoot would be an organizing principle and would interact with the prominence in particular ways. Some evidence of

a possible footed structure influencing the placement of prominence comes from the Class 3 prefixes discussed above. Prominence falls on the third syllable of the word if the second is light, but on the second syllable if it is heavy. Additionally, both Class 3 prefixes are heavy syllables themselves. This suggests that Blackfoot words could be organized into heavy and light syllables with iambic feet, and that the prominence falls on the head of the foot as follows:

Morph	Prosody	Gloss
kaak-omitaa	(kaa).(ko.mí).(taa)	‘just a dog’
kaak-aakii	(kaa).(káá).(kii)	‘just a woman’
kaak-i’towaaki	(kaa).(kí’).(to.waa).ki	‘just a chicken’

Though unexplored, some morphemes in our transcriptions of storyboards done in class do show vowel length alternation, and it would be interesting to see if these also follow a rhythmic alternating pattern that would correspond to feet.

Aside from these explorations, we would also like to explore the prominence patterns of Blackfoot verbs. We take as our null hypothesis that prominence in verbs will follow the same sorts of patterns found in nominals. However, many languages show different patterns for verbs and nouns, and it would be interesting to see if something similar occurs in Blackfoot.

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