

Phonological Domains in Blackfoot: structures shared with Algonquian and the misbehavior of preverbs

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This paper reports briefly on the prosodic structure of the verbal complex in Blackfoot (Algonquian; Frantz 2017) as described in Weber (2020, 2021), and outlines an explicit methodology for determining morphemic and prosodic analyses of Algonquian languages. I argue that the verbal complex in Blackfoot contains a smaller phonological domain corresponding to the stem, similar to other Algonquian languages. In other ways, Blackfoot prosodic structure diverges from other languages. Preverbs do not have the same generalizations as independent words, and instead adjoin to the smaller phonological domain. A brief comparison with Plains Cree shows that preverbs do not have a uniform prosody across the language, indicating a need for a family-wide comparison of prosody.

MORPHOLOGICAL TEMPLATE

Blackfoot is a polysynthetic, strongly head-marking language. A basic morphological template for the verbal complex is given in (1) below (Bliss 2013; Frantz 2017; Taylor 1969; Weber 2020). The stem can be preceded by a person prefix and any number of optional prefixes known as “preverbs”, which have a wide variety of grammatical functions. The stem is followed by obligatory inflectional suffixes.

- (1) *Morphological Template of the Verbal Complex*
person–(preverb*)–[STEM]–suffixes

Example (2) contains a complex verb with several types of preverbs, including *aak-* ‘FUT’, a control verb *mato-* ~ *oto-* ‘go to (do)’, and an incorporated nominal root $\sqrt{\text{OWAHSI}}$ ‘grub’.¹

- (2) *áakotoowahsoohpommaawa*
aak–oto– $\sqrt{\text{owahsi}}$ –[$\sqrt{\text{ohpomm}}$ –aa]–Ø–wa
FUT–go.to– $\sqrt{\text{grub}}$ –[$\sqrt{\text{buy}}$ –AI]–IND–3
‘she will go grocery shopping’ (Frantz and Russell 2017: 212)

The Blackfoot stem is also morphologically complex and contains at least two elements, named ‘initial’ and ‘final’ for their position in the stem (Armoskaite 2011; Bliss 2013; Bloomfield 1946; Déchaine and Weber 2018; Goddard 1990). The initial is minimally a $\sqrt{\text{ROOT}}$, and the finals

¹ All data is from Frantz and Russell (2017) unless otherwise stated; any examples marked with “(BB)” are from the author’s fieldwork with Beatrice Bullshields, a Káinai Blackfoot speaker in her late 60s at the time. The morphemic analysis in examples uses the orthography in Frantz (2017) and Frantz and Russell (2017), which maps closely to phonemic or broad phonetic transcription (except that /ʔ/ = <’>, /j/ = <y>, /x/ = <h>, /ɛ:/ = <ai>, /ɔ:/ = <ao>, and other long sounds are doubled.) Any IPA transcriptions which are derived from the orthography are surrounded by double brackets, [[]. The stem (plus theme suffix) is given in square brackets, []. The following abbreviations are not included in the Leipzig Glossing Rules (Comrie, Haspelmath, and Bickel 2015): AI = animate intransitive, AN = animate, CMD = command clause, CORD = one-dimensional flexible material, DEG = degree marker, IC = initial change, II = inanimate intransitive, IN = inanimate, IND = independent order, INV = inverse, LIQUID = liquid material, OBV = obviative, PRX = proximate, SHEET = two-dimensional flexible material, SUB = subject, TA = transitive animate, TI = transitive inanimate, v = transitive verbalizing head.

derive stem classes based on transitivity and animacy. A bipartite intransitive stem is shown in (3), where the inanimate intransitive (II) final *-ii* agrees with the inanimate subject.

- (3) *íiksspiiwa omi náápioyisi*
 ii\ík-[√ssp-ii]-wa om-i naapioyis-i
 IC\DEG-[√high-II]-Ø-3 DEM-IN.SG house-IN.SG.
 ‘that house is high’ (re-glossed from Frantz 2017: 271)

Transitive verbs contain a third suffix after the final, known as the theme suffix; this agrees with the person and animacy of the subject or object or else is filled by the inverse suffix *-ok*. A tripartite transitive stem is shown in (4), where the transitive animate (TA) final *-inn* agrees with the animate object, and the theme suffix *-ii* agrees with the subject.

- (4) *isspínnii ámo pookáá*
 [√issp-inn-ii]-Ø-wa amo pookaa
 [√high-by.hand.TA-3SUB]-IND-3 DEM child.AN
 ‘he lifted that child’ (Speaker: BB; re-glossed from Weber 2020: 217)

The initial and final may be separated by a medial, which is typically a √ROOT with a nominal or classifying meaning. For example, (5b) includes the same initial and final as in (5a), plus the medial *-kom-* ‘LIQUID’.

- (5) a. *áaksiksístoyiwa* b. *áaksiksístokomiwa*
 aak-[√ksisto-yi]-Ø-wa aak-[√ksisto-√**kom**-i]-Ø-wa
 FUT-[√warm-II]-IND-3 FUT-[√warm-√**LIQUID**-II]-IND-3
 ‘it will be warm’ ‘it will be warm water’

I turn now to a description of the prosodic structure of the verbal complex.

PROSODIC STRUCTURE OF THE VERBAL COMPLEX

Phonological generalizations and processes do not occur uniformly across an utterance. Instead, generalizations hold within domains which bear a close relationship to morphosyntactic constituents, or at morphosyntactic boundaries (Kaisse 1985; Nespor and Vogel 2007 [1986]; Selkirk 1984). I adopt the premises of Prosodic Phonology (Downing 1999; Inkelas 1990; Nespor and Vogel 2007 [1986]; Selkirk 1984), in which there is a finite set of ordered prosodic categories, which occur in a hierarchical phonological structure and which form the domains for sets of phonological generalizations. In this theory, domain-restricted phonological generalizations and sandhi processes across morphosyntactic boundaries (e.g. phonotactic restrictions, segmental rules, and suprasegmental rules) can diagnose prosodic constituents (Hall 1999; Nespor and Vogel 2007 [1986]: 58ff).

In this section I use domain-restricted phonological generalizations to argue that there are two distinct prosodic constituents within the verbal complex: the Prosodic (or Phonological) Word (PWd) corresponds to the stem, and the Phonological Phrase (PPh) corresponds to the entire verbal complex (described more fully in Weber 2020). The PPh is well-established as a domain which prohibits glides at the left edge, as well as the domain of vowel coalescence, minimal size constraints, obligatory stress (also called “pitch accent”), and an extra consonant slot at the right

edge (Bliss 2013; Elfner 2006; Weber 2020, 2021). Therefore, I focus the discussion on phonological evidence for a PWD constituent which is contained within the PPh constituent.

The Prosodic Word (Stem Domain)

The left and right edges of the PWD are the site of edge restrictions which interrupt a regular process of epenthesis. The evidence for epenthesis comes from two patterns of alternation for stem-internal suffixes. By comparing these together, I argue that some medials and finals begin in underlying consonants, and exhibit epenthesis at the left edge when they follow a consonant. While some older grammars do list consonant-initial morphemes (Taylor 1969; Uhlenbeck 1938), none lay out the data in this way or argue explicitly for this analysis. I include a list of underlying forms of medials and finals which were determined with this method.

One group of suffixes exhibits an [i] ~ Ø alternation at the left edge after consonants and vowels, respectively. For example, the suffix [-ipísta:] ~ [-písta:] ‘tie.AI’ is realized with an initial [-ip] after a consonant, like the root-final [k] in √YOOHK ‘lid’, (6). The suffix is realized with an initial [-p] after a vowel, like the root-final [o] in √AMO ‘gather’, (7).

- | | |
|---|---|
| <p>(6) <i>Suffix After C</i>
 [[nitâ:ksox^wksipísta:]]
 <i>nitâaksoohksipístaa</i>
 nit-aak-[√yoohk-(i?)pistaa]-(hp)
 1-FUT-[√lid-tie.AI]-(IND)
 ‘I will close the tipi flap’</p> | <p>(7) <i>Suffix After V</i>
 [[ʔamopísta:ní]]
 <i>amopístaani</i>
 [[√amo-(i?)pistaa]-n]-i
 [[√gather-tie.AI]-NMLZ]-IN.SG
 ‘ceremonial bundle’</p> |
|---|---|

There are two phonological analyses compatible with this data: either the suffix begins with a vowel, /-ipísta:/, which deletes after vowels; or the suffix begins with a consonant, /-písta:/, and the vowel is epenthesized after consonants. This indeterminacy of form is represented by “(i?)” in the morphemic analysis lines in (6) and (7). The vowel [i] is not part of the root √YOOHK ‘lid’, because this root can be followed by other segments, such as the [a] at the left edge of the medial -an- ‘SHEET’ in (8).

- (8) *C-Final Root Before V*
 [[ʔáka:jóx^wkanín:imə]]
ákaayóóhkaninnima
 akaa-[√yoohk-an-inn-i]-m-a
 PRF-[√lid-SHEET-by.hand.TI-IN]-IND-3
 ‘he has shut it (as a window)’

The two analyses can be distinguished by comparison with another type of alternation. Consider the suffix [-ipi] ‘bring.TA’ in (9) and (10). This suffix is realized with an initial [-ip] after a consonant, like the root-final [t] in √OMAT ‘start’, (9). It is also realized with an initial [-ip] after an [o], like the root-final [o] in √AMO ‘gather’, (10), where [oi] is a diphthong resulting from an underlying /o+i/ sequence (Elfner 2006; Weber 2020).

- (9) *Suffix After C*
 [[ʔomats**í**pi:s]]
 omats**í**piisa
 [√omat-**í**pi-:s]-Ø
 [√start-**bring**.TA-2SG:3.IMP]-CMD
 ‘transport him!’

- (10) *Suffix After V*
 [[ʔamó**í**pi:sa:wə]]
 amó**í**piisaawa
 [√amo-**í**pi-:s]-Ø=aawa
 [√gather-**bring**.TA-2SG:3.IMP]-CMD=PRX.PL
 ‘gather them!’

There are multiple vowel hiatus resolution strategies in Blackfoot, which means that the suffix [-ipi] ‘bring.TA’ has other realizations after other underlying vowels. For example, this suffix is realized with an initial [-ε:p] after an [a], like the root-final [a] in √SA ‘out’, (11), where [ε:] is a fusional vowel that reflects an underlying /a+i/sequence (Elfner 2006; Weber 2020).

- (11) *Suffix After V*
 [[sε:p**í**:s]]
 saip**í**is
 [√sa-**í**pi-:s]-Ø
 [√out-**bring**.TA-2SG:3.IMP]-CMD
 ‘bring her out!’

Again, the [i] at the left edge of [-ipi] ‘bring.TA’ is not part of the roots in (9)–(11), because the roots can occur before other segments. For example, the root √OMAT ‘start’ occurs before an [a]-initial suffix in (12), and the root √AMO ‘gather’ occurs before a [k]-initial medial in (13). The root √SA ‘out’ occurs before a [j]-initial morpheme in (14).

- (12) *C-Final Root Before V*
 [[ʔomatani:t]]
 omataniit
 [√omat-**anii**]-t-Ø
 [√start-**tell**.AI]-2SG.IMP-CMD
 ‘begin the song!’

- (13) *V-Final Root Before C*
 [[ʔamokins:tsa:kit]]
 amokinsstsaakit
 [√amo-**kinsst**-iaaki]-t-Ø
 [√gather-**arm**-AI]-2SG.IMP-CMD
 ‘close your hand!’

- (14) *V-Final Root Before C*
 [[ʔi:sáji:paʔsiwə]]
 iisáyiipa’siwa²
 ii-√sa-[√yiip-a’si]-Ø-wa
 IC-√out-[√leaf-AI]-IND-3
 ‘it leafed’

² The root {√NIIP, √YIIP} ‘leaf’ occurs in the noun *niip-i*, *niip-ists* ‘leaf, leaves’, as well as the inanimate intransitive verb ‘summer’, (i)–(ii), where ‘summer’ could be understood as the time when leaves grow.

- (i) [[ni:pówa]]
 niipówa
 [√niip-o]-Ø-wa
 [√leaf-II]-IND-3
 ‘it was summer’

- (ii) [[ʔáka:ji:powa]]
 ákaayiipowa
 akaa-[√yiip-o]-Ø-wa
 PRF-[√leaf-II]-IND-3
 ‘it has become summer’

Both patterns of alternation are summarized in (15). Suffixes like ‘tie.AI’, (a), begin in a vowel after consonants and a consonant after vowels. Abstracting away from vowel coalescence, suffixes like ‘bring.TA’, (b), begin in a vowel in both environments. Although the transcriptions are abstract, I have used square brackets rather than slashes around the positional variants of each morpheme because these are not underlying forms. Assuming that suffixes like ‘bring.TA’ begin in an underlying vowel, a suffix like ‘tie.AI’ cannot also begin in a vowel; if it did, then it should exhibit the same pattern of alternation as ‘bring.TA’. Crucially, there are no suffixes which begin in a consonant in both positions, as in (c). I take these patterns as evidence that ‘tie.AI’ begins in an underlying consonant, while ‘bring.TA’ begins in a vowel. The [i] ~ Ø alternation at the left edge of ‘tie’ can be analyzed as epenthesis between consonants to break up illicit consonant clusters (see Weber 2020).

(15)	<i>After C</i>		<i>After V</i>	<i>UR</i>	<i>Gloss</i>
a.	[-ipɪˈsta:]	~	[-pɪˈsta:]	/-pista:/	‘tie.AI’
b.	[-ipi]	~	[-ipi]	/-ipi/	‘bring.TA’
c.	*[-p]	~	*[-p]		(not found)

There is an additional morphophonological correlate of epenthesis: a morpheme-final /k/ always assibilates to [ks] before an epenthetic [i]. In (6) the root √YOOHK ‘lid’ surfaces with a final [ks] before the epenthetic vowel [i]. This root ends in [k] before other vowels, such as [a] in (8), which I take as evidence that the morpheme ends in an underlying /k/. To complicate matters a bit, note that morphemes can end in either [k] or [ks] before an *underlying* /i/ (Armoskaite 2006; Berman 2006; Weber 2020) unless followed by [t] (Chávez Peón 2015). The important point here is that *only* [ks] is allowed before epenthetic [i].

The patterns of alternation and /k/-assibilation discussed above occur for a number of suffixes (see Weber 2020, Section 4.2.1 and Appendix B for data). Suffixes which display the epenthesis pattern, and thus begin with an underlying consonant, are shown in (16). Suffixes which display vowel hiatus resolution, and thus begin with an underlying vowel, are shown in (17). The /i/-initial suffixes either cause a preceding /k/ to assibilate, (17a), or do not, (17b). These patterns were found in entries of the most recent dictionary (Frantz and Russell 2017) which happened to include examples with the suffix after consonant-final and vowel-final roots. I expect that more suffixes could be categorized in this way with further consultation with native speakers.

(16)	<i>CONSONANT-INITIAL MORPHEMES WITHIN THE STEM</i>	
	/-pista:/	‘tie.AI’
	/-p/	‘by.mouth.TA’
	/-ka-/	‘foot, leg’ (medial)

Many roots which begin in a nasal at the left edge of the verbal complex have an allomorph which begins in /j/ after a prefix. This is not the only pattern of alternation for nasal-initial roots, so I assume that both allomorphs are lexically listed (given in curly braces). Other roots with this pattern include {√maak, √yaak} ‘arrange’, {√miistap, √yiistap} ‘away’, and {√naam, √yaam} ‘alone’ (see Weber 2020, Section 3.2.1.2).

(17) *VOWEL-INITIAL MORPHEMES WITHIN THE STEM*

a. */i/-Initial; Cause /k/-Assibilation*

/-ipi/	‘bring.TA’	
/-istoto/	‘CAUS.TA’	
/-in/	‘by.sight.v’	(as part of the AI final /-ina(mm)/, the TA final /-ino/, and the II final /-inattsi/)
/-ipoyi/	‘stand.AI’	
/-in-/	‘BERRY’	(medial)

b. */i/-Initial; Do not Cause /k/-Assibilation*

/-imm/	‘by.mind.TA’	
/-iʔt/	‘by.mind.v’	(as part of the TI final /-iʔtsi/ and the AI final /-iʔtaki/)
/-inn/	‘by hand.v’	(as part of the TA final /-inn/ and the TI final /-inni/)

c. */a/-Initial*

/-anii/	‘say.AI’	
/-ap-/	‘CORD’	(medial)

d. */o/-Initial*

/-oʔt/	‘by.hand.v’	(as part of the TA final /-oʔto/ and TI final /-oʔtsi/)
/-opii/	‘sit.AI’	

The suffixes that I analyze as consonant-initial are often listed under <i> in the most recent dictionary (Frantz and Russell 2017), if they have a separate entry at all. For example, /-ka-/ ‘foot, leg’ is listed as “**ika med**; foot/leg” (Frantz and Russell 2017: 40). Further research might show that many of the morphemes currently analyzed as vowel-initial actually begin in an underlying consonant. Older grammars such as Taylor (1969) and Uhlenbeck (1938) do list many medials and finals as consonant-initial, but do not lay out alternations and argue for underlying forms in the way I have done here. Of the three grammars, only Taylor (1969: 75ff) discusses the epenthetic vowel [i]. He calls this a “connective //I//”, because it is analogous to Bloomfield’s “connective *i*” (Bloomfield 1946: 89–91). Only Taylor (1969: 104ff) notices that an underlying /k/ appears as [ks] *systematically* before an epenthetic [i] (as well as other underlying /i/ vowels, which he analyzes as morphophonemic //I//). Frantz (2017: 34) and Uhlenbeck (1938: 5) note that underlying /k/ is pronounced [ks] before some instances of [i], but they do not make the connection to epenthesis.

To summarize: epenthetic [i] occurs between consonants only and always causes assibilation of a preceding /k/ to [ks]. In the next sections I show how aspects of the process of assibilation are blocked across the right and left edges of the stem, which I take as evidence for prosodic boundaries.

Diagnosing the Right Edge of the PWd

The evidence for the right edge of the stem is that /k/-assibilation before an epenthetic vowel is blocked across the right edge of the stem. The inverse suffix /-ok/ is the only /k/-final suffix which can occur at the right edge of the stem. The examples below contain /-ok/ ‘INV’ followed by the plural agreement suffix [-in:a:n] ~ [-n:a:n] ‘1PL’. As discussed by Frantz (2017: 57), this suffix begins with a vowel after a consonant, (18), and a consonant after a vowel, (19).

- (18) *Suffix After C*
 [[nitsikákomim:ok**in**:a:nj kitániksi]]
*nitsikákomimmok**inna**ani kitániksi*
 nit-ik-[√vakom-imm-ok]-Ø-**inna**an-i k-itan-iksi
 1-DEG-[√favor-by.mind.TA-INV]-IND-**1PL**-3PL 2-daughter-AN.PL
 ‘Your daughters love us (excl.).’ (Frantz 2017: 61, (i))

- (19) *Suffix After V*
 [[nitsikákomim:an:a:nj kitániksi]]
*nitsikákomimm**anna**ani kitániksi*
 nit-ik-[√vakom-imm-aa]-Ø-**anna**an-i k-itan-iksi
 1-DEG-[√favor-by.mind.TA-3OBJ]-IND-**1PL**-3PL 2-daughter-AN.PL
 ‘We (excl.) love your daughters.’ (Frantz 2017: 57, (g))

The inverse suffix clearly ends in a consonant when it occurs before other suffixes, as shown in (20). In other words, the vowel [ɪ] is not part of the inverse suffix.

- (20) *C-Final suffix Before V*
 [[nitsikákomim:ok**a**]]
*nitsikákomimmok**a** nitána*
 nit-ik-[√vakom-imm-ok]-Ø-**a** n-itan-a
 1-DEG-[√favor-by.mind.TA-INV]-IND-**3** 1-daughter-AN.SG
 ‘My daughter loves me.’ (Frantz 2017: 61, (c))

The pattern of alternation for the ‘1PL’ suffix is summarized below in (21a). Vowels are predictably short and lax before geminates (Elfner 2006; Derrick 2007; Weber 2020), so I have transcribed the vowel at the left edge of the ‘1PL’ suffix as [i] below.³ Although the transcriptions are abstract, I have used square brackets rather than slashes around the positional variants of each morpheme because these are not underlying forms. Crucially, there are no suffixes which begin in a consonant in both positions, as in (21b). In other words, the alternation is compatible with a consonant-initial underlying form, /-n:a:n/ ‘1PL’, where the [i] at the left edge is epenthetic and only occurs between consonants. However, epenthesis does not cause the stem-final /k/ to assibilate to [ks], unlike epenthesis within the stem. I take this as evidence for a prosodic boundary at the right edge of the stem which prohibits [ks], even before epenthetic [i].⁴

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|------|----------------|----------------|-------------|--------------|
| (21) | <i>After C</i> | <i>After V</i> | <i>UR</i> | <i>Gloss</i> |
| a. | [-in:a:n]~ | [-n:a:n] | /-n:a:n/ | ‘1PL’ |
| b. | *[-C] ~ | *[-C] | (not found) | |

³ Frantz (2017: 7) reports that underlying long vowels may retain a tense vowel quality before geminates, even though vowel length is neutralized in this position. There may be some speaker variation regarding this, since other phonetic and phonological studies do not report this contrast (e.g. Elfner 2006; Derrick 2007; Weber 2020).

⁴ This is similar to an analysis in Armoskaite (2006), taken up in Weber (2020), which argues that /k/-assibilation *fails* to occur outside of a particular domain. There are not many combinations of stem-external suffixes which create consonant clusters, and not many suffixes which end in /k/. This means there is an absence of evidence for/against /k/-assibilation in the other stem-external suffixes. Until such evidence can be found, the examples (18)–(19) are more easily analyzed with a prosodic boundary which blocks /k/-assibilation.

A reasonable question is whether stem-internal vowel hiatus resolution strategies are also interrupted at the right edge of the stem. In practice, the answer is difficult to determine because there are very few stem-external suffixes, and these occur in a finite set of fixed orders. Future work is necessary to catalog the types of suffix alternations which occur within and outside of the stem. Only then will it be clear which alternations are unique to this boundary.

The examples in this section show that the alternations and phonological processes seen inside the stem are interrupted in at least one respect at the right edge of the stem: an epenthetic [i] does not cause a preceding /k/ to assibilate. I take this as evidence for a prosodic boundary which prohibits [ks]; specifically, the left edge of a Prosodic Word. In the next section I show how root alternations conspire to avoid stops at the left edge of the stem.

Diagnosing the Left Edge of the PWd

In this section I consider root alternations in two positions: at the left edge of the verbal complex, and after a prefix. There are three generalizations which I take as evidence for a prosodic boundary at the left edge of the stem. First, some roots which begin with a plosive at the left edge of the verbal complex begin in a vowel after a prefix of any kind, regardless of whether the root follows a consonant or a vowel. For example, $\sqrt{\text{POMM}}$ ‘transfer’ begins with a [p] at the left edge, (22), but [ip] after any prefix, (23). After a consonant, the evidence is that there is an extra vowel [i] between the two consonants which causes assibilation of a preceding /k/, (23a). After a vowel, the evidence is that the vowel length and quality changes exactly as it would if an underlying /i/ followed. In (23b) the preverb /a-/ ‘IPFV’ surfaces as [ɛ:] before $\sqrt{\text{POMM}}$, as if from an /a+i/ sequence. Note that this alternation is not driven by syllable structure, since the form *[ʔápóm:akiwə] without epenthesis is perfectly well-formed in terms of syllable structure.

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|--|--|
| <p>(22) <i>Left Edge</i></p> <p>[[póm:ós]]</p> <p>pommóós</p> <p>[$\sqrt{\text{pomm}}\text{-o-:s}$]-Ø</p> <p>[$\sqrt{\text{transfer-TA-2SG:3.IMP}}$]-CMD</p> <p>‘transfer (e.g. the bundle) to him!’</p> | <p>(23) a. <i>After C</i></p> <p>[[ʔâ:ksipóm:oji:wájɪ]]</p> <p>áaksipómmoyiiwáyɪ</p> <p>aak-[$\sqrt{\text{pomm}}\text{-o-yii}$]-Ø-w=ayɪ</p> <p>FUT-[$\sqrt{\text{transfer-TA-3SUB}}$]-IND-3=OBV.SG</p> <p>‘he will transfer it to her’</p>
<p>b. <i>After V</i></p> <p>[[ʔé:póm:akiwə]]</p> <p>áípommakiwa</p> <p>a-[$\sqrt{\text{pomm}}\text{-Ø-aki}$]-Ø-wa</p> <p>IPFV-[$\sqrt{\text{transfer-TA-AI}}$]-IND-PRX</p> <p>‘the one transferring’</p> |
|--|--|

These roots are distinct from a second set of roots which begin in a vowel in both positions, such as $\sqrt{\text{IPOTSIM}}$ ‘poison’ in (24) and (25).

(24) *Left Edge*
 [[ʔipótsimatsís]]
 ipótsimatsísa
 [√ipotsim-at-:s]-Ø
 [√poison-TA-2SG:3.IMP]-CMD
 ‘poison him!’

(25) *After C*
 [[ʔâ:ksipótsimatsi:wə]]
 áaksipótsimatsiwa
 aak-[√ipotsim-at-ii]-Ø-wa
 FUT-[√poison-TA-3SUB]-IND-3
 ‘she will poison him’

Assuming that √IPOTSIM ‘poison’ begins in an underlying vowel, a root like √POMM ‘transfer’ cannot also begin in a vowel; if it did, then it should exhibit the same pattern of alternation as √IPOTSIM ‘poison’. Crucially, there are no suffixes which begin in a consonant in both positions. For similar reasons as those discussed in Section 3.1, I take this as evidence that roots like √POMM ‘transfer’ begin in an underlying consonant and that [i] is epenthesized after a prefix.

Second, *all* roots which exhibit alternations have one form at the left edge of the verbal complex, and a second form after a prefix of any kind, regardless of whether the prefix ends in a consonant or a vowel. Weber (2020) considers a range of diverse alternations, of which epenthesis is only one, shown in (26). For example, a root after a prefix may exhibit *epenthesis* (with or without root-internal gemination) (a), an [ox] *accretion* (b), *glide retention* (c), *nasal deletion* (d), or *glide substitution* (e).⁵ (See Weber 2020, Section 3.2.1.2 and Section 4.2.2 for data. These types of root alternations and more are also discussed in Taylor 1969: 114ff, and in Uhlenbeck 1938: 6–9, with examples in later chapters.) Further research will surely show that this list is inexhaustive. However, the distribution of forms at the left edge vs. after a prefix is uniform across all alternations.

(26)	<i>LEFT EDGE</i>	<i>AFTER C</i>	=	<i>AFTER V</i>	<i>GLOSS</i>
a.	[pom:] [kipita]	[ipom:] [ip:ita]		[ipom:] [ip:ita]	‘transfer’ ‘aged’
b.	[pom:]	[oxpom:]		[oxpom:]	‘buy’
c.	[i:p]	[ji:p]		[ji:p]	‘decrease’
d.	[ma:n] [ni:po]	[an] [ipo]		[an] [ipo]	‘recent’ ‘upright’
e.	[ma:k] [na:m]	[ja:k] [ja:m]		[ja:k] [ja:m]	‘arrange’ ‘alone’

Note that the entry headers in Frantz and Russell (2017) reflect the form of a root after a prefix and *not* necessarily its underlying form. Therefore, researchers interested in the synchronic

⁵ The transcriptions in (26) abstract away from coalescence, as well as other predictable phonology such as vowel neutralization to short, lax vowels before geminates, glottal stop epenthesis before initial vowels, and the positional allophony of the dorsal fricative /x/, which is [ç] after front vowels, [x^w] after round vowels, and [x] otherwise (see Miyashita 2018; Weber 2020). Although the transcriptions are abstract, I use square brackets rather than slashes around the transcriptions, because these are not underlying forms.

or diachronic phonological analysis of roots should not rely on the entry headers but should consider the form of the root in multiple contexts, including at the left edge of the verbal complex.⁶

Third, certain segments are prohibited at the beginning of roots in each of these two positions. Table 1 summarizes these restrictions, aggregated across all root alternations. Roots never begin with a glide (e.g. a [-cons] segment; solid line) when they stand at the left edge of a verbal complex, and roots never begin with a stop (e.g. a [-cont] segment; dashed line) after a prefix.

TABLE 1: Segments allowed at left edge of roots in two positions

	p	k	m	n	j	w	i:	o:	ε:	ɔ:	a:	i	o	a
LEFT EDGE	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓
AFTER PREFIX	X	X	X	X	✓	✓	✓	✓	X	X	X	✓	✓	✓

All three facts about the left edges of stems (epenthesis after consonants and vowels, the other root alternations, and the avoidance of stops) can be explained if there is a prosodic boundary at the left edge of the stem with an edge restriction against [-cont] segments.⁷ Following Hall (1999), I take this edge restriction as evidence for a prosodic boundary. Epenthesis occurs at the left edge of obstruent-initial roots in order to displace stops away from the prosodic boundary, thereby satisfying the edge restriction; this is the reason that epenthesis occurs after consonants and vowels. The other types of root alternations serve the same function. Evidently, the effects of this edge restriction are blocked when the left edge of the prosodic boundary aligns with the left edge of the verbal complex.

Two Distinct Prosodic Constituent Types

The generalizations in the preceding sections can be accounted for if there is a Prosodic Word (PWd) constituent which corresponds to the stem, designated with () in (27). The PWd domain is motivated by phonotactic edge restrictions: the left edge prohibits [-cont] segments, and the right edge prohibits [ks], even before an epenthetic vowel.

- (27) *Prosody of the Verbal Complex*
 {person–preverb*– (STEM)_{PWd}–suffixes}_{PPh}

Although it is not the focus of this paper, there is a distinct Phonological Phrase (PPh) constituent which corresponds to the entire verbal complex, designated with { } above. Note that the PWd and the PPh cannot be analyzed as a single recursive constituent type, because they have distinct phonological generalizations (cf. arguments in Vogel 2009). For example, the PPh prohibits glides at the left edge while the PWd does not (as shown in Table 1, and discussed in Bliss 2013; Elfner 2006; Weber 2020).

⁶ The dictionary entries also reflect the large amount of speaker variation which occurs in initial position. Some speakers allow multiple forms of the root here (Taylor 1967; Weber 2020). Additionally, the left edges of roots are neutralized in the indicative past tense – probably a reflex of Algonquian initial change (Weber 2016, 2020: Appendix C).

⁷ Root-initial [s], [s:], and [t] are absent from Table 2, because Frantz and Russell (2017) does not include clear examples of roots beginning in these segments at the left edge, after consonants, and after vowels. I leave this for future research. Berman (2006: 267) notes that all noninitial verb stems (that is, after a prefix) begin in either a glide or vowel, suggesting that the PWd left edge restriction might be against all [+cons] segments rather than [-cont].

Now that I have established two distinct prosodic constituents within the verbal complex, I turn to a discussion of the phonological correlates of preverbs in Blackfoot. I show that preverbs do not form an independent prosodic domain in Blackfoot.

PREVERBS

The phonology of preverbs in Blackfoot has not been addressed in previous research. Below, I compare the phonological correlates of preverbs with those of the PWd (e.g. the stem) and the PPh (e.g. the verbal complex). The diagnostics include minimal size constraints and obligatory stress domains, following two common correlates of Prosodic Words in Algonquian languages (see Russell 1999 for Plains Cree), as well as the edge restrictions on the PWd and PPh discussed above.

Preverbs do not have the same minimal size constraints as an inflected verb or noun. Preverbs can be as small as V, CV or VC, (28), while the smallest inflected verb or noun (e.g. a PPh) is CVVC or CVCC, (29). The smallest verb stems (e.g. PWds) in (29) are imperatives, which contain a CVV verb stem plus a suffix /-t/ ‘2SG.IMP’, and the smallest noun stems in (29) are bare uninflected noun stems which are at once a PWd and a PPh, and which are either CVVC or CVCC. Therefore, the smallest PWd is CVV, which is larger than the smallest preverbs.

(28)	<i>Minimal Preverbs</i>			(29)	<i>Minimal Verbs and Nouns</i>		
	V	a-	‘IPFV’		CVVC	píi-t	‘enter!’
	CV	sa-	‘out’			sóó-t	‘go to war!’
	VC	on-	‘hurry’			kóón	‘ice’
					CVCC	pónn	‘bracelet’
						kó’s	‘dish, bowl’

Preverbs do not form an independent stress domain.⁸ The domain for obligatory stress is the verbal complex (e.g. the PPh); not the stem (e.g. the PWd) or the preverbs (Weber 2016, 2020). This can be seen in the examples below. Example (30a) contains a stem without any preverbs; the stress falls on the stem (underlined). Example (30b) contains a stem with one preverb; the stress falls on the preverb (underlined). Finally, example (30c) contains a stem with several preverbs; the stress falls on only one of the preverbs (underlined). Therefore, not all preverbs are stressed.

⁸ Frantz (2017: 3) notes that phonological prominence in Blackfoot is characterized via a pitch peak on at least one syllable of the word, which he calls “pitch accent”. Subsequent studies show that Blackfoot pitch accent shares many phonetic and phonological properties with metrical stress. Van Der Mark (2003) confirms that significant acoustic correlates of pitch accent include a higher fundamental frequency, intensity, and duration, though not glottal skew. These parallel the correlates of stress in many other languages (Beckman 1986; Gordon and Roettger 2017). Stacy (2004) shows that Blackfoot displays different phonological properties than other pitch accent languages and argues that the language may be developing tonal contrasts. Although the location of the pitch peak in nouns is not predictable (Kaneko 1999; Stacy 2004; Weber and Allen 2012), Weber (2016, 2020) shows that the location of the pitch peak in verbal complexes is predictable and has many of the properties of metrical stress, such as obligatoriness, culminativity, edge demarcation, and attraction to heavy syllables. For these reasons, it seems that Blackfoot pitch accent is typologically equivalent to stress, albeit with a language-specific phonetic manifestation.

- (30) a. *Stress on Stem*
 [ʔɪstá:wə]
 isstááwa
 [√isst-aa]-Ø-wa
 [√wish-AI]-IND-3
 ‘she wants’ (Frantz and Russell 2017: 272)
- b. *Stress on Single Preverb*
 [ʔiksíms:ta:wə]
 iksímsstaawa
 √iksím-[√sst-aa]-Ø-wa
 √secret-[√wish-AI]-IND-3
 ‘he thought’ (Frantz and Russell 2017: 61)
- c. *Stress on One of Multiple Preverbs*
 [ʔitaníʔtsíksímʔs:taja]
 itaníʔtsíksímsstaya
 it-√aníst-√iksím-[√sst-aa]-yi=aawa
 LOC-√manner-√secret-[√wish-AI]-3PL=PL
 ‘they decided thus’ (BB, 2013-02-13, ‘Old Woman in the Cold’)

Table 2 summarizes the phonological properties of preverbs, PWds, and PPhs. The data on edge restrictions is not given here due to space restrictions, but can be confirmed in the dictionary entries of Frantz and Russell (2017). The first three properties show that preverbs do not have the same phonological properties as PWds or PPhs: all three units have distinct minimal size constraints; neither preverbs nor stems have obligatory stress, while PPhs do; preverbs never allow a right edge [k] before an epenthetic [i], while PWds do. However, preverbs exhibit the same alternations and restrictions as the left edge of the PWd. Namely, the left edge of a preverb prohibits stops and allows glides whenever it is distinct from the left edge of the PPh, just like stems.

TABLE 2: Phonological properties of preverbs compared to PWd and PPh

		PWD	PPh
	PREVERBS	STEM	VERBAL COMPLEX
Minimal size?	V, CV, VC	CVV	CVVC, CVCC
Obligatory stress?	×	×	✓
Right edge [k] occurs before epenthetic [i]?	×	✓	n/a
Left edge prohibits stops	✓	✓	×
Left edge allows glides	✓	✓	×

These properties are compatible with an analysis where the left edge of the preverb corresponds to the left edge of a PWd, but the preverb itself is not a PWd. In my analysis, the preverb forms a phonological adjunct to the PWd containing the stem, creating a recursive PWd structure, as in (31).

- (31) *Prosody of the Verbal Complex*
 {person-(preverb*-(STEM)_{PWd})_{PWd}-suffixes}_{PPh}

Example (32) repeats (2) showing how the preverbs are incorporated into the prosodic structure of the verbal complex. The left edges of the PWds never coincide with a stop.

- (32) {(ʔâ:k (oto (owxs (ox^wpum:a:))))} wəʔ
 aak-oto-√owahsi-[√ohpomm-aa]-Ø-wa
 FUT-go.to-√grub-[√buy-AI]-IND-3
 ‘she will go grocery shopping’ (=₂)

In the next section I discuss how this prosodic structure is unusual in Algonquian.

DISCUSSION: TOWARDS A FAMILY-WIDE COMPARISON OF PROSODY

Preverbs are traditionally defined by their *position* and *phonology*. In terms of position, a preverb precedes a stem and forms a compound with the stem (e.g. a single unit for inflection). In terms of phonology, a preverb forms a separate prosodic (or phonological) word. The dual nature of the definition is often explicit. For example, Bloomfield notes that ‘the members [of a compound—NW] are treated phonetically like words in a phrase’ (Bloomfield 1946: 103), and Goddard states that ‘[a] preverb is a phonologically independent word that is syntactically part of a compound verb stem’ (Goddard 1990: 478). This type of prosody has been argued for preverbs in several Algonquian languages (Branigan, Brittain, and Dyck 2005 for multiple languages; Newell and Piggott 2014 for Ojibwe; Russell 1999 for Plains Cree).

However, preverbs do not form an independent prosodic domain in Blackfoot, which shows that the definitions of preverbs above are too restricted and do not hold across the entire Algonquian family. One potential explanation is that the odd prosodic structure in Blackfoot is because the language may be the oldest layer of Algonquian (Goddard 1994) or stem from a proto-language which is older than Proto-Algonquian (Goddard 2015). This explanation is too simplistic, since a closer look at the prosody of preverbs in Plains Cree shows that the traditional definition of preverbs also fails for other languages.

Preverbs in Plains Cree can be defined solely in terms of phonology, at least before some types of constituents. This can be seen by comparing the form of the root √mât ‘start’ as a so-called ‘initial’ in (33) and as a so-called ‘preverb’ in (34). The top line in the examples contains an orthographic representation from Wolvengrey (2011); the syllable boundaries and morphemic analysis are mine. The two roots do not differ in terms of position—both occur before a vowel-initial full stem.⁹ They only differ in terms of phonology. The ‘preverb’ exhibits an epenthetic [i] at the right edge in (34), which triggers palatalization of *t* to *c* ([ts] ~ [tʃ]). Note that the form in (34) occurs in slow and careful speech. In faster speech the two vowels at the boundary coalesce in an external sandhi process (Russell 1999; Wolvengrey 2011).

⁹ The constituent after the root ‘start’ in (33) is often analyzed as a derived final instead of a full stem (Bloomfield 1946; Goddard 1990). This is surprising, given that the constituents in (33) and (34) have identical internal structures. The sole reason for analyzing the constituent as a derived final in (33) but a stem in (34) is to account for the phonology of the root √mât ‘start’. This seems rather circular: the constituent must be a derived final in (33) because √mât ‘start’ is an initial; but initials are defined by position and therefore √mât ‘start’ is an initial because it precedes a final.

(33) $\sqrt{\text{ROOT}}$ as 'Initial'
 mâ.ta.tos.kêw
 $\sqrt{\text{mât}}$ –[$\sqrt{\text{atosk}}$ –ê]–w
 $\sqrt{\text{start}}$ –[$\sqrt{\text{work}}$ –AI]–3
 's/he begins work'

(34) $\sqrt{\text{ROOT}}$ as 'Preverb'
 $\sqrt{\text{mâ.ci}}$ –a.tos.kêw
 $\sqrt{\text{mâci}}$ –[$\sqrt{\text{atosk}}$ –ê]–w
 start–[$\sqrt{\text{work}}$ –AI]–3
 's/he starts working'

(Wolvengrey 2011)

To summarize, while Blackfoot preverbs can be defined by position and phonology (but not as a separate prosodic domain), Plains Cree preverbs can be defined solely by phonology (and position is not a factor). These examples above show that the prosody of preverbs is not straightforward and not uniform across the family. This in turn suggests a need for a more rigorous family-wide comparison of prosodic structure.

CONCLUSION

In this paper I outline an explicit methodology for determining morphemic and prosodic analyses of Algonquian languages. I argue that the Blackfoot verbal complex contains a smaller, distinct prosodic domain which corresponds to the stem and has not been described before. In my analysis, there is a Prosodic Word (PWD) constituent corresponding to the stem and a distinct Phonological Phrase (PPH) corresponding to the entire verbal complex. This prosodic structure is similar to that in other Algonquian languages, such as Plains Cree. However, the preverbs in Blackfoot do not form a separate prosodic domain, unlike in other languages across the family. This suggests that the traditional definition of preverbs as phonologically independent but syntactically dependent constituents should be reconsidered. This data also indicates a need for a wider and more rigorous typological study of prosodic structure across the Algonquian family.

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