On the misalignment of prosodic edges and syllables
Introduction

- Prosodic Phonology: a theory of how utterances are “chunked” into smaller domains.
- Small number of constituent types, arranged in a hierarchical structure.
  - Utt > IPh > PPh > PWd > Ft > σ
- Each constituent type is defined by unique phonological generalizations.
- Related to syntax, but indirect. Evidence: mismatches from syntactic constituents for non-syntactic reasons.

(Inkelas 1993; Nespor and Vogel 2007; Pierrehumbert and Beckman 1988; Selkirk 1984)
IsiXhosa reduplication

RED base is a prosodic constituent; stem-initial vowel not included

A. CONSONANT-INITIAL STEMS
ukú-[phátha ukú-phathá-][phatha ‘touch’
ukú-[sebénza ukú-sebe-][sebénza ‘work’

B. VOWEL-INITIAL STEMS, INFIXING
ukw-{á}[látha ukw-{á-lathá-[latha ‘point at’
uk-{ó}[phúla uk-{ó-phulá-[phula ‘break’

{ = left edge of stem, [ = left edge of prosodic stem

(Cassimjee 1994; Downing 1998a,b)
KiHehe reduplication

RED base is a prosodic constituent; prefix-final consonant included

A. CONSONANT-INITIAL STEMS

kú-[ceénga  kú-ceenga-[ceénga  ‘build’
kú-[teléka  kú-teleka-[teléka  ‘cook for’

B. VOWEL-INITIAL STEMS, “EXFIXING”

[kw-íimbila  kw-íimbila-[kw-[íimbila  ‘sing’
[kw-áaka  kw-áaka-[kw-[aáka  ‘burn’

{ = left edge of stem, [ = left edge of prosodic stem

(Downing 1998a; Odden and Odden 1985)
Mismatches from syntax for phonological reasons;
Align the prosodic edge to an *onset* by underparsing or overparsing.

Syntax: \[\ldots \text{C} \{ \text{V} \ldots \text{V} \{ \text{V} \ldots\]\n
Prosody: \[\ldots \text{C} \{ \text{V} \ldots \ldots \text{V} \{ \text{V} \ldots\]\n
- underparsing the stem
- overparsing the prefix

\{ = \text{left edge of stem}, \[ = \text{left edge of prosodic stem}\]

(Downing 1998b; McCarthy and Prince 1994; Nespor and Vogel 2007)
"Prosodic Constituents"

- "interface categories" extrinsically defined by their relation to syntax
- not metrical, rhythmic, or sonority-related categories like feet and syllables

Two relationships:
- P-to-σ align
- S-to-P align

(Inkelas 1990; Itô and Mester 2012; Selkirk 1986)

(Inkelas 1993; Nespor and Vogel 2007; Pierrehumbert and Beckman 1988; Selkirk 1984)
Prosodic edges may align with syllable edges at the expense of syntax-prosody alignment. Prosodic edges and syllable edges may misalign to maintain syntax-prosody alignment.

Syntax: $...C\{-V... ...V\{-V...$

Prosody: $...\ .C\{V.\ ... ...\ .V\{V.\ ... \ P\text{-to-}\sigma \text{ align} \succ S\text{-to-P align}$

IsiXhosa

$...\ .C\{V.\ ... ...\ .V\{V.\ ... \ P\text{-to-}\sigma \text{ align} \succ S\text{-to-P align}$

KiHehe

$...C\{V.\ ... ...V\{V.\ ... \ S\text{-to-P align} \succ P\text{-to-}\sigma\text{align}$

??? Blackfoot

\{ = left edge of stem, [ = left edge of prosodic stem
Outline

1. Phonology and syllable structure
2. Evidence for the left edge of a prosodic constituent
3. Evidence that syllables span the left edge
4. Arguments against syntax-prosody misalignment for Blackfoot
5. Summary
Phonology and syllable structure
Blackfoot (Algonquian family)

Figure 1: Map by Eric Leinberger.

(Frantz 2009; Frantz and Russell 2017)
Overview

Figure 2: Blackfoot reserves. Map by Kevin McManigal.

- Siksiká (Blackfoot)
- Aapátohsipikani (Peigan)
- Kainai (Blood)
- Aamsskáápipikani (Southern Piegan)

(some lexical, morphological, phonological differences, but mutually intelligible)
Data sources

- Fieldwork with native speakers (for: phonology and syllable structure sections)
  - Especially Totsinámm (Beatrice Bullshields; BB)

- Reference materials (for: morpheme alternations)
  - Grammar (Frantz 2017)
  - Dictionary (Frantz and Russell 2017)
### Phonological inventory

<table>
<thead>
<tr>
<th></th>
<th>Labial</th>
<th>Coronal</th>
<th>Dorsal</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stops</strong></td>
<td>p p:</td>
<td>t t:</td>
<td>k k:</td>
<td>? &lt;’&gt;</td>
</tr>
<tr>
<td><strong>Assibilants</strong></td>
<td>ts t:s</td>
<td>ks</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-assibilants</strong></td>
<td>s’t s’t:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fricatives</strong></td>
<td>s s:</td>
<td>x &lt;h&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nasals</strong></td>
<td>m m:</td>
<td>n n:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glides</strong></td>
<td>w</td>
<td>j &lt;y&gt;</td>
<td>(w)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>front</th>
<th>central</th>
<th>back</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>high</strong></td>
<td>i i:</td>
<td>o o:</td>
<td></td>
</tr>
<tr>
<td><strong>mid</strong></td>
<td>ε: &lt;ai&gt;</td>
<td>o: &lt;ao&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>low</strong></td>
<td>a a:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Doubled letters for long segments.

(Derrick and Weber n.d.; Weber 2020)
Contrastive mid vowels

- Many [ɛː] and [ɔː] arise from coalescence across boundaries
- Orthography reflects the underlying form

\[ \text{\[\text{ˈɔːkə]}} \]
\[ a \rightarrow \{\sqrt{\text{ok–aa}}\} \rightarrow \emptyset \rightarrow \text{wa} \]
\[ \text{IPFV} \rightarrow \{\sqrt{\text{rope–V}}\} \rightarrow \text{IND–3} \]

‘he is roping’ (BB)

(Frantz 1978, 2017)
Contrastive mid vowels

- But some [ɛː] and [ɔː] are morpheme-internal
- Occur in overlapping environments with other long vowels
- Some minimal pairs

\[\text{[ɔːnːɪt]}\]
\{√\text{ao}–n/i–i}–t–Ø
\{√\text{hole–by.needle/v–V}–2SG.IMP–IMP\}

‘pierce it!’ (BB)

\[\text{[aːnːɪt]}\]
\{√\text{aan–ii}–t–Ø\}
\{√\text{say–V}–2SG.IMP–IMP\}

‘say (s.t.)!’ (BB)

(Weber 2020)
Syllable structure: onsetless syllables resolved

- Via coalescence or other vowel hiatus resolution strategies.
- Via [ʔ]-epenthesis at the left edge before underlying vowels

<table>
<thead>
<tr>
<th>UR</th>
<th>IPA</th>
<th>GLOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>/apíːt/</td>
<td>[ʔapíːt]</td>
<td>‘sit!’ (BB)</td>
</tr>
<tr>
<td>/imitâː/</td>
<td>[ʔimitâː]</td>
<td>‘dog’ (BB)</td>
</tr>
<tr>
<td>/otán/</td>
<td>[ʔotán]</td>
<td>‘his/her daughter’ (BB)</td>
</tr>
</tbody>
</table>

(Elfner 2006; Weber 2020)
Syllable structure: vowel length neutralized before codas

Contrastive vowel length in open syllables.

CV  [ʔãː.ko.kaː]  
    ‘he will rope’  (BB)

CVV [ʔãː.koi.kaː]  ‘she will hold a Sundance’  (BB)

<table>
<thead>
<tr>
<th>SHORT VOWELS</th>
<th>LONG VOWELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>µ</td>
<td>µ</td>
</tr>
<tr>
<td></td>
<td>µ</td>
</tr>
<tr>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

(Hayes 1989; Hyman 1985; Pulleyblank 1994)
Syllable structure: vowel length neutralized before codas

Vowel length neutralization before codas.

CVC  \[\text{só.kαʔ.śi.m}\] ‘shirt, dress’ (BB)

\[\text{ʔим.мo.jάː.n}\] ‘fur coat’ (BB)

CVVC — —

MAXIMAL SYLLABLE

\[\sigma\]

\[\mu\] (μ)

\{\ V \ C \}
Syllable structure: codas are restricted

Codas restricted to /ʔ/, /s/, /x/, geminate

[koʔ.kí] ‘corner’ (BB)
[pʌs.káː.n] ‘dance’ (BB)
[óxʷ.ko.to.ki̥] ‘rock’ (BB)
[mut.to.ks.í.s] ‘knee’ (BB)

(assume some codas escape a CodaCond; Itô 1989)
Evidence for the left edge of a prosodic constituent
Syntactic and prosodic structure

- **Verbal complex =** CP Phonological Phrase (PPh)
- **Stem =** VP/νP Prosodic Word (PWd)

**Syntax**

\[
\begin{align*}
\text{CP} & \{ \text{prefix–} \nu P \{ \sqrt{\text{ROOT–(CL)}–\nu–V} \} \nu P – I^0 – C^0 \} \text{CP} \\
\text{Prosody} & \{ \text{prefix–} \nu P \{ \sqrt{\text{ROOT–(CL)}–\nu–V} \} \nu P – I^0 – C^0 \} \text{PPh} \\
\end{align*}
\]

(Bliss 2013; Déchaine and Weber 2015, 2018; Déchaine and Wiltschko 2010; Weber 2020, 2021)
Evidence for the PWd constituent

- Phonotactic constraints can define prosodic constituents (Bennett 2018; Hall 1999).
- Within the PWd: vowel hiatus resolution and epenthesis to conform to syllable structure.
- Left edge of PWd: left edge restriction against [-cont] segments (e.g. stops).

\[
\text{PROSODY} \quad \text{PPh}\left[ \text{prefix}_{\text{PWd}} \left[ \sqrt{\text{ROOT}-(\text{CL})-\nu-V} \right]_{\text{PWd}} -I^0-C^0 \right]_{\text{PPh}}
\]

*[-CONT]

(Bliss 2013; Déchaine and Weber 2015, 2018; Déchaine and Wiltschko 2010; Weber 2020)
Within the PWd: vowel-initial suffixes

Vowel-initial suffix: /-ip/ ‘bring’

**AFTER C**

[ʔomatípíːs]

{√omat–ip/i–ːs}–Ø

{√start–bring/v–2SG:3.IMP}–CMD

‘transport him!’

**AFTER V**

[sɛːpíːs]

{√sa–ip/i–ːs}–Ø

{√out–bring/v–2SG:3.IMP}–CMD

‘bring her out!’

(examples of other vowels in appendix)
Consonant-initial suffix: /-p/ ‘tie’

**AFTER C**

[ʔaksiˈptːt]

\{√aa[k-p/i-st–aa]–t–Ø
\{√wrap–tie/v–V\}–2SG.IMP–CMD

‘use that pole!’

**AFTER V**

[ʔawápiˈptːt]

\{√aawa[p/i-st–aa]–t–Ø
\{√move–tie/v–V\}–2SG.IMP–CMD

‘make a cradle swing!’
Within the PWd: consonant-initial suffixes

Consonant-initial suffix: /-ka/ ‘leg’

**AFTER C**

[ʔiːkómx̩ksikawə]

ii\ik→{√omahk–ka–Ø}–Ø–wa

IC\DEG→{√big–leg–V}–IND–3

‘he has big feet’

**AFTER V**

[ʔamokápiˈstaːt]

{amo–ka–p/ist–aa}–t–Ø

{gather–leg–tie/v–V}–2SG.IMP–CMD

‘hobble!’
Within the PWd: consonant-initial and vowel-initial suffixes

Suffix alternations, modulo coalescence

<table>
<thead>
<tr>
<th>AFTER C</th>
<th>AFTER V</th>
<th>UR</th>
<th>GLOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[−ip]</td>
<td>∼</td>
<td>[−ip]</td>
</tr>
<tr>
<td>b.</td>
<td>[−ip]</td>
<td>∼</td>
<td>[−p]</td>
</tr>
<tr>
<td></td>
<td>[−ika]</td>
<td>∼</td>
<td>[−ka]</td>
</tr>
<tr>
<td>c.</td>
<td>*[-p]</td>
<td>~</td>
<td>*[-p]</td>
</tr>
</tbody>
</table>

(Casali 1996; Itô 1989)
Within the PWd: analysis of syllable structure

**Optimality Theory analysis**

**Ons**  Every syllable has an onset.

**Max**  Every element in the input has a correspondent in the output.

**Dep**  Every element in the output has a correspondent in the input.

* **Diph**  Diphthongs are prohibited.

**Unif**  No element of the output has multiple correspondents in the input.

* **V**  Long vowels are prohibited.

(McCarthy and Prince 1993, 1994; Prince and Smolensky 1993)
**Within the PWd: analysis of syllable structure**

‘bring her out!’

<table>
<thead>
<tr>
<th>/sa-mpiːs/</th>
<th>ONS</th>
<th>MAX</th>
<th>DEP</th>
<th>*DIPH</th>
<th>UNIF</th>
<th>*V:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sa.i.píːs</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. sa.píːs</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. sa.ji.píːs</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. sai.píːs</td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. seː.píːs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>f. se.e.píːs</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

NB: a coalesced vowel is syllabified as a single nucleus  
(Elfner 2006; Weber 2020)
Syllable structure: epenthesis avoids illicit clusters

‘corner’

\[ /\text{koʔki}/ \]

<table>
<thead>
<tr>
<th></th>
<th>CODACond</th>
<th>Max</th>
<th>Dep</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. koʔ.\text{ki}</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. koʔ.\text{i.\text{ki}}</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. ko.\text{ki}</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

‘use that pole!zioni’

\[ /\text{aːk-pist-aː-t}/ \]

<table>
<thead>
<tr>
<th></th>
<th>CODACond</th>
<th>Max</th>
<th>Dep</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ʔak.pi.\text{ștaː.t}</td>
<td>! *</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. ʔak.pi.\text{ștaː.t}</td>
<td>!</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>c. ʔaː.pi.\text{ștaː.t}</td>
<td>!</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

(Itô 1989)
One further correlate of epenthesis

Two types of morphophonemic /i/ and /iː/

Determined by whether a preceding /k/ assibilates to [ks] or not (Frantz 2017)

**Assibilation**

[sokˈsɪʃtɒtsɪt]

\{√sok–istot/Ø–i}–t–Ø

\{√good–caus/v–V}–2SG.IMP–CMD

‘groom the area!’

**No Assibilation**

[sokɪˈnɪs]

\{√sok–in–:s}–Ø

\{√good–by.hand.v–2SG:3.IMP}–CMD

‘doctor him!’

(/k/ does not assibilate before other vowel qualities)
One further correlate of epenthesis

## Two types of morphophonemic /i/ and /iː/

Determined by whether a preceding /k/ assibilates to [ks] or not (Frantz 2017)

<table>
<thead>
<tr>
<th>Assibilation</th>
<th>No Assibilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[siksɨʔpojiwə]</td>
<td>[sikɨʔtsit]</td>
</tr>
<tr>
<td>{√sik–iʔpo/yi–Ø–wa}</td>
<td>{√sik–i’t–i–t–Ø}</td>
</tr>
<tr>
<td>{√black–speak/V–IND–3}</td>
<td>{√black–by.mind. v–V–2SG.IMP–CMD}</td>
</tr>
<tr>
<td>‘he swore’</td>
<td>‘consider it unclean!’</td>
</tr>
</tbody>
</table>

(/k/ does not assibilate before other vowel qualities)
One further correlate of epenthesis

Epenthetic [i] always causes a preceding /k/ to assibilate

**ASSIBILATION**

[ʔaːksipístaːt]

{√aak–p/ist–aa}–t–Ø

{√wrap–tie/ν–V}–2SG.IMP–CMD

‘use that pole!’

**NO ASSIBILATION**

* [ʔaːkipístaːt]

{√aak–p/ist–aa}–t–Ø

{√wrap–tie/ν–V}–2SG.IMP–CMD

‘use that pole!’
One further correlate of epenthesis

- Reflexes of two different Proto-Algonquian (PA) vowels (Berman 2006)
- Epenthetic [i] is a reflex of PA *connective-i* (Bloomfield 1946)

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Gloss</th>
<th>K-assibilation?</th>
<th>PA Vowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>-istot</td>
<td>‘caus’</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>-i’po</td>
<td>‘speak’</td>
<td>√</td>
</tr>
<tr>
<td>b.</td>
<td>-in</td>
<td>‘by hand’</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>-i’t</td>
<td>‘by mind’</td>
<td>×</td>
</tr>
<tr>
<td>c.</td>
<td>-p ~ -ip</td>
<td>‘tie’</td>
<td>√</td>
</tr>
</tbody>
</table>
Coalescence and epenthesis driven by syllable structure constraints.

Epenthesis occurs between consonants only.

Epenthesis always causes k-assibilation.
At the left edge of the PWd

- Plethora of root alternations, determined by prosodic position (when they occur)
  - One form at the left edge of the PPh
  - One form after a prefix (no difference based on syllable structure)
At the left edge of the PWd

**Left Edge**

[na:mitápi:wḁ]

{√naam–itap/ii}–Ø–wa

{√alone–person/V}–IND–3

‘he is on his own’

**After C**

[ʔâːksamitapi:wḁ]

aak–{√jaam–itap/ii}–Ø–wa

FUT–{√alone–person/V}–IND–3

‘he will be on his own’

**After V**

[ʔaká:jâːmitapi:wḁ]

akaa–{√jaam–itap/ii}–Ø–wa

PRF–{√alone–person/V}–IND–3

‘he is completely on his own’
At the left edge of the PWd

**Left Edge**

[ni:mjá?pi:tsi̥]

{√niimi–a’p/ii}–Ø–istsi

{√messy–have.quality/V}–IND–IN.PL

‘articles which cause a mess’

**After C**

[?â:ksimiçtakiwâ]

aak–{√imi–iht–aki}–Ø–wa

FUT–{√messy–put.v–V}–IND–3

‘she will make a mess’

**After V**

[?i:ké:miçtakiwâ]

ii\akaa–{√imi–iht–aki}–Ø–wa

IC\PRF–{√messy–put.v–V}–IND–3

‘he places his articles in a messy way’
At the left edge of the PWd

**LEFT EDGE**

[nâːnsːkoːs]

{√naan–ssk/o–:s}–Ø

{√own–get/v–2SG:3.IMP}–CMD

‘get something for her!’

**AFTER C**

[?âːksinâːnsːkojiːwáji]

aak–{√naan–ssk/o–yii}–Ø–w=ayi

FUT–{√own–get/v–3SUB}–IND–3=PR X.PL

‘he will pick up something for her’

**AFTER V**

[nita?pɛːnaːnsːkaː]

nit–a’p–a–{√naan–ssk/aa}–(hp)

1–around–IPFV–{√own–get/V}–IND

‘I am going about acquiring gifts’
At the left edge of the PWd

**LEFT EDGE**

> [pʊm:ɔːs]
> {√pomm–o–:s}–Ø
> {√transfer–v–2SG:3.IMP}–CMD

‘transfer (e.g. the medicine bundle) to him!’

**AFTER C**

> [ʔâːksipʊmːojiːwáji̥]
> aak–{√pomm–o–yii}–Ø–w=ayi
> FUT–{√transfer–v–3SUB}–IND–3=OBV.SG

‘he will transfer it to her’

**AFTER V**

> [ʔɛ́ːpʊmːakiwḁ]
> a–{√pomm–Ø–aki}–Ø–wa
> IPFV–{√transfer–v–V}–IND–PRX

‘the one transferring (previous owner)’
## Root alternations conditioned by position within PPh

<table>
<thead>
<tr>
<th>Left edge</th>
<th>After C =</th>
<th>After V</th>
<th>Gloss</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [na:m]</td>
<td>[ja:m]</td>
<td>[ja:m]</td>
<td>‘alone’</td>
<td>glide substitution</td>
</tr>
<tr>
<td></td>
<td>[ma:k]</td>
<td>[ja:k]</td>
<td>‘arrange’</td>
<td></td>
</tr>
<tr>
<td>b. [ni:mi]</td>
<td>[imi]</td>
<td>[imi]</td>
<td>‘messy’</td>
<td>truncation</td>
</tr>
<tr>
<td></td>
<td>[ni:po]</td>
<td>[ipo]</td>
<td>‘upright’</td>
<td></td>
</tr>
<tr>
<td>c. [na:n]</td>
<td>[ina:n]</td>
<td>[ina:n]</td>
<td>‘possess’</td>
<td>epenthesis</td>
</tr>
<tr>
<td></td>
<td>[mɔːxk]</td>
<td>[omɔːxk]</td>
<td>‘red’</td>
<td></td>
</tr>
<tr>
<td>d. [pomː]</td>
<td>[ipomː]</td>
<td>[ipomː]</td>
<td>‘transfer’</td>
<td></td>
</tr>
<tr>
<td>e. [pomː]</td>
<td>[ɔxpomː]</td>
<td>[ɔxpomː]</td>
<td>‘buy’</td>
<td>/ox/-accretion</td>
</tr>
<tr>
<td>f. [kipita]</td>
<td>[ip:ita]</td>
<td>[ip:ita]</td>
<td>‘aged’</td>
<td>epenthesis + gemination</td>
</tr>
</tbody>
</table>
Roots beginning in vowels do not alternate

**LEFT EDGE**

[ʔɨ.tsî.n̓xʷ.toː.t]
\{√itsin–oht–oo\}–t–Ø
\{√among–put.\_\_\_\_\_\_\_v–V\}–2\text{SG.IMP–CMD}
‘place it among the rest!’

**AFTER C**

[ʔâː.ki.tsî.n̓xʷ.toː.m̃a]
aak–\{√itsin–oht–oo\}–m–a
\text{FUT–}\{√among–put.\_\_\_\_\_\_\_\_\_\_v–V\}–\text{IND–3}
‘he will place it among the rest’

**AFTER V**

[ʔéː.tsî.n̓xʷ.toː.má.ji]
a–\{√itsin–oht–oo\}–m–Ø=ayi
\text{IPFV–}\{√among–put.\_\_\_\_\_\_\_\_\_\_v–V\}–\text{IND–3=OBV.SG}
‘he is placing it among the rest’
Some root alternations involve epenthesis

Root alternations, modulo coalescence

<table>
<thead>
<tr>
<th>LEFT EDGE</th>
<th>AFTER PREFIX</th>
<th>UR</th>
<th>GLOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [itsin]</td>
<td>∼ [itsin]</td>
<td>/itsin/</td>
<td>‘among’</td>
</tr>
<tr>
<td>b. [naːn]</td>
<td>∼ ∼ [inaːn]</td>
<td>/naːn/</td>
<td>‘possess’</td>
</tr>
<tr>
<td>[pomː]</td>
<td>∼ ∼ [ipomː]</td>
<td>/pomː/</td>
<td>‘transfer’</td>
</tr>
<tr>
<td>c. *[n]</td>
<td>∼ ∼ *[n]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*[p]</td>
<td>∼ ∼ *[p]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(other allomorphs are lexically listed; Mascaró 2007)
Some root alternations involve epenthesis

An [i] accretion at the left edge of a root always causes /k/-assibilation, just like epenthesis

[ʔâːksipúm:ojo:jáji]  
aak–{√pomm–o–yii}–Ø–w=ayi  
  FUT–{√transfer–v–3SUB}–IND–3=OBV.SG

‘he will transfer it to her’

* [ʔâːkipúm:ojo:jáji]  
aak–{√pomm–o–yii}–Ø–w=ayi  
  FUT–{√transfer–v–3SUB}–IND–3=OBV.SG

‘he will transfer it to her’

(other allomorphs are lexically listed; Mascaró 2007)
Root alternations not conditioned by syllable structure

- An epenthesizing root is shown below.
- Not surprising: same form occurs after C and V

‘the one transferring’

<table>
<thead>
<tr>
<th>/a-pomm-aki-wa/</th>
<th>ONS</th>
<th>Max</th>
<th>Dep</th>
<th>Unif</th>
<th>*V:</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ʔá.pʊm.ma.ki.wাথ</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. ʔɛː.pʊm.ma.ki.wա�</td>
<td></td>
<td></td>
<td>**!</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Well-formed syllable structure without epentheses.
Root alternations avoid natural classes at edges

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

<table>
<thead>
<tr>
<th></th>
<th>p</th>
<th>k</th>
<th>m</th>
<th>n</th>
<th>j</th>
<th>w</th>
<th>iː</th>
<th>oː</th>
<th>ɛː</th>
<th>ɔː</th>
<th>aː</th>
<th>i</th>
<th>o</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left edge</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>After prefix</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

([-cont] [-cons])

(NB: glottal stop and /x/ do not occur at left edge of stem; /s/ and /t/ missing from table)
Left edge constraint triggers epenthesis

**Proposal**

Root alternations and epenthesis occur to satisfy a *#[-cont] constraint at the PWd left edge.

- *#[-cont] Assign a violation mark for every [-cont] segment which is leftmost in the PWd.

**CdCnd, Onset, *#[-cont] >> Max >> Dep >> Unif, *V:, *Cod**
Left edge PWd constraint triggers epenthesis

**After V: *#[-cont] >> Dep**

‘the one transferring’

<table>
<thead>
<tr>
<th>a-{pom:-aki-wa</th>
<th>CdCND</th>
<th>ONS</th>
<th>*#[-cont]</th>
<th>Max</th>
<th>Dep</th>
<th>UNIF</th>
<th>*V:</th>
<th>*Cod</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ?á.{pʊm.ma.ki.wḁ</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ?ɔ́{ɔ́m.ma.ki.wḁ</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. ?ɛ̃[ɛ̃.{pʊm.ma.ki.wḁ</td>
<td></td>
<td></td>
<td>**</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
### Left edge constraint triggers epentheses

**After C: \(*\#{\text{-cont}}\) \gg \text{Dep}**

‘he will transfer it to her’

<table>
<thead>
<tr>
<th></th>
<th>aak{-pom:o-ii-w=ayi</th>
<th>CdCND</th>
<th>ONS</th>
<th>*#{\text{-cont}}</th>
<th>Max</th>
<th>Dep</th>
<th>Unif</th>
<th>V</th>
<th>Cod</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>?â.k{póm.mo.ji:wái.ji</td>
<td>*!</td>
<td></td>
<td>*!</td>
<td>*!</td>
<td>*</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>b</td>
<td>?âː.k{úm.mo.ji:wái.ji</td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>c</td>
<td>?âː.ks[i{póm.mo.ji:wái.ji</td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
**Left edge: epenthesis overgenerates!**

‘transfer to him!’

<table>
<thead>
<tr>
<th>{pom:-o:-s}</th>
<th>CD(\text{ND})</th>
<th>ONS</th>
<th>*[#[-CONT]]</th>
<th>MAX</th>
<th>DEP</th>
<th>UNIF</th>
<th>V</th>
<th>COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. {pʊm.mó:.s}</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. {ʔʊm.mó:.s}</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c. [ʔi.{pʊm.mó:.s}</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Solution: epenthesis of a mora at left edge of PPh must be blocked
Diagnosing the left edge of the vP/VP

- **ANCHOR-L[µ]**: Assign a violation if the leftmost mora in a CP in the input has a correspondent in the output which is not leftmost within a PPh in the output.

**LEFT EDGE: ANCHOR-L[µ] ≥≥ *#[-CONT]**

‘transfer to him!’

<table>
<thead>
<tr>
<th>{pom:-o:s}</th>
<th>Anch-L</th>
<th>CdCnd</th>
<th>Ons</th>
<th>*#[-CONT]</th>
<th>Dep</th>
<th>Unif</th>
<th>*V</th>
<th>*Cod</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. {[pʊ.m.ʊː.s}</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. {[ʔʊ.m.ʊː.s}</td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c. [ʔi.{pʊ.m.ʊː.s}</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td>*</td>
</tr>
</tbody>
</table>
Summary: Evidence for a Prosodic Word (PWd) constituent

- Within PWd: suffix alternations driven by syllable structure.
- PWd left edge: restriction against [-cont] segments (e.g. stops) drives root alternations.
Evidence that syllables span the left edge
Evidence that syllables span the left edge

Evidence of syllables spanning the left edge:

\[\text{ʔɛ́ \[ɛ́ .\{pum.ma.ki.wa} \]

\text{a–{\sqrt{pomm–Ø–aki}–Ø–wa}}

\text{IPFV–{\sqrt{transfer–v–V}–IND–PRX}}

‘the one transferring (previous owner)’

\[\text{ʔâː.} \text{ks}\[i .\{púm.mo.ji:.wá.ji} \]

\text{aak–{\sqrt{pommo–yii}–Ø–w=ayi}}

\text{FUT–{\sqrt{transfer–v–3SUB}–IND–3=OBV.SG}}

‘he will transfer it to her’

**Diagnoses for Syllabification**

1. Vowel length neutralized before codas
   - Diagnostic for codas: preceding vowel is short

2. Onsetless syllables resolved via coalescence or epenthesis
   - Diagnostic for nuclei: a coalesced vowel is syllabified as a single nucleus
   - Onsetless syllables repaired via epenthesis at the left edge of a PPh

3. Codas restricted to /ʔ/, /s/, /x/, geminate
   - Illicit clusters avoided via [i] epenthesis
Evidence that syllables span the left edge

**Proposal**

Syllables and PWds do not exist in the same prosodic hierarchy; there is no need for containment.

- $\text{Al}(\text{PWd}, \sigma)$ The left edge of every PWd aligns with the left edge of a $\sigma$.

$\text{CdCnd, Onset, *#[-cont]} \gg \text{Max} \gg \text{Dep} \gg \text{Unif, Al(PWd,}\sigma), *V:, *Cod$
Evidence that syllables span the left edge: V-V syllabification

**AFTER V: ONSET, *#[-CONT] \(\Rightarrow\) Al(PWd,\(\sigma\))**

‘the one transferring’

<table>
<thead>
<tr>
<th></th>
<th>Cdcnd</th>
<th>ONS</th>
<th>*#[-CONT]</th>
<th>Max</th>
<th>Dep</th>
<th>Unif</th>
<th>Al(PWd,(\sigma))</th>
<th>V:</th>
<th>*Cod</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-{pom.-aki-wa</td>
<td></td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. (\ddot{\text{a}}.{[pum.ma.ki.wa}\</td>
<td></td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (\ddot{\text{e}}.{[\ddot{\text{e}}m.ma.ki.wa}\</td>
<td></td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (\ddot{\text{a}}.{[\ddot{\text{i}}.{pum.ma.ki.wa}\</td>
<td></td>
<td></td>
<td></td>
<td>***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. (\ddot{\text{e}}.{[\ddot{\text{e}}.{pum.ma.ki.wa}\</td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. (\ddot{\text{e}}.{[\ddot{\text{e}}.{pum.ma.ki.wa}\</td>
<td></td>
<td></td>
<td>!</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. (\ddot{\text{e}}.{[\ddot{\text{e}}.{pum.ma.ki.wa}\</td>
<td></td>
<td></td>
<td></td>
<td>***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(also true of underlying V-V sequences)
Evidence that syllables span the left edge: C-V syllabification

**After C: CdCND, *[#-[cont]] &gt; AL(PWd,σ)**

‘he will transfer it to her’

<table>
<thead>
<tr>
<th></th>
<th>CdCND</th>
<th>ONS</th>
<th>*#-[cont]</th>
<th>Max</th>
<th>Dep</th>
<th>UNIF</th>
<th>AL(PWd,σ)</th>
<th>*V:</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ʔâ.k.[pû́m.mo.jiː.wá.jį́]</td>
<td></td>
<td>!</td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ʔâ.k[û́m.mo.jiː.wá.jį́]</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
<td>!</td>
<td>!</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c. ʔâ:ks[i.þú.m.o.jiː.wá.jį́]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>d. ʔâ.k[i.þú.m.o.jiː.wá.jį́]</td>
<td></td>
<td>!</td>
<td></td>
<td>*</td>
<td>*</td>
<td>!</td>
<td>**</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>e. ʔâ.k[i.þú.m.o.jiː.wá.jį́]</td>
<td></td>
<td>!</td>
<td></td>
<td>*</td>
<td>**</td>
<td>!</td>
<td>***</td>
<td>*</td>
<td>**</td>
</tr>
</tbody>
</table>

(also true of underlying C-V sequences)
Arguments against syntax-prosody misalignment for Blackfoot
Arguments against syntax-prosody misalignment

- Is the misalignment of prosodic edges and syllable edges *artificial*?
- Why not overparse the prefix (like Kihehe) or underparse the stem (like IsiXhosa)?

<table>
<thead>
<tr>
<th>‘the one transferring’</th>
<th>AL(PWd,σ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>?ɛ[ɛ.{pum.ma.ki.wà]</td>
<td>✗</td>
</tr>
<tr>
<td>[?ɛ:.{pum.ma.ki.wà]</td>
<td>✓</td>
</tr>
<tr>
<td>?ɛ:.{[pum.ma.ki.wà]</td>
<td>✓</td>
</tr>
</tbody>
</table>

Last puzzle piece: syntax-prosody mismatches (i.e. [ and { may or may not align!)
Anticipating a modified analysis based on exhaustive dominance and correspondence...

- Match constraints require isomorphism between syntactic and prosodic constituents.
- Parallel evaluation of constraints in Optimality Theory

**Syntax-prosody correspondences in Match Theory**

- “syntactic clause” $\leftrightarrow \nu$ (intonational phrase)
- “syntactic phrase” CP $\leftrightarrow \Phi$ (phonological phrase)
- “syntactic word” vP/VP $\leftrightarrow \omega$ (prosodic word)

(Selkirk 2011; Selkirk 2009)
Defining MATCH constraints

- Originally defined in terms of alignment of both edges (Selkirk 2011)
- Redefined based on exhaustive dominance to ignore phonologically null morphemes and traces (Elfner 2012)

**MATCH-PHRASE (to be revised)**
Suppose there is a syntactic phrase (XP) in the syntactic representation that exhaustively dominates a set of one or more terminal nodes A. Assign one violation mark if there is no phonological phrase (\(\Phi\)) in the phonological representation that exhaustively dominates all and only the phonological exponents of the terminal nodes in A.

(Elfner 2012: 28, (19))
Redefining MATCH constraints

XP exh. dom. A = \{x, y, z\}

Exponents of terminal nodes:
- \(x \leftrightarrow /bc/\)
- \(y \leftrightarrow \emptyset\)
- \(z \leftrightarrow /def/\)
- \(w \leftrightarrow /ghi/\)

<table>
<thead>
<tr>
<th>Exponents</th>
<th>MATCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>/{bc-def}-ghi/</td>
<td></td>
</tr>
<tr>
<td>a. {{[bcdef]}ghi</td>
<td></td>
</tr>
<tr>
<td>b. [[a}{bcdef}]ghi</td>
<td>*</td>
</tr>
<tr>
<td>c. {[bcde]}ghi</td>
<td>*</td>
</tr>
<tr>
<td>d. {[bcde]f}ghi</td>
<td>*</td>
</tr>
<tr>
<td>e. {[bcde]g]hi</td>
<td>*</td>
</tr>
</tbody>
</table>
Problems with \textsc{match} constraints

\[
*\text{[-cont]} \Rightarrow \textsc{match}(vP,PWd)
\]
‘the one transferring’

<table>
<thead>
<tr>
<th>a-{pom:-aki-wa</th>
<th>CdCnd</th>
<th>ONS</th>
<th>*[-cont]</th>
<th>\textsc{match}</th>
<th>Max</th>
<th>Dep</th>
<th>Unif</th>
<th>Al(PWd,σ)</th>
<th>*V:</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ?á.{[pom.ma.ki.wḁ</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ?é[é.{pom.ma.ki.wḁ</td>
<td></td>
<td></td>
<td>*</td>
<td>**</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. [?é:.{pom.ma.ki.wḁ</td>
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<tr>
<td>HB e. ?é:.{[pom.ma.ki.wḁ</td>
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<td>*!</td>
<td>**!</td>
<td>!</td>
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</tr>
</tbody>
</table>

Candidates with correct pronunciation violate \textsc{match} (vP) or are harmonically bound (HB).
Problems with MATCH constraints

*#[-cont] \(\Rightarrow\) MATCH(vP,PWd)
‘the one transferring’

<table>
<thead>
<tr>
<th>a-{pom:-aki-wa</th>
<th>CdCND</th>
<th>ONS</th>
<th>*#[-cont]</th>
<th>MATCH</th>
<th>MAX</th>
<th>Dep</th>
<th>UNIF</th>
<th>Al(PWd,σ)</th>
<th>*V:</th>
<th>*COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ʔá.{pum.ma.ki.wاخر</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
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<tr>
<td>b. [ʔá.{pum.ma.ki.wاخر</td>
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<tr>
<td>c. ʔɛ́[ɛ́.{pum.ma.ki.wاخر</td>
<td></td>
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<td>*</td>
<td>**!</td>
<td>*!</td>
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<td>*!</td>
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</tbody>
</table>

Correct pronunciation is HB by a candidate that overparses the PWd without epenthesizing!
Problems with MATCH constraints

TWO PROBLEMS

1. MATCH should penalize overparsing (b), but not epenthesis (c) and (d)
2. MATCH should distinguish overparsing (b, d) from underparsing (e) (Guekguezian 2017)
   - e.g. IsiXhosa vs. KiHehe
Redefining MATCH constraints

Let $S$ be an input syntactic representation and $P$ its corresponding output phonological representation. Suppose there is a syntactic constituent $\alpha$ in $S$ that exhaustively dominates a set of terminal nodes $A \in S$.

- $\text{MAX-SP}(\alpha, \pi)$: Assign a violation mark for every element that (1) is an exponent of a morpheme in $A$ and (2) has a correspondent in $P$ which is not dominated by a $\pi$ corresponding to $\alpha$. (“Don’t underparse.”)

- $\text{DEP-SP}(\alpha, \pi)$: Assign a violation mark for every element that (1) is an exponent of a morpheme that is not in $A$ and (2) (has a correspondent in $P$ which) is dominated by a $\pi$ corresponding to $\alpha$. (“Don’t overparse.”)

(similar to definitions in Downing 1998b; Guekguezian 2017)
Redefining MATCH constraints

α exh. dom. A = {x, y, z}

Exponents of terminal nodes:
- $x \leftrightarrow /bc/$
- $y \leftrightarrow \emptyset$
- $z \leftrightarrow /def/$
- $w \leftrightarrow /ghi/$

<table>
<thead>
<tr>
<th>/{bc-def}-ghi/</th>
<th>MAX-SP</th>
<th>DEP-SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. {[bcdef]}ghi</td>
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<td></td>
</tr>
<tr>
<td>b. {[a}{bcdef]}ghi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. {[bcde]}ghi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. {[bcde]f}ghi</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>e. {[bcde]g]hi</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
**Arguments against syntax-prosody misalignment**

*After V: *#[-cont], Dep-SP ≫ Dep, AL(PWd,σ)*

‘the one transferring’

<table>
<thead>
<tr>
<th></th>
<th>CdCnd</th>
<th>ONS</th>
<th>*#[-cont]</th>
<th>Dep-SP</th>
<th>Max</th>
<th>Dep</th>
<th>Unif</th>
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<th>*COD</th>
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</tr>
<tr>
<td>a. ʔá.{[pum.ma.ki.wã]</td>
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<td>*!</td>
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</table>
Arguments against syntax-prosody misalignment

**After C: *#[-cont] ⊃ Dep, Al(PWd, σ)**

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<tr>
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Arguments against syntax-prosody misalignment

### Left edge: Anch-L $\gg$ *##[-cont]

<table>
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<th>Unif</th>
<th>Al(PWd, σ)</th>
<th>V</th>
<th>Cod</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [[pum.mó:.s</td>
<td></td>
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</tbody>
</table>

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Summary
Summary

1. **Evidence for the Left Edge of a Prosodic Constituent**
   - Edge restriction against [-cont] segments
   - Triggers root alternations, including epenthesis

2. **Evidence that Syllables Span the Left Edge**
   - Prefix-final C is an onset, not a coda
   - Prefix-final V coalesces with following V

3. **Arguments against Syntax-Prosody Misalignment for Blackfoot**
   - Candidate with P-to-σ alignment are not optimal, and do not exhibit epenthesis
   - Match constraints must ignore epenthesis and deletion
Prosodic edges and syllable edges misalign *systematically* in Blackfoot (Algonquian) to maintain syntax-prosody alignment.

```
... .C{V. ...  ... .V{V. ...  P-to-σ align > S-to-P align  IsiXhosa
... [.C{V. ...  ... [.V{V. ...  P-to-σ align > S-to-P align  KiHehe
... .C{[V. ...  ... .V{[V. ...  S-to-P align > P-to-σ align  Blackfoot
```

Expected language type if prosodic and metrical hierarchies are split.
Acknowledgements

◦ Thanks to Beatrice Bullshields, Natalie Creighton, Rod Scout, and others who have shared their language with me and literally made this project possible. Nitsíkohtaahsi’taki!

◦ Thanks especially to Rose-Marie Déchaine, Douglas Pulleyblank, and Gunnar Ólafur Hansson, Andrei Anghelescu, Ella Fund-Reznicek, Taylor Miller, and Hovsep Dolatian for comments and discussion.

◦ Phonology Reading Group at Yale, Jason Shaw, Chelsea Sanker, Roslyn Burns, Sarah Babinski, Mike Stern.

◦ Audience and organizers at ICU LINC Prosody Series and the Spring 2021 “Sensing Syntax” seminar at UBC.
References


Vowel-initial suffixes
Vowel-initial suffixes

[a]-initial suffix -ap- ‘CORD’

**AFTER C**

[ijí:sta\papɪn:iːwḁ]

\{√iyiistap–ap–inn–ii\}–Ø–wa

\{√away–CORD–by.hand.v–3SUB\}–IND–3

‘he adjusted the strand out and away from it’

**AFTER V**

[níts:a\paːpɪn:awḁ]

nit–\{√sa–ap–inn–a\}–Ø–wa

1–\{√out–CORD–by.hand.v–3OBJ\}–IND–3

‘I adjusted the strand out from the inside of it’
Vowel-initial suffixes

[о]-initial suffix -op ‘sit’

**AFTER C**

[nitâːksːapopi:]  
nit–aak–{√sap–op/ii}–(hp)  
1–FUT–{√inside–sit/V}–(IND)

‘I’ll ride in (a vehicle)’

**AFTER V**

[іpkɔsːɔpiwə]

{√ipakkss–op/ii}–Ø–wa  
{√bare–sit/V}–IND–3

‘he’s sitting with nothing on (in the nude)’
Vowel-initial suffixes

* i > [i]-initial suffix -istot ‘CAUS’

**AFTER C**

[sapiʰtʰotʰoːsạ]

{√sap–istot/o–:s}–Ø

{√correct–CAUS/v–2SG:3.IMP}–CMD

‘reach an agreement with him!’

**AFTER V**

[satɛʰtʰotʰoːs]

{√sata–istot/o–:s}–Ø

{√offended–CAUS/v–2SG:3.IMP}–CMD

‘purposely make her angry!’
Vowel-initial suffixes

* e > [i]-initial suffix -i’t ‘by mind’

**AFTER C**

[ɛːsikimiʔtakiwạ]

a–{√/isikim–i’t–aki}–Ø–wa

IPFV–{√/stingy–by.mind.v–V}–IND–3

‘he is feeling miserly’

**AFTER V**

[ɪskɛjʔtakit]

{√/isska’–i’t–aki}–t–Ø

{√/shock–by.mind.v–V}–2SG.IMP–CMD

‘be overwhelmed!’

[ej] is an allophone of [ɛː] before [ʔ] (Derrick and Weber n.d.; Frantz 2017; Weber 2020)
## Underlying Short Vowels within the Stem

<table>
<thead>
<tr>
<th>V =</th>
<th>a</th>
<th>o</th>
<th>i (&lt; *i)</th>
<th>i (&lt; *e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>After C</td>
<td>a</td>
<td>o</td>
<td>i</td>
<td>i</td>
</tr>
<tr>
<td>a+V</td>
<td>aː</td>
<td>ɔː</td>
<td>ɛː</td>
<td>ɛː</td>
</tr>
<tr>
<td>i+V</td>
<td>ja/a</td>
<td>jo/o</td>
<td>iː</td>
<td>iː</td>
</tr>
<tr>
<td>o+V</td>
<td>aː/a</td>
<td>oː</td>
<td>oi</td>
<td>oi</td>
</tr>
</tbody>
</table>

(Elfner 2006; Weber 2020)
Consonant-initial suffixes

[p]-initial suffix -p ‘tie’

**AFTER C**

[nitâːksoxʷksipiʃta]

nit–aak–{√yoohk–p/ist–aa}–(hp)  
1–FUT–{√lid–tie/v–V}–(IND)

‘I will close the tipi flap’

**AFTER V**

[aːwápiʃta:t]

{√aawa–p/ist–aa}–t–Ø  
{√move–tie/v–V}–2SG.IMP–CMD

‘make a cradle swing!’

'I will close the tipi flap'
Root alternations
Roots which begin with a short vowel \{i, o, a\}

**LEFT EDGE**

[ʔi.tsí.nxʷ.toː.t]
\{√itsin–oht–oo\}–t–Ø
\{√among–put.v–V\}–2SG.IMP–CMD
‘place it among the rest!’

**AFTER C**

[ʔâː.ki.tsí.nxʷ.toː.mḁ]
aaka{√itsin–oht–oo}–m–a
FUT–{√among–put.v–V}–IND–3
‘he will place it among the rest’

**AFTER V**

[ʔéi.tsí.nxʷ.toː.má.ji̥]
aa{√itsin–oht–oo}–m–Ø=ayii
IPFV–{√among–put.v–V}–IND–3=OBV.SG
‘he is placing it among the rest’
Roots which begin with a short vowel \{i, o, a\}

**LEFT EDGE**

[ʔo.káː.t]

\{\sqrt{ok–aa}\}–t–Ø

\{\sqrt{snare–V}\}–2SG.IMP–CMD

‘rope!’

**AFTER C**

[ʔâː.ko.kaː.wḁ]

aak–\{\sqrt{ok–aa}\}–Ø–wa

FUT–\{\sqrt{snare–V}\}–IND–3

‘he will rope’

**AFTER V**

[ʔi.kaː]

a–\{\sqrt{ok–aa}\}–Ø–wa

IPFV–\{\sqrt{snare–V}\}–IND–3

‘he is roping’ (BB)
Roots which begin with a short vowel \{i, o, a\}

**Left Edge**

\[\text{ʔa.tsi.ní.ki.t} \]
\[\sqrt{\text{atsinik–i}} – t – \emptyset \]
\[\sqrt{\text{relate.story–V}} – 2\text{SG.IMP–CMD} \]

‘relate a story!’ (BB)

**After C**

\[\text{ʔâː.ki.tsi.ni.ki.wḁ} \]
\[\text{aak} – \sqrt{\text{itsinik–i}} – \emptyset – \text{wa} \]
\[\text{FUT} – \sqrt{\text{tell.story–V}} – \text{IND–3} \]

‘s/he will relate a story’

**After V**

\[\text{ʔɛ́.tsi.ní.ki.wḁ} \]
\[\text{a} – \sqrt{\text{itsinik–i}} – \emptyset – \text{wa} \]
\[\text{IPFV} – \sqrt{\text{tell.story–V}} – \text{IND–3} \]

‘s/he is relating a story’
Roots which begin with a short vowel \{i, o, a\}

**LEFT EDGE**

\[
\[?a.\text{kš.tá.ki.t}\]
\{\sqrt{a}k–st–aki\}–t–\emptyset
\{\sqrt{\text{count–}v–V}\}–2\text{SG.IMP–CMD}
\]

‘read!’ (BB)

**AFTER C**

\[
\[?âː.ko.\text{kš.ta.ki.wâ}\]
\text{aak}–\{\sqrt{\text{ok–st–aki}}\}–\emptyset–\text{wa}
\text{FUT}–\{\sqrt{\text{read–}v–V}\}–\text{IND–3}
\]

‘s/he will read’

**AFTER V**

\[
\[?âː.ko.\text{kš.ta.ki.wâ}\]
\text{a}–\{\sqrt{\text{ok–st–aki}}\}–\emptyset–\text{wa}
\text{IPFV}–\{\sqrt{\text{read–}v–V}\}–\text{IND–3}
\]

‘s/he is reading/counting’
Roots which begin with a short vowel \{i, o, a\}

Root alternations, modulo coalescence

<table>
<thead>
<tr>
<th><strong>LEFT EDGE</strong></th>
<th><strong>AFTER PREFIX</strong></th>
<th><strong>UR</strong></th>
<th><strong>GLOSS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [ʔitsin]</td>
<td>[itsin]</td>
<td>/itsin/</td>
<td>‘among’</td>
</tr>
<tr>
<td>b. [ʔok]</td>
<td>[ok]</td>
<td>/ok/</td>
<td>‘snare’</td>
</tr>
<tr>
<td>c. [ʔatsinik]</td>
<td>[itsinik]</td>
<td>/atsinik, itsinik/</td>
<td>‘relate a story’</td>
</tr>
<tr>
<td>d. [ʔak]</td>
<td>[ok]</td>
<td>/ak, ok/</td>
<td>‘count’</td>
</tr>
<tr>
<td>e. *[ʔaC]</td>
<td>[aC]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(phonologically optimizing allomorphy; Mascaró 2007)
Roots which begin with a long vowel

High long vowels coalesce with preceding vowel

**LEFT EDGE**

\[[iː.tʃ:.ká:.t]\]

\{√iitssk–aa\}–t–Ø

\{√scuffle–V\}–2SG.IMP–CMD

‘fight!’

**AFTER V**

\[[ɛː.so:.ké:.i.tʃ:.ka:.wa]\]

a–isooka–\{√iitssk–aa\}–Ø–wa

IPFV–used.to–\{√scuffle–V\}–IND–3

‘he used to fight’
Roots which begin with a long vowel

Non-high long vowels begin in a long vowel at the left edge and a [w] after a prefix

**LEFT EDGE**

[aː.kxʷ.kí.maː.t]
\{$\sqrt{aak–ohk/im–aa}$–t–Ø
\{$\sqrt{argue–vocalize/v–V}$–2SG.IMP–CMD
‘argue!’

**AFTER V**

[iç.tá.waː.kxʷ.kí.maː.wa]
\{iɪ\oht–a–\{$\sqrt{aak–ohk/im–aa}$–Ø–wa
\{ɪ\c\ins–ɪPFV–\{$\sqrt{argue–vocalize/v–V}$–IND–3
‘he is arguing for that reason’
Roots which begin with a long vowel

- Complementary sets of vowels
- Only long [+high] vowels coalesce
- Only long [-high] vowels have glide epenthesis

<table>
<thead>
<tr>
<th>LEFT EDGE</th>
<th>AFTER V</th>
<th>UR</th>
<th>GLOSS</th>
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<tbody>
<tr>
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<td>[iːtʃ:k]</td>
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<tr>
<td>b. [oːk]</td>
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<td>[oːk]</td>
<td>/oːk/</td>
</tr>
<tr>
<td>c. [aːk]</td>
<td>~ ~</td>
<td>[waːk]</td>
<td>/aːk/</td>
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<td>[wɛːst]</td>
<td>/ɛːst/</td>
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<tr>
<td>e. [ɔːni]</td>
<td>~</td>
<td>[wɔːni]</td>
<td>/ɔːni/</td>
</tr>
</tbody>
</table>
Roots which begin with a glide

Some roots begin in a long vowel at the left edge and a [j] after a prefix

**Left Edge**

\[
\text{[iː.pi.ús.to.tsi.t]}
\]

\{√yiip–istot/Ø–i–t–Ø
\{√decrease–\text{CAUS}/\text{v–V}–2\text{SG.IMP–CMD}

‘decrease the volume of it (e.g. of your load of ironing)’

**After Prefix**

\[
\text{[ni.tá.jiː.pi.ús.to.tsi:ʔ.pḁ]}
\]

nit–a–\{√yiip–istot/Ø–i–hp–a
1–\text{IPFV–}\{√decrease–\text{CAUS}/\text{v–V}–\text{IND–3}

‘I am decreasing the amount’
Roots which begin with a glide

**Root alternations**
- Not a complementary set of vowels
- Not even a natural class of vowels (high and low but not mid)

<table>
<thead>
<tr>
<th>LEFT EDGE</th>
<th>AFTER V</th>
<th>UR</th>
<th>GLOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [iːp]</td>
<td>~ ~</td>
<td>[jiːp] /jiːp/</td>
<td>‘decrease’</td>
</tr>
<tr>
<td>b. [oːm]</td>
<td>~ ~</td>
<td>[joːm] /joːm/</td>
<td>‘husband’</td>
</tr>
<tr>
<td>c. [aːm]</td>
<td>~ ~</td>
<td>[jaːm] /jaːm/</td>
<td>‘twisted’</td>
</tr>
<tr>
<td>d. *[ɛː...]</td>
<td>~ ~</td>
<td>[jɛː...]</td>
<td></td>
</tr>
<tr>
<td>e. *[ɔː...]</td>
<td>~ ~</td>
<td>[jɔː...]</td>
<td></td>
</tr>
</tbody>
</table>
Diagnosing the right edge of the vP/VP
Diagnosing the right edge of the vP/VP

Selected suffixes within the independent clause type.
- Central agreement suffixes (AGR) occur between $I^0$ and $C^0$
- Segments in parentheses occur in some phonological environments.

<table>
<thead>
<tr>
<th>...$V^0$</th>
<th>$-I^0$</th>
<th>$-AGR$</th>
<th>$-C^0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-aa ‘3OBJ’</td>
<td>$\emptyset$</td>
<td>-(i)nnaan ‘1PL’</td>
<td>-(w)a ‘3’</td>
</tr>
<tr>
<td>-ok ‘INV’</td>
<td>-hp</td>
<td>-0aa ‘PL’</td>
<td>-(y)ini ‘3SG.OBV’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-(y)i ‘3PL’</td>
</tr>
</tbody>
</table>
Diagnosing the right edge of the vP/VP

**After C**

[nitsikákomɪm:mmːaːnɨ] kitániksi

nit–ik–{√akom–imm–ok}–Ø–nnaan–i k–itan–iksi


‘Your daughters love us.’ (Frantz 2009: 56, (i))

**After V**

[nitsikákomɪmaːnɨ] kitániksi


‘We (excl.) love your daughters.’ (Frantz 2009: 53, (g))
Diagnosing the right edge of the vP/VP

**AFTER C**

[kitsikákəmːokoaːj工业园区 kitsániksí]

kit–ik–{√akom–imm–ok}–Ø–oaa–yi

k–itan–iksi


‘Your daughters love you (pl.).’

(Frantz 2009: 56, (j))

**AFTER V**

[kitsikákəmːawaːj工业园区 nitániksí]

kit–ik–{√akom–imm–aa}–Ø–waa–yi

k–itan–iksi


‘You (pl.) love my daughters.’

(Frantz 2009: 53, (h))
Diagnosing the right edge of the vP/VP

<table>
<thead>
<tr>
<th>After C</th>
<th>After V</th>
<th>UR</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-ɪnːaːn]</td>
<td>~</td>
<td>[-nːaːn]</td>
<td>/-nːaːn/</td>
</tr>
<tr>
<td>[-oaː]</td>
<td>~</td>
<td>[-waː]</td>
<td>/-waː/</td>
</tr>
</tbody>
</table>

**NO ASSIBILATION**

- No assibilation before epenthetic [i]
- Assibilation blocked across right edge of stem
Additional evidence for the Phonological Phrase

- Right edge: extra consonant slot allowed (Weber 2017)
- Minimal size: CVCC, CVVC
- Domain of obligatory stress (Weber 2016, 2020)
- Domain of *[ti] (Weber 2020)
- Domain of syllable structure and phonotactic generalizations (Weber 2017, 2020)
- Domain of vowel coalescence (Bliss 2013) and syllable-driven epenthesis (present work)
Domain of primary stress

Domain of stress assignment = PPh, not PWd

**STRESS ON PREFIXES**

\[
\text{[ i.\underline{ksim}.?\textbullet:.ta.ja ]}_{\text{PPh}}
\]

√iksim–{√sst–aa}–Ø–yi=aawa

√secret–{√wish–V}–IND–3PL=PRX.PL

‘they thought’

**STRESS ON PREFIXES**

\[
\text{[ i.ta.\underline{ní}.\textbullet:tsi.ksim.?\textbullet:.ta.ja ]}_{\text{PPh}}
\]

it–anist–√iksim–{√sst–aa}–Ø–yi=aawa

then–manner–√secret–{√wish–V}–IND–3PL=PL

‘they decided thus’