Phase-based Constraints within Match Theory

Natalie Weber
Yale University

1 Introduction

Research on prosodic phonology over the past 40 years has shown that prosodic structure is closely related to syntactic structure, but may mismatch in ways that are phonologically optimizing (cf. Downing, 1999; Inkelas, 1990; Ladd, 2008; Nespor & Vogel, 2007; Selkirk, 1986, 2011; Truckenbrodt, 1999). One aspect of this research concerns the syntactic constituents which are relevant for prosodic structure. In general, lexical heads (X^0 in X-bar theory; Jackendoff 1977) correspond by default to prosodic words, and maximal projections (XP) correspond to phonological phrases. However, there are phonological and syntactic reasons to extend theories of phrasal correspondences "below the word". In terms of phonology, many languages have phonological domains which correspond to morphological units smaller than the inflected word. Because of this, many theories of the syntax-phonology interface allow correspondences between morphological constituents like the stem and morphophonological constituents like the Prosodic Stem (e.g. Downing, 1999; Inkelas, 1990; McCarthy & Prince, 1993a; Nespor & Vogel, 2007). In terms of syntax, Bare Phrase Structure (Chomsky, 1995) erases any distinction between X^0 and XP. Because of this, recent constructionist theories argue that complex words are constructed using the same syntactic principles which underlie phrases (Borer, 2013; Halle & Marantz, 1993; Marantz, 1997; Starke, 2009).

These developments in phonology and syntax raise the possibility that phrasal *and* word-internal prosodic constituents could be defined by correspondence to phrasal syntactic constituents, without relying on language-specific morphological definitions. This paper takes this idea seriously by analyzing the prosodic and syntactic structure of the verbal complex in Blackfoot (Algonquian; Frantz 2017), a polysynthetic, strongly head-marking language. I show that the verbal complex contains two distinct prosodic constituents as well as phrasal syntactic constituents, making Blackfoot an ideal test case for bringing phrasal prosodic phonology "below the word". Match Theory (Selkirk, 2011) is chosen as the framework for syntax-prosody correspondence, because it posits a small number of universal prosodic constituents which correspond to universal syntactic constituents in constrained ways. There is therefore no need to refer to morphological constituents. I argue that the "syntactic word" and the "syntactic phrase" must be redefined in order to account for the phrasal correspondences within the Blackfoot verbal complex. I propose that syntactic *v*P and CP phases (Chomsky, 2001) are the units which correspond by default to prosodic words and phrases, respectively. The result is a unified theory of the prosodic phonology of stems and phrases which is built on universal syntactic definitions.

2 Prosodic structure of the verbal complex

In this section I argue that there are two distinct prosodic constituents within the verbal complex, which I call the Prosodic Word (PWd) and the Phonological Phrase (PPh). I focus the discussion on epenthesis and root alternations, because they provide evidence for the PWd constituent which corresponds to the stem. (For a fuller discussion of Blackfoot phonology and syllable structure, see Elfner 2006; Goad & Shimada 2014; Weber 2020.) The process of epenthesis is interrupted at the left and right edges of the stem, which I take as evidence for a prosodic constituent. The root alternations conspire to avoid stops at the left edge of the stem, which I take as further evidence for this prosodic constituent.

* Thank you to Natalie Creighton, Rod Scout, and especially Beatrice Bullshields, for teaching me and sharing their language. *Nitsiikohtaahsi'taki!* Thanks also to Douglas Pulleyblank, Rose-Marie Déchaine, Andrei Anghelescu, Taylor Miller, Inge Genee, Mizuki Miyashita, Jason Shaw, and the Phonology Reading Group at Yale for helpful comments.

Proceedings of *AMP 2020*

2.1 *Epenthesis within the stem* The evidence for epenthesis comes from two patterns of alternation for stem-internal suffixes. One group of suffixes exhibit an [i] ∼ Ø alternation at the left edge after consonants and vowels, respectively. For example, the suffix /-pist/ 'tie' is [-ipist] after a consonant, (1a), but [-pist] after a vowel, (1b). I have bolded the suffix-initial [-ip] and [-p] sequences below.[1]

(1) a. AFTER C
⟦nitâːksox^{w}ks**ip**istaː⟧
nitáaksoohks**ip**istaa
nit–aak–[√yoohk–**p**ist–aa]–(hp)
1–FUT–[√lid–**tie.*v***–AI]–(IND)
'I will close the tipi flap'

b. AFTER V
⟦ʔamo**p**íˢtaːni⟧
amo**p**ístaani
[[√amo–**p**ist–aa]–n]–i
[[√gather–**tie.*v***–AI]–NMLZ]–IN.SG
'ceremonial bundle'

This is crucially different from suffixes which begin in a vowel after consonants and vowels. For example, the suffix /-ipi/ 'bring' is [-ipi] after a consonant, (2a), but surfaces with an initial diphthong as [-oipi] when it follows an [o]-final root, (2b), where the diphthong [oi] is the output of the underlying /o+i/ sequence.

(2) a. AFTER C
⟦ʔomats**íp**iːs⟧
omats**íp**iisa
[√omat–**ip**iː–s]–Ø
[√start–**bring**.*v*–2:3.IMP]–CMD
'transport him!'

b. AFTER V
⟦ʔamó**íp**iːsaːwa̧⟧
amó**íp**iisaawa
[√amo–**ip**iː–s]–Ø=aawa
[√gather–bring.*v*–2:3.IMP]–CMD=PRX.PL
'gather them!'

There are multiple vowel hiatus resolution strategies in Blackfoot, which means that the suffix [-ipi] 'bring' has other realizations after other vowels. For example, this suffix is realized as [-ɛːp] after an [a], like the root-final [a] in√SA 'out', (3), where [ɛː] is a coalesced vowel that reflects an underlying /a+i/sequence.

(3) AFTER V
⟦sɛː**p**íːs⟧
sa**ip**íís
[√sa–**ip**iː–s]–Ø
[√out–**bring**.*v*–2:3.IMP]–CMD
'bring her out!'

Those alternations are summarized below. Suffixes like 'tie' begin in a vowel after consonants and a consonant after vowels. Abstracting away from vowel coalescence, suffixes like 'bring' begin in a vowel in both environments. I take this as evidence that 'tie' begins in an underlying consonant, while 'bring' begins in a vowel. The [i] ∼ Ø alternation at the left edge of 'tie' can be analyzed as epenthesis between consonants which is driven by principles of syllabification (Itô, 1986).

(4)

	After C		*After V*	*UR*	*Gloss*
a.	[-ipist]	∼	[-pist]	/-pist/	'tie.*v*'
b.	[-ipi]	∼	[-ipi]	/-ipi/	'bring.*v*'

[1] All data is from Frantz & Russell (2017) unless otherwise stated; any examples marked with "(BB)" are from the author's fieldwork with Beatrice Bullshields. For the morphemic analysis of examples, I use the orthography in Frantz (2017) and Frantz & Russell (2017), which maps closely to phonemic or broad phonetic transcription (except that /ʔ/ = <'>, /j/ = <y>, /x/ = <h>, /ɛː/ = <ai>, /ɔː/ = <ao>, and other long sounds are doubled.) IPA transcriptions are based on the orthography and are surrounded by double brackets, ⟦ ⟧. The stem is given in square brackets, [ ]. Abbreviations which are not included in the Leipzig Glossing Rules (Comrie et al., 2015): *o* = object, *s* = subject, AI = animate intransitive, AN = animate, CMD = command clause, CNJ = conjunctive order, DEG = degree marker, DEP = dependent clause, II = inanimate intransitive, IN = inanimate, IND = independent order, INV = inverse, OBV = obviative, PRX = proximate, SHEET = two-dimensional flexible material, TA = transitive animate, TI1 = transitive inanimate (Class 1), TI2 = transitive inanimate (Class 2).

Finally, a morpheme-final /k/ always assibilates to [ks] before the epenthetic vowel [i]. In (1a) 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 (5) and [o] in (6), 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; Weber, 2020). The important point here is that *only* [ks] is allowed before epenthetic [i].

(5) ⟦ʔáka:jóxʷ**k**anın:imą̊⟧
ákaayóóh**k**aninnima
akaa–[√yooh**k**–an–inn–i]–m–a
PRF–[√lid–SHEET–by.hand.*v*–TI1]–IND–3
'he has shut it (as a window)'

(6) ⟦ʔâksoxʷ**k**ójiji:wájį̊⟧
áaksooh**k**óyiyiiwáyi
aak–[√yooh**k**–oyi–i–yii]–Ø–w=ayi
FUT–[√lid–mouth–*v*–3*s*]–IND–3=OBV.SG
'she will cover it with a lid'

To summarize the properties of epenthesis: epenthetic [i] occurs between consonants only and always causes assibilation of a preceding /k/ to [ks]. In the next section I show how this process of assibilation is blocked across the right edge of the stem, which I take as evidence for a prosodic boundary.

2.2 *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 suffix [-ın:a:n] ∼ [-n:a:n] '1PL' begins with a vowel after a consonant, (7), and a consonant after a vowel, (8).

(7) AFTER C
⟦nitsikákomım:ok**ın**:a:nį̊⟧
nitsikákomimmok**inn**aani
nit–ik–[√akom–imm–ok]–Ø–**inn**aan–i
1–DEG–[√favor–by.mind.*v*–INV]–IND–1PL–3PL
'They love us (excl.).' (Frantz, 2017:61, (i))

(8) AFTER V
⟦nitsikákomım:ʌ**n**:a:nį̊⟧
nitsikákomimma**nn**aani
nit–ik–[√akom–imm–aa]–Ø–**nn**aan–i
1–DEG–[√favor–by.mind.*v*–3*o*]–IND–1PL–3PL
'We (excl.) love them.' (Frantz, 2017:57, (g))

The suffix [-oa:] ∼ [-wa:] 'PL' begins with a vowel after a consonant, (9), and a glide after a vowel, (10).

(9) AFTER C
⟦kitsikákomım:ok**oa**:jį̊⟧
kitsikákomimmok**oaa**yi.
kit–ik–[√akom–imm–ok]–Ø–**oaa**–yi
2–DEG–[√favor–by.mind.TA–INV]–IND–PL–3PL
'They love you (pl.).' (Frantz, 2017:61, (j))

(10) AFTER V
⟦kitsikákomım:a**wa**:jį̊⟧
kitsikákomimma**waa**yi.
kit–ik–[√akom–imm–aa]–Ø–**waa**–yi
2–DEG–[√favor–by.mind.TA–3*o*]–IND–PL–3PL
'You (pl.) love them.' (Frantz, 2017:57, (h))

In other words, both suffixes begin with a vowel after a consonant, and a consonant after a vowel. Only the '1PL' suffix exhibits alternations compatible with epenthesis, because the vowel-initial realization is formed by adding an extra vowel [ɪ] to the left edge of the morpheme. (Note that vowels are predictably lax before geminates.) In contrast, the 'PL' suffix shows a pattern of [w]-vocalization after consonants.[2] However, epenthesis does not cause the stem-final /k/ to assibilate to [ks]. I take this as evidence for a prosodic boundary at the right edge of the stem which blocks assibilation.

(11)

	After C		*After V*	*UR*	*Gloss*
a.	[-in:a:n]	∼	[-n:a:n]	/in:a:n/	'1PL'
b.	[-oa:]	∼	[-wa:]	/oa:/	'PL'

In the next section I show how epenthesis occurs after consonants *and* vowels at the left edge of stems which begin in plosives. This unusual epenthesis and other root alternations can be explained by a restriction against stops at the left edge of the stem, which I take as evidence for a prosodic boundary.

[2] Another possibly is that both suffixes begin with an underlying vowel which deletes after another vowel, assuming that there is a glide [w] between the two vowels of the plural suffix. More research is needed to determine whether other suffixes also exhibit deletion. If so, then there is no strong evidence for a prosodic boundary at the right edge of the stem.

2.3 *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 exhibit epenthesis 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, (12), but [ip] after any prefix. After a consonant, the evidence is that there is an extra vowel [i] between the two consonants which causes assibilation of a preceding /k/, (13a). After a vowel, the evidence is that the vowel length and quality changes exactly as it would if an underlying /i/ followed. In (13b) the prefix /a-/ 'IPFV' surfaces as [ɛː] before $\sqrt{\text{POMM}}$, as if from an /a+i/ sequence. Note that this alternation is not driven by syllable structure, since the form *[ʔápʊm:akiwa̧] without epenthesis is perfectly well-formed.

(12) LEFT EDGE
⟦**p**ʊm:ó:s⟧
pommóós
[$\sqrt$**p**omm–o–:s]–Ø
[$\sqrt$transfer–*v*–2:3.IMP]–CMD
'transfer (e.g. the medicine bundle) to him!'

(13) a. AFTER C
⟦ʔâ:ks**ip**ʊ́m:oji:wájį̨⟧
áaks**ip**ómmoyiiwáyi
aak–[$\sqrt$**p**omm–o–yii]–Ø–w=ayi
FUT–[$\sqrt$transfer–*v*–3*s*]–IND–3=OBV.SG
'he will transfer it to her'

b. AFTER V
⟦ʔɛ́:**p**ʊm:akiwa̧⟧
á**íp**ommakiwa
a–[$\sqrt$**p**omm–Ø–aki]–Ø–wa
IPFV–[$\sqrt$transfer–*v*–AI]–IND–PRX
'the one transferring (previous owner)'

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. Weber (2020) considers a range of diverse alternations, shown in (14). For example, after a prefix roots may exhibit *epenthesis*, (a)–(b), an [ox] *accretion*, (c), *deletion* (d), or *glide substitution*, (e). However, the distribution of forms at the left edge vs. after a prefix is uniform.

(14)

	LEFT EDGE	AFTER C	AFTER V	GLOSS
a.	[pom:]	[**i**pom:]	[**i**pom:]	'transfer'
	[kipita]	[**i**p:ita]	[**i**p:ita]	'aged'
b.	[pom:]	[**ox**pom:]	[**ox**pom:]	'buy'
c.	[i:p]	[**j**i:p]	[**j**i:p]	'decrease'
d.	[**m**a:n]	[an]	[an]	'recent'
	[**n**i:po]	[ipo]	[ipo]	'upright'
e.	[**m**a:k]	[**j**a:k]	[**j**a:k]	'arrange'
	[**n**a:m]	[**j**a:m]	[**j**a:m]	'alone'

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:	ɛ:	ɔ:	a:	i	o	a
Left edge	✓	✓	✓	✓	✘	✘	✓	✓	✓	✓	✓	✓	✓	✓
After prefix	✘	✘	✘	✘	✓	✓	✓	✓	✘	✘	✘	✓	✓	✓

All three facts can be explained if there is a prosodic boundary at the left edge of the stem with an edge restriction against [-cont] segments. 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.

2.4 *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 (15). The PWd domain is motivated by the distinct phonotactic restrictions on either edge. The left edge prohibits [-cont] segments, and the right edge prohibits [ks], even before an epenthetic vowel.

(15) PROSODY OF THE VERBAL COMPLEX
{person–prefix*– (STEM)$_{\text{PWd}}$ –suffixes}$_{\text{PPh}}$

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. The left edge of this constituent prohibits glides (as shown in Table 1). This constituent is also well-established as the domain of vowel coalescence and /t/-assibilation (Bliss, 2013; Weber, 2020), and Weber (2020) also establishes PPh as the domain with minimal size constraints, obligatory stress, and an extra consonant slot at the right edge. 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).

Now that I have established the existence of two distinct prosodic constituents within the verbal complex, in the next section I turn to a discussion of the internal syntax of the stem and verbal complex. I argue that the stem and verbal complex are both derived via phrasal syntax.

3 Syntactic structure of the verbal complex

In this section I argue that the stem and the verbal complex are phrasal syntactic constituents. Specifically, the stem is a *v*P/VP phrase and the verbal complex is a CP phrase.

3.1 *The stem is a vP/VP phrase* I focus on two arguments that the stem itself is phrasal. First, the stem contains suffixes instantiating the heads V^0 and *v*^{0}, indicating that the stem contains VP and *v*P phrasal projections. Second, the stem-internal $\sqrt{\text{ROOT}}$ is a phrasal adjunct which freely modifies verbs or nouns. Both of these facts indicate that the stem is derived via phrasal syntactic operations.

The smallest intransitive verb stems consist of an a-categorical $\sqrt{\text{ROOT}}$ and a verbal suffix. The suffix (bolded below) occurs only in intransitive stems and agrees with the grammatical (in)animacy of the single argument, which is always a DP. In (16) the root $\sqrt{\text{OMAHK}}$ 'big' combines with *-i* if the DP is animate, (16a), or *-o* if the DP is inanimate, (16b). The stem is given in square brackets.

(16) INTRANSITIVE VERBS

a. áakomahks**i**mma
áak–[$\sqrt$omahk–**i**]–mm–a
FUT–[$\sqrt$large–AI]–IND–3
's/he will be older, large'

b. áakomahk**o**wa
áak–[$\sqrt$omahk–**o**]–Ø–wa
FUT–[$\sqrt$large–II]–IND–3
'it will be big' (BB)

The smallest transitive verbs consist of an a-categorical $\sqrt{\text{ROOT}}$ and two verbal suffixes. The first suffix occurs only in transitive stems, while the second suffix (bolded below) agrees with the (in)definiteness and grammatical (in)animacy of the internal argument. In (17) the root $\sqrt{\text{SSP}}$ 'high' combines with the transitive suffix *-inn* 'by hand'. The second suffix is *-ii*[3] if the internal argument is a DP and animate, (17a), *-i* if it is a DP and inanimate, (17b), and *-aki* if it is not a full DP, regardless of animacy.

[3] This suffix takes different forms depending on the person features of both arguments. For certain configurations of subject and object the suffix agrees with one of the two arguments, while for others the suffix is simply *-ok* 'inverse'. This type of direct/inverse agreement system occurs across the Algonquian family (Oxford, 2014).

(17) Transitive verbs

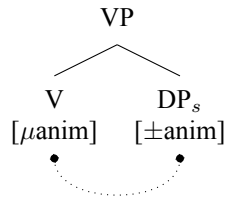
a. isspínn**ii** ámo pookáá
[√ssp–inn–**ii**]–Ø–wa amo pookaa
[√high–by.hand.*v*–3***s***]–IND–3 DEM child.AN
'he lifted that child' (BB)

b. isspínn**i**ma ámo sináákia'tsis
[√ssp–inn–**i**]–m–a amo [√sin–a–aki]–a'tsis
[√high–by.hand.*v*–TI1]–IND–3 DEM [√mark–*v*–AI]–INS.IN
'he lifted that book' (BB)

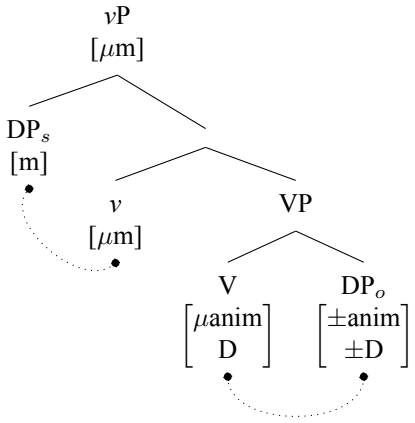
c. isspínn**aki** (pookáíks / sináákia'tsiists)
[√ssp–inn–**aki**]–Ø–wa pookaa–iksi / [[√sin–a–aki]–a'tsis]–istsi
[√high–by.hand.*v*–AI]–IND–3 child–AN.PL / [[√mark–*v*–AI]–INS]–IN.PL
'he lifted (s.t./s.o.)' (BB)

Based on derivational paradigms like those above, Déchaine & Weber (2018) and Weber (2020) argue that the verbal suffixes instantiate verbal heads in the standard argument structures shown in (18). In this way there is a one-to-one mapping between the morphology and syntax of the verb stem. The restrictions on DP features discussed above are analyzed as the result of an Agree operation, where a head probes for a matching feature (Chomsky, 2000). Intransitive verbs contain a V^0 which is instantiated by the single suffix in intransitive verbs, and which selects one DP_s, (18b). This V^0 enters the derivation with an unvalued [μanim] feature enters a syntactic Agree relation with the local DP, which values the animacy feature as [+anim] or [-anim]. Transitive verbs contain two heads, big V^0 and little v^0 (Hale & Keyser, 1993; Kratzer, 1996; Marantz, 1997), with V^0 selecting the internal argument, DP_o, and v^0 selecting the external argument, DP_s, (18b). Because the first suffix is restricted to transitive verbs I assume it instantiates v^0, and the second suffix instantiates V^0. The big V^0 in transitive verbs probes for animacy and definiteness (Weber & Matthewson, 2017). Following Kim (2017); Wiltschko & Ritter (2015), the higher v^0 enters the derivation with an unvalued [μm(ental state)] feature and enters a syntactic relation with the external argument.[4]

(18) a. Intransitive verb



b. Transitive verb



For the purposes of this paper, the main takeaway is that the verbalizing suffixes in Blackfoot instantiate individual heads within the phrasal syntax. This shows that the verbal complex is phrasal and contains a VP and *v*P phrase. Further evidence for this claim is that the stem-internal $\sqrt{\text{ROOT}}$ in Blackfoot is a phrasal adjunct to an intransitive VP or transitive *v*P, as in (19).[5]

[4] This syntactic analysis follows Déchaine & Weber (2018) and Weber (2020). Other syntactic analyses of Algonquian verb stems agree that the first suffix after the $\sqrt{\text{ROOT}}$ is a light verbal head, but differ in how the $\sqrt{\text{ROOT}}$ and the second suffix in transitive verbs are syntacticized (Hirose, 2000; Brittain, 2003; Quinn, 2006; Branigan et al., 2005).

[5] Déchaine & Weber (2018) argues that a $\sqrt{\text{ROOT}}$ in Blackfoot and Plains Cree may syntacticize in one of three ways: as XP-adjuncts, as X^0-adjuncts computed online, and as precompiled X^0-adjuncts. Here I focus only on XP-adjoined roots.

(19) Root syntacticization as phrasal adjunct

a. Intransitive: $[_{VP}\sqrt{\text{ROOT}}$ $[_{VP}\ V^0\ DP_s\ ]_{VP}\ ]_{VP}$

b. Transitive: $[_{vP}\sqrt{\text{ROOT}}$ $[_{vP}\ DP_s\ v^0$ $[_{VP}\ V^0\ DP_o\ ]_{VP}]_{vP}\ ]_{vP}$

Phrasal adjuncts have three correlates: (1) no categorical restrictions on their sister, (2) no limit on the number of adjuncts in a phrase, (3) phrasal adjuncts can themselves be phrasal. All three correlates are true for Blackfoot roots. First, the root $\sqrt{\text{OMAHK}}$ 'big' can occur as a modifying prefix to a full verb stem, (20), or noun stem, (21). Second, roots can freely stack, as shown (20), with the order of the prefixes determining scope relations (Bliss, 2013).

(20) Adjunct to verb stem

ómahksiníkkssapiwa
$\sqrt$**omahk**–$\sqrt$inikk–[$\sqrt$ss–api]–Ø–wa
$\sqrt$**big**–$\sqrt$sulking–[$\sqrt$thus–look.AI]–IND–3
'she gave a [big—NW] sulking glance'

(21) Adjunct to noun stem

ómahkomitaa
$\sqrt$**omahk**–omitaa–wa
$\sqrt$**big**–dog–PRX
'big dog'

Third, the adjunct need not be a monomorphemic root; modifying prefixes can themselves be phrasal. In the example below, the modifier for the stem *opii* 'sit' is a multimorphemic phrase (a nominalized verb stem).

(22) Phrasal adjunct to verb stem

áakso'kaanópiiwa
aak–[[$\sqrt$yo'k–aa]–n]–opii]–Ø–wa
FUT–[[$\sqrt$sleep–AI]–NMLZ]–sit.AI]–IND–3
'he will doze (off)'

Adjuncts are usually optional, so it is surprising that the roots I analyze as *v*P/VP adjuncts are obligatory. As I showed above, the verbal heads contribute grammatical information (e.g. valency, and agreement with DP arguments) but they contribute very little, if anything, in terms of lexical/concrete meaning. Perhaps adjoined roots are obligatory because the verbal heads are so 'light' that event modifiers are required to restrict their denotation.[6] On this view, some languages restrict light verbs via nominal complements (e.g. English *take a seat*, *do the dishes*), while other languages restrict them via adverbial modifiers (e.g. Blackfoot).

3.2 *The verbal complex is a CP phrase* In this section I argue that the verbal complex itself is a minimal CP. First I argue that the verbal complex contains a C^0 merged with an IP complement, $[_{CP}\ C^0\ [_{IP}\ I^0\ \dots\ ]_{IP}\ ]_{CP}$. Then I argue that the verbal complex has the distribution of a CP.

There are five morphological clause types in Blackfoot, which are each associated with a distinct set of clause-typing suffixes. Following Déchaine & Wiltschko (2010) and Ritter & Wiltschko (2014), I assume that these suffixes instantiate I^0. Two of the five morphological clause types are shown below (independent and imperative), with the clause-typing suffix bolded.

(23) Independent

$[_{CP}$Kitsówatoo**'p**oaa<u>wa</u> $]_{CP}$
kit–[io–wat–oo]–**'p**–oaa–<u>wa</u>
2–[eat–*v*–TI2]–IND–2PL–<u>3</u>
'You all ate it.'

(24) Imperative

$[_{CP}$Oowátoo**k** $]_{CP}$
[oo–wat–oo]–**k**–<u>Ø</u>
[eat–*v*–TI2]–2PL.IMP–<u>IMP</u>
'(you all) eat it!'

There is also a suffix in the verbal complex (underlined above) which Weber (2020) argues instantiates C^0. The evidence is that there are dependencies between the C^0 and its complement IP, such that C^0 selects the finiteness of the complement IP phrase. This is similar to the relationship between complementizers and

[6] A semantic argument for why verbal heads are bound is also pursued in Déchaine & Weber (2015) for Blackfoot and Plains Cree and in Slavin (2012) for Oji-Cree. In contrast, Déchaine & Weber (2018) takes the view that this is a morphosyntactic requirement.

(in)finite clauses in English, such as how *that* occurs with tensed clauses and *for* occurs with infinitive clauses. In Blackfoot, the relevant finiteness distinction is realis/irrealis rather than tense (Déchaine & Wiltschko, 2010), which has semantic and morphological correlates; namely, person proclitics are only allowed in [+REALIS] clauses. Thus, the independent clause in (23) is [+REALIS] while the imperative clause in (24) is [-REALIS]. Weber (2020) considers the full range of C^0 heads, and argues that some types of C^0 require a [+REALIS] IP complement, some require a [-REALIS] IP complement, and some are neutral to the realis/irrealis distinction. The generalizations are given in Table 2.

Table 2: Dependencies between C^0 and IP features

C^0	Features of the IP	Clause types
-wa '3', *-yini* '3SG.OBV', *-yi* '3PL'	[+REALIS]	independent
-wa '3'	[+REALIS]	independent (non-assertive)
-Ø '3', *-yini* '3SG.OBV', *-yi* '3PL'	[+REALIS]	unreal
-i 'DEP'	*neutral*	conjunctive, subjunctive
-Ø 'IMP'	[-REALIS]	imperative

The entire verbal complex has the distribution of a CP: some clauses only occur in matrix clauses, some only occur in embedded contexts, and some are neutral with respect to embedding. For example, the C^0 head *-i* shown in (25) only occurs in embedded clauses, while the C^0 heads in (23) and (24) occur in matrix clauses.

(25) CONJUNCTIVE

$[_{CP}$Nítssksinii'pa	$[_{CP}$kitsówatoo**hs**oaayi	$]_{CP}]_{CP}$
Nit–[ssk–in/Ø–i]–'p–a	kit–[io–wat–oo]–**hs**–oaa–yi	
1–[return–by.sight/*v*–TI1]–IND–3	2–[eat–*v*–TI2]–CNJ–2PL–DEP	

'I know you ate it.' (Frantz 2017:123, (f); re-glossed)

The generalizations for the full range of C^0 heads are given in Table 3.

Table 3: Dependencies between C^0 and embeddedness

C^0	Matrix/embedded?	Clause types
-wa '3', *-yini* '3SG.OBV', *-yi* '3PL'	matrix	independent
-wa '3'	matrix	independent (non-assertive)
-Ø '3', *-yini* '3SG.OBV', *-yi* '3PL'	*neutral*	unreal
-i 'DEP'	embedded	conjunctive, subjunctive
-Ø 'IMP'	matrix	imperative

I conclude that the stem and the verbal complex are both syntactic phrases. Since they are phrasal, phrasal theories of the syntax-phonology correspondence should apply. In the next section I turn to a discussion of Match Theory and argue that the syntactic constituents must be better defined.

4 Problems for Match Theory

Match Theory (Selkirk, 2011) derives the correspondence of syntactic and prosodic constituents via a set of ranked and violable MATCH constraints, represented informally in (26), within an Optimality Theory (OT) framework (McCarthy & Prince, 1993a,b; Prince & Smolensky, 1993).

(26) SYNTAX-PROSODY CORRESPONDENCES IN MATCH THEORY

"syntactic word"	⟷	ω	(prosodic word, PWd)
"syntactic phrase"	⟷	ɸ	(phonological phrase, PPh)
"syntactic clause"	⟷	ι	(intonational phrase, IPh)

There are three components to any theory of syntax-prosody correspondence: (1) identification of the syntactic units or structures which are relevant for prosodic structure, (2) an independent theory of prosodic representation, and (3) a mapping algorithm which equates the two. I take issue with only the first of these, and adopt the tenets of Match Theory for the other two components. In the following sections I argue that the "syntactic word" and the "syntactic phrase" must be redefined more restrictively to account for Blackfoot.

4.1 *Problems at the "word" level* Selkirk (2011) suggests that a Prosodic Word corresponds to a lexical category word in the syntax. Within X-bar theory (Jackendoff, 1977), these are terminal elements, X^0, which are lexical, e.g. N^0, V^0, or A^0. However, in the syntactic analysis given above, where categorization occurs by merging a functional categorizing head, it is clear that a 'lexical category word' must be more rigorously defined for Blackfoot. There are three plausible interpretations: (a) the $\sqrt{\text{ROOT}}$, which contributes the main 'lexical' or 'concrete' meaning to the verb, (b) the V^0 head, which is a syntactic terminal element and which introduces the internal argument, or (c) the entire *v*P/VP. For Blackfoot, only (c) can be correct. Neither the $\sqrt{\text{ROOT}}$ nor the V^0 head have the same prosodic correlates as a verb or noun.[7] For example, the smallest verbs and nouns are either CVCC or CVVC (Weber, 2020), but roots can be much smaller, like CV *sa-* 'out' or VC *on-* 'hurry', and V^0 can be as small as a single vowel. Yet even this requires some interpretation for Blackfoot because the $\sqrt{\text{ROOT}}$ is a phrasal adjuncts which merges *outside* of the *v*P/VP. I posited above that the $\sqrt{\text{ROOT}}$ is required to restrict the denotation of a light verbal *v*P/VP, essentially by providing a semantic predicate. Here I suggest that this constituent is a *v*P/VP *phase* of events, which does not 'close' until the $\sqrt{\text{ROOT}}$ has merged.

If the verbal complex can be reanalyzed as a complex X^0 via head movement (Baker, 1988), then the original definition of a lexical category word could still apply. There are phonological and syntactic reasons this cannot be correct for Blackfoot. Phonologically, it is clear that the verbal complex contains a second, smaller, distinct prosodic constituent. The "word" level is the lowest interface category in Match Theory, which means there is no way to account for the inner prosodic constituent. (This argument was also made in Miller (2018) on the basis of Saulteaux Ojibwe and Kiowa, two other polysynthetic languages.) Syntactically, the V^0 would raise to v^0 if it exists, and then raise into an adjunct position to adjoin with the $\sqrt{\text{ROOT}}$. This is not head movement in the typical sense. I conclude that the *v*P/VP phase of events is the syntactic constituent which corresponds to a Prosodic Word.

4.2 *Problems at the "phrase" level* Match Theory posits that each syntactic maximal projection (XP) corresponds by default to a Phonological Phrase. As discussed above, the *v*P/VP phase and the CP each correspond to a distinct prosodic constituent in Blackfoot, and there is no evidence for prosodic constituents at any other boundary. The problem with this is that by definition, not all XPs in Blackfoot correspond to a PPh. The solution is to revise the correspondence relation to refer only to the relevant XPs. Although Selkirk (2011) raises the possibility that only lexical XPs (e.g. NP, AP, VP) are relevant for MatchPhrase, my analysis restricts MatchPhrase even farther. Specifically, I suggest that the CP phase corresponds to a PPh, because this directly reflects the prosodic evidence in Blackfoot.[8]

5 Revision and analysis

The problems discussed above can be avoided by allowing Match constraints to refer directly to phases (Chomsky, 2001). The *v*P/VP phase corresponds to a Prosodic Word (PWd), and the CP phase corresponds to a Phonological Phrase (PPh), as in (27).

(27) a. Phase II: CP $\longleftrightarrow$ PPh/IPh

b. Phase I: *v*P/VP $\longleftrightarrow$ PWd

This revision does not require cyclic spell-out of phases, as in many recent proposals of phase-based pprosodic phrasing (e.g. Dobashi, 2004; Ishihara, 2007; Kahnemuyipour, 2009; Kratzer & Selkirk, 2007; Pak,

[7] Windsor (2017) treats each $\sqrt{\text{ROOT}}$ as a PWd, under the assumption that these elements are categorized adverbs/adjectives. A fuller consideration of the phonological and syntactic properties of $\sqrt{\text{ROOT}}$s shows this is incorrect.

[8] This is perhaps surprising, since research in prosodic phonology shows that the CP or clause corresponds to an Intonational Phrase (IPh) (Ladd, 2008; Nespor & Vogel, 2007; Selkirk, 2011). In fact, none of the evidence in Blackfoot crucially decides between these two analyses. Because the verbal complex is a minimal CP and a minimal utterance, it is at once a PPh and an IPh. Further research is needed to see if these two prosodic constituents are distinct in Blackfoot.

2008; Wagner, 2010). Instead, I follow the assumption in Match Theory that the entire syntactic structure of an utterance (post movement) forms the input to the phonological component of grammar. As in Match Theory, the phonologically optimizing nature of mismatches occurs because the correspondence constraints are evaluated in parallel with other phonological constraints. The analysis I present here conceptualizes MATCH correspondence constraints as purely existential constraints (Itô & Mester, 2019; Weber, 2020).[9] Given a set of syntactic phases, α, and a set of prosodic constituents, π, the following constraints regulate the correspondence relations between α and π. The two constraints in this family which are relevant for us are MATCH(vP→PWd) and MATCH(PWd→vP), which are abbreviated as M(vP) and M(PWd) below.

(28) Given a syntactic representation S and a phonological representation P, such that $S\Re P$,

a. MATCH(α→π): Assign a violation mark for every α phase in S which does not have a correspondent π in P.

b. MATCH(π→α): Assign a violation mark for every π in P which does not have a correspondent α phase in S.

Edge misalignments are regulated by the following constraints which penalize underparsing and overparsing, respectively. (These definitions are similar to constraints in Downing 1998 and Guekguezian 2017.)

(29) Suppose there is a syntactic constituent α in S that exhaustively dominates a set of terminal nodes $A \in S$.

a. MAX-SP(α,π): Assign a violation 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 π corresponding to α.

b. DEP-SP(α,π): Assign a violation 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 π corresponding to α.

I also include the following two markedness constraints on prosodic wellformedness.

(30) EQUALSISTERS (EQSIS)
Sister nodes in prosodic structure are instantiations of the same prosodic category. (Myrberg, 2013)

(31) BINMIN (BIN)
A PPh must consist of at least two prosodic words. (Inkelas & Zec, 1995)

The tableau below shows how these constraints prevent the suffixes from being parsed into a PWd. (The *v*P and CP phases are shown in the input, PPh = { }, and PWd = ( ).) The optimal candidate (a) parses only the *v*P phase into a PWd, violating EQSIS and BIN. Candidate (b) shows that MATCH(Pwd) ≫ EQSIS, BIN. Candidate (c) shows that DEP-SP ≫ EQSIS.

(32)

$[$nit-ik-$[\sqrt{}$akom-imm-ok$]_{vP}$-Ø-innaan-i$]_{CP}$	MAX-SP	DEP-SP	M(vP)	M(PWD)	EQSIS	BIN
☞ a. {nitsik (ákomɪm:ok) ɪn:a:nɨ̥}					*	*
b. {nitsik (ákomɪm:ok) (ɪn:a:nɨ̥)}				*!		
c. {nitsik (ákomɪm:okɪn:a:nɨ̥)}		*!				*

[9] As argued in Itô & Mester (2019), the MATCH constraints as originally formulated (as double edge alignment in Selkirk 2011 and in terms of exhaustive dominance in Elfner 2012) are redundant in the sense that they not only (a) require the *existence* and *correspondence* of particular syntactic and prosodic constituents, but also (b) require an exact match of edges between the two. They suggest that we formally disentangle the two uses of MATCH constraints: MATCH should be redefined to only require the *existence* of particular constituents (which they call MATCH-∃ for clarity), and MATCH constraints regulate the details of exact correspondence. I adopt this idea here as well.

6 Conclusion

In this paper I presented independent arguments for prosodic and syntactic structure inside of the Blackfoot verbal complex. There is evidence that the morphological stem and the entire verbal complex correspond to two distinct prosodic constituents. In terms of the syntax, the stem is a *v*P/VP phrase and the verbal complex is a CP phrase. Because the stem is multimorphemic in Blackfoot, I show that the definition of a lexical category word in the syntax does not straightforwardly apply. I argue that the definitions of the syntactic units which correspond to prosodic constituents must be redefined based on phases and show how a phase-based revision of Match Theory accounts for Blackfoot. The result is a unified theory of the prosodic phonology of stems and phrases which is built on universal syntactic definitions. This means that it should be applicable to all languages.

In the revised theory, a categorized *v*P/VP stem is the syntactic constituent which corresponds to a PWd by default. One implication is that the Prosodic Stem (Downing, 1999; Inkelas, 1990) is another label for the PWd (as posited in McCarthy & Prince 1993a and for some languages in Nespor & Vogel 2007). As a result of this, it is unclear whether another prosodic constituent between the PWd and the PPh, corresponding to the fully inflected stem, is necessary. For Blackfoot specifically, the data in this paper includes only minimal CPs. It remains to be seen what kind of phrasal prosodic constituents exist in CPs with overt DP arguments. For example, Prins (2019) and Windsor (2017) argue that final devoicing is a phrasal phenomenon; future research should investigate further whether this is a property of the PPh or IPh.

Although Match Theory is the theoretical focus of this paper, the evidence from Blackfoot implies that phrasal syntax-prosody correspondences can and should be brought 'below the word' in any theory of prosodic phonology. It is important to search for independent evidence of prosodic and syntactic structure whenever possible, and not to rely on notions like the morphological stem or inflected grammatical word, which are less robustly defined under Bare Phrase Structure (Chomsky, 1995).

References

Armoskaite, Solveiga (2006). Heteromorphemic assibilation of *k* in Blackfoot. Qualifying Paper, UBC.

Baker, Mark C. (1988). *Incorporation: a theory of grammatical function changing*. University of Chicago Press.

Bliss, Heather (2013). *The Blackfoot configurationality conspiracy*. Ph.D. thesis, University of British Columbia.

Borer, Hagit (2013). *Structuring Sense III*, vol. 3. Oxford University Press, Oxford.

Branigan, Phil, Julie Brittain Brittain & Carrie Dyck (2005). Balancing syntax and prosody in the Algonquian verb complex. Wolfart, H.C. (ed.), *Papers of the 36th Algonquian Conference*, University of Manitoba, Winnipeg, 75–93.

Brittain, Julie (2003). A distributed morphology account of the syntax of the Algonquian verb. *CLA Proceedings*, 25–39.

Chomsky, Noam (1995). Bare phrase structure. Campos, Hector & Paula Kempchinsky (eds.), *Evolution and Revolution in Linguistic Theory: Essays in honor of Carlos Otero*, Georgetown University Press, Washington, D.C., 51–109.

Chomsky, Noam (2000). Minimalist inquiries: the framework. Martin, Roger, David Michaels & Juan Uriagereka (eds.), *Step by Step: Essays in Minimalist Syntax in Honor of Howard Lasnik*, MIT Press, Cambridge, MA, 89–155.

Chomsky, Noam (2001). Derivation by phase. Kenstowicz, Michael (ed.), *Ken Hale: A Life in Language*, MIT Press, Cambridge, MA, 1–52.

Comrie, Bernard, Martin Haspelmath & Balthasar Bickel (2015). Leipzig glossing rules: Conventions for interlinear morpheme-by-morpheme glosses. https://www.eva.mpg.de/lingua/resources/glossing-rules.php. Last modified May 31, 2015. Accessed January 23, 2021.

Déchaine, Rose-Marie & Natalie Weber (2015). Head-merge, adjunct-merge, and the syntax of root categorisation. Umbal, Pocholo & Kyeong-min Kim (eds.), *WCCFL 33*, SFUWPL 5, 38–47.

Déchaine, Rose-Marie & Natalie Weber (2018). Root syntax. Macaulay, Monica (ed.), *Papers of the Forty-seventh Algonquian Conference*, MSU Press.

Déchaine, Rose-Marie & Martina Wiltschko (2010). Micro-variation in agreement, clause-typing and finiteness: Comparative evidence from Plains Cree & Blackfoot. Valentine, J. Randolph (ed.), *Proceedings of the 42nd Algonquian Conference*, SUNY Press, vol. 42.

Dobashi, Yoshihito (2004). Multiple spell-out, label-free syntax, and PF-interface. *Explorations in English Linguistics* 19, 1–47.

Downing, Laura J. (1998). On the prosodic misalignment of onsetless syllables. *NLLT* 16, 1–52.

Downing, Laura J (1999). Prosodic stem≠ prosodic word in Bantu. Hall, T Alan & Ursula Kleinhenz (eds.), *Studies on the phonological word*, John Benjamins Publishing, Amsterdam, 73–98.

Elfner, Emily (2006). *The mora in Blackfoot*. Master's thesis, University of Calgary.

Elfner, Emily (2012). *Syntax-prosody interactions in Irish*. Ph.D. thesis, University of Massachusetts Amherst.

Frantz, Donald G. (2017). *Blackfoot grammar*. UToronto Press.

Frantz, Donald G. & Norma Jean Russell (2017). *Blackfoot dictionary of stems, roots, and affixes*. UToronto Press.
Goad, Heather & Akiko Shimada (2014). In some languages, /s/ is a vowel. *AMP 2013 Proceedings*.
Guekguezian, Peter Ara (2017). *Prosodic recursion and syntactic cyclicity inside the word*. Ph.D. thesis, UCSC.
Hale, Kenneth Locke & Samuel Jay Keyser (1993). On argument structure and the lexical expression of syntactic relations. Keyser, Jay & Kenneth Hale (eds.), *The view from building 20: Essays in linguistics in honor of Sylvain Bromberger*, MIT Press, 53–109.
Halle, Morris & Alec Marantz (1993). Distributed Morphology and the pieces of inflection. Keyser, Jay & Kenneth Hale (eds.), *The view from building 20: Essays in linguistics in honor of Sylvain Bromberger*, MIT Press, 111–177.
Hirose, Tomio (2000). *Origins of predicates: evidence from Plains Cree*. Ph.D. thesis, University of British Columbia.
Inkelas, Sharon (1990). *Prosodic constituency in the lexicon*. Garland, New York.
Inkelas, Sharon & Draga Zec (1995). The phonology-syntax interface. Goldsmith, John A (ed.), *The handbook of phonological theory*, Blackwell, Oxford.
Ishihara, Shinichiro (2007). Major phrase, focus intonation, multiple spell-out (MaP, FI, MSO). *The Linguistic Review* 24:2-3, 137–167.
Itô, Junko (1986). *Syllable theory in Prosodic Phonology*. Ph.D. thesis, University of Massachusetts, Amherst.
Itô, Junko & Armin Mester (2019). Match as syntax-prosody MAX/DEP: Prosodic enclisis in english. *English Linguistics* 36:1.
Jackendoff, Ray (1977). *X syntax: A study of phrase structure*. MIT Press, Cambridge, MA.
Kahnemuyipour, Arsalan (2009). *The syntax of sentential stress*. Oxford University Press, Oxford.
Kim, Kyumin (2017). Animacy and transitivity alternations in Blackfoot. Macaulay, Monica & Margaret Noodin (eds.), *Papers of the 47th Algonquian Conference*, MSU Press, East Lansing, MI, 123–140.
Kratzer, Angelika (1996). Severing the external argument from its verb. Rooryck, J. & L.A. Zaring (eds.), *Phrase structure and the lexicon*, Springer, vol. 33 of *Studies in Natural Language and Linguistic Theory*, 109–137.
Kratzer, Angelika & Elisabeth Selkirk (2007). Phase theory and prosodic spellout: The case of verbs. *The Linguistic Review* 24:2–3, 93–135.
Ladd, D Robert (2008). *Intonational phonology*. Cambridge University Press, Cambridge, 2nd edn.
Marantz, Alec (1997). No escape from syntax. *University of Pennsylvania Working Papers in Linguistics* 4:2, 201–225.
McCarthy, John J. & Alan Prince (1993a). Generalized alignment. *Yearbook of morphology* 79–153.
McCarthy, John J. & Alan Prince (1993b). Prosodic morphology I: Constraint interaction and satisfaction. Rutgers Technical Reports TR-3, Rutgers University Center for Cognitive Science.
Miller, Taylor Lampton (2018). *The phonology-syntax interface and polysynthesis: A study of Kiowa and Saulteaux Ojibwe*. Ph.D. thesis, University of Delaware.
Myrberg, Sara (2013). Sisterhood in prosodic branching. *Phonology* 30:1, 73–124.
Nespor, Marina & Irene Vogel (2007). *Prosodic phonology: with a new foreword*. Walter de Gruyters, 2nd edn.
Oxford, Will R. (2014). *Microparameters of agreement: A diachronic perspective on Algonquian verb inflection*. Ph.D. thesis, University of Toronto.
Pak, Majorie (2008). *The postsyntactic derivation and its phonological reflexes*. Ph.D. thesis, University of Pennsylvania.
Prince, Alan & Paul Smolensky (1993). Optimality theory: Constraint interaction in generative grammar. Rutgers Technical Reports TR-2, Rutgers University Center for Cognitive Science.
Prins, Samantha (2019). *Final Vowel Devoicing in Blackfoot*. Master's thesis, University of Montana.
Quinn, Conor (2006). *Referential Access Dependency in Penobscot*. Ph.D. thesis, Harvard University.
Ritter, Elizabeth & Martina Wiltschko (2014). The composition of INFL. *NLLT* 32:4, 1331–1386.
Selkirk, Elisabeth (1986). On derived domains in sentence phonology. *Phonology Yearbook* 3, 371–405.
Selkirk, Elisabeth (2011). The syntax-phonology interface. Goldsmith, John, Jason Riggle & Alan C.L. Yu (eds.), *The handbook of phonological theory*, Blackwell Publishing, 435–484, 2nd edn.
Slavin, Tanya (2012). *The Syntax and Semantics of Stem Composition in Ojicree*. Ph.D. thesis, University of Toronto.
Starke, Michal (2009). Nanosyntax: A short primer to a new approach to language. *Nordlyd* 36:1, 1–6.
Truckenbrodt, Hubert (1999). On the relation between syntactic phrases and phonological phrases. *LI* 30:2, 219–256.
Vogel, Irene (2009). The status of the Clitic Group. Grijzenhout, Janet & Baris Kabak (eds.), *Phonological domains: Universals and deviations*, Mouton de Gruyter, Berlin, 15–46.
Wagner, Michael (2010). Prosody and recursion in coordinate structures and beyond. *NLLT* 28, 183–237.
Weber, Natalie (2020). *Syntax, prosody, and metrical structure in Blackfoot*. Ph.D. thesis, University of British Columbia.
Weber, Natalie & Lisa Matthewson (2017). The semantics of Blackfoot arguments. Macaulay, Monica, Margaret Noodin & J. Randolph Valentine (eds.), *Papers of the Forty-fifth Algonquian Conference*, MSU Press, 213–232.
Wiltschko, Martina & Elizabeth Ritter (2015). Animating the narrow syntax. *The Linguistic Review* 32:4, 869–908.
Windsor, Joseph (2017). Predicting prosodic structure by morphosyntactic category: a case study of Blackfoot. *Glossa* 2.