

THE PHONOLOGY-SYNTAX INTERFACE AND POLYSYNTHESIS
A STUDY OF KIOWA AND SAULTEAUX OJIBWE

by

Taylor Lampton Miller

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Linguistics

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A STUDY OF KIOWA AND SAULTEAUX OJIBWE

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ABSTRACT

This dissertation examines phonology and its interface with morphology and/or syntax. Current models diverge in terms of what phonology may reference in order to delimit domains for phonological processes: primarily phonology (the Phenomenon-Based Approach), a mix of morphology and syntax (Relational Mapping), or syntax only (Syntax-Driven Mapping and the Syntactic Spell-Out Approach). While comparisons exist between some – but not all – approaches, no comparison evaluates the approaches using the same language data (e.g. Selkirk, 2011, Vogel, to appear). The primary contribution of the current work is to fill this gap. To do this, data from two languages are presented as test cases: Kiowa and Saulteaux Ojibwe. Selected because they are traditionally described as polysynthetic, the languages’ extreme levels of morpho-syntactic complexity often blur the lines between words, phrases, and clauses, offering a crucial test for interface approaches.

Through comprehensive phonological analysis of each language, focusing on syllables and larger strings up to full clauses, it is shown that Relational Mapping (c.f. Nespor and Vogel, 1986) is the only approach which successfully accounts for the data in both languages. Relational Mapping assumes a strict separation between morphology and syntax, offering new insight to the ongoing debate regarding the necessity or even existence of a morphological module of grammar (see Bruening, 2018). It is argued that while Relational Mapping is successful, a syntax-only approach is theoretically preferred. Finally, a new theoretical proposal is put forward which accounts for both languages with the same level of success, but which references only syntax. The approach yields new advantages and disadvantages compared to Relational Mapping, which are discussed in detail.

A secondary contribution of the current work is that of language-specific analysis and documentation. In addition to their theoretical value for this line of questioning, each language is endangered. Unless otherwise cited, the language data presented here comes from fieldwork in each language community. Thus, this body of work serves as a major step forward in the documentation of each language - particularly of phonological processes. For Kiowa, the phonology has not been studied closely since the 1980s, and Saulteaux phonology has never been analyzed to this degree.

Chapter 1

INTRODUCTION

1.1 Introduction

Chomsky introduced the concept of "linguistic levels," what we now call grammatical modules, in his Introduction to *Syntactic Structures* (1957). It is generally accepted that Language is modular, with the majority of research in contemporary linguistics taking place within one module or another (phonology, morphology, syntax, semantics, etc.). Over the past few decades, however, research has expanded beyond the confines of single modules instead asking about the interaction between modules. As discussed in Ramchand and Reiss (2007), research developments at the interfaces offer insight into the basic architecture of the human language faculty, often undermining previous assumptions in linguistic theory.

The work in this dissertation examines phonology and its interface with morphology and/or syntax, focusing specifically on the relationship between (morpho-) syntactic structure and phonological domains. Current models diverge in terms of what phonology may reference in order to delimit domains for phonological processes: primarily phonology (the Phenomenon-Based Approach), a mix of morphology and syntax (Relational Mapping), or syntax only (Syntax-Driven Mapping and the Syntactic Spell-Out Approach).¹ There are size-able literatures under each approach, and comparisons have been offered between some – but not all – of them (e.g. Selkirk, 2011,

¹ For examples of work under each approach, see the following references: Phenomenon-Based Approach (Schiering et al. 2007, 2010; Hildebrandt 2007), Relational Mapping (Nespor and Vogel 1986, Vogel, to appear), Syntax-Driven Mapping (Itô and Mester 1999, 2009a,b; Selkirk 2011; Elfner 2012), the Syntactic Spell-Out Approach (Pak 2008; Ko 2008; Sato 2008, 2009, 2012; Samuels 2009, 2010, 2011; McPherson 2014; Ahn 2015)

Vogel, to appear). To date, however, there has been no direct comparison evaluating each approach using the same language data. The primary goal of this dissertation is to fill this gap in the literature.

To do this, data from two languages are presented as test cases: Kiowa and Saulteaux Ojibwe. Selected because they are traditionally described as polysynthetic, the languages' extreme levels of morpho-syntactic complexity often blur the lines between words, phrases, and clauses. This level of complexity offers fertile and, to be argued in the present work, crucial testing ground for approaches to delimiting phonological domains.

Through comprehensive phonological analysis of each language, focusing on syllables and larger strings up to full clauses, it is shown that Relational Mapping (c.f. Nespor and Vogel, 1986) is the only approach which successfully accounts for the data in both languages. Relational Mapping assumes a strict separation between morphology and syntax, offering new insight to the ongoing debate regarding the necessity or even existence of a morphological module of grammar. Building from Chomsky's (1970) Lexicalist Hypothesis, some researchers argue that separate systems are necessary in order to account for the formation of words and phrases (among others, as cited in Bruening (2018), Jackendoff, 1972; Bresnan, 1982; Kiparsky, 1982; Simpson, 1983; Mohanan, 1986; Di Sciullo and Williams, 1987; Bresnan and Mchombo, 1995; Williams, 2007; Newmeyer, 2009; Müller, 2013; Müller and Wechsler, 2014). Others, however, argue words and phrases are formed within the same system: syntax (among others, as cited in Bruening (2018), Sadock, 1980; Baker, 1985; Sproat, 1985; Lieber, 1988, 1992; Hale and Keyser, 1993; ?; Borer, 2005; Bruening, 2014).²

Though a definitive answer to the debate surrounding the necessity of a morphological module is beyond the scope of this dissertation, the present study does argue a syntax-only approach is theoretically preferred over Relational Mapping. A new theoretical proposal is put forward which accounts for both languages with the same level

² For a thorough literature review and discussion, readers are directed to Bruening (2018).

of success, but which references only syntax. The approach yields new advantages and disadvantages compared to Relational Mapping, which are discussed in detail.

A secondary contribution of the current work is that of language-specific analysis and documentation. In addition to their theoretical value for this line of questioning, each language is endangered. Unless otherwise cited, the language data presented here comes from fieldwork in each language community. Thus, this body of work serves as a major step forward in the documentation of each language - particularly of phonological processes. For Kiowa, the phonology has not been studied closely since the 1980s, and Saulteaux phonology has never been analyzed to this degree.

The remainder of this chapter introduces the main components of the dissertation. Section 1.2 overviews the Phonology-Syntax interface as whole, situating the main issue of delimiting phonological domains and their relationship with other modules of grammar. Section 1.3 justifies the decision to examine so-called "polysynthetic" languages, arguing they are crucial test cases for the present theoretical questions. Section 1.4 includes an overview of results in Kiowa and Saulteaux, and Section 1.5 provides an outline of the dissertation.

1.2 The Phonology-Syntax Interface

It is widely acknowledged that phonological processes may be restricted to certain domains, appearing in a particular location or spanning some - but not all - junctures within (morpho-)syntactic structure. For example, Chomsky and Halle (1968) account for phrasal stress in English by referencing the rightmost constituent within a phrase. As seen in (1a), phrasal stress (as marked by an accute accent) falls on ‘Chicágo’ and ‘eléc-tion’ because they are at the right edge of a phrase. Selkirk (1974) accounts for French *liaison* (pronunciation of a final consonant before a vowel) as a process which occurs within a phrase but not across a phrase boundary. As seen in (1b), the [t] of ‘petit’ is only pronounced if followed by a vowel-initial word within the

same phrase. When separated by a phrase boundary, [t] deletes.³

- (1) a. [A sènator [from Chicágo]] [wòn [the làst éléction]]
b. [Le petit_âne] [le suivait] ‘The little donkey followed him.’ *vs.*
[Le petit][aime] [le Guignol] ‘The little ones love the puppet theater.’

The observation that phonology patterns with respect to certain junctures and domains dates back to Panini’s work on word-internal and word-external sandhi phenomena (e.g. Vogel, to appear), and this observation continues to drive linguistic analysis.

Current debate centers on how to derive phonological domains, primarily asking what role the syntax should play. The difference between approaches is typically presented as a competition between two concepts: Direct Reference and Indirect Reference. Simply put, Direct Reference models read phonological domains directly from syntactic structure while Indirect Reference models reference syntactic structure when deriving an independent prosodic structure like the Prosodic Hierarchy due to non-isomorphism between phonology and syntactic structure (see Shwayder (2015) for an overview of the distinction between the two types of approaches).

In addition, current work differs with regard to assumptions regarding the role of syntax in delimiting phonological domains and whether or not there is a strict separation of a morphological and syntactic module of grammar. The four main approaches in current literature are compared in this dissertation: the Phenomenon-Based Approach, Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach.

1.3 Turning to Polysynthesis

Polysynthetic languages (many of which are found in North America) are known for extremely complex verbs expressing rather "lexical" properties like quantification, location, or motion, often leading the verb to convey enough information corresponding to an entire sentence in English (Sapir, 1921; Comrie, 1989; Mithun, 1983; Baker, 1996;

³ The data in (1) may be found in Selkirk (2011:1) in her brief overview of previous literature. For clarity, only brackets indicating phrase boundaries have been included.

Mattissen, 2004, among many others). While several have tried to find a theoretically valuable definition for a class of polysynthetic languages (e.g. Baker, 1996; Fortescue, 1994, 2007; Fortescue et al., 2014; Mithun, 2014), researchers have generally concluded the class of languages may be nothing more than a "feeling" (Mattissen, 2004, Miller, in prep). Discovering a formal definition of polysynthesis does not fall within the scope of this dissertation. Instead, it is proposed that languages traditionally labeled "polysynthetic" (regardless of the controversy surrounding that label) provide crucial testing ground at the phonology-syntax interface because they often exhibit overlapping morpho-syntactic structures at the word, the phrase, and the clause.

To this end, this dissertation draws on data from two such languages in order to test current approaches to the phonology-syntax interface: Kiowa and Saulteaux Ojibwe. There are two main reasons which motivate the selection of Kiowa and Saulteaux Ojibwe as test cases. First, both languages have previously been described as polysynthetic due to extreme levels of morpho-syntactic complexity. Second, the two languages differ typologically (e.g. tone vs. stress, traditional incorporation vs. pre-verbs), offering different perspectives regarding the same issue at the phonology-syntax interface.

1.4 Overview of Findings

The present analysis of Kiowa and Saulteaux expose issues for all of the current phonology-syntax interface models, but Relational Mapping is the most successful overall when predicting and accounting for the phonological patterns in both languages. This suggests that a separate morphological module of grammar may be necessary when mapping from (morpho-)syntactic structure to prosodic structure. It also lends support to an Indirect Reference model over a Direct Reference model.

Though most successful, it is argued that a syntax-only approach is theoretically preferred when delimited phonological domains. Thus, a new proposal is put forward (here called Phase-Based Prosodic Phonology or PPP). PPP is an Indirect Reference model, defining prosodic constituents with different types of phases (morphological and

clause-level) as well as existing prosodic structure (i.e. referencing previously mapped prosodic constituents when mapping others). Though in early stages, and meant to merely build the foundation for a fully formed theory, PPP achieves the same level of success as Relational Mapping in accounting for the language data in Kiowa and Saulteaux. While PPP does not require a separate morphological module thus allowing a more economic architecture of Grammar, referencing prosodic structure in constituent definitions adds complexity in terms of theoretical machinery. Thus, PPP offers marked theoretical advantages over Relational Mapping, but future research must address this "exchange of complexity" or asking whether fewer grammatical modules or simpler definitional criteria is overall more preferred when accounting for phonological domains at the phonology-syntax interface.

1.5 Outline

The remainder of this dissertation is organized as follows. Chapter 2 presents background information on each of the four main approaches to delimiting phonological domains (The Phenomenon-Based Approach, Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach). Chapter 3 introduces the languages which form the case studies in this dissertation, as well as detailing the fieldwork and methodology in both communities.

Chapters 4 and 5 are the Kiowa and Saulteaux analyses respectively. Each analysis examines a set of phonological processes in the language, where they apply, and compares those domains to the theoretical predictions of each model. Chapter 6 summarizes and discusses the results together, focusing primarily on the overall implications of Relational Mapping's success. The end of the chapter includes a (preliminary) proposal outlining Phase-Based Phonology (PPP) which accounts for Kiowa and Saulteaux data without the need for a separate morphological module.

Chapter 2

CURRENT INTERFACE APPROACHES TO DELIMITING PHONOLOGICAL DOMAINS

2.1 Introduction

This chapter gives a brief overview of each of the four main approaches to delimiting phonological domains: the Phenomenon-Based Approach, Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. The following sections introduce the details, assumptions, and predictions of each approach, as well as providing illustrative examples from previous literature. In comparing each approach, the following questions are asked:

- (2) What predictions are made regarding the size and characteristics of phonological domains?
- (3) What are the underlying assumptions of each interface approach?
- (4) What are the broader implications of these assumptions for the grammatical organization of Language?

Question (2) evaluates the model as a linguistic theory, which should be sufficient and predictive (see Chomsky's Levels of Adequacy in his 1965 *Aspects of the Theory of Syntax*). That is, a theory should provide an adequate account for the patterns observed across languages, and it should yield predictions as to what is and is not possible in language. If an approach makes no predictions, it is not testable and is merely descriptive. If an approach makes predictions, it is in those predictions that crucial differences between approaches should become obvious.

Questions (3) and (4) relate to what phonology has access to, and how it references that material, when delimiting phonological domains. If purely morphological

information is required, the architecture of Language must include both morphological and syntactic modules in the grammar. This has implications for grammatical and theoretical complexity. Likewise, Indirect Reference models appeal to an independent prosodic structure which must be defined and constrained independently of syntactic structure. Direct Reference models must make explicit what kind of syntactic structure is expected and may be referenced.

The outline for this chapter is as follows. Section 2.2 introduces the Phenomenon-Based Approach, which gives syntax no role in deriving phonological domains. Sections 2.3 and 2.4 introduce two types of Indirect Reference Theories: Relational Mapping and Syntax-Driven Mapping. Relational Mapping assumes morphology and syntax form separate grammatical modules, while Syntax-Driven Mapping refers only to syntax. Section 2.5 includes an overview of a Direct-Reference approach using Syntactic Spell-Out, which strictly rules out a morphological module. Finally, Section 2.6 concludes with a summary and discussion of the four main approaches together.

2.2 Phenomenon-Based Approach

Syntax is given no role in delimiting phonological domains under the Phenomenon-Based Approach (as referred to in Vogel, to appear). Instead, individual phonological processes drive the procedure. Due to the complexity, number, and clustering of phonological processes, phonological domains in the Phenomenon-Based Approach are argued to be emergent and only used if necessary (e.g. Schiering et al., 2010). Therefore, languages may have as many or as few domains as deemed necessary. Processes are examined and their application domain is determined. After all phonological processes have been accounted for, the researcher then looks back to see if there are overlapping domains/a clustering of processes. Any non-overlapping processes then form their own phonological domain. In most Phenomenon-Based work the particular domain is

selected from the Prosodic Hierarchy¹ and determined according to relevant phonological and/or morpho-syntactic information (e.g. does it reference a stem and affixes or a phrase?). For example, the Kham language is argued to have up to 13 Prosodic Words, while Vietnamese is proposed to forgo the Prosodic Word entirely (e.g. Voll, 2006; Hildebrandt, 2007; Schiering et al., 2007, 2010; Bickel et al., 2009). Referencing pre-defined constituents, however, is not crucially part of the approach.

The majority of work adopting this approach stems from work associated with the AUTOTYP database, a cross-linguistic survey of over 70 languages and their phonological characteristics and domains (Bickel and Nichols, 2001). The same process-driven analysis is adopted – though not overtly acknowledged – in recent work on South Baffin Inuktitut by Arnhold et al. (2016). The authors examine two processes (f0 fall and pausing) which form two domains of different sizes. Based on the type of process and morpho-syntactic information, the authors posit the use of the Phonological Word (f0 fall) and the Intonational Phrase (pausing). They deliberately exclude the Phonological Phrase, pointing to a lack of prosodic evidence, in agreement with Arnhold’s (2014) analysis of West Greenlandic.

2.2.1 Phenomenon-Based Approach: Assumptions and Predictions

Since domains are delimited only by phonology, the Phenomenon-Based Approach makes few assumptions regarding the overall grammatical organization of language. Researchers using the approach reference a mix of morphological and syntactic information, but the separation of the two modules is not a central assumption of the approach. As long as there are properties (phonology, morphological, syntactic, or a mix of all three) to associate with certain types of prosodic constituents, the procedure moves forward without issue. It is this lack of assumptions regarding phonology-external grammar, in fact, that leads to major issues for the approach in terms of predictive power.

¹ Schiering et al. (2010:658) discuss the following constituents: Phonological Phrase, Phonological Word, Foot, Syllable.

First, consider the issue of unlimited proliferation of constituents. Without referencing phonology-independent information in the beginning stages, and using only phonological processes to delimit phonological constituents, it is possible to propose as many constituents as there are processes in a language. In other words, this approach does little more than rename phonological processes with constituent names, giving nothing but a basic description of the phonology in a given language. Moreover, the delimiting process falls victim to circularity in that "for each phenomenon (or set of phenomena), the context in which it is found to apply is identified, and this in turn is deemed a phonological domain or constituent" (Vogel, to appear:27).

Second, unlimited proliferation leads to a major problem in terms of the definition of phonological constituents and how they may be used for cross-linguistic comparison (Vogel, 2009b, Vogel, to appear). For example, Vogel (2009b) proposes that "simply positing different structures for different languages in the absence of any underlying motivation for such differences is tantamount to saying that phonological systems are free to vary in essentially unconstrained ways" (Vogel 2009b:64). In addition, a phonological constituent cannot be argued to be theoretically valuable if its characteristics differ dramatically from one instantiation to another. For example, Limbu is claimed to have three phonological words (ω s) in the following subsection. Each ω corresponds to different morphological strings and markedly different phonological process. Thus, there is no predictive value within the claim that all three domains correspond to the same phonological constituent type.

2.2.2 Phenomenon-Based Approach Illustration: Limbu

For an example of process-driven domain assignment, consider Limbu, a Tibeto-Burman language spoken in Nepal. Work based on the AUTOTYP database has disagreed regarding the exact number of ω s in Limbu. Hildebrandt (2007) posits three ω s, while Schiering et al. (2010) posits two ω s while also acknowledging 11 possible process domains. For the sake of this example, consider Hildebrandt's (2007) analysis.

In Limbu, nouns and verbs are organized according to morpheme templates or slots of the form *prefix-stem-suffix=clitic*. Hildebrandt examines seven phonological processes and their application domains with regard to this template. Once each application domain is determined, any overlapping domains are combined. In the end, Hildebrandt proposes three ω domains. They are listed in (5).

- (5) a. $\omega_1 = \text{Stem} \pm \text{Suffix(es)} \pm \text{Enclitic(s)}$
 b. $\omega_2 = \text{Prefix} + \text{Stem Only}$
 c. $\omega_3 = \text{Prefix} + \text{Stem} + \text{Suffix} + \text{Enclitic}$

The first ω (5a) forms the domain for an [l]~[r] alternation, the placement of main stress, and various assimilation processes. In each case, prefixes are excluded from the processes. Consider the [l]~[r] alternation, which Hildebrandt summarizes as /l/ \rightarrow [r] between vowels based on earlier work by Van Driem (1987). As seen in (6), /l/-initial morphemes do not change to [r] after vowel-final prefixes (Hildebrandt 2007:11).

- (6) a. ku- la:p *ku-ra:p
 3PE.POSS- wing
 ‘its wing’
 b. ku- lum -ʔo *ku-rum-ʔo
 3PE.POSS- between -LOC
 ‘situated between’
 c. kɛ- lept -u *kɛ-rept-u
 2PE- throw -3PE
 ‘You threw it.’ (Michailovsky 1997:140)

In (7), however, /l/-initial suffixes change to [r] after vowel-final stems. Consider the following example with the nominal suffix /-le/ ‘GEN/ERG/INSTRU’ which surfaces with underlying /l/ following a consonant in (7a) - (7b) but [r] after a vowel in (7c) - (7d) (Hildebrandt 2007:12-13).

- (7) a. *siŋbo:ŋ -le ku- bo:ŋ -ʔo:*
 tree -GEN 3PE.POSS- base -LOC
 ‘under the tree’ (Van Driem 1987:44)
- b. *khɛneʔ yəmba mənə kɛ- bo:ŋ -lo*
 you big man 2PE- become -OPT
 ‘May you become a great man.’ (Van Driem 1987:133)
- c. *anige -re -n yaŋ*
 we -GEN -ABS money
 ‘our money’ (Van Driem 1987:38)
- d. *kusiŋ kɛ- ni:tt -u -rɔ kusiŋ kɛ -nis -u*
 understand 2PE- understand -3PE -OPT like.that 2PE -see -3PE
 -rɔ
 -OPT
 ‘May you understand it! May you see it as it is!’ (Van Driem 1987:134)

The second ω (5b) forms the domain for alternative stress assignment. Contrary to ω_1 , this domain includes prefixes but excludes suffixes and enclitics. Typically, main stress is assigned to the first non-prefix morpheme in Limbu. If, however, the word only consists of a prefix and a stem, an alternative stress assignment process is applied. In only this case, the prefix takes the primary stress as in (8).

- (8) */ku- la:p/ [ˈku.la:p]*
 3PE.POSS -wing
 ‘its wing’ (Hildebrandt 2007:15)

Another process called n-velarization, or anticipatory velarization, also applies across the prefix-stem boundary. As seen in (9), /n/ surfaces as velar [ŋ] before velar /k/.

- (9) */mɛ- n- kɔt -mʔna -haʔ/ [mɛŋkɔpmʔnahaʔ]*
 NEG- NEG- have -PP -NOM
 ‘(The haves) and the have-nots.’ (Van Driem 1987:17)

Finally, Hildebrandt argues that the third ω (5c) exhaustively spans the entire morpheme template, and it forms the domain for anticipatory labialization. As seen below, stops and nasals become labial before a labial stop or consonant across the

entire Limbu morpheme template.² Hildebrandt also shows that this process only spans across the morpheme template, failing to apply between grammatical words (see pp. 18-19 of her discussion).

(10) Anticipatory Labial Assimilation (as seen as (25) in Hildebrandt 2007:17)

a. *prefix-stem*

/mɛ- n- mɛt -baŋ/ [mɛ**m**mɛpbaŋ]
 NEG- NEG- tell -1PE.SG->3PE/PT-PF

‘I did not tell him.’

b. *stem-suffix*

/ke:t -maʔ/ [ke:**p**maʔ]
 insert -NOM

‘to insert’

c. *suffix-suffix*

/si -aŋ -mɛn -pa [siaŋmɛ**m**ba]
 die -1PE.PAST -COND -IPFV

‘I might die.’

d. *suffix=enclitic*

/myaŋluŋ =phɛlle hen =phɛlle [myaŋluŋbɛlle hembɛlle]
 myaŋluŋ =SUB what =SUB

‘What does *Myaŋluŋ* mean?’

To summarize, Hildebrandt examines seven phonological processes in Limbu. Some processes apply across the full noun/verb template, while others only apply to part. Taking overlap into account, Hildebrandt proposes that all seven processes may be accounted for using three ω domains.

2.3 Relational Mapping

Relational Mapping, which Selkirk (2011) refers to as the "standard theory," refers to a relationship between morphology, syntax, and phonology when mapping

² As seen in the data, however, velars appear to be exempt from the process.

phonological constituents. This relationship was first formalized as Prosodic Phonology (Selkirk, 1980, 1981a,b, 1986; Nespor and Vogel, 1986). In Prosodic Phonology, phonological domains layer and build according to size and character to form the Prosodic Hierarchy (Nespor and Vogel, 1986). The most recent work in Relational Mapping (Vogel, to appear) lists the following prosodic constituents in the hierarchy, which are assumed to be universal.

- (11) Intonational Phrase (ι)
- Phonological Phrase (φ)
- Composite Group (κ)
- Prosodic Word (ω)
- Foot (Σ)
- Syllable (σ)

Under Relational Mapping, prosodic constituents reference morphological and syntactic structures but are not the same. In fact, the resulting prosodic structure can be quite different from syntactic structure (non-isomorphic). Prosodic Phonology originally assumed the Strict Layer Hypothesis (SLH), ruling out recursivity and level-skipping, as well (e.g. Selkirk, 1980, 1981a,b, 1986; Nespor and Vogel, 1986).

- (12) **Strict Layer Hypothesis** (as stated in Vogel, to appear)
- a constituent of a particular level (C_n) dominates only constituents of one level lower (C_{n-1})

Later work has since argued to relax the SLH or exclude it entirely, finding it to be too restrictive (e.g. McCarthy and Prince, 1993; Truckenbrodt, 1995, 1999; Selkirk, 1995, 2000; Vigário, 2010; Vogel, 2008, 2009a,b, Vogel to appear).

Most recently, Vogel (to appear), proposes the Composite Prosodic Model (CPM), which retains a Relational Mapping approach without the SLH. First, CPM makes use of an intermediate constituent between the phonological word and phonological phrase: the Composite Group (as discussed in previous work like Vogel (1999, 2008, 2009a,b,

2012). It also divides the prosodic hierarchy into three parts: non-interfacing constituents (Segment, Foot, Syllable), those at the Morphology Interface (Phonological Word, Composite Group), and those at the Syntax Interface (Phonological Phrase, Intonational Phrase).

The main difference between the two interface groupings is the direction of the mapping procedure. At the Morphology Interface, mapping is a bottom-up procedure meaning that prosodic structure is built up referencing morphological information and including phonologically cohesive elements. For example, the Phonological Word (ω) is required to obey the *Principle of the Morphological Core*.

(13) **Principle of the Morphological Core** (Vogel to appear:50; c.f. Vogel 2012:52)

A Phonological Word must contain a morphological root.

Each ω therefore consists minimally of a root. Other material may also be included (i.e. cohering affixes). Previous work (Kabak and Vogel, 2001) has argued for a special subcategorization status (Prosodic Word Ajoiner) for affixes which do not cohere with the ω and instead join at a higher prosodic level. According to Vogel (to appear:51), "If no PWA is present, the ω extends until the ends of the [Lexical Word] are reached; however, when a PWA is present, it signals that the ω may extend only to that element."³

According to the Composite Prosodic Model's *Principle of Minimal Distance*, any stray elements (PWAs, clitics, function words) join the ω (s) at the next level: the Composite Group (κ). In addition, κ forms the domain for compounds, though compound elements do not share status with stray elements. Thus, Vogel (to appear) proposes the *Principle of the Morphological Maximum*. A κ is therefore defined as a one LW plus any stray material.

(14) **Principle of Minimal Distance** (Vogel to appear:51)

Material must be parsed at the next available level.

³ The Lexical Word (LW) is defined as a lexical X^0 (Vogel to appear:50).

(15) **Principle of the Morphological Maximum** (Vogel to appear:53)

A Composite Group maximally contains one Lexical Word.

In contrast, prosodic constituents are mapped top-down at the Syntax Interface primarily referencing syntactic structure and thus demonstrating more markedly syntactic properties (e.g. recursion). Constituents above κ rely on syntactic information, rather than morphological information. The only formal definition of the ϕ domain is provided in Nespor and Vogel (1986:168), though it is out of date as it refers crucially to the Clitic Group (κ 's predecessor) and appeals to the Strict Layer Hypothesis and disallowing level skipping. Therefore, a revised and updated definition based on Nespor and Vogel (1986) and subsequent work is provided below.

(16) ϕ domain

The domain of ϕ consists of the lexical head (N, V, A) of a syntactic phrase. The head's complement is optionally included, depending on whether or not it patterns phonologically with the head.

Finally, the ι is defined as in (17), which is summarized and adapted from Nespor and Vogel (1986). The authors refer to a "root sentence" as the main constituent which corresponds to an ι based on work by Emonds (1976). In more contemporary terms, consider the root sentence to be a main clause or CP. In addition, structures external to the root sentence (listed below) automatically form their own ι .

(17) The following structures obligatorily map to the Intonational Phrase (ι):

- a. Root Sentence (CP)
- b. External Structures (parenthetical expressions, nonrestrictive relative clauses, tag questions, vocatives, expletives, certain moved elements)

The ι may also undergo restructuring (i.e. made into smaller ι s) due to length, speech rate, style, or contrastive prominence. It should be noted, that ι domains are subject to much more variation than other domains and have been argued to demonstrate true recursion in previous literature (e.g. Ladd, 1986; Selkirk, 2011). These facts led

Vogel (2012) to postulate that perhaps ι is not the same as other prosodic constituents, suggesting that the relevant phenomena may be accounted for as boundary phenomena or from some other source. The present work assumes the ι plays a role in the hierarchy as originally proposed, leaving this question open to future research.

As the absence of the SLH significantly opens up the prosodic hierarchy and its properties, the CPM aims to restrict the model’s power using a combination of three properties: *Constituent Sequencing*, *Proper Headedness*, and the *Principle of Minimal Distance*. *Constituent Sequencing*, the restriction that a constituent cannot dominate a constituent of its same type, is found at the Morphology Interface thus ruling out recursion at these levels. The remaining two properties are true of the whole hierarchy. Namely, *Proper Headedness* requires that a constituent dominate at least one constituent of the immediately lower level, and the *Principle of Minimal Distance* requires that phonological material be parsed into prosodic structure as soon as possible. In both cases, these properties greatly restrict level skipping.

2.3.1 Relational Mapping: Assumptions and Predictions

Relational Mapping makes two noteworthy assumptions. First, the model assumes the strict separation between phonology, morphology, and syntax. Though a definitive conclusion regarding the status of a separate morphological module is beyond the scope of this dissertation, the debate itself plays a large role in the present analysis. If Relational Mapping is successful over another approach due to its reference of morphology, the results contribute directly to lexicalist accounts (see discussion in Bruening 2018).

Second, Relational Mapping assumes the Prosodic Hierarchy is universal. It is not immediately clear, however, if this means that the constituents are universally *available* or universally *present*. The weaker interpretation (universally available) allows for some languages to differ, perhaps skipping entire constituents entirely. For example, some researchers argue that some languages require an additional constituent: the Prosodic Stem (e.g. Downing 2016 and the citations therein), while others argue other

constituents like feet are unnecessary for certain languages (e.g. Özçelik, 2012). The stronger interpretation makes clear predictions about which constituents are present (all of them) regardless of whether or not a researcher has found the expected phonological evidence yet (e.g. Vogel, 2009b). This dissertation adopts the strongest possible assumption (universally present) in order to test the model’s success.

By appealing to phonology-external information from the onset, Relational Mapping yields clear and testable definitions of each prosodic constituent. For example, a ω consists minimally of a root. If a domain does not include a root, it cannot form its own ω . If there is more than one root, there must be more than one ω . In addition, the ω demonstrates the same phonological characteristics across the language. This explicitly rules out recursive constituents which demonstrate markedly different properties. Under Relational Mapping, such differences mean that the constituents must not be the same (e.g. two ω s).

2.3.2 Relational Mapping Illustration: Italian

For an example of Relational Mapping, consider Vogel’s (to appear) analysis of Italian, which appeals to both ω and κ . First, Intervocalic s-Voicing is argued to be a ω -level process. Requiring a Morphological Core, the ω is defined as minimally a root plus any cohering material. As seen below, Intervocalic s-Voicing is shown to apply within a root (18a) and also across suffixes (18b).

- (18) a. ca[**z**]erma ‘barracks’
 b. noi-o[**z**]-ino ‘somewhat annoying’ (Vogel to appear:43)⁴

Prefixes complicate the picture, as Intervocalic s-Voicing applies across some prefixes but not others. Vogel accounts for this difference using κ . Namely, Intervocalic s-Voicing applies across (Level 1) prefixes which cohere with the ω , but the process fails to apply across non-cohering (Level 2) prefixes because they are outside the ω -domain.

⁴ The data in (18) have been adapted to exclude prosodic boundaries and include phonetic pronunciation.

- (19) a. Level 1: $[[ri-**[z]**alire]_{\omega}]_{\kappa}$ ‘to date back to’
 b. Level 2: $[[ri]_{\sigma} [silare]_{\omega}]_{\kappa}$ ‘to go up again’ (Vogel to appear:43)⁵

The distinction between the ω and κ domain becomes even clearer in compounds. Namely, /s/ voices within individual members of a compound ([poza]) but not across the entire compound (20).

- (20) $[[po $[z]$ a]_{\omega} [[s]igarette]_{\omega}]_{\kappa}$ ‘ash tray’

Second, Vogel discusses a κ -level process. Specifically, an /i/ \rightarrow [e] process only occurs between clitics in the same κ -domain. As seen below, /mi/ is pronounced as [me] when preceding the clitic ‘lo’ (21a-21b) but as [mi] when the only clitic in the κ (21c).

- (21) a. $[me \quad lo \quad [porta]_{\omega}]_{\kappa}$
 me_{CL} it_{CL} brings
 ‘(He) brings it to (me).’
 b. $[[porta]_{\omega} \quad me \quad lo]_{\kappa}$
 brings me_{CL} it_{CL}
 ‘Bring it (to) me!’
 c. $[[porta]_{\omega} \quad mi]_{\kappa} \quad [lo \quad [specchio]_{\omega}]_{\kappa}$
 bring me_{CL} the mirror
 ‘Bring me the mirror!’ (Vogel to appear:54)

To summarize, Intervocalic s-Voicing applies across ω , and /i/-Lowering applies across κ . The difference becomes particularly salient when examining cohering and non-cohering affixes, compounds, and directional clitic attachments.

2.4 Syntax-Driven Mapping

Syntax-Driven Mapping models only reference syntactic constituents (i.e. X^0 , XP, CP) when forming the constituents of the Prosodic Hierarchy. The theories also rely primarily on violable constraints (e.g. Optimality Theory) when parsing prosodic

⁵ The data in (19) have been adapted to include phonetic pronunciation.

structure. Theories under this approach differ in terms of what exactly they reference in syntactic constituents (i.e. one edge or both edges) and what is required of the Prosodic Hierarchy (i.e. Strict Layering Hypothesis or allowing recursion). Consider first what is referenced in the syntax.

Alignment Theory (e.g. Selkirk, 1986, 1995; Hale and Selkirk, 1987; Selkirk and Shen, 1990; Selkirk and Tateishi, 1991; McCarthy and Prince, 1993; Truckenbrodt, 1995) requires that prosodic constituents align with syntactic constituents at at least one edge. The direction of the alignment is language-specific. For example, Selkirk (1986, 1995) proposes a φ account for Chimwiini vowel length. She argues for right-alignment between the XP and φ (Align-XP,R), and underlying long vowels only surface when penultimate in the φ . As seen below, /a:/ surfaces when ‘water’ forms its own NP but it shortens in ‘fresh water’ because /ma:yi/ is no longer at the right edge of a the NP/ φ .

$$(22) \quad \text{ma:yi}]_{\varphi} \text{ ‘water’ } \text{mayi malada}]_{\varphi} \text{ ‘fresh water’}$$

In addition to Alignment constraints, Wrap Theory (Truckenbrodt, 1999) introduces a new constraint requires that a syntactic constituent be contained within its corresponding prosodic constituent (i.e. an XP must be within a φ). Given Wrap(XP, φ), for example, $[\text{XP}_1 \text{ XP}_2 \text{ V}]_{VP}$ may now correspond to a single φ because each of the XPs XP_1 , XP_2 , and the full VP are contained within a φ .

Adjunction Theory (Itô and Mester, 2009a,b) requires that upper level constituents (e.g. φ and ι) coincide with syntactic constituents. The ω , however, is treated in a more bottom-up fashion and parsing stray elements into recursive words as seen below in (23). Itô and Mester subsequently reduce word-level recursion to include only a ω_{max} (or ω') and ω_{min} .

$$\begin{array}{c}
(23) \quad \omega' \quad \rightarrow \text{[FW FW []}_\omega \text{]}_{\omega'} \\
\swarrow \quad \searrow \\
\text{FW} \quad \omega' \\
\swarrow \quad \searrow \\
\text{FW} \quad \omega
\end{array}$$

More recently, Match Theory (Selkirk, 2011) requires all prosodic and syntactic constituents to coincide completely. Prosodic and syntactic constituents must coincide or "match" as in the following optimality theoretic faithfulness constraints (24).

- (24) a. Match Clause
A clause in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ι , in phonological representation.
- b. Match Phrase
A phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it φ , in phonological representation.
- c. Match Word
A word in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ω , in phonological representation.

A series of markedness constraints pertaining to the phonological characteristics of the prosodic domains, if highly ranked, allow violations of the above Match constraints thus leading to non-isomorphism between the prosodic and syntactic structures. For example, Selkirk uses Elordieta's (2006; 2007) analysis of Lekeitio Basque to show the need for a constraint against non-binary φ s at the beginning of the ι domain.

Like Relational Mapping, early Syntax-Driven theories like Alignment Theory (Selkirk, 1986, 1995) and Wrap Theory (Truckenbrodt, 1995, 1999) assumed the Strict Layer Hypothesis (12). As in Relational Mapping, the SLH is later weakened or eliminated entirely, but it is this change which steered the changes from one Syntax-Driven theory to another. Specifically, the SLH (either weak or strong) often single-handedly

yields non-isomorphism between syntactic and phonological structure. Without such a requirement, later theories predict far more isomorphic structures than earlier theories.⁶

As it is most recent, this dissertation focuses primarily on Match Theory when considering the Syntax-Driven Mapping approach. Earlier Syntax-Driven theories will only be referenced if relevant (i.e. if their predictions differ from Match Theory).

2.4.1 Syntax-Driven Mapping: Assumptions and Predictions

Syntax-Driven Mapping references only syntax, offering a markedly simpler account of grammar than the previous approaches. It, however, is not without issues. Specifically, problems arise with regards to the assumption of recursion in phonology, when syntax is referenced for mapping, and how stray elements should be included in prosodic structure.

First, consider the assumption that phonology (like syntax) also demonstrates recursion. It has generally been argued that the presence of recursion is one of the main differences between phonology and syntax (Jackendoff and Pinker, 2005; Pinker and Jackendoff, 2005; Neeleman and van de Koot, 2006; Van der Hulst, 2010; Heinz and Idsardi, 2011), though the idea of allowing some kind of recursion in phonology (especially at higher prosodic levels) is not new (e.g. Ladd, 1986). At its core, recursion requires that an entity of a certain type be contained within another entity of that type (e.g. XP within XP or N within N). The nested entities retain the same category label because they share all characteristics. A noun phrase behaves the same regardless of its relationship to another noun phrase.

Match Theory (Selkirk, 2011) goes beyond previous Syntax-Driven Mapping approaches and assumes recursion to not only be possible but prevalent based on the syntactic structure. As will be seen in the next subsection, true recursion is possible at the φ and ι levels in languages like Xitsonga. In each case, the prosodic constituents in question retain the same phonological characteristics regardless of their position in the

⁶ Ladd (1986) is a notable exception. He did not adopt the SLH and allowed for recursive phrasing.

structure (e.g. the same phonological processes apply at each successive φ). Problems arise, however, in the assumption that the same property is prevalent everywhere in the Prosodic Hierarchy. For example, Vogel (to appear) highlights that using the same name for a ω and ω' obfuscates the characteristic difference between the two (e.g. cohering vs. non-cohering affixes and their phonological processes). This, in turn, makes it impossible to define the ω domain in an unambiguous and testable way. This relates back to the Phenomenon-Based Approach and the unlimited proliferation of domains. Recursive categories demonstrating different characteristics lead to the same theoretical problems.

Second, and closely related to the inclusion of recursion in phonological structure, is where exactly in the derivation syntax is referenced in mapping. As with the two previous approaches in this chapter, it is customary to map prosodic structure from syntactic structure at the surface after all Merge operations have completed. As will be discussed in the following chapter, this has major implications for incorporating languages, but stray elements also cause problems. As Vogel (to appear) discusses stray elements are incorrectly predicted to be grouped into the ω -domain because together with the root they form a single grammatical word (e.g. Level 2 affixes). Because they are automatically parsed into the ω , two generalizations are entirely lost: 1) Level 2 affixes do not pattern with the rest of the grammatical word and 2) Level 2 affixes pattern with other stray elements like clitics and function words. The reverse is also true of Match Theory, in that it incorrectly predicts certain elements should pattern differently due to differences in syntactic structure when they in fact do not. For example, English demonstrates a single Voicing Assimilation rule for its various -s morphemes (plural, third person singular, possessive, copula and auxiliary). Because each of these morphemes attach at different levels of syntactic structure, Match incorrectly predicts them to act differently from one another - or, conversely - requires separate phonological rules of Voicing Assimilation for each morpheme.

2.4.2 Syntax-Driven Mapping Illustration: Xitsonga

For an example of Syntax-Driven Mapping, consider Selkirk’s (2011) analysis of Xitsonga based on data originally presented in Kisseberth 1994 and Cassimjee and Kisseberth 1998. In Xitsonga, penultimate vowels are lengthened in the clause as in (25). According to the Match Constraints in (24), the clause matches with the prosodic constituent ι in (25b).

- (25) a. $\begin{bmatrix} \text{ndzi} & & \text{-xav -el} & & \text{-a}_{Verb} & \text{xi -phukuphuku} &] & \text{fo:le} &] \\ \text{1PE.SG.SUB -buy -apple -FV} & & & & \text{fool} & & & \text{tobacco} &] \\ \text{Clause} \end{bmatrix}$

‘I am buying tobacco for a fool.’

- b. $\iota(\text{ndzi-xavela xi-phukuphuku fo:le})_{\iota}$ (Selkirk 2011:6)

A second rule, High tone spread, spreads a lexical H tone to the right. Note that there are two instances where H-spread is blocked. First, H-spread is blocked from spreading to the final syllable of the φ domain as seen in (26-27).

- (26) a. $[[\text{vá-xávéla} [\text{xí-phúkúphúku}] [\text{fo:le}]]]$

‘they are buying tobacco for a fool’

- b. $\iota_{\varphi}(\text{vá-xávéla} \text{ xí -phúkúphúku})_{\varphi} \text{ fo:le})_{\iota}$ (Selkirk 2011:10)

- (27) a. $[[\text{vá-xávéla} [\text{mú-nhu}] [\text{ti-n-gu:vu}]]]$

‘they are buying clothes for s.o.’

- b. $\iota_{\varphi}(\text{vá-xávéla} \text{ mú-nhu})_{\varphi} \text{ ti-n-gu:vu})_{\iota}$ (Selkirk 2011:10)

Cassimjee and Kisseberth 1998 account for this blocking of H-spread with a proposed markedness constraint $\text{NonFinality}(\varphi, \text{H})$, which blocks H-spread to the final syllable of the φ domain. In order to derive the correct surface forms above, $\text{Non-Finality}(\varphi, \text{H}) \gg \text{H-Spread}$.

Second, H-spread is also blocked from spreading across the left edge of a φ domain by Itô and Mester 1999) proposed $\text{CrispEdgeLeft}(\varphi, \text{H})$, which generally blocks

multiple-linking across specific prosodic domain boundaries (in this case the φ boundary). This markedness constraint is also ranked above H-Spread in order to derive the correct blocking patterns.

This kind of H-spread blocking offers a perfect picture of when language-specific markedness constraints can outrank Match constraints and lead to non-isomorphism. Specifically, consider the following example in which H-spread is permitted to apply across the morpheme boundary onto one object NP ‘pig’ (28a) but not onto a multi-word object NP ‘their pig’ (28b).

- (28) a. vá-súsá [n-gúlú:ve]
 ‘they are removing a pig’
 b. vá-súsá [n-guluve y!á vo:n!á]
 ‘they are removing their pig’ (Selkirk 2011:11)

As both NPs are phrases, which should Match with a φ domain, the difference can only be accounted for using phonology. Namely, Inkelas and Zec (1995) propose a markedness constraint $\text{BinMin}(\varphi, \omega)$, a requirement that a φ domain consists of at least two ω domains. A minimality requirement is not uncommon cross-linguistically, especially at lower levels in the Prosodic Hierarchy, so this is not entirely unexpected (Selkirk 2011). By ranking $\text{BinMin}(\varphi, \omega)$ above $\text{Match}(\text{Phrase}, \varphi)$, the optimal prosodic parsing calls for the difference between the two NPs, as the single word NP is not parsed into a full φ domain, while the two word NP is. Thus, H-spread is not blocked in the first case, but it is due to the φ boundary in the second. Notice, also that the second structure calls for recursive φ domains for both the binary NP and the full VP, mirroring the syntactic structure perfectly.

(29)

<i>clause</i> [[verb [noun] _{NP}] _{VP}] <i>clause</i>	$\text{BINMIN}(\varphi, \omega)$	$\text{MATCH}(\text{PHRASE}, \varphi)$
a. $\iota(\varphi(\text{verb } \varphi(\text{noun})_{\varphi})_{\varphi})_{\iota}$	*	
b. $\iota(\varphi(\text{verb noun })_{\varphi})_{\iota}$		*

$clause[[\text{verb} [\text{noun adj}]_{NP}]_{VP}]_{clause}$	$\text{BINMIN}(\varphi, \omega)$	$\text{MATCH}(\text{PHRASE}, \varphi)$
a. $\iota(\varphi(\text{verb } \varphi(\text{noun adj})_{\varphi})_{\varphi})_{\iota}$		
b. $\iota(\varphi(\varphi(\text{verb noun})_{\varphi} \text{adj})_{\varphi})_{\iota}$		*

(31) a. $[_{NP}[\text{noun adjective}]_{NP} \text{ } _{VP}[\text{verb } _{NP}[\text{noun adjective}]_{NP}]_{VP}]$
b. Match (XP, φ)/Match (φ , XP): $\varphi(\text{noun adjective})_{\varphi} \varphi(\text{verb } \varphi(\text{noun adjective})_{\varphi})_{\varphi}$
c. Align R (XP, φ): $^{*}_{\varphi}(\text{noun adjective})_{\varphi} \varphi(\text{verb noun adjective})_{\varphi}$
d. Align L (XP, φ): (i) $^{*}_{\varphi}(\text{noun adjective})_{\varphi} \varphi(\text{verb})_{\varphi} \varphi(\text{noun adjective})_{\varphi}$
. OR (ii) $\varphi(\text{noun adjective})_{\varphi} \varphi(\text{verb } \varphi(\text{noun adjective})_{\varphi})_{\varphi}$

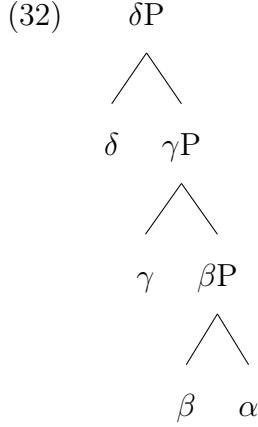
Phonology only references syntactic structure in a Syntactic Spell-Out Approach, as well, but phonological application is restricted to phases and not heads (X^0), phrases (XP), and clauses (CP). Syntactic Spell-Out Approaches differ in exactly how Phase Theory (Uriagereka, 1999; Chomsky, 2000, 2001, 2008; Citko, 2014; Collins and Stabler, 2016) is implemented in phonology. For example, models differ in terms of which syntactic heads trigger Spell-Out (what is a phase head), what

phonology may access after Spell-Out (the Phase Impenetrability Condition), and how phonology references the structure itself (Direct or Indirect Reference).

Phases are smaller computational chunks derived in the syntax and transferred to syntax's interfaces – semantics/pragmatics (LF) or phonetics/phonology (PF). This transferred chunk, referred to as a Spell-Out Domain, is the complement of a phase head (or functional head which triggers transfer). A Spell-Out Domain undergoes Transfer to PF as soon as the next phase head is introduced in the tree. It is widely acknowledged that what is and is not a phase head is up for debate (e.g. Samuels 2011:75). Surkalovic (2011); Šurkalović (2013) bypasses phase heads entirely, building on previous work (Epstein and Seely, 2002, 2006; Marvin, 2002; Newell, 2008). Instead, each instance of Merge and Move creates a phase which is only spelled out when all features are checked.⁷

Once transferred, the Spell-Out Domain is subject to the Phase Impenetrability Condition (henceforth PIC) (Chomsky, 2001), which disallows higher phases access to material which has already been spelled out. Thus, a phase head only has access to the elements in its phase (and the following c-commanding phase head if one exists). Consider, for example, the following structure found in Samuels 2011:75-76. Assume α , β , γ , δ are phase heads. Since syntax trees build from the bottom up, β and α merge first and thus are accessible to each other in terms of phonology and semantics. β projects upward, and the phrase βP is formed. Next, γ merges with βP . Since a new phase head has been introduced into the tree, β 's complement (α) is transferred to PF. Due to the PIC, α is no longer accessible once it is transferred. Thus, The newly introduced γ has access to β but not to α . This process iterates up the tree as seen in (33).

⁷ Svenonius (2004) and Bobaljik and Wurmbrand (2013)'s Suspension Across Domains is another instance in which Spell-Out may be delayed until all uninterpretable features are checked. In this literature, however, phase nodes are still used to demarcate potential Spell-Out Domains. Newell and Piggott (2014) argue that Suspension Across Domains should be extended to phonology, as well.



- (33) Derivation of (32)
- a. Merge (β, α) : α accessible to β .
 - b. Merge $(\gamma, \beta P)$: β accessible to γ . α transferred.
 - c. Merge $(\delta, \gamma P)$: γ accessible to δ . βP transferred.

Though originally proposed only for syntactic operations, some work extended the PIC (in various forms) to phonological operations (Wagner et al., 2005; Pak, 2008; Samuels, 2009, 2010, 2011). For example, Samuels (2009; 2010; 2011) proposes different versions of the PIC for lexical and post-lexical rules. For lexical rules, they must obey the PIC at both the morpheme level (phase heads *n*, *a*, etc.) and the clausal level (phase heads *v*, *C*, etc.). Post-lexical rules, however, need only obey the PIC at the clausal level. In other words, a lexical rule's domain is the phase head's complement and edge (following phase head), and a post-lexical rule's domain is the entire phase head's complement. More recently, researchers have argued against using the PIC in phonology entirely (e.g. Surkalovic, 2011; Šurkalović, 2013; Michaels, 2013; McPherson, 2014; McPherson and Heath, 2016; Ahn, 2016), some proposing to use Phase-Phase Faithfulness Constraints to account for what was originally claimed to be instances of the PIC in Phonology (e.g. McPherson and Heath, 2016).

Finally, work like Pak (2008); Ko (2008); Sato (2008, 2009, 2012); Samuels (2009, 2010, 2011); and (in a somewhat modified fashion) Shwayder (2015) directly reference phases when determining phonological domains. Other work, however, uses phases

to map to prosodic constituents in the Prosodic Hierarchy (e.g. Cheng and Downing, 2007; Kratzer and Selkirk, 2007; Ishihara, 2007; Dobashi, 2003, 2004a,b; Compton and Pittman, 2007; Piggott and Newell, 2006; Ahn, 2015).⁸ Surkalovic (2011)’s cumulative Spell-Out has the same effect of an independent prosodic structure, but it is still derived directly from the order of syntactic operations and Spell-Out instead of an independent constituent structure.

In this dissertation, phase heads are assumed to trigger Spell-Out. Two kinds of phase heads are referenced: clause-level heads *C*, *v*, and morpheme-level categorizing heads *v*, *a*, and *n*. A Direct Reference approach to the Syntactic Spell-Out Approach is adopted, and the PIC is not assumed to play a role in phonology. Instead, Phase-Phase Faithfulness Constraints may play a role in order to constrain what phonology may reference trans-cyclically.

2.5.1 Syntactic Spell-Out Approach: Assumptions and Predictions

Like Syntax-Driven Mapping, the Syntactic Spell-Out Approach also appeals only to syntax, assuming there is not a strict separation between syntax and morphology. Eliminating an independent prosodic structure entirely yields strong predictions regarding the size, character, and role of phonological domains cross-linguistically. However, the ever-changing state of syntactic theory leads to potential setbacks.

As the approach relies heavily on (detailed) syntactic structure, anything subject to debate leads to issues for an analysis. As mentioned earlier, what is and is not a phase head is the subject of debate and discussion in the literature (see Samuels 2011). Thus, it is possible to challenge any analysis relying strictly on Spell-Out Domains by positing different phase nodes based on the structure. In addition, overall syntactic structure is often up for debate. For example, Samuels’ choice to adopt a multiple DP structure in accordance with Etxeberria (2007) lays her Basque analysis vulnerable if a

⁸ Readers are encouraged to read Chapter 2 in Pak 2008 for an in depth comparison of Direct and Indirect Reference Syntactic Spell-Out Approaches, as well as work which avoids taking a stance (e.g. Legate, 2003; Kahnemuyipour, 2005; Adger, 2006).

fellow researcher disagrees with that single idea. Without two DPs, the phasal analysis falls short and no longer explains the phonological patterns.

Second, restricting phonological patterns to Spell-Out Domains greatly restricts the possible size and content of phonological domains. If the PIC is adopted, a Spell-Out model predicts that phonological domains will always coincide with one and only one cycle due to the PIC. Modifications like Pak (2008)'s 'holding bin' model allows for intermediate structures within a single Spell-Out Domain. Samuels (2009) proposes two different versions of the PIC, essentially proposing two different types of cycles (morpheme-level and clause-level). Phase-Phase Faithfulness Constraints allow for more flexibility, but it is still based on the assumption that phases and their boundaries are relevant objects for phonological domains.

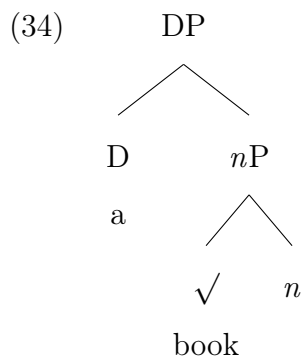
It is worth asking if modifications like Pak's and Samuels or the introduction of violable constraints retain the same spirit of Phase Theory itself. For example, intermediate structures within a phase could be argued to be reminiscent of a layered prosodic structure, referencing differing levels of syntactic structure. Samuels' separation of two different kinds of cycles also lends the model quite a bit of power. Without ample independent evidence that there are in fact two kinds of cycles in the syntax, re-naming them at the phonology interface is not theoretically sound or predictive. As will be seen in the following chapters, this power is deemed necessary but it is worth questioning the theoretical cost for the framework.

2.5.2 Syntactic Spell-Out Illustration: English

For an example of the Syntactic Spell-Out Approach, consider Šurkalović's 2013 analysis of English function words. English function words are unstressed, vowels therefore surfacing in their 'weak' or reduced form. In contrast, lexical words always bear primary stress. Previous analyses of this distinction rely on lexical words forming full ω s, and functional words acting as a free clitic and thus less prominent (Selkirk, 1995). Šurkalović (2013), however, accounts for the distinction appealing to phases and

Phase-Phase Faithfulness. Thus, the phonological distinction between lexical and functional words comes automatically from syntactic derivation and not from phonology referencing syntactic features.

Consider the functional-lexical sequence ‘a book’ in (34). Šurkalović assumes the lower nP and the DP form phases. As the nP is lower, it is Spelled-Out earliest (she calls this Phase 1). As Spell-Out continues up the tree, phonological computation remains faithful later on (Phase-Phase Faithfulness). Since ‘book’ has already been sent to PF, then, it retains its phonological structure even when it is included in the next (cumulative) phase (DP). Therefore, even though the DP is a single phase, the lexical word ‘book’ is phonologically distinct from ‘a’ as it was originally its own phase.



The analysis is presented in terms of Optimality Theory as follows. The PARSE FT constraint creates a prosodic word (PWd) in Phase 1, which dominates the input string /book/. Since this is only the first phase (Phase 1), the second constraint does not apply as there are no two phases to anchor/align.


(35) **PHASE-ANCHOR-L(PWd) – PAL PWD**

Assign a violation mark if a Prosodic Constituent which is at the Left edge of a prosodic word in Phase n is not at the Left edge of that Prosodic word in Phase $n+1$

PARSE FT

Assign a violation for each foot not immediately dominated by a PWord

(36)


/book/		PARSE FT	PAL PWD
a.	 [book] _ω		
b.	book	*!	

As Spell-Out occurs in the higher DP, PAL PWD prevents function words from incorporating in the PWD created in the first phase ([book]_ω). P-DEP PWD then disallows recursion in the structure.

(37) **P-DEP PWD**

A prosodic word constituent in phase n must have a correspondent in phase $n-1$

(38)

/a book/		PARSE FT	PAL PWD	P-DEP PWD
a.	 [a [book] _ω] _φ			
b.	[[a book] _ω] _φ		*!	
c.	[[a [book] _ω] _ω] _φ			*!

2.6 Summary and Discussion

To summarize, current work falls into four main categories when it comes to the role of syntax in deriving phonological domains: the Phenomenon-Based Approach, Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. As seen above, these approaches primarily vary with regard to three areas: predictive power, underlying assumption regarding morphology and syntax, and whether or not phonology directly or indirectly references syntactic structure.

The Phenomenon-Based Approach offers little to no predictive power due to a lack of phonology-independent criteria when mapping prosodic structure. The model's potential unlimited proliferation of constituents leads to little more than a language description and definitional issues as to what exactly a prosodic constituent is and

should act like in the language. Since domains are delimited primarily by phonology, the Phenomenon-Based Approach makes few assumptions regarding the overall grammatical organization of language. Finally, the model is an Indirect Reference model of the interface - referencing various properties (phonology, morphological, syntactic, or a mix of all three) to associate with certain types of prosodic constituents.

Relational Mapping assumes the strict separation between Phonology, Morphology, and Syntax. It is an Indirect Reference model, assuming that the prosodic hierarchy is universal and phonology-independently defined. Thus, there are clear predictions about the nature of prosodic constituents and cross-linguistic expectations. It is the only current model which explicitly assumes an active morphological model.

Syntax-Driven Mapping (specifically Match Theory) appeals to syntax only. This yields a notably simpler theoretical model. Also an Indirect Reference model, it references syntactic constituents like heads, phrases, and clauses when mapping prosodic structure. Because of the primarily syntactic approach, Match Theory predicts that phonological domains will exhibit traditionally syntactic characteristics like recursion. While this works at higher levels, it is not clear that recursion is the correct analysis at the word-level.

Finally, The Syntactic Spell-Out Approach again merges syntax and morphology into one module. Unlike the previous approaches, however, it is a Direct Reference model - referencing cycles/Spell-Out Domains within the syntax as opposed to other constituent types. It also yields strong predictions regarding what is and is not possible within a language and also the size and characteristics of phonological domains.

The above-mentioned approaches make different assumptions and therefore yield different predictions regarding the nature of the phonology-syntax interface and phonological domains. These differences inform the core of this dissertation – that is, a direct comparison of each approach using the same language data.

Chapter 3

LANGUAGES AND LANGUAGE DATA

The purpose of this chapter is to introduce the languages studied in this dissertation, detail the fieldwork in both language communities, and discuss the methodology used in subsequent analysis. As the primary goal of this dissertation is theoretical in nature, the information in this and the subsequent chapters are not intended to form a full grammar of either language. Interested readers are encouraged to read the sources cited herein to learn more about both languages.

This chapter consists of four main sections. The first two sections (3.1-3.2) introduce the two languages studied in this dissertation: Kiowa and Saukteaux Ojibwe. Subsections provide relevant background information on the language, its speakers, and its grammar. Section 3.3 details the fieldwork conducted in both language communities. Finally, Section 3.4 details the methodology and analysis used in the following chapters.

3.1 Kiowa

This section provides an overview of the Kiowa language and its speakers (3.1.1), previous research on the language (3.1.2), various orthographies in use, and how Kiowa data will be presented throughout this study (3.1.3). A brief grammatical sketch follows including the phoneme inventory (3.1.4.1), basic syllable structure (3.1.4.2), tone (3.1.4.3), the morpho-phonology of the verb complex (3.1.4.4), and relevant syntactic information (3.1.4.5).

3.1.1 The Language and its Speakers

Kiowa is a North American language spoken in southwestern Oklahoma. Though originally classified as a linguistic isolate by Powell (1891), later work found a close

relationship between Kiowa and the Tanoan languages of New Mexico and Arizona (Harrington, 1910, 1928; Miller, 1959; Trager and Trager, 1959). Hale (1962) definitively showed that Kiowa should be classified as a Tanoan language, an affiliation which has since been adopted in subsequent work (e.g. Watkins, 1984; Harbour, 2003; Adger et al., 2009; McKenzie, 2012; Sutton, 2014; Miller, 2015, under review a,b).

The Kiowa Tribal Complex is located in Carnegie, Oklahoma, with most tribal members living in Caddo, Kiowa, and Comanche counties (see Figure 3.1, adapted from The Oklahoma Mesonet). While tribal membership is in the thousands, local administrators estimate there to be only 10 living native speakers: a dramatically smaller number than the "several dozen" estimated in recent work (Adger et al., 2009) or the 60 speakers mentioned in Linn (2011). The most fluent elders are nearing 90 years old, though there are some younger speakers in their 70s who fair rather well with the language. Most younger Kiowa people have little knowledge of the language, sometimes only knowing a few words or songs. There is, however, an active program to teach young men ceremonial songs in the drum circle. This requires a much deeper understanding of the song lyrics. There are also small groups in various areas in the state for young Kiowa language enthusiasts.

There have been notable pushes for language revitalization in the community, but the impact thus far has been small. For example, the elders worked together in the 1970s and 1980s to compile Kiowa teaching materials for classes. The classes were held for a period of time, but participation and interest dissipated. While a few local elders still have those teaching materials, they are currently sitting in storage rather than being used. In the recent past, the Kiowa Early Childhood Education program has implemented the Kiowa language into its curriculum teaching individual vocabulary items such as the days of the week or animal names. There are also Kiowa classes at certain high schools and University of Oklahoma (in partnership with Dr. Gus Palmer Jr. and Dane Poolaw).

As the overall outlook of the language is not positive, native speaking elders and local administrators recognize that it is time to document the language as much

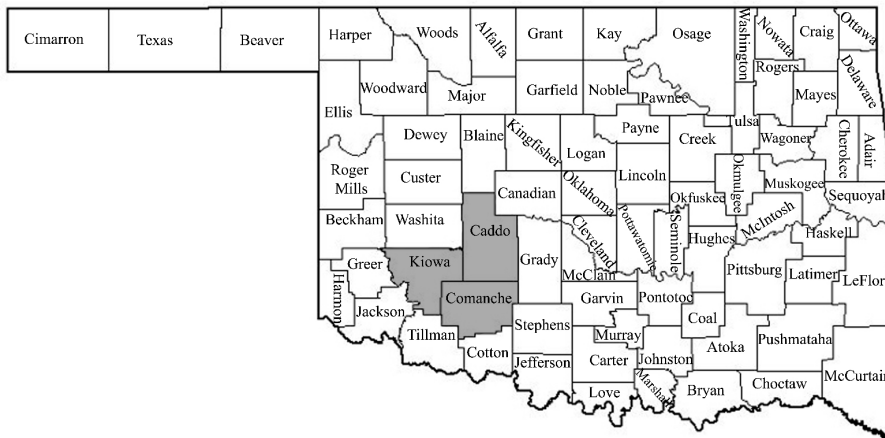


Figure 3.1: Oklahoma County Map

as possible before the last generation of fluent speakers pass away. To do this, the Kiowa tribal museum staff applied and were awarded a five year grant (2016-2021) by the Administration for Native Americans entitled "Kiowa Language and Culture Revitalization Program: Implementing a Continuum of High-Quality Kiowa Language Instruction across all Educational Levels from Preschool Through Post-Secondary Education." The project aims to provide Kiowa language teacher professional training, develop learning materials, and host outreach activities. There are five target sites throughout the state: Anadarko, Cache, Carnegie, Norman, and Tulsa. Dr. Andrew McKenzie of Kansas University also secured a three year (2017-2020) Documenting Endangered Languages grant (NSF #1664431) entitled "Investigations in the Semantics of Kiowa, a Native American language of Oklahoma" in order to study and document Kiowa semantics. Finally, work has begun for a pilot Online Dictionary project, a partnership between the Kiowa Tribe, Dane Poolaw, Dr. Amber Neely, and the present author.

3.1.2 Previous Research

The first research on the Kiowa tribe and its language took place in the mid-to-late 19th century. The earliest work is a group of word lists by John Russell Bartlett (1861) and Lieutenant Amiel Weeks Whipple (Whipple et al., 1855). Bartlett elicited his list while on expedition (1850-1853) in the Southwest as per the Treaty of Guadalupe Hidalgo. Lieutenant Whipple was in Kiowa country surveying for a transcontinental rail line. Their lists, consisting of 176 and 190 words respectively, were based on word prompts as formalized by the Bureau of American Ethnology – a noted precursor to the more well-known Swadesh Lists (Swadesh, 1950, 1952, 1955, 1971). A shorter word list was also provided in Latham (1862). Whipple references another word-list by a Dr. Say, but this word list has since been lost.

Several years later, Gatschet's (1882) article "The Phonetics of the Kāyowé Language" not only provided a word list, but also the first analysis of the Kiowa sound inventory, phonotactics, and sound alternations. Further work by Gatschet remains unpublished but is stored at the Smithsonian's National Anthropological Archives in Washington, D.C. (Gatschet, 1880, 1884a,b, 1886).¹ As to be expected, the transcriptions in these earliest works on Kiowa are inconsistent and problematic by modern standards. They did, however, form the basis for more influential work on Kiowa.

For example, James Mooney's work in the late 19th century laid the groundwork for all future ethnographic and linguistic work on Kiowa. Working under John Wesley Powell at the Bureau of American Ethnology, Mooney published a brief ethnography of the Kiowa and the Plains Apache in his 1896 *The Ghost Dance Religion and the Sioux Outbreak of 1890*. In his main work *A Calendar History of the Kiowa Indians*, published in 1979, he documents the tribe's early migration from the Black Hills of South Dakota and provides a substantial Kiowa-English vocabulary. It was this major migration of

¹ References from the National Anthropological Archives in this section were found in Sutton (2014)'s impressive and thorough literature review. Interested readers are directed to that dissertation for further detail and discussion of Kiowa documentation (linguistic and otherwise).

the Kiowa people which obfuscated the language's genetic affiliation (Powell, 1891).

The early 20th century saw a fair bit of documentation of the language and Kiowa culture, though much of the work remains unpublished like an anonymous translation of the Lord's Prayer (NAA Manuscript 518). Robert Lowie's fieldwork produced articles on Kiowa society (1916) and kinship terms (1923). Vestal & Schutes (1939) include several translations of Kiowa plant terms in their work. Alexander Lesser, one of Franz Boas' students, also studied kinship terms in his published work (1929a) and subsequent field notes (1929b). Lesser also led a field school on Kiowa through the Laboratory of Anthropology in Santa Fe, New Mexico in 1935. Collaborating with five other scholars (Bascom, Collier, LaBarre, Mishkin, and Richardson), Lesser compiled a few hundred pages of notes on Kiowa culture and customs (Lesser, 1935). While Lesser's notes were never published, a few works resulted from the endeavor (Richardson, 1940; Collier, 1944).

In addition to the works above, which provided introductions to certain groups of terms in Kiowa, work also focused entirely on Kiowa culture – namely, story telling. Specifically, ethnographers Parsons and Marriot published a few volumes which included English versions of Kiowa stories (Parsons, 1929; Marriott, 1945; ?, 1968). Though both authors include a handful of Kiowa words and transcriptions, the published works only serve to document the idea of Kiowa storytelling.

Modern linguistic analysis began with works by John Harrington and Parker McKenzie. Harrington's (1928) *Vocabulary* provides the first analysis and dictionary of the language, followed by his popular survey of the language in collaboration with McKenzie: a self-trained linguist and Kiowa tribal member (McKenzie and Harrington, 1948). Inspired by his work with Harrington, Parker McKenzie went on to document and analyze the language, perhaps becoming the most influential scholar of the Kiowa language. His exhaustive notes, analyses, and teaching guides of the language can now be found in the archives at the Oklahoma Historical Society in Oklahoma City (McKenzie, 2002).

A vast number of linguistic works on Kiowa come from the 1940s and 1950s,

most of which form a series of articles in the *International Journal of American Linguistics* (Crowell, 1949; Harrington, 1946; Wonderly et al., 1954; Sivertsen, 1956; Merrifield, 1959a,b). E.C. Trager Johnson continued work on the language's structure and pronominal prefixes (1960; 1972), Takahashi wrote his (1984) dissertation on Kiowa case-marking and noun classes, and Watkin's work (1976-1983) led to the first comprehensive grammar of Kiowa (1984). To date, Watkins' grammar remains the most detailed and complete analyses of Kiowa's morphology and phonology. Watkins' other work focuses more on the syntax and semantics of Kiowa, in particular switch-reference (Watkins, 1976, 1977, 1978b,a, 1982, 1987, 1990, 1993, 1995, 1996, 2009).

In the years that followed, there was another break in terms of formal linguistic analysis. Most work focused on preparing basic vocabulary lists and hymns (Russell, 1991; Paddlety, 1998; Kotay, 2005), education materials (Gonzales, 2001), and ethnographic materials regarding Kiowa cultural artifacts (Merrill et al., 1997). There was also a large push to publish and discuss Kiowa story-telling and histories, though very little Kiowa language is included (Boyd, 1981, 1983; Nye, 1997; Ellis, 2002; Archer, 2005; Tōcākút, 2000, 2002). In addition, N. Scott Momaday arose as a prolific Kiowa author - reading and writing original stories and poems about Kiowa life in Oklahoma.

The start of the 21st century has seen a resurgence in interest in Kiowa linguistics. Daniel Harbour conducted fieldwork on Kiowa writing about Kiowa's tone in an unpublished MIT masters thesis (2002) and Kiowa syntax in later work (Harbour, 2003; Adger and Harbour, 2007). Harbour has also collaborated with Laurel Watkins and David Adger, furthering understanding of both McKenzie's work (Watkins and Harbour, 2010) and the syntax of Kiowa (Adger et al., 2009). Andrew McKenzie's current work on the semantics of switch-reference focuses on Kiowa (2012; 2015), and Logan Sutton (2010; 2014) has worked from a historical-comparative perspective on the language. Finally, the current author's work analyzes the prosodic structure of Kiowa (Miller, 2015, *ura*), as well as using computational modeling with Kiowa's pronominal prefixes (*urb*).

3.1.3 Orthography and Data Presentation

There is no standard Kiowa orthography, which has certainly challenged revitalization efforts. While early researchers developed systems for their work (e.g. Harrington), few persisted past their initial use. Today, there are two main types of competing orthographies: phonetic transcription systems and transphonic systems (Neely and Palmer Jr., 2009). Phonetic transcription systems aim to achieve a one-to-one correspondence between sounds and symbols much like the International Phonetic Alphabet (IPA). This was the case with Harrington’s system, and it is the case with the best known Kiowa orthography (Parker McKenzie’s system). Transphonic systems are focused more on literacy, education, and direct communication. The first transphonic writing system for Kiowa was devised by students and teachers at the Summer Institute of Linguistics. The most widely-used transphonic system to date, however, is Alecia Gonzales’ writing system. I focus on the two most popular writing systems here.²

Parker McKenzie’s writing system is perhaps the best known system to date. McKenzie devoted the majority of his life to the study of the language and the development of an orthographic system. The system is summarized and published in McKenzie and Meadows (2001). It is praised for its phonetic accuracy in Watkins and Harbour (2010). The system has also been used extensively in various works on Kiowa (e.g. Palmer Jr., 2003; Meadows, 2010; McKenzie, 2010, 2012, 2015; Sutton, 2014). Though the most popular orthography amongst second language learners (e.g. at University of Oklahoma) and linguists for its marking of vowel length, nasality, and tone, native speakers find it difficult to learn and understand. Alecia Gonzales, using much of Parker McKenzie’s work as a guide, devised a more user friendly orthography for pedagogical purposes (Gonzales, 2001). See (39) for a comparison. Her transphonic

² There are other Kiowa writing systems used in different geographic locations (most transphonic), as well as two phonetic transcription systems that have been proposed and adopted in some Kiowa research (Harbour and Guoladdle, ms; Salmi, nd). Interested readers are directed to the above cited sources, as well as Neely and Palmer Jr. (2009) for a more detailed overview of all systems and the surrounding debate.

system is decidedly closer to English orthography and bypasses marking tone entirely while marking nasalization and non-English sounds with a series of digraphs and tri-graphs. It is also largely written in monosyllabic chunks. Though successfully used in the classroom (e.g. Anadarko High School), as well, it does not lend itself well to linguistic study.

(39) McKenzie and Gonzales Writing Systems (Neely and Palmer 2009:283)

	‘Come here’	‘one’	‘man’
McKenzie	èm á:	fá:gàu	qá:hî
Gonzales	Aim ahn	p’ah gaw	kxai-hehn

As the purpose of this dissertation is to study the phonology of Kiowa in depth, a transcription system like McKenzie’s is better suited to analysis. In the interest of a larger linguistic audience, however, a Kiowa writing system has been bypassed entirely in the present work. Instead, Kiowa data is presented using the IPA throughout the dissertation. The aim of doing so is to make the data more accessible for future linguistic research on the language, particularly research in phonetics and phonology.

3.1.4 Grammatical Sketch

This subsection provides a basic description of Kiowa grammar. The Phoneme Inventory is presented in (3.1.4.1), followed by Syllable Structure in (3.1.4.2), and Tone in 3.1.4.3. The final subsections conclude with an overview of the morpho-phonological structure of the Kiowa verb complex (3.1.4.4) and relevant syntactic information (3.1.4.5).

3.1.4.1 Phoneme Inventory

Kiowa’s phoneme inventory has been established in earlier work (see Wonderly et al., 1954; Sivertsen, 1956; Merrifield, 1959b; Trager, 1960; Watkins, 1984). See Table 3.1 for the consonant inventory. The use of /c/ as the alveolar affricate (usually transcribed as /t͡s/) is used widely within the Kiowa literature and is adopted here, as well. Note, also, that the phonemic status of the glottal stop is controversial. Some

work has concluded that the glottal stop in Kiowa is problematic and unpredictable and therefore phonemic (Wonderly et al., 1954; Trager, 1960), while other work has explained its distribution as entirely predictable and thus not phonemic (Sivertsen, 1956; Merrifield, 1959b; Watkins, 1984). The present analysis assumes the glottal stop is not a phoneme (adopting Watkin’s (1984)’s analysis, but the phonemic status of the glottal stop is not relevant to the arguments made here. It is included in Table 1, as this is an unresolved issue.

	Labial	Dental	Alveolar	Palatal	Velar	Laryngeal
Stops						
<i>Plain</i>	p b	t d			k g	(ʔ)
<i>Ejective</i>	pʼ	tʼ			kʼ	
<i>Aspirated</i>	p ^h	t ^h			k ^h	
Affricates						
<i>Plain</i>			c			
<i>Ejective</i>			cʼ			
Fricatives			s z			h
Nasals	m	n				
Liquids		l				
Glides				j		

Table 3.1: Consonants (adapted from Watkins 1984)

Kiowa’s vowel inventory may be found in Table 3.2. All vowels may be underlyingly short or long and oral or nasal. Length is marked with the IPA symbol [ː], and nasality is marked with the Polish hook (e.g. ą). The Polish hook is used extensively in the existing research on Kiowa, and that usage is continued here in place of the more modern tilde in order to avoid conflict with tonal diacritics.

3.1.4.2 Syllable Structure

The basic syllable in Kiowa consists of a vocalic nucleus, optionally preceded by one consonant (or Cj cluster), and optionally followed by one consonant from the set /p, t, m, n, l, j/ (Watkins, 1984). The syllable may be schematized as (C)V(C). Thus,

<i>Vowels</i>			<i>Diphthongs</i>		
	Front	Back		Front	Back
High	i	u	High		uj
Mid	e	o	Mid		oj
Low	a	ɔ	Low	aj	ɔj

Table 3.2: Vowels (adapted from Watkins 1984)

depending on the boundaries of syllabification, VCV sequences may be ambiguous in terms of syllabification. For example, a CVCV sequence may be syllabified as CV.CV as in the noun [mà:.jǽ] ‘woman’ or as CVC.V as in the verb [bàt.ôm] ‘You make it.’ This ambiguity will play a large role in the analysis of Kiowa in the following chapters.

3.1.4.3 Tone

Pitch is contrastive in Kiowa (high, low, and falling). High tone (H) is marked with an acute accent (e.g. á), low tone (L) is marked with a grave accent (e.g. à), and falling tone (HL) is marked with a circumflex (e.g. â). Only H and L are permitted on short vowels, while all three tones are permitted on long vowels or VC sequences when C is from the set /m, n, l, j/ (Watkins, 1984). A minimal triplet is provided below in (40).

(40) H-L-F Minimal Triplet [JA]³

k'ó:	‘cold’
k'ò:	‘to lay there’
k'ô:	‘knife; cut’

3.1.4.4 The Kiowa Verb Complex

According to Watkins (1984), the verb is the most complex word class in Kiowa. With up to seven slots, the verb can form an independent clause through a) inflection

³ When relevant, the bracketed initials (Speaker ID) of the consultant who provided the data are provided throughout the dissertation. Please see Section 3.3.1 for further information on each speaker.

for aspect, mood, and tense, b) verb agreement through pronominal prefixes, and c) the incorporation of verbs, nouns, and adverbs. The linear organization of the verb complex is provided in (41), which includes a pronominal prefix (Ppfx), an incorporated adverb (Adv), incorporated noun (N), incorporated verb (V), the verb stem (STEM), an inflectional or modal suffix (I/M), and syntactic suffixes (Synt).

$$(41) \text{ Ppfx} - (\text{Adv}) - (\text{N}) - (\text{V}) - \text{STEM} - \text{I/M} - (\text{Synt})$$

Only three elements above are obligatory: the pronominal prefix, stem, and the inflectional/modal suffix. Therefore, a verb complex in Kiowa may be very short as in (42) or extremely long as in (43).

$$(42) \begin{array}{l} \text{hón} \quad \emptyset- \quad t^h\acute{e}p \quad -\emptyset \\ \text{NEG [3sg]- go.out -PF} \\ \text{NEG Ppfx- STEM -I/M} \\ \text{'He didn't go out.' [ET]} \end{array}$$

$$(43) \begin{array}{l} \grave{a}n \quad \grave{a}- \quad b\acute{o}:- \quad p\acute{o}l\grave{a}:j\grave{i}- \quad \grave{e}:- \quad b\grave{a}: -m\grave{a} \\ \text{HAB [1sg]- always- rabbit- hunt- go -IPFV} \\ \text{HAB Ppfx- ADV- N- \quad V- \quad STEM-I/M} \\ \text{'I'm always going rabbit hunting.' [JA]} \end{array}$$

The first element, a pronominal prefix, is a complex element, which conveys semantic information about the primary participants in the verb (Merrifield, 1959b; Watkins, 1984, 1993; Adger and Harbour, 2007; Miller, *urc*). Specifically, Watkins (1984) argues that the pronominal prefix is composed of a tightly knit cluster of morphemes, which indicate the semantic role of the primary animate participant (agent or patient), that participant's person and number, and the number of any third person object. Each piece of information is encoded as a sub-syllabic segment (C or V) or tone (H or L) in the form C \acute{V} VC or C \grave{V} VC. The semantic interpretations of each segmental slot and tone are provided in (44).

$$(44) \begin{array}{cccccc} \text{C} & -\text{V} & & -\text{V} & -\text{C} & (\text{H/} \quad \text{L}) \\ \text{Person} & -\text{Person Number} & & -\text{Object} & -\text{Object Number} & (\text{Agent/} \quad \text{Patient}) \end{array}$$

For example, (45) shows a prefix that marks a second person plural agent and a plural object. Because the agent is second person, the first morpheme slot for Person is filled with /b/. The second slot for Person Number is then filled with /ɔ/, since the agent is plural. The third slot for Object is filled with /ia/, since the object is plural. The last morpheme slot is then filled with /d/, since a plural object is non-singular. Finally, the prefix is marked with a high tone, since the primary animate participant is an agent.⁴

(45)	b	-ɔ	-ia	-d
	2SG	-PL	-3PL	-PL

The underlying forms of the pronominal prefixes can be quite different from their corresponding surface forms, since they are subject to a series of phonological processes. For example, /b-ɔ-ia-d/ surfaces as [bát] as shown in (46).

(46) Pronominal Prefixes (Watkins 1984:41-42)

(x/AGT):2PL/PAT:PL/OBJ⁵

/b-ɔ-ia-d/

biád V Truncation

bjád Glide Formation

bád Glide Deletion

bát Final Devoicing

[bát]

The remaining obligatory elements are the stem and an inflectional/modal suffix. The stem may consist of a simple root or a root combined with derivational or

⁴ Interested readers are directed to Watkins (1984) and to Miller (urc) for a discussion of the pronominal prefixes and all of the possibilities for each of the morpheme slots.

⁵ The pronominal prefix glossing strategy adopted here is first found in Watkins (1984). Each gloss includes up to three parts (Agent, Patient, and Object) which indicate the person of that role in the prefix. An ‘x’ as in (x/AGT) indicates ‘any Agent’ is acceptable.

inflectional endings resulting in several different kinds of stems, including derived transitives and intransitives, thematic, and imperfective(/hearsay) stems (Watkins, 1984). For example, (47) shows a stem /bô:/ becoming imperfective and imperfective/hearsay.

(47)	Stem	IPFV Stem	IPFV/HSY Stem	Gloss
	bô:-	bô:-n	bô:-n-ê	‘look at, see’ (Watkins 1984:156)

Stems are then combined with inflectional or modal suffixes, such as imperfective/hearsay, imperative, and future in (48).

(48)	Inflectional/Modal Suffixes				
	Root	IPFV/HSY	IMP	FUT	Gloss
	/gû:n/	gû:n-ê:	gûn-ø	gûn-tò	‘dance’
	/â:j/	â:j-î:	âj-ø	âj-tò	‘start off’
	/gû:l/	gû:l-ê:	gûl-ø	gûl-tò	‘write’

Preceding the stem but following the pronominal prefix are optionally incorporated adverbs, nouns, and verbs (49). Incorporated stems are bare (without suffixes) and are typically phonologically identical to their unincorporated counterparts.⁶

- (49) a. adverb
 â- kòét- bá:
 [1sg]- fearfully- go.PF
 ‘I fearfully went.’ [JA]
- b. verb
 â- dè:- hê:m -à
 [1sg]- sleep- die -IPFV
 ‘I’m sleepy/I’m about to fall asleep.’ [ET]

⁶ A notable exception to this is that incorporated verbs beginning in an underlying voiced obstruent or /h/ demonstrate a stem-initial ablaut rule. Interested readers are directed to Watkins 1984:60 for a discussion of this process.

- c. noun
 bé- cá- hẹ:dè
 [2sg/agt:inv/obj]- door- remove.IPFV
 ‘Open the door.’ [JA]

Finally, syntactic suffixes mark clausal relationships such as relative clauses, subordinating conjunctions, and switch-reference markers (Watkins, 1984). A complete list of Kiowa’s syntactic suffixes is provided in (50), and (51) shows the nominal basic suffix /-dè/ in the context of a verb complex.

(50) Syntactic Suffixes (Watkins 1984:230-244)

Nominal	/-dè/	‘basic’
	/-gò/	‘inverse’
Locative	/-èm/	‘here/away’
	/-òj/	‘at/generally’
	/è/	‘here’
Switch-Reference	/-gò/	‘same’
	/-nò/	‘different’
	/-cè/	‘when/same’
	/è/	‘when/different’
Others	/-àl/	‘although, even though’
	/-dò/	‘because’

(51) Relative Clause Nominalization (/ -dè/ ‘nominal basic’)

kút gjá- tót -dè já- ǵ:
 book [(1sg):2,3sg/P:sg]- send.PF -NOM.BAS [(2,3sg):1sg/P:pl]- give.IMP
 ‘Give me the book that was sent.’ [JA]

3.1.4.5 Relevant Syntax

Kiowa demonstrates a basic SOV word order (e.g. Watkins, 1984; Harbour, 2003; Adger and Harbour, 2007; McKenzie, 2012) as seen in (52), though it is subject to change due to discourse factors. For example, topics may be left-dislocated and

given nouns may be right-dislocated after the verb. When two objects are present, the indirect object precedes the direct object. Kiowa is also a pro-drop language, and any argument can be left out. In fact, most Kiowa sentences consist only of a verb and its pronominal prefix.

- (52) cé:gùn sà:né Ø- hân
 dog snake [3sg]- eat.PF
 ‘The dog ate the snake.’ [JA]

Noun phrases consist of Quantifier - Demonstrative - Noun. Demonstratives are the only overt determiners in Kiowa. There are no adjectives in Kiowa. Instead, adjectival modification occurs through compounds (54) or relative clauses (recall 51).

- (53) té: új -gò cê: -gò
 all that -INV horse -INV
 ‘All those horses’ (adapted from McKenzie 2012: 35)

- (54) k’já:hî: -ét
 man -be.big
 ‘big man’ [ET]

Questions use a sentence-initial yes/no question particle hò as in (55). Wh-words are obligatorily fronted as in (56).

- (55) á -jój -gò hò bèt- kój- tò- hájgjá- dò:
 your -child.INV -INV Q [2pl/agt:pl/obj]- Kiowa- speak- know- be
 ‘Do your children speak Kiowa?’ [ET]

- (56) hôndé Ø- dò:
 what [3sg]- be
 ‘What is it?’ [ET]

In terms of phrase-structure, Adger and Harbour (2007) and Adger et al. (2009) show functional morphology (Aspect, Negation, Modal, Evidential) builds up from the verb in the tree with linear order mirroring the hierarchical structure. There has been some discussion as to whether or not Kiowa is right-headed or left-headed (see

McKenzie 2012 for a brief discussion). As this dissertation is primarily focused on phonology and only references basic syntactic structure, Adger et al. (2009)'s account is largely adopted in Figure 3.2, which is found on the next page.

There are two main differences from Adger et al.'s account. First, the lower information regarding the internal structure of the verb complex is included (e.g. incorporated elements). Some current models refer to X^0 (e.g. Relational Mapping, Syntax-Driven Mapping) while others use a "syntax all the way down" approach and refer to morphological cycles (e.g. the Syntactic Spell-Out Approach). Below, a Distributed Morphology structure has been adopted, as it will be useful to reference when testing the Syntactic Spell-Out Approach. This is not done to the exclusion of other approaches, though. Second, an AgrP approach to the pronominal prefixes has been adopted rather than three separate XPs denoting the main semantic components of the prefix. This is done to simplify the tree, as the details of the analysis are not pertinent to the present discussion.

Figure 3.3 presents the surface structure of the Kiowa clause indicating the main movements (S, O, and V) indicated. As the exact analysis of how the verb complex comes together (via head movement or some other morpho-syntactic operation) is not pertinent to the following analysis, it is not explicitly presented. Instead "Verb Complex" stands in for the conjoined (Adv)-(N)-(V)-STEM-I/M sequence, which joins with the pronominal prefix.

3.2 Saulteaux Ojibwe

This section introduces the Ojibwe Language - in particular the Saulteaux dialect. Again, subsections provide an overview of the language and its speakers (3.2.1), previous research on the language (3.2.2), the standard orthography used in instruction, and how Saulteaux Ojibwe data will be presented throughout this study (3.2.3). Saulteaux Ojibwe's grammatical sketch includes the phoneme inventory (3.2.4.1), stress (3.2.4.2), the verb complex (3.2.4.3), and relevant syntactic information (3.2.4.4).

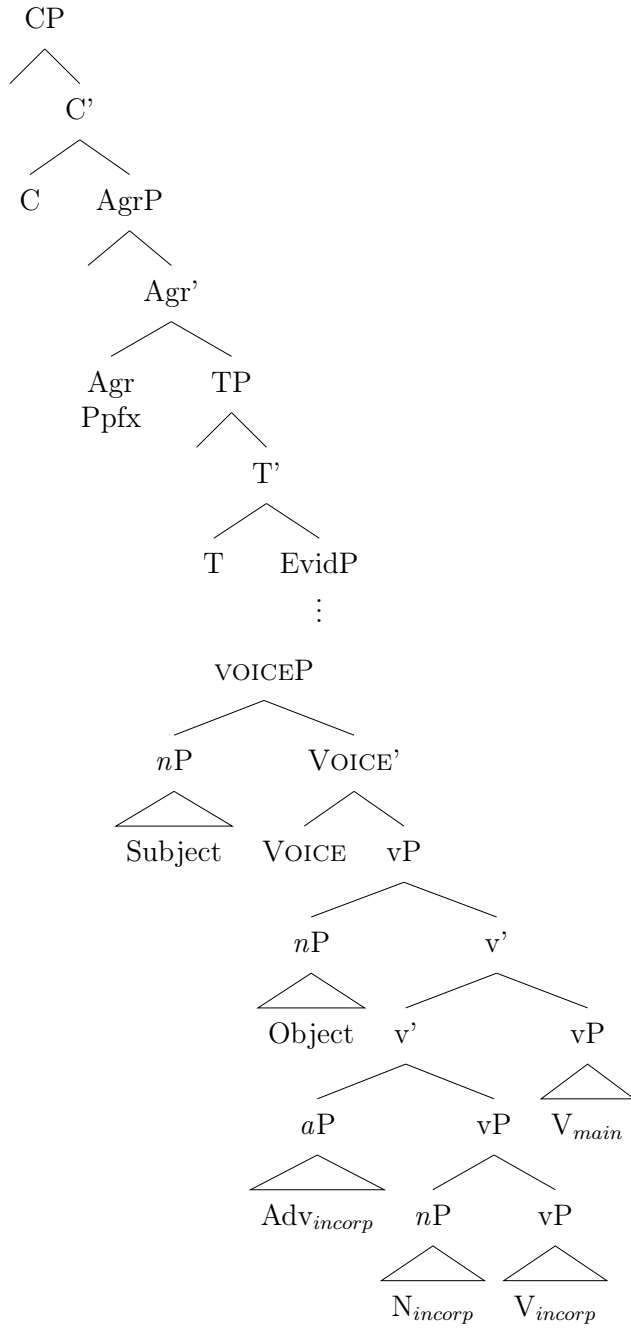


Figure 3.2: Kiowa Clausal Spine (Deep Structure)

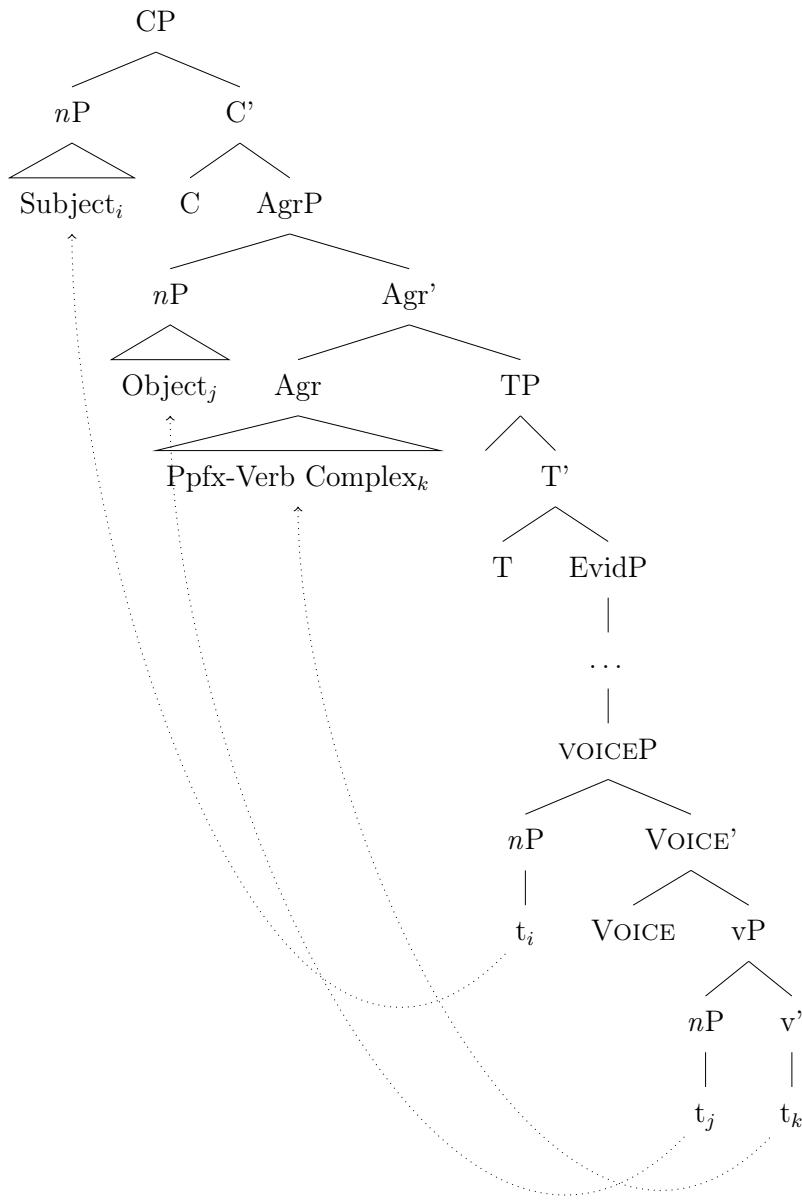


Figure 3.3: Kiowa Clausal Spine (With Movement)

3.2.1 The Language and its Speakers

Ojibwe (sometimes spelled Ojibwa or Ojibway) is an Algonquian language spoken in the Great Lakes region of the United States and Canada. It is one of the largest indigenous populations in North America with an ethnic population of approximately 160,000 living in Canada (Bishop, 2015) and 170,742 (Chippewa/Ojibwe) living in the US (US Census, 2010). Estimates of the number of native speakers are hard to come across and vary widely. For example, Ethnologue Online estimates the number to be 90,000, the UCLA Language Materials Project estimates 35,000-50,000, and Golla (2007) estimates 43,000 native speakers. The Ojibwe language poses a particular challenge to linguists as there are numerous dialects differing at virtually every level of linguistic structure (Valentine, 1994, 2001). The map below (from Valentine 2001:15) shows the different dialects and the areas in which they are spoken.



Figure 3.4: Ojibwe Dialect Map

This study focuses on the Saulteaux Ojibwe dialect (also known as Western Ojibwe or Plains Ojibwe), which is spoken in Southern Manitoba and Saskatchewan, Canada

(Valentine, 1994, 2001; Peers, 1994). More specifically, the data comes from speakers who grew up in the Lake Winnipeg area of Manitoba.

There is no central Ojibwe government. Instead, there are smaller bands of Ojibwe typically consisting of a single community and/or nearby reservations. The bands have elected governing officials and may even have distinct membership criteria (Warren, 1885). The regional Métis population (mixed-race descendants from aboriginal people and European settlers) is not included in the band governments, but they are officially recognized as First Nations people by the Canadian government (Canada Constitution Act, 1982). Saulteaux Ojibwe band offices and Indigenous Métis Friendship centers tend to have central offices in the city of Winnipeg.

Perhaps in great part due to the geographic isolation of the inter-lake communities, there are still approximately 10,000 speakers of Saulteaux Ojibwe (Golla, 2007). The dialect is endangered, however, because children are no longer acquiring the language. The majority of Saulteaux Ojibwe speakers are over the age of 40. There are active re-vitalization efforts, however, including language immersion camps and schools. There is also active Ojibwe education programs at (primary, middle, and high) schools and universities (e.g. Hogue et al., 1975; Johnston, 1978; Nichols and Nyholm, 1979; Nichols, 1986; White, 1983, 1988; Kewaquado, 1989; Beauchamp and Boulanger, 1995). In addition, a number of native speakers are going back to university in order to obtain a teaching certification in hopes of helping their local communities and reservations. The local community is therefore hopeful for the future of the dialect and Ojibwe language as a whole.

3.2.2 Previous Research

Saulteaux Ojibwe is one of the least studied dialects of Ojibwe. The first, and perhaps most comprehensive study of Saulteaux grammar, was a missionary grammar written by Belcourt (1839). It would be almost 150 years before the dialect would be revisited. The next published works were geared towards educators and students

interested in learning the dialect, though they also include some preliminary grammatical analysis of the dialect. Voorhis' (1976) phrase book and Cote et al.'s (1987) work on conditionals are often cited. In addition, Cote (1985) wrote *Saulteaux, Ojibway Dialect of the Plains* complete with individual vocabulary and grammar lessons. Scott et al. (1995) wrote a dictionary for the dialect. More recently, three MA theses provide linguistic analyses of different aspects of the dialect. Logan (2001) analyzes the morpho-syntax of several Saulteaux texts, Tallman (2011) analyzes the acoustic correlated of lenis and fortis stops in the dialect, and Cote (2012) analyzes the discourse function of Saulteaux /mi-/.

While there is relatively little work on Saulteaux Ojibwe, there is a rather large body of work studying Ojibwe and its other dialects. Though the dialects may sometimes differ quite a bit (see Rhodes & Todd 1981 and Valentine 1994, 2001 for detailed discussions of the dialectal differences), this other literature still offers valuable insight. Basic descriptions of Ojibwe include Bloomfield's (1958) grammatical sketch, texts, and word lists of Eastern Ojibwa, as well as the *Odawa Language Project* reports (Kaye et al., 1971; Kaye and Piggott, 1973a). Nichols' (1980) dissertation focuses on the morphology of Ojibwe. Of particular note is Valentine's (2001) *Nishnaabemwin Reference Grammar*, which is the most comprehensive grammar of Ojibwe to date. There are also numerous dictionaries and lexicons for various dialects (Baraga and Nichols, 1992; Rhodes, 1985; Piggott and Grafstein, 1983; Nichols and Nyholm, 1995; Valentine, 2011).

There is also a body of formal linguistic analyses. Major works on the morpho-syntax of Ojibwe include Rhodes (1976, 1991, 1994) and Piggott (1989). Works on semantics include Denny (1978a,b, 1986) and Rhodes (1980, 1981, 1986). The phonetics and phonology of various Ojibwe dialects are covered in early works such as Kaye (1973); Kaye and Piggott (1973b); Piggott (1980); Truitner and Dunnigan (1975) and Shrofel (1982). Also of particular interest in this dissertation is research on the Ojibwe verb and its elements (e.g. Rogers, 1978; Rhodes, 1990, 2006; Slavin, 2005, 2007, 2012a; Béjar, 2003; Lochbihler and Mathieu, 2007; Mathieu and Barrie, 2010; Barrie and

Mathieu, 2016), complex sentence structure (e.g. Johns, 1982), and the interaction between phonology and syntax (e.g. Piggott and Newell, 2006, 2016; Slavin, 2012b; Newell and Piggott, 2014).

3.2.3 Orthography & Data Presentation

There are two main orthography systems for Ojibwe: a syllabary system and a romanized alphabet. The syllabary was created in 1840 by the Protestant missionary James Evans (Todd, 1972; Fiero, 1976; Murdoch, 1981; Nichols, 1996; Walker, 1996; Mithun, 2001). Inspired by the success for a syllabary system for Cherokee, Evans developed a system for both Ojibwe and Cree which represents full syllables. Consonants are represented by separate symbols, and their orientation indicates which vowel is present. Consider the following chart:

(57) Ojibwe and Cree Syllabic Writing (Valentine, no date)

	e	i/i	o/oo	a/aa	Final
	▽	△	▷	◁	
w	•▽	•△	•▷	•◁	◦
b/p	∨	∧	>	<	<
d/t	∪	∩	⌋	⌈	⌋
j/ch	ſ	ſ	ſ	ſ	ſ
g/k	q	p	d	b	b
m	┐	┐	┐	┐	┐
n	ᵒ	ᵒ	ᵒ	ᵒ	ᵒ
z/s	ᶇ	ᶇ	ᶇ	ᶇ	ᶇ
zh/sh	ᶈ	ᶈ	ᶈ	ᶈ	ᶈ
y	ᶉ	ᶉ	ᶉ	ᶉ	ᶉ

Evans printed a hymnal in his syllabary system in 1841, and it spread quickly from that point. The system is still used widely in Manitoba and Saskatchewan, oftentimes seen alongside English and French on government signs.

Romanized systems are used throughout all Ojibwe-speaking areas, which are subject to regional variation (Double-Vowel System, Cree-Saulteaux Roman System, Northern Ojibwe System, Algonquin Roman System, Folk Spelling). Their primary differences revolve around methods of encoding certain aspects of Ojibwe phonology: vowel length, nasal vowels, obstruent contrasts, and sounds which typically require an IPA symbol. Regional debates thus argue for certain methods over others (e.g. Wolvengrey 1996 discusses Saulteaux-specific concerns). The most widely used system is the Double-Vowel System – an adaptation of Leonard Bloomfield’s (1958) work and developed by Charles Fiero and John Nichols (e.g. Nichols and White, 1987). It has been used in educational materials, dictionaries, and other work to promote standardization across dialects.

Under the Double-Vowel System, short vowels are written <i, o, a> with their long counterparts written as two vowels <ii, oo, aa>. The only exception is long /e:/, which is written as <e> as it is the only version available of the vowel. Nasal vowels are followed by <nh> word-finally or <ny> word-internally. Obstruents are distinguished by voicing (e.g. <p vs. b>), and sounds typically presented in the IPA are marked by a mix of monographs and digraphs ([tʃ] = <ch>, [dʒ] = <j>, [ʃ] = <sh>, [ʒ] = <zh>, and [j] = <y>).

Common practice in Ojibwe linguistics is to use the Double-Vowel system, but this hampers any detailed phonetic or phonological analysis. In fact, neither type of orthographic system (syllabary or romanized) offers much in terms of studying alternations, which is the main goal of this dissertation. Just as with Kiowa, Ojibwe data will be presented exclusively in IPA throughout this dissertation to encourage future linguistic research on the language, particularly research in phonetics and phonology.

3.2.4 Grammatical Sketch

This subsection provides a basic description of Saulteaux grammar. The Phoneme Inventory is presented in 3.2.4.1, followed by a brief overview of stress in 3.2.4.2. The morpho-phonological structure of the Ojibwe verb complex is detailed in 3.2.4.3.

3.2.4.1 Phoneme Inventory

Saulteaux Ojibwe’s phoneme inventory is discussed in previous works on the dialect (e.g. Voorhis, 1976; Cote, 1985; Valentine, 1994, 2001). See Table 3.3 for the consonant inventory. It is worth noting that there are multiple approaches to documenting the obstruents in the language. In some work they are distinguished by voicing only, and in others they are distinguished by a fortis/lenis contrast (e.g. Valentine, 2001; Logan, 2001). According to Valentine 2001:48, the voiceless obstruents not only differ in voicing but also in duration and muscular intensity. In Valentine’s work, the fortis obstruents are written as the voiceless counterparts (e.g. /p/), while the lenis obstruents are voiced (e.g. /b/). In other work, the difference is written as fortis /pp/ vs. lenis /p/. Because the fortis consonants may also be accompanied by pre-aspiration, Logan (2001) goes as far as also transcribing the fortis sound as /hp/ vs. lenis /p/. Though there is indeed evidence that fortis obstruents are geminate lenis consonants (see Valentine 2001) and pre-aspiration does occur (see Logan 2001), the exact nature of the contrast is not germane to the analyses in this dissertation. A voiced/voiceless distinction is adopted throughout this study for simplicity and easier reading.

	Labial		Alveolar		Alveopalatal		Palatal	Velar		Glottal
Stops	p	b	t	d				k	g	ʔ
Fricatives			s	z	ʃ	ʒ				
Affricates					tʃ	dʒ				
Nasals	m		n							
Glides	w						j			

Table 3.3: Consonants (adapted from Valentine 2001)

Ojibwe dialects (including Saulteaux) are described as having long and short versions of /i, a, o/ but only a long version /e:/ (e.g. Valentine, 2001; Logan, 2001). Piggott (1980) includes an analysis of an abstract /e/ in Odawa, though it is not clear that this is active in Saulteaux. In more recent research, Miller (2016) argues the short counterpart does play a roll but as an allophone in free variation with other short vowels.

	Front	Back
High	i/i:	o/o:
Low	e:	a/a:

Table 3.4: Ojibwe Vowel (adapted from Valentine 2001)

3.2.4.2 Stress

Analyses of stress assignment in Saulteaux Ojibwe are put forward by Voorhis (1976), Cote (1985), and summarized in Logan (2001) as follows:

(58) Saulteaux Stress Assignment (Logan 2001:11)

- a. Each syllable with a long vowel will be stressed.
- b. The last syllable of every word is obligatorily stressed.
- c. Every second syllable in a sequence of syllables with short vowels will be stressed. The other short vowels are realized in one of the unstressed allomorphs (often with [ɪ] or [e]) or are elided – though they are elided far less than in dialects to the east (especially Odawa).

As discussed in Miller (urb), this analysis is flawed because it fails to distinguish primary and secondary stress thus violating the property of culminativity (e.g. Hayes,

1995). Previous work on other dialects of Ojibwe, however, bypass these issues.⁷ While Ojibwe dialects differ in how frequently unstressed vowels are syncopated, metrical structure and stress is proposed to be largely consistent across the language. Thus, it is this previous work that builds the foundation for later analysis of Saulteaux stress in Chapter 5.

There is a general consensus in the literature that Ojibwe demonstrates left-to-right iambic parsing (Bloomfield, 1958; Todd, 1972; Kaye, 1973; Voorhis, 1976; Piggott, 1980; Cote, 1985; Hayes, 1995; Valentine, 1994, 2001; Logan, 2001; Piggott and Newell, 2016), but accounts differ in terms of whether foot construction is exhaustive (allowing degenerate feet), whether word-final prominence is due to phonological stress or phonetic final lengthening, and how exactly primary stress is assigned. There are two many accounts in the literature, which are referred to here (as in Miller *urb*) as the Exhaustive Foot Construction Approach (EFC) and the Non-Exhaustive Construction Approach (NEC).

The EFC builds on the proposal first introduced in Kaye 1973 (Piggott, 1980; Valentine, 1994, 2001; Piggott and Newell, 2016) which requires that foot construction spans the entire word allowing degenerate (monomoraic) feet at the right edge of the word.⁸ Long vowels must occur in a strong position, either as the head of an iambic foot or the only syllable in a bimoraic foot. Word-final vowels must also occupy a strong position, regardless of length, even if this yields a degenerate foot. This is stipulated as final vowels have been perceived as prominent. Finally, primary stress is assigned to the foot head (strong position) in the antepenultimate foot of the word.

⁷ Examples of this work include analyses of Eastern Ojibwe/Odawa in Bloomfield (1958); Kaye and Piggott (1973a); Piggott (1980); Hayes (1995); Valentine (1994, 2001); Piggott and Newell (2016), North Western Ojibwe in Valentine (1994), and Severn Ojibwe in Todd (1972); Valentine (1994).

⁸ It is not immediately clear if "the word" is meant to refer to ω in previous work, as there is no overt discussion of the exact domain of stress assignment. Piggott and Newell's (2016) analysis of the Odawa dialect's stress adopts a phase-based perspective thus eliminating the use of prosodic structure entirely.

(59) Stress in Ojibwe (Exhaustive Foot Construction)

- a. Parse iambic feet left-to-right with the following restrictions:
 - i. Long vowels must occupy a strong position
 - ii. Word-final vowels must occupy a strong position
- b. Main Stress is placed on the strong syllable in the antepenultimate foot

Consider the following examples from Eastern Ojibwe (Valentine 2001:52). Primary stress is indicated by an acute accent on the stressed syllable's vowel. Iambic feet are parsed left-to-right. Feet are bracketed, while foot heads (strong positions) are bolded. Long vowels necessarily occur in the strong syllable of the foot. If this does not happen, they are forced to form their own foot, and foot parsing begins again immediately to its right as seen below.⁹ Degenerate feet are allowed at the right edge, which is also seen below. Finally, primary stress is assigned by counting three feet from the end of the word and assigning primary stress to the strong syllable of that foot. If the word is shorter than three syllables, the initial (or only) foot head is assigned primary stress.

(60) [g i d **a**]_Σ [g o ʃ **i** n]_Σ 'you arrive' (Valentine 2001:52)

(61) [**e:**]_Σ [s i b **a**]_Σ [n **a** g]_Σ 'you arrive' (Valentine 2001:52)

The proposed primary stress rule is typologically unexpected. In fact, it has long been claimed in the literature that primary stress is limited to a maximal three-syllable window at either edge of the word domain (confirmed in Kager, 2012). Placing primary stress on the antepenultimate foot-head, on the other hand, requires a five-syllable window. Hayes' (1995) NEC analysis of Eastern Ojibwe/Odawa stress bypasses this issue. While iambic feet are still parsed left-to-right, Hayes proposes a language-wide

⁹ Note that Valentine (2001:52) uses /e/ to indicate the long vowel in accordance with the Ojibwe standard orthographic practices. Length is indicated here by [:] for easier reading.

ban on degenerate feet.¹⁰ Any perceived final prominence, he argues, is phonetic and thus irrelevant at the foot-level. Primary stress is then assigned to the antepenultimate (footed) syllable.

- (62) [n i n a]_Σ [m a d a]_Σ < b i m i > ‘we (excl.) sit’
(Hayes 1995:217; data from Piggott 1980:69)

3.2.4.3 The Ojibwe Verb Complex

Ojibwe verbs form four morphological classes based on transitivity and the gender (or animacy) of the selected argument (see Figure 3.5). Intransitive verbs can either be Animate Intransitive (AI) or Inanimate Intransitive (II). Likewise, Transitive verbs can be Transitive Animate (TA) or Transitive Inanimate (TI).¹¹ Though the classes tend to be quite regular, there are syntactic mismatches and a small class of VAI verbs select for an object even though they are intransitive (Valentine, 2001; Slavin, 2012b).

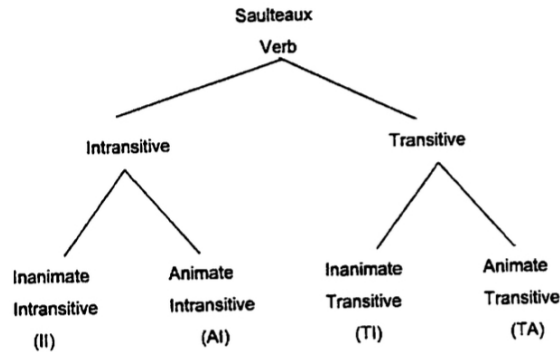


Figure 3.5: Ojibwe Verb Classes (Logan 2001:78)

¹⁰ For a discussion of how Hayes justifies this, interested readers are directed to Hayes (1995) and Miller (urb).

¹¹ The acronyms used here are traditionally used throughout Algonquianist literature. They are also presented as VAI, VII, VTA, and VTI respectively (see Valentine, 2001, for a comprehensive catalogue of verb classes and possible paradigms in Ojibwe). Though the order in which transitivity and animacy are indicated change between intransitive and transitive verbs, the traditional labels are adopted for this study.

In addition to the morphological classes, there are three mood conjugations (Independent, Imperative, and Conjunct). The Independent Order is used in declarative sentences. The Imperative Order is used in imperative sentences. The Conjunct Order is used in subordinate clauses, questions, and certain declarative sentences (Valentine, 2001). Each order conforms to a template according to its morphological class, including person affixes (involving number and obviative status in the discourse), negative, and mode (Indicative, Preterit, Dubitative, Preterit Dubitative). As an example, consider the templates for VAI verbs in (63)-(65) from Valentine (2001).

- (63) *Independent Order Template (VAI)*
 Person - STEM - Negative - 1,2Person Plural - Mode - 3Person Plural/Obviative
- (64) *Imperative Order Template (VAI)*
 STEM – Mode/Polarity – Person/Number
- (65) *Conjunct Order Template (VAI)*
 STEM – Negative – Person/Number/Obviative – Mode

The Ojibwe stem is not traditionally considered a single morphological unit in the literature. Instead, it is said to consist of an *initial*, *medial*, and *final* element (e.g. Bloomfield, 1946, 1958, 1962; Wolfart, 1973; Rhodes, 1976; Goddard, 1988, 1990; Valentine, 2001). Some work proposes that the stem elements, since they are decomposable, require a layered approach to the morphology (Rhodes, 1976; Goddard, 1988, 1990; O'Meara, 1990).

The initial is the only obligatory element, the medial adds a nominal meaning, and the final defines the category of the stem often including a lexical component. Consider (66) - (68) for examples from Slavin 2012a:14. The stem *niimi* in (66) consists only of an initial element, *miskosi* in (67) consists of an initial and a final, and *tahkisite* in (68) consists of all three elements (initial, medial, final).

- (66) niimi
 dance.AI

- (67) miskosi
 misko-si
 red-AI
 ‘It [inanimate] is red.’
- (68) tahkisite
 tahki-sit-e
 cold-foot-AI
 ‘She has cold feet’

The set of possible morphemes for each elemental slot is quite varied and hard to categorize in a cohesive way. For example, initials can include adjective, adverbial, or verbal elements (e.g. Rhodes, 1976), and finals can be either abstract (only category defining) or concrete (offering lexical meaning) (e.g. Valentine, 2001).

The Ojibwe verb complex also optionally includes preverbal modifiers and tense markers. Piggott and Newell adopt the following template in (69). It begins with a pronominal prefix, tense, any preverbal modifiers, the verb stem, and the inflectional endings follow the verb conjugations described above (e.g. Independent, Imperative, Conjunct).

- (69) The Ojibwe Verb Complex (Piggott and Newell 2016:6)

Pronominal Affix	Tense Marker	Modifier	Verb Stem	Inflection
------------------	--------------	----------	-----------	------------

The picture is complicated, however, by the morpho-syntactic status of affixes versus clitics. It has been argued that the Pronominal Affix is, in fact, a clitic (e.g. Halle and Marantz, 1993; McGinnis, 1995; Déchaine, 1997; Richards, 2004; Mathieu, 2007; Cook, 2008; Branigan, 2012; Oxford, 2013) In addition, Oxford (2013) discusses a separation of the Inflectional Suffixes above: inner versus outer suffixes.

(70) Algonquian Verb Morphology (adapted from Oxford 2013:3)

Prefix	Root <i>v</i>	Theme Sign	Neg	Inner Suffix	T	Outer Suffix
SUBJECT		OBJECT		SUBJECT		OBJECT
[person]		[person]		[pers/num]		num/gen
clitic		agreement		agreement		clitic

Consider (71) below. The Inner Suffix, which agrees with the prefix and subject, is classified as a suffix. It is conditioned by number (making the first person subject plural), appears closest to the verb stem, appears between inflectional suffixes (NEG and PAST), and it varies according to tense ([wa:na:nj] for present tense). Conversely, the Outer Suffix is conditioned by definiteness, is historically related to a definite article, and is does not vary for any reason. As Oxford points out, the properties of the Outer Suffix are better explained as clitic doubling than agreement.

- (71) n- wa:bm -a: -si: -mina: -banj -ag
 1PE- see -3PE -NEG -1PE.PL -PAST -3PE.PL
 ‘We did not seem them’ (adapted from Valentine 2001:292, Oxford 2013:3)

There is no limit to the number of preverbs allowed within the complex, though there are rarely instances of more than five (Valentine, 2001; Slavin, 2005). Consider the following verb, which comes from a longer sentence translating to ‘Our darn little teenage turtles, probably never tried to pretend to be smart and wise.’ (adapted from Logan 2001:51).

- (72) gi:- gagwe:- niba:ga:- ga:fo -fki -si: -toge: -ban -i:k
 PAST- try- be.smart/wise- pretend -habitual -NEG -DUB -PT -3PE

The following schematization of the Ojibwe verb complex is adopted throughout the following analysis. It should be noted that while there are arguments for the clitic status of the pronominal and object number elements, no previous analysis has argued for clitic-specific phonological phenomena. Results of the present study may or may not confirm these morphemes to be phonologically separate (or have clitic-status).

(73) The Ojibwe Verb Complex (Revised)

Pronominal = Tense - Modifier(s) - STEM - Inflection = Obj. Number

3.2.4.4 Relevant Syntax

Ojibwe is traditionally described as a non-configurational language with free word order. A fully inflected verb is the only requirement element of an Ojibwe clause – encoding semantic roles, aspect, and more (Logan, 2001; Valentine, 2001, among many others). Subject to the Pronominal Argument Hypothesis (Jelinek, 1984), overt NPs are completely optional and are in fact adjuncts referring to the argument pronouns in the verb itself.

While it is true that in most cases that word order is completely free, discourse and syntactic functions can play a role in the order of NPs with regards to the verb. According to Tomlin and Rhodes (1979), Ojibwe demonstrates a basic preference for VOS word order. Logan (2001) goes a step further and suggests Saulteaux Ojibwe’s dialectal preference is VO(S), as overt subjects are rarer than overt objects though do occur as seen in 74 and 75.¹²

- (74) ni- tʃa:nis -ək wi:smi -jək
1PE.POSS -child -PL eat -PL
‘My children are eating.’ Subject-Verb Order [YC]

- (75) wi:smi -jək ni- tʃa:nis -ək
eat -PL 1PE.POSS -child -PL
‘My children are eating.’ Verb-Subject Order [YC]

Noun Phrases and Adverb Phrases consist of modifiers followed by the head. Noun modifiers may be possessors, demonstratives, number, or a general quantifier as in (76), and Adverb modifiers are qualifying adverbs as in (77).

¹² See Dahlstrom (1995)’s semantic account for pre-verbal NPs (e.g. Topic, Negative, Focus, Oblique), giving them special status in Algonquian languages.

(76) ni- tʃa:nis -əʔk
 1PE.POSS- child -PL
 ‘my children’ [YC]

(77) a:ʒi be:fo
 already near
 ‘quite soon’ (adapted from Valentine 2001:932)

Yes/No Questions include a question particle *na* after the word being questioned as in (78). Yes/No questions are also reported to be accompanied by a rising intonation. In content questions, WH-words are obligatorily fronted as in (79).

(78) waja **na** gi:gõ: gi- gi:- de:bna:?
 any Q fish 2PE- PAST- catch
 ‘Did you catch any fish?’ (adapted from Valentine 2001:975)

(79) a:ni:n ʃikwa ki:n?
 how then you?
 ‘How are you?’ (adapted from Logan 2001:170)

The basic clausal structure used in Piggott and Newell 2016’s work on Odawa has been adopted here. No overt NPs have been included. Recall that according to the Pronominal Argument Hypothesis, if they are present they are adjuncts in the tree. Instead, the subject argument is present as pro_i - with the appropriate person prefix inserted under C. A space for a pronominal object argument has also been provided (pro_x). The tree includes an SVO order considering the pronominal arguments, but keep in mind the surface order may be any order of S, V, and O.

3.3 Data Collection

Unless otherwise cited, the data throughout this dissertation comes from field-work on Kiowa and Saulteaux Ojibwe during 2016. The following subsections provide an overview of this work: locations and consultants (3.3.1), how recordings were made and stored (3.3.2, and which tools were used during analysis (3.3.3).

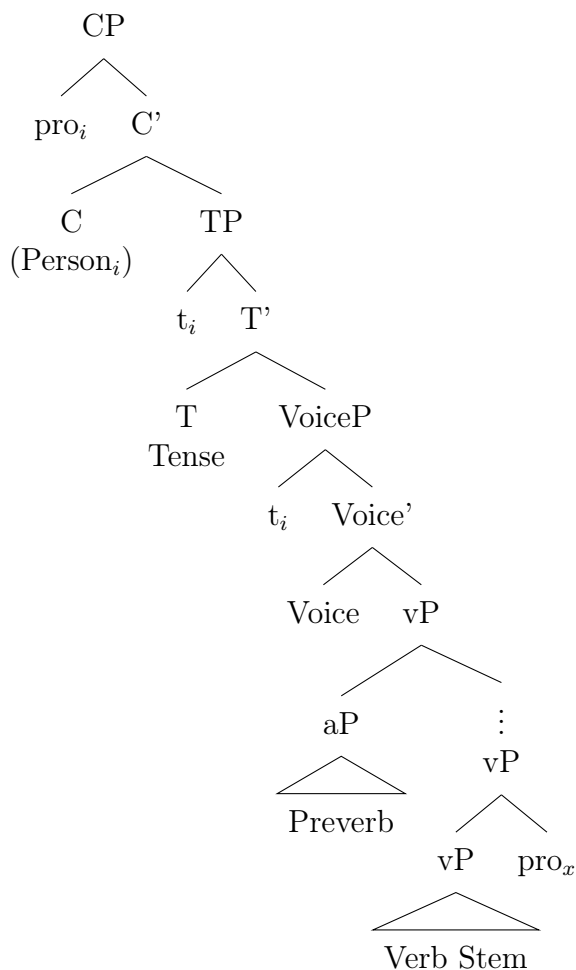


Figure 3.6: Saulteaux Clausal Spine (adapted from Piggott and Newell 2016:18)

3.3.1 Consultants and Locations

The corpus of Kiowa data for the current study consists of 35 hours of recorded interviews, comprised primarily of recordings of two native speaking consultants. A third consultant also worked on the project, though not regularly. Elicitation sessions took place in Carnegie, Oklahoma over four weeks (June 2016). Most sessions were recorded at the Administration of the Aging, the elder center at the Kiowa Tribal Complex, though additional sessions were recorded at the Carnegie Public Library. Relevant demographics and language background for each of the Kiowa consultants

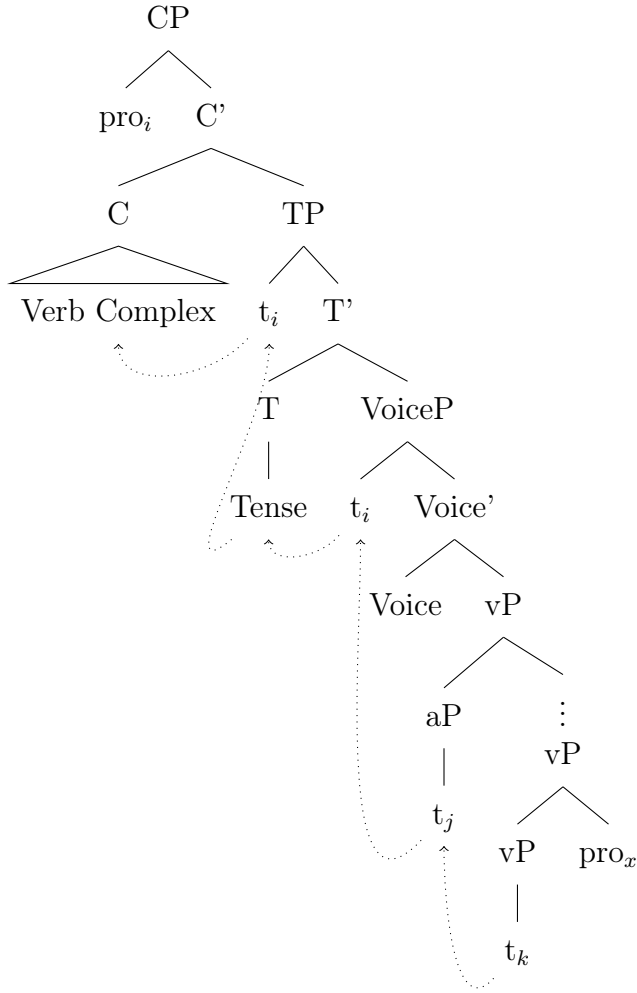


Figure 3.7: Sauiteaux Clause (With Movement)

are found in Table 3.5.

The corpus of Sauiteaux Ojibwe data consists of 24 hours of recorded interviews with eight native speaking consultants. Elicitation sessions took place in Winnipeg, Manitoba over two trips. The first trip lasted four weeks (July 2016), and the follow trip lasted two weeks (fall 2016). Interviews were recorded in the speakers' homes, the University of Winnipeg's campus center, or in the Indian and Méti Friendship Centre. Relevant demographics and language background for each of the Sauiteaux consultants are found in Table 3.6.

Speaker ID	Gender	Age	Languages Spoken	Birthplace
DH	F	87	Kiowa, English	Carnegie, OK
ET	M	79	Kiowa, English	Carnegie, OK
JA	F	87	Kiowa, English, Spanish	Cargnegie, OK

Table 3.5: Kiowa Consultant Demographic Information

Speaker ID	Gender	Age	Languages Spoken	Birthplace
AB	F	59	Ojibwe, English	Berens River, MB
CN	M	67	Ojibwe, English	Roseau River, MB
FR	M	45	Ojibwe, English	Gypsunville, MB
MM	F	66	Ojibwe, Cree, English	Blood Bay, MB
RL	F	65	Ojibwe, Cree, English	Hollow Water, MB
SL	F	53	Ojibwe, Cree, English	Sandy Bay, MB
TC	M	45	Ojibwe, English	Duck Bay, MB
YC	F	74	Ojibwe, English	Duck Bay, MB

Table 3.6: Saulteaux Consultant Demographic Information

Each native speaking consultant is identified by a sequence of initials in the tables above. As briefly mentioned in footnote 3, novel data examples are accompanied with the bracketed initials of the speaker who produced the relevant utterance(s).

3.3.2 Recordings and Storage

All sessions with native speakers were audio-recorded and documented in field notes. Audio was recorded using a Blue Snowball iCE microphone, mounted on a desktop stand, and connected to an Apple Macbook Pro via USB. A desktop mounted microphone was used rather than a head-mounted microphone in order to maximize comfort for native speaking elders. Several expressed hesitation to participate if they had to wear any equipment. Sessions did not take place in sound proofed environments. Therefore, recordings have a fair amount of background noise. As the goals of this dissertation did not include acoustic analysis, however, the loss in recording quality does not directly interfere with any findings. All recordings were backed up each evening in multiple locations, and copies of all recordings (digital and CD) were provided directly to the Kiowa Tribal Museum and the University of Washington through the Jacobs Research Fund.

3.3.3 Analytical Tools

Audio files were recorded in Audacity and saved as WAV files for storage and analysis. Each recording was then annotated using Praat textgrids allowing later IPA transcription. If necessary, the spectrogram was referenced to verify tone markings.

3.4 Methodology

Data in this dissertation was collected through a mix of elicitation and consultation of previously published data in the language. Three translation-based tasks (individual word translation, incremental sentence building, and structural correction) and one disambiguation task were used in the field.

Individual word translation was the least taxing of the tasks for the consultants and was the most effective tool for ear training in both languages. A version of the

Swadesh List found in Bower's (2008) *Linguistic Fieldwork: A Practical Guide* was used as a starting point. Working within noun and verb paradigms, the addition and subtraction of affixes allowed for observation of lower-level phonological phenomena in simple environments. Resulting structures were used to construct new forms to test in subsequent elicitation sessions. For example, in both languages, obstruent-final roots and morphemes that came up during a session in order to construct data in which the effects of Final Devoicing could be observed in different places in the sentence, noun phrase, and verb complex.

(80) Obstruent-Final Stems in Saulteaux Ojibwe

Interviewer: What is the word for 'snake'?

Consultant: [kne:bɪk]

Interviewer: [kne:bɪk]

Consultant: Yes, that's right.

Interviewer: And what if there is more than one [kne:bɪk]?

Consultant: Then you would say [kne:bɪgo:k].

Incremental Sentence-Building was used for higher-level phenomena and more complicated syntactic structures. Beginning with simple sentences (e.g. 'The boy sent the letter. '), modifiers or semantic roles were added in order to examine incrementally more complicated structures (e.g. relative clauses, conditionals, etc.). In Kiowa, this often involved adding incorporated elements as in (81). In Ojibwe, this meant adding preverbs or verb inflections.

(81) Incremental Sentence Building in Kiowa

àbà:	I go.
àbà:mà	I am going.
ẹ:bà:mà	I go hunting.
àpòlà:jìẹ:bà:mà	I go rabbit hunting.
àbô:pòlà:jìẹ:bà:mà	I always go rabbit hunting.

By building up incrementally, the speaker is able to work with small changes instead of full translations - easing the difficulty for the consultant. It also allows the linguist to see phonological changes for each structural change, thus allowing for further study of phenomena across junctures and domains that may have not been anticipated.

The third, and unexpectedly successful, method was providing consultants with hypothetical pronunciations of constructions and asking them to translate and/or correct the sentence. Though originally planned to avoid pronouncing any language data aside from repetition to avoid priming a consultant's response grammaticality judgment, this method proved best when working with more rare constructions. For example, the Kiowa Imperfective-Hearsay verb forms proved quite difficult to elicit because it was a rarer verb form even when the language was its healthiest. By first offering the pronunciation first, consultants remembered and then produced new and related forms (e.g. èm-gú:nê 'I heard they are dancing.'). An unanticipated side effect of this method was the happy response it evoked from each of the Kiowa consultants. For each of them, it was the first time they'd heard the form in years, and they also enjoyed listening to someone learn and become better at speaking the language.

Finally, to pursue analysis of higher-level phonological phenomena (e.g. the phonological phrase and intonational phrase), prosodic disambiguation tasks were designed in both languages. Conjunction ambiguities allowed for observation of processes at the edge of the phonological phrase as in (e.g. I invited [Dan and Tim] or [John] vs. I invited [Dan] and [Tim or John]). Sentences that differed only in intonational phrases were also examined in Saulteaux Ojibwe (e.g. When danger threatens, your children call the police. vs. When danger threatens your children, call the police.). Similarly structured sentences were not possible in Kiowa due to its more rigid SOV word-order. In each type of test, the disambiguated sentences offered a type of minimal pair in terms of prosodic edges. Namely, in one sentence a word (e.g. 'Tim' and 'child' respectively) was at the edge of phonological or intonational phrase, while in the other sentence it was at the end. This task was the most difficult to elicit and for the consultants to understand. Not every consultant was capable of completing the

task. In most cases, the consultants did not want to tolerate the ambiguity and instead disambiguated the sentence by changing the structure completely.

Chapter 4

KIOWA AT THE INTERFACE

4.1 Introduction

In this chapter, the four main interface approaches are evaluated using data from Kiowa. As discussed in Chapters 1 and 2, Kiowa has been selected as one of two case studies in this dissertation due to its complex morpho-syntactic structure - particularly because of its widespread use of incorporation. Traditionally described as "polysynthetic," it is this complexity which offers a critical test for any phonology-syntax interface model. In addition, Kiowa is critically endangered and the phonology of the language is understudied relative to its morpho-syntax and semantics (see Chapter 3). Thus, this chapter is intended not only to serve the theoretical questions put forward in this dissertation but also to further document the phonological system of the language.

The remainder of this chapter is outlined as follows. In Section 4.2, the four main interface approaches are considered. Of the four models, three make testable predictions: Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. These models yield three unique sets of predictions regarding the phonological domains of Kiowa. The predictions primarily differ in treatment of the lexical verb and whether or not the model in question predicts verb-internal phonological domains. Section 4.3 consists of a comprehensive prosodic analysis of Kiowa, focusing on the domains of eleven phonological processes. Three domains of different sizes are found for Kiowa, among which confirm the presence of verb-internal domains. Relational Mapping and the Syntactic Spell-Out Approach successfully predict verb-internal domains, but Relational Mapping is the most successful model when accounting for the phonological patterns in Kiowa (Section 4.4). As Relational Mapping is the only model which

assumes a strict separation between morphology and syntax as grammatical modules, its sole success has broader implications beyond Kiowa-specific phonology as discussed in Section 4.5.

4.2 Kiowa-Specific Predictions

As previously discussed in Chapter 2, the Phenomenon-Based Approach does not make theoretical predictions. This is due to the fact that it is a purely data-driven approach which assigns names to all present phonological domains in the language. In fact, The Phenomenon-Based Approach *cannot* fail to account for all of the domains in Kiowa, though the names of those domains may vary. By nature, the unlimited proliferation problem and the lack of systematic definitions for prosodic constituents means the Phenomenon-Based Approach is merely descriptive. Thus, the focus of this chapter is to evaluate the three remaining, predictive interface approaches: Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach.

In the following subsections each model’s predictions are evaluated from individual morphemes up to the full clause in the syntax. For Indirect Reference models this means evaluating structure from the Phonological Word (ω) to the Intonational Phrase (ι). The basic Kiowa clause and compound structure, discussed in detail in Chapter 3, are provided again below. Note that the maximal verb is included (all incorporated elements and possible affixes).

(82) **Clause:** Subject Object Ppfx-Adv-N-V-Stem-I/M-Synt

Compound: Root₁ + Root₂

4.2.1 Relational Mapping

Relational Mapping predicts four prosodic constituents will play a role in Kiowa phonology: the phonological word (ω), the composite group (κ), the phonological phrase (φ), and the intonational phrase (ι). First, recall Vogel (to appear)’s definition of ω arising from the *Principle of the Morphological Core*.

(83) **Principle of the Morphological Core** (Vogel to appear:50; cf. Vogel 2012:52)

A Phonological Word must contain a morphological root.

Given the above definition, the Kiowa verb complex will consist at least one phonological word (the obligatory verb stem and patterning affixes). Previous work has noted that suffixes pattern within the ω more often than prefixes (e.g. Kabak and Vogel, 2001; Vogel, 2008, 2009a, Vogel, to appear), so the role of the prefix is unclear before phonological patterns are taken into account. Depending on the number of incorporated stems, the Kiowa verb may reach up to four ω s. Note that without phonological information, it is unclear how many (if any) suffixes form part of the verb stem's ω . Assuming all suffixes pattern with the stem, Relational Mapping predicts the following ω s in the Kiowa verb (84).

$$(84) \text{ Ppfx} - [\text{Adv}]_{\omega} - [\text{N}]_{\omega} - [\text{V}]_{\omega} - [\text{STEM} - \text{I/M} - \text{Synt}]_{\omega}$$

According to the Composite Prosodic Model's *Principle of Minimal Distance*, any stray elements (prosodic word adjoiners (PWAs), clitics, function words) join the ω (s) at the next level: the Composite Group (κ). In addition, κ forms the domain for compounds.

(85) **Principle of Minimal Distance** (Vogel to appear:51)

Material must be parsed at the next available level.

If any Kiowa prefixes or suffixes are PWAs, they are predicted to join at the κ . In addition, compounds should group at the κ accounting for any compound-specific phonological processes that apply in the language.

Next, φ is proposed to consist of the head of a syntactic phrase (XP) and optionally its complement. Kiowa's Verb Phrase consists of an optional object followed by the verb complex (V head) as in (86). Given this definition, the object NP will form a φ , and the VP φ in Kiowa will consist of at least the verb complex. Phonological patterns will show whether or not the object and the verb complex act as a cohesive φ or not, which if it does, will trigger φ restructuring, placing the NP into the higher φ eliminating recursion at the phrase-level.

$$(86) \quad [[NP] V]_{VP}$$

Finally, the ι is defined as CPs and external syntactic structure like parathetical expressions or tag questions. Any CP in Kiowa should therefore be mapped to ι before potential restructuring. To summarize, Relational Mapping predicts the following prosodic domains in (87).

(87) Relational Mapping Predictions

Clause: $[[[Subject]_{\omega}]_{\varphi} [[Object]_{\omega} [Ppfx-[Adv]_{\omega}-[N]_{\omega}-[V]_{\omega}-[STEM-I/M-Synt]_{\omega}]_{\varphi}]_{\iota}$

Compound: $[[Root_1]_{\omega} + [Root_2]_{\omega}]_{\kappa}$

4.2.2 Syntax-Driven Mapping

Next, consider Syntax-Driven Mapping - in particular - Match Theory (c.f. Selkirk 2011). As Match Constraints reference syntactic constituents, the Kiowa clausal spine is provided again in Figure 4.1. While the tree provided adopts a Distributed Morphology structure with categorical heads and phrases, Match Theory references classic X' constituents (lexical X^0 , XP, CP). More often than not, the lowest categorical phrase (nP , aP , vP) corresponds with the lexical X^0 and is referenced as such for the current purposes.

Match constraints alone predict complete isomorphism between syntactic and prosodic structure at the surface. Thus, each lexical head (X^0) corresponds to a ω , each phrase (XP) corresponds to a φ , and each clause (CP) corresponds to an ι . Any non-isomorphism derives from phonological patterns in the data spanning adjusted domains indicating higher ranked markedness constraints.

The three Match Constraints together predict the structure in (88). After head-movement of the incorporated stems, the Kiowa verb complex forms a single V head in the syntax tree. Thus, according to Match-Word, the entire verb complex is predicted to correspond to a single ω . Match-Phrase requires each XP to map to a φ , yielding recursive phrasing within the VP: one φ for the object NP embedded within one φ for the full VP. Finally, Match-Clause maps a CP to an ι .

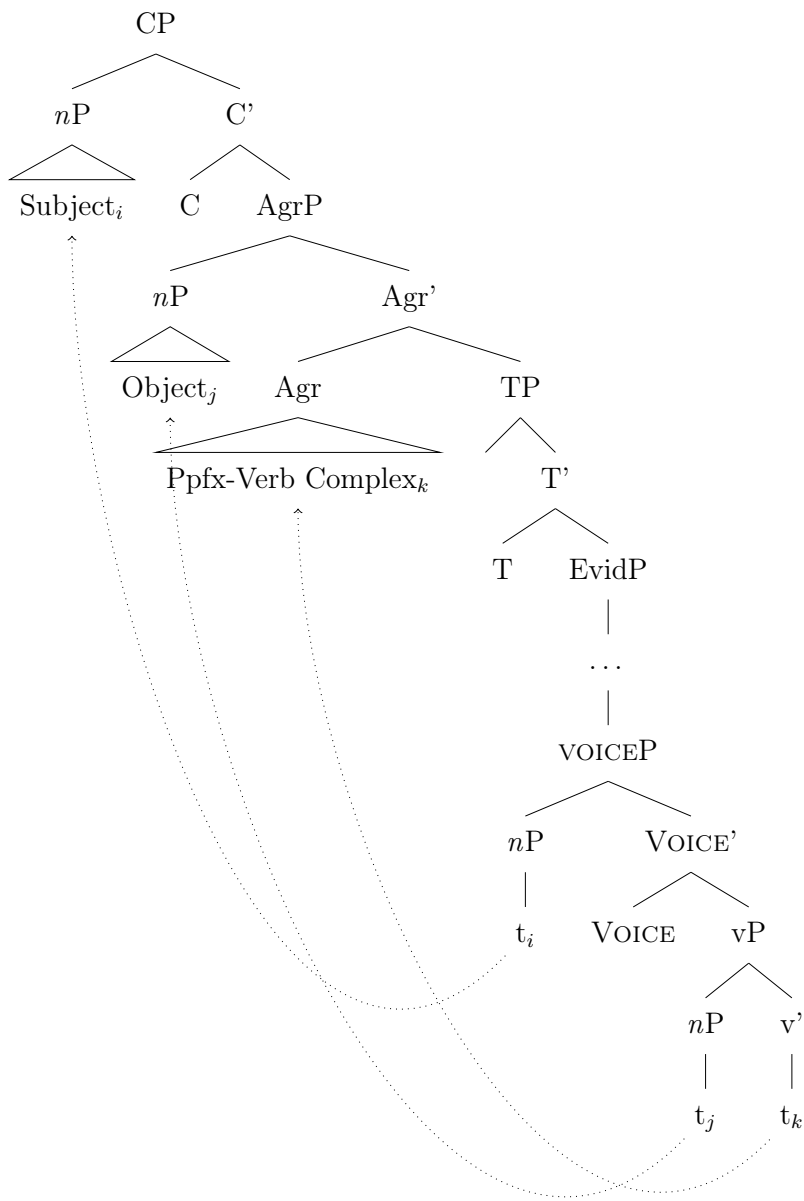


Figure 4.1: Kiowa Clause - Repeated

(88) Syntax-Driven Mapping Predictions

Clause: $[[[\text{Subject}]_\omega]_\varphi \ [[[\text{Object}]_\omega]_\varphi \ [\text{Ppfx-Adv-N-V-STEM-I/M-Synt}]_\omega]_\varphi]_\iota$

Compound: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\omega$

4.2.3 Syntactic Spell-Out Approach

Finally, consider the Syntactic Spell-Out Approach. Possible phase heads include clause-level heads *C*, *v*, and morpheme-level categorizing heads *v*, *a*, and *n*. In (89), there are 6 predicted Spell-Out Domains. Because incorporation in Kiowa is optional, it is assumed here that the process is not motivated by uninterpretable feature checking (as proposed for Inuktitut and other languages by Johns 2007, see also Sugimura 2008). Therefore, Spell-Out occurs without delay. As each incorporated element is the complement of a categorizing phase head, they each therefore form their own Spell-Out Domain. The same is true of the Subject and the Object within the clause. The verb complex must check its features with *T* for tense and *Agr* for agreement. As *T* is crucially not considered a phase (see Samuels 2010 footnote 2 for a discussion), the the full verb complex and its suffixes are Spelled-Out last as the complement of *C*.

(89) Syntactic Spell-Out Predictions

Clause: $[\text{Subject} \ [\text{Object}]_n \ \text{Ppfx-}[\text{Adv}]_a\text{-}[\text{N}]_n\text{-}[\text{V}]_v\text{-}[\text{STEM}]_v\text{-I/M-Synt}]_C$

Compound: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

4.2.4 Summary of Predictions

Each interface approach makes different predictions for Kiowa phonological domains. The main difference at the clause-level is whether or not the model predicts verb-internal phonological domains. As seen in the summary below (90), Relational Mapping (RM) and the Syntactic Spell-Out Approach (SO) predict these smaller domains (though slightly different). Syntax-Driven Mapping (SD), however, does not.

(90) Summary of Predictions for Kiowa Clause

- RM: $[[[\text{Subject}]_\omega]_\varphi [[\text{Object}]_\omega [\text{Ppfx}-[\text{Adv}]_\omega-[\text{N}]_\omega-[\text{V}]_\omega-[\text{STEM-I/M-Synt}]_\omega]_\varphi]_\iota$
SD: $[[[\text{Subject}]_\omega]_\varphi [[[\text{Object}]_\omega]_\varphi [\text{Ppfx-Adv-N-V-STEM-I/M-Synt}]_\omega]_\varphi]_\iota$
SO: $[[\text{Subject}]_n [\text{Object}]_n \text{Ppfx}-[\text{Adv}]_a-[\text{N}]_n-[\text{V}]_v-[\text{STEM}]_v\text{-I/M-Synt}]_C$

For compounds, all approaches predict the same number and size of domains. It is the nature of those domains, and therefore the kinds of expected phenomena, that differs. Specifically, Relational Mapping (RM) is the only approach which overtly predicts that compounds form a unique phonological constituent other than the component roots. Though recursive words in Syntax-Driven approaches often demonstrate different phonological characteristics, this is not a prediction of the model itself and is subject to definitional problems as discussed in Chapter 2.

(91) Summary of Predictions for Kiowa Compounds

- RM: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\kappa$
SD: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\omega$
SO: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

4.3 Kiowa Phonological Processes

This section is an examination of eleven phonological processes and their domains of application. These eleven processes form the majority of those reported in the previous literature (Watkins, 1984; Adger et al., 2009, among others). Processes were excluded if reported or observed to be variable between utterances and/or speakers.¹ There are six subsections here, grouping the processes in six groups based on phonological targets and/or results (92).

¹ The following reported processes have been excluded: Glide Spread, Diphthong Reduction, Lateral Obstruentization, Tonal Devoicing, Verb Root-Initial Ablaut, Glottal Increment, and Allegro Contraction (for details on each process, interested readers are directed to Watkins 1984).

(92) Previously Reported Phonological Processes

- a. Devoicing Processes
 - i. Syllable-Final Devoicing
 - ii. Cluster Devoicing
- b. Glide Processes
 - i. Glide Formation
 - ii. Glide Deletion
- c. Vowel Processes
 - i. Vowel Truncation
 - ii. Closed Syllable-Shortening
- d. Quality Changes
 - i. Dental-Velar Switch
 - ii. Nasalization
- e. Tonal Modification
 - i. Tone Lowering
 - ii. Tone Raising
- f. Pausing

In this chapter and the next, phonology is presented primarily in terms of SPE-style rules rather than optimality theoretic constraints. This is done for two reasons. First, the approaches to be tested largely adopt a derivational analysis, with the exception of Match Theory and Phase-Phase Faithfulness constraints in some Syntactic Spell-Out analyses. Second, SPE-style rules make the analysis available to a larger audience - including to non-theoretical linguists who may be more interested in phenomena for fieldwork or language documentation purposes.

4.3.1 Devoicing Processes

First, consider two Devoicing processes in Kiowa: Syllable-Final Devoicing and Cluster Devoicing. Syllable-Final Devoicing (93) devoices obstruents at the end of a syllable, thus acting as a diagnosis for the syllabification domain in Kiowa. In fact, Syllable-Final Devoicing shows a clear prefix-final boundary, and it confirms that syllabification spans the morpheme boundary between the STEM and I/M suffix(es). Previous work reports the process to be more active in the Kiowa verb and larger clause, but these findings have not been replicated and are discussed in detail below.

(93) Syllable-Final Devoicing (Watkins 1984:51)

Devoice all syllable-final obstruents.

$[-\text{sonorant}] \rightarrow [-\text{voice}] / \text{ — }]_{\text{syllable}}$

Consider (94), in which the voiced obstruent-final prefix /b-ià-ia-d/ appears before the vowel-initial STEM *ôm*. If syllabification spans the prefix's morpheme boundary, /d/ will syllabify as the onset of the following syllable and remain voiced (*[bà.dôm]). Instead, /d/ devoices prefix-finally (as in 95) corroborating earlier proposals (Harbour, 2002, 2003; Adger et al., 2009) that prefixes are part of a separate phonological domain (syllabification in this case) from the rest of the grammatical word.

(94) bàt- ôm
 [2sg/agt:pl/obj]- do.IPFV
 'You make it.' [ET]

- (95) Pronominal Prefix
 [2sg/agt:pl/obj]
 /b-ià-ia-d/
 biàd V Truncation
 bjàd Glide Formation
 bàd Glide Deletion
 bàt Syllable-Final Devoicing
 [bàt]

Syllabification does span the morpheme boundary between the STEM and I/M suffix, though (96). Voiced obstruent-final STEM /tò:d/ ‘send’ appears before vowel-initial negative suffix /-ô/. Since /d/ surfaces unchanged, it is syllabified as the onset of the following syllable. When /d/ occurs at the end of the verb complex in (97), however, it forms the coda and surfaces as voiceless [t] as expected.

- (96) hón àn pígjá gjà- tò:d -ô
 NEG HAB food [3sg/agt:sg/obj]- send -NEG
 ‘They do not send the food.’ [JA]
- (97) pígjá gjà- tòt
 food [3sg/agt:sg/obj]- send.PF
 ‘They sent the food.’ [JA]

Watkins (1984) reports the process as active in nouns (see her derivations in 98-99), though this remained unconfirmed in the present corpus. No native speaking consultant recognized the locative suffix -ô: in (98), and a vowel-initial nominal suffix is the crucial in order to confirm an underlying voiced obstruent. Vowel-initial nominal suffixes are relatively rare thus leaving Watkins’ noun analysis unconfirmed and the boundaries of subjects, objects, and incorporated nouns untestable. Adverbs pose the same issue, as there is no vowel-initial suffix to modify them to provide evidence for underlying voiced obstruents. The present corpus does not include a voiced obstruent-final incorporated verb stem. Therefore, no conclusions may be reached regarding syllabification and whether or not it spans across incorporated elements.

- (98) Syllable-Final Devoicing in Nouns (Watkins 1984:51)
- | | | |
|-----------|----------------------------|--------------|
| ‘doorway’ | | ‘doorway-at’ |
| /cá:d/ | | /cá:d-ô/ |
| cád | Closed-Syllable Shortening | – |
| cát | Syllable-Final Devoicing | – |
| [cát] | | [cá:dô] |
- (99) Syllable-Final Devoicing in Nouns (Watkins 1984:51)
- | | | |
|-----------|----------------------------|-----------------|
| ‘stomach’ | | ‘stomach-along’ |
| /bó:d/ | | /bó:d-pé/ |
| bód | Closed-Syllable Shortening | bódpé |
| bót | Syllable-Final Devoicing | bótpé |
| [bót] | | [bótpé] |

Finally, it is unclear whether or not syllabification spans the boundary across into syntactic suffixes. Vowel-initial syntactic suffixes are rare, but they do exist (e.g. the switch reference marker /-è/ ‘WHEN.DIFF’). To test this boundary, it would need to be preceded by a voiced obstruent-final morpheme. As there is no such construction in the present corpus, a definitive answer regarding syllabification and syntactic suffixes is not possible without examining additional processes sensitive to syllabification. Thus, the issue is revisited in later subsections in this chapter.

The second devoicing process is Cluster Devoicing, which devoices stops following a voiceless obstruent (100). All morpheme-internal clusters agree in voicing, so the process’s application may only be tested at morpheme boundaries. In Kiowa, Cluster Devoicing only applies across noun-suffix boundaries and the boundary between the STEM and I/M suffix(es) in the verb. The process is blocked at all other morpheme boundaries.

(100) Cluster Devoicing (Watkins 1984:52)

Stops become voiceless following a voiceless obstruent.

$$\begin{bmatrix} -\text{sonorant} \\ -\text{continuant} \\ +\text{voice} \end{bmatrix} \longrightarrow [-\text{voice}] / \begin{bmatrix} -\text{sonorant} \\ -\text{voice} \end{bmatrix} \text{ ———}$$

As seen in (101), the perfective suffix /-gjá/ surfaces as [-kjá] following voiceless [t] at the end of the verb root ‘write’ spanning the STEM-I/M boundary.² In (102), a nominal suffix of the same shape (/ -gjá/) also devoices after a voiceless obstruent.

- (101) gját- gút -kjá
 [1sg/agt:pl/obj]- write -PF
 ‘I wrote it/It was written.’ [JA]

(102) Cluster Devoicing and Suffixed Nouns

- pí:-gjá ‘food-basic’
 bót-kjá ‘stomach-at’

The process is blocked, however, at every other morpheme boundary within the verb complex. Voiceless stops (resulting from Syllable-Final Devoicing) prefix-finally do not trigger Cluster Devoicing in (103). Likewise the incorporated adverb’s final [t] does not trigger the process, and STEM-initial /b/ surfaces unchanged.

- (103) gját- gúl -tò
 [1sg/agt:pl/obj]- write -FUT
 ‘I will write.’ [JA]

- (104) à- kòét- b’a:
 [1sg]- scared- go
 ‘I fearfully went.’ [JA]

Cluster Devoicing also does not apply across the boundary between the verb stem and syntactic suffixes. Specifically the nominalizing /-gò/ surfaces with [g] instead of a devoiced [k] after [t] (105).

² Note that the verb ‘write’ /gú:l/ has also undergone another phonological process called Lateral Obstruentization in order to satisfy the environment for Cluster Devoicing.

- (105) pǎá:dò è- ét -gò dé- hó: -gyà
 table.inv [3inv]- big.sg -NOM/INV [1sg/agt:inv/obj]- get -PF
 ‘I bought a big table/table that is big.’ (Watkins 1984:230)

Finally, Cluster Devoicing is also blocked across compound and grammatical word boundaries. In (106), distributive /gù:/ surfaces unchanged in the three root compound ‘watch everywhere.’ Likewise, the pronominal prefix [dè-] does not devoice in (107) following the [t]-final subject ‘door.’

- (106) Cluster Devoicing and Compounds (Watkins 1984:93)

tá + hòt + gù: ‘watch everywhere’
 eye + travel + distr

- (107) cāt dè- t^hêm -dò:
 door [1sg/refl]- break -TR
 ‘The door is broken.’ [JA]

4.3.2 Glide Processes

Next, consider two glide-related processes: Glide Formation and Glide Deletion. Glide Formation (108) changes underlying /i/ to [j] before another vowel. In fact, Watkins (1984) proposes that this rule is responsible for every [ja] sequence at the surface in Kiowa and why there are no [ia] sequences within morphemes. Her analysis is based on historical comparative analysis, which plays a central role in her analysis of pronominal prefixes. As with Cluster Devoicing, Glide Formation must be tested across morpheme boundaries and not within morphemes.³ Also like Cluster Devoicing, Glide Formation applies across noun-suffix boundary. Due to a modified gliding process in the verb complex, it is not currently possible to test for the application from the STEM through the suffixes. The process is blocked, however, at all other testable morpheme boundaries in the Kiowa clause.

³ Pronominal Prefixes are the exception, as they are consistently presented with underlying /iV/ sequences which undergo the rule. For example, Watkins 1984:47 derives [gját] ‘[x/agt:2sg/pat:obj]’ from /g-iá-ia-d/.

(108) Glide Formation (Watkins 1984:46)

/i/ becomes [j] before another vowel

$$\begin{bmatrix} +\text{syll} \\ +\text{high} \\ -\text{back} \end{bmatrix} \longrightarrow [-\text{syll}] / \text{ — } [+ \text{syll}]$$

In (109), Glide Formation applies across the noun-suffix boundary. Both /i/-final noun stems surface with [j] before the vowel initial inverse suffix /-ój/.

(109) Glide Formation and Suffixed Nouns (Watkins 1984:48)

'sister-inv'	'boy-inv'	
p'í:-ój	t ^h àlí:-ój	underlying
p'jój	t ^h àljój	Glide Formation
p'jój	t ^h àljój	surface

Glide Formation may be argued to play a modified role at the boundary between the verb stem and inflectional/modal suffix. Rather than convert the stem-final /i/ to a glide, a glide is simply inserted between the two vowels. For example, consider (110).

(110)

àn	Ø-	gú:l-	q̂:m	-è:	òt	hájá
HAB	[3sg/agt:sg/obj]-	paint-	make	-IPFV/HSY	YET.DIFF	somewhere
àn	Ø-	jî:-	jî:			
HAB	[3sg]-	disappear	-IPFV/HSY			

'He would paint her (every morning) and yet she would disappear somewhere.' (Watkins 1984:158)

There are two possible explanations for the modified gliding process: 1) a glide is inserted when the second vowel is also /i/ or 2) a glide is inserted in order to retain the verb stem's shape (i.e. stem integrity). If the first explanation is true, the modified Glide Insertion should apply before /i/-initial noun suffixes, too. As nominal suffixes are rare, this remains unconfirmed. If the second explanation is true, then a multi-syllabic stem with a final /i/ will demonstrate the traditional Glide Formation process. The previous literature reports only one di-syllabic /i/-final verb stem (álpí: 'disagree'). If the above analysis is correct, a vowel-initial suffix (i.e. the negative

Glide Formation is blocked, however, across the prefix boundary to a verb stem. The prefix-final /i/ surfaces unchanged in (111), even though the next segment is another vowel /ɔ/ in the verb ‘give.’ Likewise, the process is blocked across incorporated elements’ boundaries. In (112), the /i/-final noun stem ‘rabbit’ does not trigger Glide Formation before the vowel-initial incorporated verb ‘hunt.’ The process is also blocked between an incorporated element (‘food’) and the main verb stem itself (‘be seated’) in (113).

- Glide Formation does not apply across compound elements like in ‘table’ below. Finally, it is not currently possible to test across grammatical words (i.e. Subject, Object, Verb) given the current corpus.

- 88

- (115) pǎá:dò è- ét -gò dé- hó: -gyà
 table.inv [3inv]- big.sg -NOM/INV [1sg/agt:inv/obj]- get -PF
 ‘I bought a big table/table that is big.’ (Watkins 1984:230)

Next, consider Glide Deletion. The process is previously formalized as glides deleting after labials and initially (see Watkins 1984:47). In the present corpus and in previous literature, however, initial glides do not delete. For example, glide-initial pronominal prefixes are attested as in (116-117). Nor does the glide delete stem-initially as in (117). Thus, Glide Deletion is assumed here to only be triggered following labials as in (118).

- (116) já- kój- tóžán -mà
 [(2,3sg/agt):1sg/pat:pl/obj]- Kiowa- speak -IPFV
 ‘I’m speaking Kiowa.’ [JA]

- (117) já- jáj
 [(2,3sg/agt):1sg/pat:pl/obj]- be.busy
 ‘I’m busy/occupied with things.’ (Watkins 1984:137)

- (118) Glide Deletion (Revised)

/j/ is deleted following labials.

$$\left[\begin{array}{c} +\text{sonorant} \\ -\text{syll} \\ +\text{high} \end{array} \right] \longrightarrow \emptyset \quad / \quad \left[\begin{array}{c} +\text{cons} \\ +\text{voice} \\ +\text{ant} \\ -\text{cor} \end{array} \right] \text{ ———}$$

Glide Deletion applies within prefixes, and it shows a clear prefix-final boundary. The process also applies across the morpheme boundary between the STEM and I/M suffix(es). The current corpus and surveys of the previous literature do not include forms with which to test the process’s application within or across incorporated elements or syntactic suffixes. Further, there are no glide-initial nominal suffixes in order to test nouns or compounds.

Watkins (1984) shows Glide Deletion applies within prefixes (119). The process does not apply, however, across the prefix’s morpheme boundary in (120). Prefix-final

/m/ does not trigger the following glide’s deletion. Instead, the process is blocked, and the incorporated noun ‘four’ surfaces unchanged as [jí:kjá].

(119) [x/agt:2pl/pat:obj] (Watkins 1984:47)

/b-ǵ-ia-d/

biád Vowel Truncation

bjád Glide Formation

bád Glide Deletion

bát Syllable-Final Devoicing

[bát]

(120) èm- jí:kjá- t^hòn- k^hùl -hèl gígó Ø- ònhá:dè-
 [3sg/refl]- four- attack- rush.out -HSY AND.THEN/SAME [3sg]- bear-
 dè: -mè:
 be -HSY

‘She rushed out the fourth time and had become a bear/was in the likeness of a bear.’ (Watkins 1984:228)

Glide Deletion does apply between the STEM and the I/M suffix(es). The imperfective suffix is /-ia/. It typically surfaces as [-jà] (see Watkins 1984), but it surfaces as [-à] in (121) after the labial-final ‘die.’

(121) Ø- hê:m -à
 [3sg]- die -IPFV
 ‘He/She is dying.’ [ET]

4.3.3 Vowel Processes

There are two phonological processes which specifically target vowels in Kiowa: Vowel Truncation and Closed-Syllable Shortening. First, Vowel Truncation deletes the first vowel in a VV sequence, where a V corresponds to monothongs, diphthongs, and long vowels.⁴ The process applies within prefixes, and it applies across noun-suffix and

⁴ Watkins’ original formalization of this rule did not specify the status of diphthongs and long vowels other than stating that /ia/ sequences do not count as VV sequences

STEM-I/M boundaries. Its application is blocked, however, across other morpheme boundaries.

(122) Vowel Truncation

In a VV sequence (V = monothongs, diphthongs, V:), delete the first V.

[+syll] → Ø / ____ [+syll]

In (123), the inverse suffix /-op/ – an allomorph that occurs after /e/-final noun stems – triggers Vowel Truncation. The root-final vowel is deleted. Vowel Truncation also applies across the STEM-I/M boundary in Watkins’ (1984) derivation of the intransitive stem ‘break.’ As seen in (125), the intransitive derivational suffix /-gé/ loses its vowel before perfective /-iá/.

(123) Vowel Truncation and Suffixed Nouns [ET]

root root-inv

sà:né sà:né-op

[sà:né] [sà:nóp]

(124) Vowel Truncation across Stem-{I/M} (Watkins 1984:44-45)

/t^hém-gé-iá/ underlying

break-INTR-PF

t^hémgiá Vowel Truncation

t^hémgiá Dental-Velar Switch

t^hémgjá Glide Formation

[t^hémgjá] surface

(125) é- t^hém -gjá
 [3sg/agt:inv/obj]- break -PF
 ‘It’s broken.’ [JA]

(Watkins 1984:41). In recent work, Miller (urc) argues it is necessary to treat these as single Vs for the sake of this rule due to evidence from pronominal prefixes in Kiowa, as well as re-examining Watkins’ own treatment of the rule in derivations. This approach has been adopted here.

(126) ě- ǎ:- ǎ
[(2,3sg/agt):1sg/pat:Ø/obj]- temporarily- give
'You loan it to me.' [ET]

(127) àn à- bô:- pòlà:jì- ě:- bà: -mà
HAB [1sg]- always- rabbit- hunt- go -IPFV
'I always go rabbit hunting.' [JA]

(128) gjá- t^hénc'ò -tò -è: èm- bá:
[(1sg):2,3sg/P:sg]- allow -FUT -WHEN.DIFF [2sg]- go
'When I allow it, you will go.' [JA]

(129) Vowel Truncation and Compounds [ET]
 píá: pí + á: (food + wood) 'table'

(130) Closed-Syllable Shortening (Watkins 1984:20)
 Long vowels become short in closed syllables.
 $[+syllabic] \rightarrow [-long] / \text{ — C }]_{syllable}$

In (131), the long /u:/ of both ‘write’ and ‘dance’ surface because the STEM-final consonants syllabify as the onset of the following syllable. Thus, syllabification spans the STEM-I/M boundary confirming the preceding analysis of Syllable-Final Devoicing.

	Root	IPFV/HSYIMP	FUT	Gloss
(131)	/gú:n/	gú:.n-ê:	gún-Ø	gún.-tò: ‘dance’
	/gú:l/	gú:.l-ê	gúl-Ø	gúl.-tò: ‘write’

- (132) èm- gú:n -ê:
 [3sg/refl]- dance -IPFV/HSY
 ‘I heard they were dancing.’ [ET]

Syllabification also spans the noun-suffix boundary. For example, the underlying long vowel in the noun ‘there’ surfaces unchanged in (133). It shortens, however, when the general suffix /-j/ closes the syllable in (134).

- (133) ó: -hò: è- kíł
 there -def [1du/pl]- dwell
 ‘We live there (in that room).’ (Watkins 1984:188)

- (134) ó -j -hò: è- kíł
 there -general -def [1du/pl]- dwell
 ‘We live there (near that room).’ (Watkins 1984:188)

Closed Syllable Shortening does not apply when a suffix begins with a Cj cluster. The underlying long vowel surfaces as long. Further, if the initial C is a voiced obstruent it surfaces as itself and does not devoice as if forming the coda of the preceding syllable (e.g. [pí:-gjá] ‘food-basic’). Therefore, a Cj cluster is not acting as a full consonant cluster in Kiowa and should not be treated as such when testing for phonological domains.

As there are no underlying long vowels in prefixes, it is not possible to test whether or not the process applies within a prefix. Mixed:Object prefixes demonstrate final long vowels on the surface, though. To test whether or not the process applies

across the prefix's boundary, it must be followed by a consonant cluster. Since it has been shown Cj clusters (the only possible clusters in Kiowa) do not act as full consonant clusters, this test is also impossible. This also precludes any tests of compound and grammatical word boundaries.

Closed Syllable Shortening does allow for testing syllabification's domain with regard to incorporated elements. As seen in (135), the incorporated verb stem /gú:l/ surfaces with a short vowel. In other words, syllabification stops at the boundary forcing the final consonant to form the coda of the syllable.⁵ Therefore, incorporated elements form separate domains for syllabification.

- (135) kút -à:gjà
 write -be.sitting
 'be in school' (Watkins 1984:61)

In order to test if the process applies across syntactic suffix's boundaries, there needs to be a consonant-final verb with an underlying long vowel before a vowel-initial syntactic suffix (e.g. è: 'when/diff). The current corpus does not include such a construction, and it is thus left to future research.

4.3.4 Quality Changes

The two remaining segmental processes are the Dental-Velar Switch and Nasalization. The Dental-Velar Switch is a particularly unusual phonological process described by Watkins (1984), in which velar and dental stops switch in certain sequences (e.g. /ge/ → [de] and /di/ → [gi]). The process applies across the STEM-I/M boundary and within pronominal prefixes. A combination of rare /i/-initial morphemes and constraints on syllable structure in Kiowa disallow testing of other morphemes and boundaries, though.

⁵ The final [t] in 'write' is due to a process called Lateral Obstruentization, which (variably) changes /l/ to [d] syllable-finally. The resulting obstruent has also undergone Syllable-Final Devoicing in this example.

(136) Dental-Velar Switch (Watkins 1984:43)

Switch dental and velar place in case of the sequences before /i/ and /e/ respectively (e.g. /di/ and /ge/).

$$\begin{bmatrix} +\text{cons} \\ -\text{son} \\ -\alpha \text{ ant} \\ -\alpha \text{ cor} \\ \alpha \text{ high} \end{bmatrix} \longrightarrow \begin{bmatrix} \alpha \text{ ant} \\ \alpha \text{ cor} \\ -\alpha \text{ high} \end{bmatrix} / \text{---} \begin{bmatrix} +\text{syll} \\ -\text{back} \\ -\alpha \text{ high} \end{bmatrix}$$

In (137), the derivational stem suffix's /d/ switches to [g] when Vowel Truncation delete the intervening vowel before the imperfective imperative suffix /-î:/ . The process also applies within prefixes, again fed by Vowel Truncation in (138).

	/há:/ 'shout'	(Watkins 1984:44)
	/há:-dè-î:/	
(137)	há:-dî:	V Truncation
	há:-gî:	D-V Switch
	—	Glide Formation
	[há:-gî:]	

(138) [(x/agt):1pl/pat:pl/obj] (Watkins 1984:43)

/d-ó-ia-d/	
diád	Vowel Truncation
giád	Dental-Velar Switch
gjád	Glide Formation
gját	Syllable-Final Devoicing
[gját]	

In order to test whether or not the process applies across the prefix boundary, the prefix must end in either a dental or velar before /i/ or /e/ respectively. As seen earlier, prefixes form a separate syllabification domain from the rest of the verb complex. Therefore, devoiced [t] is the only possible coda to test for the process's

application. There are very few /i/-initial morphemes reported in Kiowa, though (e.g. /îl/ ‘warn,’ /í:/ ‘baby’). In fact, the current corpus and surveys of the literature do not include the necessary constructions to test the boundaries of prefixes, incorporated elements, compounds, or grammatical words. Additionally, there are no /i/-initial nominal suffixes or syntactic suffixes.

Next, consider Nasalization. According to the rule, voiced stops become [+nasal] when before a [+nasal] segment as in /d-iâ-e/ → [nê] ‘(2,3sg/agt):1sg/pat:du/obj’ (Watkins 1984: 49). Voiced stops also become [+nasal] after a [+nasal] segment as in /Ø-Û-ẽ-b/ → [ẽm-] ‘3sg/agt:3pl/obj’ (Watkins 1984:130).

(139) Nasalization (Watkins 1984:48)

Voiced stops become nasal before or after nasals in a prefix.

$$\begin{bmatrix} +\text{cons} \\ -\text{cont} \\ +\text{voice} \end{bmatrix} \longrightarrow [+nasal] / \left\{ \begin{array}{l} \text{prefix}[[+nasal] \text{ —}] \\ \text{prefix}[\text{ — } [+nasal]] \end{array} \right\}$$

The rule is also bi-directional and nasalizes voiced stops in both directions (140).

(140) [(x:agt)/2du/pat:pl/obj] (Watkins 1984:48)

/b-ǵ-ia-d/

biâd Vowel Truncation

bjâd Glide Formation

bâd Glide Deletion

mân Nasalization

[mán]

Nasalization does not occur in any other contexts. For example, it does not occur stems (e.g. /dê/ ‘sleep’) nor does it occur across any morpheme boundaries (e.g. thematic verb stem /hé;-dé/ ‘remove’).

4.3.5 Tonal Modification

Finally, consider two tonal modification processes in Kiowa: phonological Tone Lowering and Tone Raising. These are not the only tone-related processes in Kiowa,

but they are the most productive and not lexically specified. Tone Lowering (141) lowers all tones to L following a falling tone (HL sequence). Watkins' (1984) proposed formalism below, though, a more modern interpretation is that it is a L-spreading process.

(141) Tone Lowering (Watkins 1984:30)

High tones (H) are lowered to (L) following a falling tone (HL) within the word.

[+H] → [-H] / [+H][-H]C₀ —

As seen in (142), a falling tone in the prefix spreads low tone throughout the rest of the verb complex. A falling tone on an incorporated element lowers tone throughout the rest of the verb complex. Non-lowered versions of 'see/look' and 'come' may be found in (148).

(142) kút bágî:- pò:- ò:
book [2pl/agt:(1,3sg/pat):pl/obj]- look- give.IMP
'You (pl.) show me the book.' [ET]

(143) à- sâ- pò:- ò:
[1sg]- child- see- come.PF
'I came to see the child.' [ET]

Tone Lowering also applies across the Stem - I/M boundary. The imperfective imperative suffix bears an underlying falling tone /-î:/, which is subsequently lowered.

(144) hólà bàt- ô:m -î:
dress [2sg/agt:pl/obj]- make -IPFV/IMP
'Keep on making the dress.' [JA]

Every syntactic suffix bears an underlying low tone. Therefore, it is not possible to confirm if Tone Lowering applies across the suffix's boundary.

Tone Lowering applies within suffixed nouns. As seen in (145), the falling tones within the noun stems for 'Comanche' and 'child' lower the tone of the inverse suffix.

- (145) Suffixed Nouns [JA]
 kój-gú ‘Kiowas’ kjâj-gù ‘Comanches’
 pó:-dó ‘bugs’ sâ:-dò ‘children’

Tones are also lowered within compounds as seen in (146).

- (146) Compounds (Watkins 1984:31)
 hôl + tó: → hôltò: ‘hospital (sick+house)’
 pí: + êl + k^hí:dá → pí:êlk^hì:dà ‘Thanksgiving (eat+big+day)’

Tone Lowering spans a much larger domain than the above-mentioned segmental phenomena, but the process is blocked from applying across grammatical word boundaries. It does not apply between an unincorporated object and verb complex as seen in (147-148).

- (147) Ø- k’jâ:hî -dò:
 [3sg]- man -me
 ‘He is a man.’ [ET]
- (148) k’jâ:hî Ø- pô:- â:
 man [3sg]- see- come.PF
 ‘The man came to see (you).’ [ET]

In addition to phonological Tone Lowering process, a Morphological Lowering process also applies in Kiowa. According to Watkins (1984), roots are lexically specified as triggers for Morphological Tone Lowering. As the distribution is lexically specified, it is not discussed here in detail. Instead, consider the remaining roots: those Watkins refers to as Non-Tone Lowering (NTL) roots. NTL roots trigger Tone Raising.

- (149) Tone Raising (Watkins 1984:36)

Initial L is raised to H following a compounded non-tone lowering root.

As previously reported (Watkins, 1984; Harbour, 2002; Adger et al., 2009), Tone Raising applies within compounds. In (150), the first roots ‘water’ and ‘mountain’ have been reported as NTL roots. Therefore, the following elements demonstrate an initial H tone instead of the underlying L.

(150) Raising in Compounds

$t^h\acute{o} : + s\grave{a} : n\acute{e} \rightarrow t^h\acute{o} : s\acute{a} : n\acute{e}$ ‘water moccasin (water + snake)’

$k'\acute{o}p + s\grave{o}p^h\acute{o}l \rightarrow k'\acute{o}ps\acute{o}p^h\acute{o}l$ ‘mountain ogre (mountain + owl)’

In addition, Watkins (1984) proposes that the process applies across incorporated elements in the verb complex. Specifically, she points to the compounds provided in (??) and proposes that Tone Raising occurs across the elements as expected when in the full verb complex (Watkins 1984:37).

(151) Incorporated Elements

$k^h\acute{i} : s\acute{o} + d\grave{e} : \rightarrow k^h\acute{i} : s\acute{o}d\acute{e} :$ ‘afternoon nap (afternoon + sleep)’

$p\acute{i} : + m\grave{o}\acute{o} : d\grave{e}p \rightarrow p\acute{i} : m\acute{o}\acute{o} : d\grave{e}p$ ‘have trouble eating (eat + have.trouble)’

As seen in the data below, though, this is not the case. Tone Raising does not apply in either case (152-153) as the second incorporated elements retain their underlying L tone.

- (152) $d\grave{e}-$ $k^h\acute{i} : s\acute{o}-$ $d\grave{e} :$ $-m\grave{a}$
[1sg/agt:3pl/obj]- afternoon- sleep -IPFV
‘I’m taking an afternoon nap.’ [ET]

- (153) $j\acute{a}-$ $p\acute{i} :-$ $-m\grave{o}\acute{o} : d\grave{e}p$
[(2,3sg/agt):1sg/pat:pl/obj]- food- have.trouble.IPfV
‘I’m having trouble eating.’ [DH]

Harbour (Harbour (2003)) used this evidence to make the argument that Tone Raising applies word-internally but is blocked by prefixation. To put it more simply, Tone Raising is a compound-specific process. This is not unusual as many languages demonstrate compound-specific phonology (e.g. English compound vs. phrasal stress patterns).

4.3.6 Pausing

Finally, Kiowa uses pausing to mark grammatical information between clauses. A brief pause has been indicated by the IPA pause symbol (.) in (154) below. It occurs between the first and second clause, separating the conditional statement from the rest

of the sentence. This is the same as occurs in English. Thus, the domains for pausing (being full clauses) are the largest attested phonological domains in Kiowa.

- (154) jà-n- pǿ:- ô:m -è (.)
 [(2,3sg/agt):1sg/pat:pl/obj]- food- make.IMP -WHEN.DIFF (.)
 bà-t pô:
 [2sg/agt:pl/obj]- eat.IMP
 'If I make food for you, you must eat.' [JA]

4.3.7 Summary

Table 4.1 includes a summary of the phenomena in Kiowa and where they apply within the Kiowa verb, clause, and compounds. Syllabification is presented, though two processes acted as diagnostics for syllabification (Syllable-Final Devoicing and Closed-Syllable Shortening). Elements are grayed out if it was determined to be impossible to test that boundary or if the necessary data has not been acquired yet. Elements are grayed out and crossed out if the process specifically does not apply within and across those morphemes (e.g. morpheme-specific processes). Brackets indicate boundaries between domains of application, and black text indicates the application spans throughout the morphological string.

There is a high degree of overlap in domains between processes. Collapsing the table into a single example, there are three different sizes of domains. In order to be successful, an interface approach needs to be able to account for each of the domains below. Moreover, it needs to do so in a theoretical valuable (predictive) way. To this end, these patterns are compared to current theoretical predictions in the following section.

- (155) **Clause:** [[Subject] [Object] [[Ppfx]-[Adv]-[N]-[V]-[STEM-I/M] -Synt]]
Compound: [[Root₁] + [Root₂]]

Process	Clause Subject	Object	Verb Complex		Compound Root ₁ + Root ₂	
Syllabification	Subj	Obj	[Ppfx]	[Adv]	Root ₁	Root ₂
Cluster Devoicing	[Subj]	[Obj]	[Ppfx]	[Adv]	[Root ₁]	[Root ₂]
Glide Formation	[Subj]	[Obj]	[Ppfx]	[Adv]	[Root ₁]	[Root ₂]
Glide Deletion	Subj	Obj	Ppfx	Adv	Root ₁	Root ₂
Vowel Truncation	[Subj]	[Obj]	[Ppfx]	[Adv]	[Root ₁]	[Root ₂]
Dental-Velar Switch	Subj	Obj	[Ppfx]	Adv	Root ₁	Root ₂
Nasalization	Subj	Obj	[Ppfx]	Adv	Root₁	Root₂
Tone Lowering	[Subj]	[Obj]	[Ppfx]	Adv	[Root ₁]	Root ₂
Tone Raising	Subj	Obj	Ppfx	Adv	Root₁	Root₂
Pausing	[Subj]	Obj	Ppfx	Adv	[Root ₁]	Root ₂

Table 4.1: Kiowa Phonological Processes and Domains

Subj. and Obj. correspond with suffixed nouns

Black Text: Process's application spans morpheme string

[: Process is blocked from applying across this boundary

~~Strike-Out~~: Process does not apply

Gray: No direct evidence of process's application available

4.4 Testing the Predictions

In this section, the phonological domains of Kiowa are compared to each of the predictive models' predictions (repeated below).

(156) Summary of Predictions for Kiowa Clause

RM: $[[[\text{Subject}]_\omega]_\varphi [[\text{Object}]_\omega [\text{Ppfx}-[\text{Adv}]_\omega-[\text{N}]_\omega-[\text{V}]_\omega-[\text{STEM-I/M-Synt}]_\omega]_\varphi]_\iota$

SD: $[[[\text{Subject}]_\omega]_\varphi [[[\text{Object}]_\omega]_\varphi [\text{Ppfx-Adv-N-V-STEM-I/M-Synt}]_\omega]_\varphi]_\iota$

SO: $[[\text{Subject}]_n [\text{Object}]_n \text{Ppfx}-[\text{Adv}]_a-[\text{N}]_n-[\text{V}]_v-[\text{STEM}]_v\text{-I/M-Synt}]_C$

(157) Summary of Predictions for Kiowa Compounds

RM: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\kappa$

SD: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\omega$

SO: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

(158) Kiowa Phonological Domains

Clause: $[[\text{Subject}] [\text{Object}] [[\text{Ppfx}]-[\text{Adv}]-[\text{N}]-[\text{V}]-[\text{STEM-I/M}]-\text{Synt}]]$

Compound: $[[\text{Root}_1] + [\text{Root}_2]]$

As mentioned earlier in the chapter, the approaches differ primarily in terms of whether or not they predict verb-internal phonological domains. As the previous section confirms, the Kiowa verb may be comprised of up to five phonological domains (i.e. the pronominal prefix, up to three incorporated elements, and Stem-I/M). Relational Mapping and the Syntactic Spell-Out Approach predict verb-internal domains. Syntax-Driven Mapping does not.

By referencing only X^0 in the definition of Match-Word, the full verb complex is predicted to consist of a single ω domain. In fact, Match Theory does not have any machinery which accounts for the smaller domains within the verb complex. There are two possible changes which would allow Match Theory to be successful: 1) change the definition of Match-Word to reference roots rather than X^0 s or 2) allow prosodic structure to be mapped before syntactic operations occur. It is worth noting, however, that both changes affect fundamental tenants of Match Theory and syntax-driven mapping as a whole.

By changing the definition of Match-Word to reference roots instead of X^0 s, it would be possible to predict the smaller domains within the Kiowa verb while allowing for phonological adjustments to include cohering affixes. Referencing roots need not necessarily entail a morphological module of grammar, especially if adopting a Distributed Morphology/"syntax all the way down" approach. By separating the root, though, the question of other types of morphemes (e.g. prefixes, suffixes, clitics) is raised in terms of how the phonology acts. Such a change begins to blur the lines between Match Theory and Relational Mapping.

Rather than introducing morphological information, then, the second option is to allow prosodic structure to map prior to syntactic operations. This is quite a drastic departure from previous syntax-driven analyses. In fact, it has largely been assumed regardless of Indirect Reference approach (Relational Mapping or Syntax-Driven Mapping) that phonology exclusively references surface structure (see Selkirk 2011 for a brief overview). If, however, these X^0 s mapped to ω s prior to movement and retained their ω status within the larger lexical X^0 's phonological constituent, Kiowa's patterns are successfully predicted.

While the Syntactic Spell-Out Approach successfully predicts verb-internal domains, it fails to predict or account for the fine-grained details separating different suffixes, the independent status of the pronominal prefix, or to predict that the full verb complex would form its own phonological domain independent of the full clause. Adopting an Indirect Reference Strategy would account for the smaller domains in the Kiowa verb, as well as easily allowing for reconstruction to explain different relationships between suffixes. At issue then is how to define and adjust domains so that the full verb complex forms an independent phonological domain. It is not immediately clear if a phase-based analysis allows for this separation. While it is possible to adjust boundaries (using flavors of the PIC, cumulative Spell-Out, or violable constraints), it is not possible to map entire domains that are not initially predicted.

Of the three predictive approaches, Relational Mapping is the most successful in its account for the domains and phonological patterns in Kiowa. The pronominal

prefix and syntactic suffix are correctly excluded from the ω s in the verb complex based on phonological patterns, and they then join the remainder of the verb complex at κ . The predicted φ domain is also phonologically adjusted so that the Object and Verb do not form parts of the same φ as they never pattern together as a phonological unit. Relational Mapping also correctly predicts that compounds will act as two elements (ω s) which join together at a higher level (κ).

(159) Characteristic Phonology of Prosodic Constituents in Kiowa:

ω : Syllabification, Cluster Devoicing, Glide Formation, Glide Deletion, Dental-Velar Switch

κ : Tone Raising

φ : Tone Lowering

ι : Pausing

While overall very successful, there is one issue which must be raised with regards to the model's predicted characteristics of κ . As defined, the full verb complex and compounds are both predicted to form κ constituents. Logically, all κ s in the language should demonstrate the same characteristic phonological processes. Therefore, the verb complex κ should demonstrate Tone Raising as in compounds. This has already been shown to not be the case, though. The relevant data has been repeated below for convenience. Whereas raising occurs within compounds (160), it does not apply within the verb complex (161-162). In fact, there is no positive evidence for any characteristic process of the verb complex's κ domain.

(160) Incorporated Elements

$k^h\acute{i}:s\acute{o} + d\grave{e}: \rightarrow k^h\acute{i}:s\acute{o}d\acute{e}:$ 'afternoon nap (afternoon + sleep)'

$p\acute{i}: + m\grave{o}\acute{o}:d\grave{e}p \rightarrow p\acute{i}:m\acute{o}\acute{o}:d\grave{e}p$ 'have trouble eating (eat + have.trouble)'

- (161) $d\grave{e}-$ $k^h\acute{i}:s\acute{o}-$ $d\grave{e}:$ $-m\grave{a}$
 [1sg/agt:3pl/obj]- afternoon- sleep -IPFV
 'I'm taking an afternoon nap.' [ET]

- (162) jǎ- pǐ:- mǎǎ:dèp
 [(2,3sg/agt):1sg/pat:pl/obj]- food- have.trouble.IPFV
 'I'm having trouble eating.' [DH]

Relational Mapping is most successful, only requiring additional grammatical information at the κ level. Match Theory requires major modifications in order to successfully predict Kiowa’s patterns (e.g. map prosodic structure throughout syntactic derivation or change crucial definitions like Match-Word). The Syntactic Spell-Out Approach fares better than Match Theory, but it also fails to predict the level of detailed relationships between different elements of the Kiowa verb complex.

Relational Mapping’s success entails two major implications for the nature of the phonology-syntax interface and delimiting phonological domains. First, the model’s success suggests that a separate morphological module may be a necessary grammatical module. It is largely due to the types of morphological information taken into account and variation allowed for which leads to the model’s success. For example, it allows for asymmetry between different kinds of affixes (prefixes vs. suffixes), specification of different types of clitics, and it recognizes there may be a boundary between suffixes. This level of detail allows for more fine grained predictions which are then further boosted and restructured by phonological information. It is the role of purely phonological information that informs the second implication. Namely, the results lend support for adopting an Indirect Reference mapping strategy over a Direct Reference account.

4.6 Conclusions

This chapter presented eleven phonological processes in Kiowa and detailed the application domain of each. The results were compared directly to model-specific predictions for Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. Each of the models face challenges, but overall Relational Mapping is the most successful when predicting and accounting for the phonological patterns in Kiowa. This suggests that a separate morphological module of grammar may be necessary when mapping from (morpho-)syntactic structure to prosodic structure. It also lends support to an Indirect Reference model over a Direct Reference model. These conclusions are exclusive to Kiowa, however. A different model may in fact be more

useful for a language like Saulteaux. Thus, the results from this chapter and the next will be discussed together along with their broader implications in Chapter 6.

Chapter 5

SAULTEAUX OJIBWE AT THE INTERFACE

5.1 Introduction

In this chapter, the four main interface approaches are evaluated using data from Saulteaux. Like Kiowa, Saulteaux has been selected for its complex morpho-syntax. In addition to its theoretical value, the language offers a different typological perspective in that it is not typically analyzed as an incorporating language, and it has been analyzed as a stress language (not tonal). Beyond the theoretical questions asked in this chapter, the following analysis is the first close analysis of Saulteaux phonology.

The remainder of this chapter is outlined as follows. In Section 5.2, the four main interface approaches are considered. Of the four models, three make testable predictions: Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. These models yield three unique sets of predictions regarding the phonological domains of Saulteaux. Again, the predictions primarily differ in treatment of the lexical verb and whether or not the model in question predicts verb-internal phonological domains. Section 5.3 consists of a comprehensive prosodic analysis of Saulteaux, focusing on the domains of nine phonological processes. Three domains of different sizes are found for Saulteaux, among which confirm the presence of verb-internal domains. Relational Mapping and the Syntactic Spell-Out Approach successfully predict verb-internal domains, but Relational Mapping is again the most successful model (Section 5.4). The continued success of Relational Mapping and its broader implications are discussed in Section 5.5.

5.2 Ojibwe-Specific Predictions

As previously discussed in Chapter 2 and 4, the Phenomenon-Based Approach does not make theoretical predictions. This is due to the fact that it is a purely data-driven approach. Like Kiowa, a Phenomenon-Based account simply assigns names to the domains produced by overlap. Thus, the core of this chapter evaluates the three remaining, predictive interface approaches: Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach.

In the following subsections each model's predictions are evaluated from individual morphemes up to the full clause in the syntax. For Indirect Reference models this means evaluating structure from the Phonological Word (ω) to the Intonational Phrase (ι). While there is a rich literature studying the internal morphology of verb stems in Algonquian languages like Saulteaux (Slavin, 2012a,b, among many others), the present study focuses on larger constituents within the verb complex and full clause. Stem-internal morpho-phonology is only referenced when it is relevant to a particular interface approach. The basic Saulteaux clause and compound structure, discussed in detail in Chapter 3, are provided again below.

(163) **Clause:** Pronom=Tense-Mod(s)-Stem-Infl=Obj.No. Obj. Subj.

Compound: Root₁ + Root₂

5.2.1 Relational Mapping

Relational Mapping predicts four prosodic constituents will play a role in Saulteaux phonology: the phonological word (ω), the composite group (κ), the phonological phrase (φ), and the intonational phrase (ι). First, recall Vogel (to appear)'s definition of ω arising from the *Principle of the Morphological Core*.

(164) **Principle of the Morphological Core** (Vogel to appear:50; cf. Vogel 2012:52)

A Phonological Word must contain a morphological root.

Given the above definition, the Ojibwe verb complex (165) will include at least one phonological word (the obligatory verb stem and patterning affixes). Preverbal modifiers contain their own roots thereby forming individual ω s. As the number of preverbal modifiers is unbounded, the maximal number of ω s is also unbounded in Saulteaux. The role of the pre-stem elements is unclear before phonological patterns are taken into account.

(165) Pronom. = Tense - [Mod(s)] $_{\omega}$ - [Stem - Infl] $_{\omega}$ = Obj. No.

Any stray elements (PWAs, clitics, function words) join the ω (s) at the next level: the Composite Group (κ). As there are two proposed clitics (Pronominal and Object Number), Relational Mapping predicts they will join the ω at the κ . Additionally, if the Tense prefix does not cohere with the neighboring ω , it will also join at the κ . Saulteaux compounds should group at the κ .

The φ is proposed to consist of the head of a syntactic phrase (XP) and optionally its complement. As Saulteaux's argument NPs are analyzed as adjuncts, the Verb Phrase will only ever include the verb complex itself. Finally, the ι is defined as CPs and external syntactic structure like paranthetical expressions or tag questions. Any CP in Saulteaux should therefore be mapped to ι before potential restructuring. To summarize, Relational Mapping predicts the following prosodic domains in (166).

(166) Relational Mapping Predictions

Clause: [[[Pronom.=Tense-[Mod(s)] $_{\omega}$ -[Stem-Infl] $_{\omega}$ =Obj. No.] $_{\kappa}$] $_{\varphi}$ [[Obj.] $_{\omega}$] $_{\varphi}$ [[Subj.] $_{\omega}$] $_{\varphi}$] $_{\iota}$

Compound: [[Root₁] $_{\omega}$ + [Root₂] $_{\omega}$] $_{\kappa}$

5.2.2 Syntax-Driven Mapping

Next, Match Constraints (c.f. Selkirk 2011's Match Theory) predict complete isomorphism between syntactic and prosodic structure at the surface. Each lexical head (X^0) corresponds to a ω , each phrase (XP) corresponds to a ϕ , and each clause (CP) corresponds to an ι . The Ojibwe Clausal Spine as discussed in Chapter 3 is provided again for reference in Figure 5.1. While the tree provided adopts a Distributed

Morphology structure with categorical heads and phrases, Match Theory references classic X' constituents (lexical X⁰, XP, CP). More often than not, the lowest categorical phrase (*nP*, *aP*, *vP*) corresponds with the lexical X⁰ and is referenced as such for the current purposes.

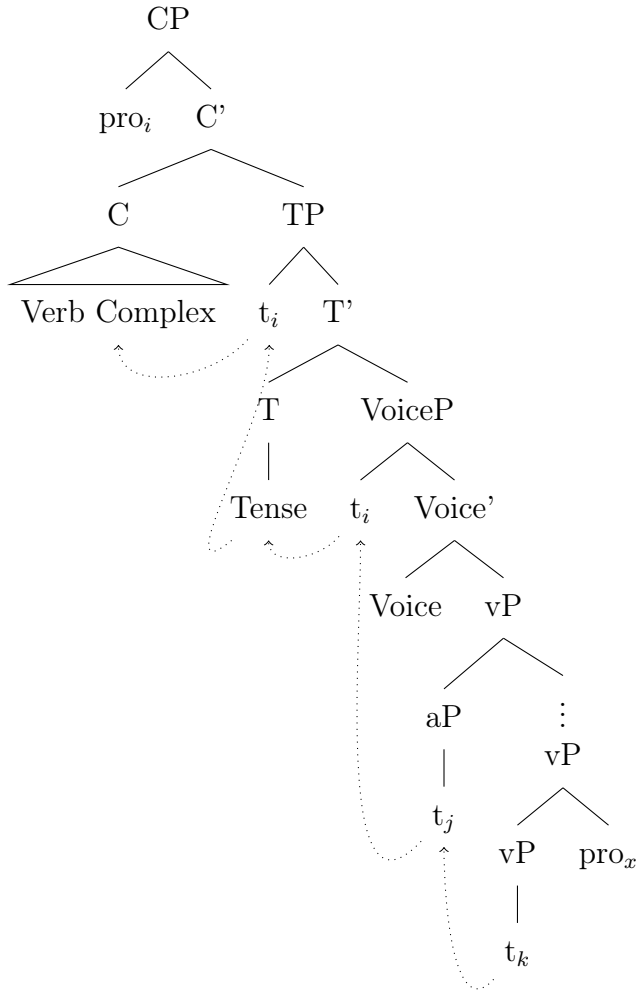


Figure 5.1: Sauteaux Clause - Repeated

Match Constraints together predict the structure in (167). The Ojibwe verb complex forms a single V head in the syntax tree after movement. Thus, according to Match-Word, the entire verb complex is predicted to correspond to a ω . Match-Phrase requires each XP to map to a ϕ . As argument NPs are all adjuncts, the Subject,

Object, and Verb Complex are predicted to act separately (i.e. no recursion). Finally, Match-Clause maps a CP to an ι . Any non-isomorphism derives from phonological patterns in the data spanning adjusted domains indicating higher ranked markedness constraints.

(167) Syntax-Driven Mapping Predictions

Clause: $[[[\text{Pronom.}=\text{Tense-Mod(s)-STEM-Infl}=\text{Obj.No.}]_\omega]_\phi [[\text{Obj.}]_\omega]_\phi [\text{Subj.}]_\omega]_\phi]_\iota$

Compound: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\omega$

5.2.3 Syntactic Spell-Out Approach

Finally, consider the Syntactic Spell-Out Approach. Possible phase heads include clause-level heads C, v, and morpheme-level categorizing heads $\sqrt{}$, a , and n . In (168), there are three domains predicted within the clause (indicated by the phase head which triggers transfer). Modifiers are spelled out as the complements of a . Subject to the Pronominal Argument Hypothesis, overt NPs are generated outside the main clausal spine and introduced later in the derivation. They are therefore spelled out prior to being introduced into the full clause. The Stem and suffixes spell out as the complement of the lower vP. The remainder of the verb complex is spelled out at the next highest phase head C.

(168) Syntactic Spell-Out Predictions

Clause: $[\text{Pronom.}=\text{Tense}-[\text{Mod(s)}]_a-[\text{Stem-Infl}=\text{Obj.No.}]_v]_C [\text{Obj.}]_n [\text{Subj.}]_n$

Compound: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

5.2.4 Summary of Predictions

Each interface approach makes different predictions for Kiowa phonological domains. The main difference at the clause-level is whether or not the model predicts verb-internal phonological domains. As seen in the summary below (169), Relational Mapping (RM) and the Syntactic Spell-Out Approach (SO) predict these smaller domains (though slightly different). Syntax-Driven Mapping (SD), however, does not.

(169) Summary of Predictions for Saulteaux Clause

- RM: $[[[\text{Pronom.}=\text{Tense}-[\text{Mod(s)}]_{\omega}-[\text{Stem-Infl}]_{\omega}=\text{Obj. No.}]_{\kappa}]_{\varphi} [[\text{Obj.}]_{\omega}]_{\varphi} [[\text{Subj.}]_{\omega}]_{\varphi}]_{\iota}$
SD: $[[[\text{Pronom.}=\text{Tense}-\text{Mod(s)}-\text{STEM-Infl}=\text{Obj.No.}]_{\omega}]_{\phi} [[\text{Obj.}]_{\omega}]_{\phi} [\text{Subj.}]_{\omega}]_{\phi}]_{\iota}$
SO: $[\text{Pronom.}=\text{Tense}-[\text{Mod(s)}]_a-[\text{Stem-Infl}=\text{Obj.No.}]_v]_C [\text{Obj.}]_n [\text{Subj.}]_n$

For compounds, all approaches predict the same number and size of domains. It is the nature of those domains, and therefore the kinds of expected phenomena, that differs. Specifically, Relational Mapping (RM) is the only approach which overtly predicts that compounds form a unique phonological constituent other than the component roots. Though recursive words in Syntax-Driven approaches often demonstrate different phonological characteristics, this is not a prediction of the model itself and is subject to definitional problems as discussed in Chapter 2.

(170) Summary of Predictions for Saulteaux Compounds

- RM: $[[\text{Root}_1]_{\omega} + [\text{Root}_2]_{\omega}]_{\kappa}$
SD: $[[\text{Root}_1]_{\omega} + [\text{Root}_2]_{\omega}]_{\omega}$
SO: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

5.3 Ojibwe Phonological Processes

This section details nine attested phonological processes and their domains of application in Saulteaux (171). The following four subsections group the processes based on phonological targets and/or results.

(171) Previously Reported Phonological Processes

- a. Consonant Processes
 - i. Final Obstruent Devoicing
 - ii. Nasal Assimilation
 - iii. Palatalization
 - iv. Consonant Epenthesis
- b. Vowel Processes
 - i. Vowel Truncation
 - ii. Final Short Vowel Deletion
 - iii. Glide Deletion
- c. Prosody
 - i. Stress Assignment
 - ii. Pausing

As mentioned in Chapter 3, the majority of previous research on Ojibwe has focused on the morphology, syntax, and semantics of the language. Because of this, previous phonological analyses are minimal, often bypassing formalization entirely. Notable exceptions are in works by Kaye, Piggott, and Newell. Therefore, unless otherwise cited, the following formalisms are the present author's interpretation of previous work. For the reasons discussed in the previous chapter, a derivational analysis is also adopted in this section. Additionally, Hayes' phonological features are adopted in all rule formalisms, but it should be noted that the specific feature set is not germane to the analysis. The use of Hayes' features is that of convenience as opposed to a theoretical claim regarding feature theory itself.

5.3.1 Consonantal Processes

First, consider four processes in Saulteaux which target or insert consonants: Final Obstruent Devoicing, Nasal Assimilation, Palatalization, and Consonant Epenthesis. Final Obstruent Devoicing devoices obstruents at the end of a ‘word’ (e.g. Valentine, 2001) as in (172). There has been no work on the application domain of the process, however, so it is not clear in the literature whether or not ‘word’ corresponds to a syntactic or phonological object. As the following data show, Final Devoicing applies and therefore shows phonological boundaries at the end of nouns and the end of the verb complex. Surprisingly, it also applies before the Mode suffix in the verb complex indicating multiple domains within inflectional suffixes.

(172) Final Obstruent Devoicing

Obstruents become voiceless at the end of a word.

[*-son*] → [*-voice*] / ____ #

As seen in (173), stem-final /*b*/ and /*g*/ in nouns ‘duck’ and ‘muskrat’ devoice when they occur finally. When the plural suffix /*-ag*/ is added, however, they remain voiced.

(173) Final Obstruent Devoicing in Nouns [RL]

<i>ʃi:ʃi:p</i>	duck	<i>ʃi:ʃi:b-ak</i>	ducks
<i>oʒaʃk</i>	muskrat	<i>oʒaʃg-ok</i>	muskrats

Very few morphemes in the verb complex demonstrate final voiced obstruents (i.e. there are no obstruent-final pronominal clitics, tense markers, or preverbs). Final Devoicing does apply verb complex finally, however. This is true even when the verb complex is followed by a vowel-initial object (174) or subject (175).

(174) *dʒi:ke:nim -ok* *animof -ək*
 hate -3PE.PL dog -PL
 ‘They hate dogs.’ [FR]

- (175) mmi -wak andawe:ndzige: -jak
 man -PL hunt -3PE.PL
 ‘The men hunt.’ [WL]

As seen in (176), the verb stem /bagizo/ ‘swim’ undergoes Final Short Vowel Deletion (to be discussed later) and Final Obstruent Devoicing even though the environment is not verb complex-final. In fact, the application indicates a phonological boundary before the Mode suffix. Consider (177) to confirm the vowel-final underlying form of the stem and (178) to confirm the expected complex-final devoicing.¹

- (176) ni- wi:- bagɛs -na:ban
 1PE -FUT -swim -PT
 ‘I was going to swim.’ [MM]

- (177) bagezo (/bagizo-w/
 swim.3PE
 ‘He is swimming.’ [YC]

- (178) gi- bagɛs
 2PE- swim
 ‘You are swimming.’ [YC]

Finally, while there are compounds in which first elements are voiced obstruent-final, the current corpus does not include any such constructions that do not exhibit phonological linkage (e.g. with a linking /i/ vowel). Valentine (2001) suggests that such compounds without linkage are possible, though, so this is left to future research.

Next, nasal sounds take the place of articulation of a neighboring consonant due to Nasal Assimilation (179). Piggott (1980) explains that the process usually applies based on the place of the following consonant, implying the process may also happen in reverse (nasal takes the place of the preceding consonant). This, however, remains unconfirmed. Valentine (2001) explains that the following consonant is usually a voiced stop, though there is evidence that voiceless stops may also play a role in

¹ In (177), the verb stem /bagizo/ is affixed with the 3PE /-w/. Due to a Glide Deletion rule (to be discussed in detail later), final /-w/ is deleted.

the process (e.g. Piggott 1980:266). In Saulteaux, the process applies across the pronominal clitic boundary and the stem and inflectional suffix boundary. It is blocked between grammatical words, though.

(179) Nasal Assimilation

Nasal sounds assimilate to the place of articulation of the following stop

$$[+nasal] \rightarrow [\alpha \text{ place}] / \text{ — } \left[\begin{array}{c} \alpha \text{place} \\ -\text{continuant} \end{array} \right]$$

While other dialects of Ojibwe always syncopate unstressed vowels, the process is optional in Saulteaux, and it is mostly attested in the pronominal clitic. In (180), optional Syncopation feeds Nasal Assimilation with the 1PE /ni-/ surfacing as [ŋ] to match the velar /g/ in the past tense marker.

- (180) ŋ- gi:- nagəm ako
 1PE- PAST- sing used.to
 ‘I used to sing.’ [RL]

There are no nasal final tense markers or preverbs. In fact, preverbs which are derived from nasal-final elements add [-i] blocking any opportunity for Nasal Assimilation to apply (e.g. /anaam-/ ‘under’ surfaces as [anaami-]).

Nasal Assimilation does apply within the verb complex, though, as seen below in (181). The verb stem is relativized (/g/) and has a third person singular subject (/w/). Alongside Glide Deletion, Nasal Assimilation causes the stem-final /n/ to surface as ŋ to match the relativizing /g/. Saulteaux has a phonotactic constraint against word-final /g/, though, so /g/ deletes. The velar nasal, however, is evidence that it was once there and triggered the Nasal Assimilation process.

- (181) nanəŋ
 form.REL.3PE
 ‘(that) he/she forms it. ’ [AB]

Most suffixes and all Object Number clitics are not stop-initial. It is only possible to test for the application of Nasal Assimilation across the Preterit Dubitative suffix

/-go:ban/'s boundary. The current corpus does not include the necessary constructions, though, leaving the morpheme boundary untested.

Nasal Assimilation is blocked between verbs and objects (182) and verbs and subjects (183). Verb-final /n/ in (182) does not surface as bilabial [m] to match the /b/ in Bill. In (183), the final /n/ in 'sheep' does not assimilate to the velar place of articulation of the past tense marker /gi:-/.

- (182) John obakiteejan Bill -an
 John hit.3PE Bill -OBV
 'John hit bill.' [FR]

- (183) manatʃa:neʃ -ən gi:- tapazi:
 sheep -PL PAST -run.away
 'The sheep ran away.' [FR]

In terms of nouns, there are some obstruent-initial nominal suffixes (e.g. /-dog/ vocative plural and /-ban/ preterit), though they only occur with nouns of a certain class (Class II). Class II nouns always end in a long vowel, thus eliminating the option of testing for the application of the process. Likewise, it is difficult (if not impossible) to test across a compound because of the prevalent linking vowel /i/ between compound elements.

Next, Palatalization causes alveolar sounds /t, d, s, z, n/ to surface as their palatalized counterparts before [i:, i, j].^{2,3} The process applies within preverbal modifiers, and it has been reported to apply within the stem in other dialects of Ojibwe. The process is blocked from applying, however, within pronominal clitics and inflectional suffixes.

² The process was initially discussed in Kaye et al. (1971); Kaye and Piggott (1973b) and Piggott (1980) and treated as a process unique to /t/. Valentine (2001) later confirmed the process affects all alveolar sounds in Ojibwe.

³ The inclusion of /n/ → [ɟ] may be reconstructed from a very old Proto-Algonquian process where θ palatalizes to ʃ (*θ > *1 > /n/). The synchronic rule retains /n/'s voicing and palatalizes to ɟ. Interested readers are directed to Valentine (2001) and the sources cited therein.

(184) Palatalization

Alveolar sounds become alveo-palatal before high front vowels and glides.

$$\begin{bmatrix} +\text{coronal} \\ +\text{anterior} \\ -\text{distributed} \end{bmatrix} \rightarrow [+ \text{distributed}] / \text{---} \begin{bmatrix} -\text{consonant} \\ +\text{high} \\ -\text{back} \end{bmatrix}$$

Preverbs are derived by adding a final /-i/ to a root/initial (Valentine 2001:526).

When this /-i/ occurs after an alveolar sound, palatalization always occurs. For example, the preverb /ma:dʒi-/ ‘start’ is derived from the root /ma:d-/ ‘start’ and the derivational /-i/.⁴

- (185) gi:- ma:dʒi- nagamo
 PAST- start- sing
 ‘He started singing.’ [RL]

Palatalization is discussed at length regarding its application in Oji-Cree (or Severn Ojibwe) verb stems by Slavin (2007; 2012a; 2012b). For example, the Transitive Animate marker /t-/ palatalizes before the epenthetic /i/ in (186) below. The current corpus for Saulteaux does not include the relevant construction, though, leaving this unconfirmed for Saulteaux.

- (186) [nitofitʃike:]
 ni- ofi- t- i- ke:
 1PE- make- VTA- i- VAI
 ‘I build things.’ (adapted to use IPA from Slavin 2007:1)

Most of the morphemes before the verb stem are vowel-final (Pronominal Clitic, tense marker, preverbs), so it is not possible to test for application across those morpheme boundaries. It is, however, clear that Palatalization does not apply within Pronominal clitics, as 1PE /ni-/ surfaces as itself or it’s syncopated counterpart /n-/. It never surfaces as [ʒi-] as it would if the /n/ palatalized. Likewise, inflectional suffixes

⁴ Non-palatalizing contexts for /ma:d/ include the verb stem /ma:dam/ ‘start eating.’

do not show evidence of Palatalization. For example, the negative suffix /-si:/ does not surface as [ʃi:], and the dubitative /-dig/ does not surface as [-dʒig].

In terms of testing for the application across the stem boundary to suffixes, the stem must be alveolar-final. As there are no obstruent-final stems, at least before Short Vowel Deletion, the only option is to examine /n/-final stems before /i/-initial suffixes (e.g. the Animate Obviative Mode suffix /-ini/). The current corpus and survey of the previous literature did not include the relevant construction, so this morpheme boundary remains untested.

Palatalization does not apply across a noun suffix boundary, nor does it apply across compounds (i.e. before the linking [i] vowel mentioned earlier). As seen below, the stem-final /n/ in ‘stone’ and ‘potato’ does not palatalize to [ɲ] before the plural suffix /-i:ɡ/. The current corpus does not allow testing across grammatical word boundaries, and this is left to future research.

(187) No Palatalization in Suffixed Nouns

asm	‘stone’	asini:k	‘stones’
om	‘potato’	opmi:k	‘potatoes’

Finally, Consonant Epenthesis is reported to be an active process in Ojibwe. An alveolar stop is inserted in some cases of vowel hiatus (discussed in detail in Piggott and Newell 2016). In fact, the process only occur across one morpheme boundary: that of the Pronominal Clitic. As seen in (189), /d/ is inserted between the 2PE clitic and the verb stem.

(188) Consonant Epenthesis

An alveolar stop (/t/ or /d/) is inserted between vowels.

$$\emptyset \rightarrow \begin{bmatrix} -\text{continuant} \\ +\text{coronal} \\ +\text{anterior} \end{bmatrix} / \text{V} \text{ --- } \text{V}$$

- (189) gid- anoki:
 2PE- work
 ‘You work.’ [FR]

In other locations in the verb complex, vowel hiatus is either tolerated or another process applies. For example, Vowel Truncation (to be discussed in detail later) applies across the Tense marker boundary in (190), the Preverb boundary in 191, and the noun-suffix boundary in (192).⁵ The Stem-Infl boundary remains untested, as there are very few inflectional suffixes which are vowel-initial (e.g. -ini animate obviative).

- (190) niŋ- g- anoki:
 1PE- FUT- work
 ‘I will work.’ [RL]

- (191) ŋ- ga- gi:mo:dʒ- anoki:
 1PE- FUT- secretly- work
 ‘I will secretly work.’ [RL]

Suffixed nouns also do not demonstrate Consonant Epenthesis. Instead, Vowel Truncation applies. As seen below, the vowel in the plural suffix deletes.

- (192) Nouns and Vowel Truncation
- | | | | |
|-------|----------|--------|-----------|
| name: | sturgeon | name:k | sturgeons |
| a:mo: | bee | a:mo:k | bees |

Instead of Consonant Epenthesis, a thus far unreported Glide Insertion process applies across the Stem-Object Clitic boundary.⁶ Details of such a process are left to future research.

⁵ Repairs for Vowel Hiatus in Ojibwe is a clear example of a phonological ‘conspiracy’ (c.f. Kisseberth 1970). An Optimality Theoretic analysis provides a simpler account of why the phonology is behaving the way it is. As stated earlier, however, the process in this chapter are presented in SPE-style rules for easier comparison and future work.

⁶ Apparent intervening glides are often analyzed as being stem-final and deleting in final positions (e.g. stem /ininiw/ ‘man’ surfaces as [inini] ‘man’ and [ininiw-ak] ‘men’). The verb stem ‘eat’ has not previously been proposed to be glide-final thereby supporting an epenthesis analysis.

- (193) ni -tʃa:nis -ək wi:smi -jək
 1PE.POSS -child -PL eat -PL
 ‘My children are eating.’ [YC]

Vowel hiatus is tolerated between a verb and object (194) and a verb and subject

- (195). Hiatus is also tolerated between elements of a compound.

- (194) gi:- ada:we: a:ndeg -on
 PAST- buy crow -OBV
 ‘He bought the crow.’ [RL]

- (195) inine ada:we: wismɪwən
 man buy food
 ‘The man buys food.’ [FR]

- (196) Compound Vowel Hiatus (Ojibwe People’s Dictionary)
 gitʃi-aniʃna:be: elder (big + person)
 makade:-ani:bi:ʃ black tea (black + tea)

As Consonant Epenthesis is only applies at the Pronominal Clitic boundary, the phonological process is more economically analyzed as an instance of allomorphy. Namely, Pronominal Clitics have alveolar-final allomorphs which occur before vowels. Assuming such an analysis, it is therefore excluded when considering phonological domains in the remainder of this chapter.

5.3.2 Vowel and Glide Processes

Next, consider three reported processes which target vowels and glides: Vowel Truncation, Final Short Vowel Deletion, and Glide Deletion. Vowel Truncation deletes the second vowel in a VV sequence (see, for example, discussions on Suffix Vowel Deletion in Valentine 2001:178 and Vowel Deletion in Piggott and Newell 2016). Piggott and Newell also discuss the process applying in reverse (deleting the first vowel) in prefixing situations. The difference appears to protect stem-integrity, deleting vowels in

affixes rather than stems.⁷ As mentioned in the preceding subsection, Vowel Truncation applies across the Tense Marker and Preverbal Modifier boundaries (deleting the first vowel). It also applies across noun-suffix boundaries (deleting the second vowel). Vowel hiatus is tolerated in other environments (between compounds and grammatical words).

(197) Vowel Truncation

In a sequence of two vowels (short or long), delete non-stem vowel.

$$V_1V_2 \rightarrow V_{stem}$$

Examples (190)-(191) have been repeated below for convenience. In (198), Truncation applies between the Tense marker /ga-/ and the verb stem /anoki:/. As both vowels are underlyingly /a/, it is ambiguous as to which vowel is deleting. Example (199) is much clearer, though, as the Preverb-final /i/ in /gi:mo:dʒi-/ deletes before the verb stem.

(198) niŋ- g- anoki:

1PE- FUT- work

‘I will work.’ [RL]

(199) ŋ- ga- gi:mo:dʒ- anoki:

1PE- FUT- secretly- work

‘I will secretly work.’ [RL]

In suffixed nouns, it is the second instead of the first vowel that deletes. Specifically, the vowel in the plural suffix deletes in both ‘sturgeons’ and ‘bees’ below.

(200) Nouns and Vowel Truncation

name: sturgeon name:k sturgeons

a:mo: bee a:mo:k bees

⁷ In order to see if there is a default order for the rule to apply in, it is necessary to check between prefixes/preverbs or between two suffixes. Piggott and Newell (2016) report vowel hiatus to be tolerated between two preverbs, but this has not yet been confirmed with the current corpus for Saulteaux. In addition, no two suffixes form the necessary environment (VV).

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- (206) ni- wi:- bages -na:ban
 1PE -FUT -swim -PT
 ‘I was going to swim.’ [MM]

The process is crucially ordered after Glide Deletion, as third person subject suffix /-w/ makes it so that the short vowel does not occur finally. Once the glide deletes (as will be discussed in detail later), it is too late for the final vowel to delete.

- (207) bagezo (/bagizo-w/)
 swim.3PE
 ‘He is swimming.’ [YC]

It is not possible to test for the process occurring anywhere in the remainder of the verb complex. No subject suffixes end in a short vowel. Object clitics are all consonant-final. In terms of other Mode Suffixes, /ini/ is the only potential test, but the current corpus does not include the required construction.

Nouns which appear to end with short vowels are instead analyzed as ending in a glide (/w/ or /j/) which subsequently deletes word-finally (e.g. Valentine (2001), Ojibwe People’s Dictionary (OPD), among many others). The analysis is supported by the presence of these glides when suffixed with vowel-initial morphemes (e.g. plural /-ag/). In other cases, short vowel-final nouns (e.g. makwa ‘bear’, nika ‘goose’) are analyzed as retaining their final vowel to satisfy a minimality requirement that words be bisyllabic (e.g. Piggott, 1980; Logan, 2001) or be consonant-final with the vowel inserting later (OPD). Likewise, compound elements are rarely (if ever) short vowel-final.

Thus, it is difficult to comprehensively test for the application of Final Short Vowel Deletion between verbs and subjects and objects. In fact, the only reliable test is to look at short vowel-final verb stems before a noun. As seen below, Final Short Vowel Deletion applies to a verb stem /bimibizo/ ‘drive’ when followed by an object. The current corpus does not include the required construction to test between a verb and subject but it is assumed it will pattern with other grammatical word boundaries. Confirmation is left to future research.

- (208) m- bimibis oda:ba:n
 1PE- drive car
 ‘I drive a car.’ [FR]

Finally, Glide Deletion has been reported across dialects of Ojibwe, including Saulteaux Ojibwe (Logan, 2001:49; Kaye et al., 1971; Kaye and Piggott, 1973a; Piggott, 1980). While it typically referred to as a rule for /w/ only, the above-mentioned analyses positing /j/-final noun stems may be extended to include /j/, as well. For the sake of making the broadest generalization, this analysis groups the glides together.⁸ Glide Deletion applies grammatical-word finally (i.e. at the end of noun and verb complexes and between verbs, subjects, and objects). Previous reports suggest Glide Deletion also applies between compound elements, but this remains unconfirmed in Saulteaux.

- (209) Glide Deletion

Glides delete at the end of the word.

$$\left[\begin{array}{l} -\text{consonantal} \\ -\text{syllabic} \end{array} \right] \rightarrow \emptyset \text{ — } \#$$

There are no glide-final Pronominal Clitics, Tense Markers, or Preverbal Modifiers. Some Preverbs are derived from stems that are indeed glide-final, though there is no evidence the glide remains present in its Preverb form. For example, /mino-/ ‘good’ is derived from the stem /minw/ ‘good.’ It appears the /w/ has vocalized, thus eliminating any opportunity to check if Glide Deletion applies Preverb-finally.

Verbs and nouns behave the same regarding Glide Deletion. If there is no suffixation, the glide deletes. For example, the process applies in third person verbs (third person /-w/ deletes). Noun stem /ininiw/ ‘man’ only surfaces with the underlying /w/ when followed by a vowel-initial suffix (e.g. plural /-wag/). Elsewhere, it is pronounced

⁸ Piggott 1980 argues that Glide Deletion and Final Short Vowel Deletion are in fact the same phonological process. This is not adopted here, but interested readers are directed to his discussion.

[m]textipaIne]. Glides also delete between the subject and the verb (210) and between the verb and the object (211).

- (210) ikwe: nagamo
 woman sing.3PE
 ‘The woman is singing.’ [RL]

- (211) gi:- ada:wa:ge: asap
 PAST- sell.3PE net
 ‘He sold the set.’ [RL]

Glide-final compound elements reportedly show evidence of Glide Deletion, though this remains unconfirmed for Saulteaux. For example, Valentine (2001:517) discusses compounds like that of ‘man’s trousers.’ As seen below, the noun stem /ininiw/ ‘man’ loses its glide, and the final vowel merges with the linking vowel /i/.

- (212) Glide Deletion and Compounds (Valentine 2001:517)
- | | | | | | | |
|--------|---|---|---|----------|---|-----------------|
| ininiw | + | i | + | mi:kinod | → | inini:-mi:kinod |
| man | + | i | + | trousers | → | man’s trousers |

5.3.3 Prosody

Finally, consider two prosodic processes: Stress and Grammatical Pausing. As mentioned in Chapter 3, Ojibwe Stress Assignment is a point of major debate in the previous literature. While there is general agreement that iambic feet are parsed left-to-right, there is still disagreement in terms of the nature of foot construction (e.g. is it exhaustive?), where and how primary stress is assigned, and whether or not final prominence is due to stress assignment or something phonetic. In addition, there has been little to no discussion about the acoustic correlates with Ojibwe prominence.

Final Prominence (whatever its source) is confirmed in Saulteaux nouns (213) and verbs (214) both in isolation and within a sentence (215). Impressionistically, this prominence is marked by a rise in pitch and intensity. The prominent syllables are underlined in the examples below.

(213) Final Prominence in Nouns [AB]

animof ‘dog’
odʒi:bik ‘root’
wi:pit ‘tooth’

(214) Final Prominence in Verbs [AB]

omigi: ‘to have sores/scabs’
diko:na:t ‘to cut someone short’
dagobizo ‘to drive up among others’

(215) Final Prominence within a Sentence

gi:jose: -jok ondʒe wawaʃke:ʃ -an
hunt -3PE.PL for deer -OBV

‘They hunt for the deer.’ [RL]

Beyond this final prominence, stress assignment in Saulteaux Ojibwe has proven elusive. Recall that there are two main approaches to stress in Ojibwe: Exhaustive Foot Construction (EFC) from the traditional Algonquianist literature and Non-Exhaustive Construction (NEC) from Hayes (1995). The two approaches make different predictions for stress assignment, but testing shows neither approach’s predictions are borne out in Saulteaux.

Consider the following nouns in (216). In each case, the same iambic foot structure is predicted, though peripheral feet in ‘black’ and ‘hair.PL’ are considered extrametrical for the NEC. The main difference arises in the predicted placement of primary stress in the noun [makəte:wa:] ‘black’ and [opm] ‘potato.’ The EFC predicts primary stress to fall on the second vowel in both nouns, as that vowel ([ə] and [ɪ]) forms the head of the antepenultimate foot. The NEC predicts it will fall on the initial vowel in both nouns. In ‘black,’ the first vowel is the antepenultimate footed syllable. In ‘potato,’ there are not enough syllables to reach an antepenultimate syllable. Therefore, primary stress falls on the initial syllable.

(216) Stress Assignment Predictions

<u>Exhaustive Approach</u>		<u>Non-Exhaustive Approach</u>	
(maké)(te:)(wa:)	‘black’	(mákə)(te:)<wa:>	‘black’
(wí:)(nizi)(sa:n)	‘hair.PL’	(wí:)(nizi)<sa:n>	‘hair.PL’
(opín)	‘potato’	(ópín)	‘potato’

In fact, there is no consistent acoustic evidence for either primary or secondary stress in Saukteaux regardless of the predictions above. Some syllables may sound more prominent, but their location is not predictable from item to item. There are also lexical items which do not demonstrate prominence other than the final prominence mentioned above. First impressions therefore suggest Saukteaux Ojibwe does not mark or differentiate primary and secondary stress – at least how previously predicted. It should be acknowledged that these results stem from impressionistic analysis, though. It is not possible to affirmatively state the status of stress in Saukteaux without an acoustic analysis. This is a critical avenue for future research.

As there appears to be no acoustic manifestation of stress (primary or secondary), one could argue there is no evidence for iambic foot structure in the dialect. The phonological process of Vowel Syncopation suggests this would be an incorrect conclusion, though. Specifically, it is not any vowel which may delete - but it is a vowel in the weak position of an iambic foot. Other dialects (e.g. Eastern Ojibwe) apply Vowel Syncopation much more freely than Saukteaux Ojibwe, often deleting all weak vowels in an utterance. Saukteaux speakers, however, *do* sometimes delete weak vowels (e.g. Pronominal Clitics). Though rare and optional, it is in fact active in the dialect thus necessitating the previously proposed iambic foot structure – just not for stress assignment.

An active foot structure without acoustically manifested stress (at least rhythmic secondary stress) is not a novel proposal. Feet and stress are considered intrinsically linked under traditional Metrical Theory (e.g. Hayes, 1985, 1995; Hammond, 1984; McCarthy and Prince, 1996; Kager, 1989), but this is not a universally held view. Other researchers have argued for foot structure and stress to be separated, allowing for foot

structure to be interpreted outside of stress (e.g. Halle and Vergnaud, 1987; Crowhurst, 1991, 1996; Rachel, 1997; Hewitt, 1992; Idsardi, 1992; González, 2005, 2007). González (2005) conducts a typological survey of 74 languages and finds strictly stress-sensitive phonology, processes sensitive to both stress and foot structure, and strictly foot-sensitive phonology. Capanahua (Panoan), for example, does not exhibit any acoustic correlates of secondary stress but trochaic foot structure dictates which vowels may reduce (González 2007:63) – analogous to the above described situation in Saulteaux Ojibwe.

Given an analysis without the previously predicted primary and secondary stress, the status of the observed final prominence is open. Perhaps Saulteaux Ojibwe is, in fact, a final stress language. It is just as likely to be a boundary phenomenon, however. As there is no clear way to decide between the two analyses, it remains open to future research. The fact that Final Prominence exists and occurs at the end of lexical items (e.g. nouns and verbs) is all that is relevant to the present analysis, however.

Finally, Saulteaux Ojibwe exhibits pausing to mark grammatical and contrastive information at the end of clauses. As this is also based on impressionistic analysis alone, future research should evaluate the exact nature of pausing. Consider the following examples, in which pausing is used to indicate whether or not a particular noun is the object in the first clause or the subject of the second. In English, these sentences are entirely ambiguous without the pause. Ojibwe’s productive morphology on the verb, however, makes it so the only ambiguity is where the noun should be parsed and interpreted as part of the semantics. As seen in (217), the brief pause has been indicated by the IPA symbol (.).

- (217) gi:ʃpm maji:ngən -ək damo -w -ak manatʃa:neʃ -an (.)
 if wolf -PL eat -3PE -3PE.PL sheep -OBV (.)
 tapazi:n
 run.away.IMP
 ‘When the wolves eat the sheep, run away.’ [WL]

- (218) gi:ʃpm maji:ngən -ək damo -w -ak (.) manatʃa:neʃ -an ki:
 if wolf -PL eat -3PE -3PE.PL (.) sheep -OBV 3PE
 -tapazi:
 -run.away
 ‘When the wolves eat, the sheep run away.’ [WL]

5.3.4 Summary

Table 5.1 includes a summary of the phenomena in Saulteaux and where they apply within the verb, clause, and compounds. Elements are grayed out if it was determined to be impossible to test that boundary or if the necessary data has not been acquired yet. Elements are grayed out and crossed out if the process specifically does not apply within and/or across those morphemes. Brackets indicate boundaries between domains of application, and black text indicates the application spans throughout the morphological string. Finally, the Infl slot has been marked with an asterisk and bracket when it is clear that there is a boundary between inflectional suffixes. The details about where exactly this split occurs within the inflectional suffixes merits comprehensive testing and analysis and is therefore left to future research. At issue in this dissertation is whether or not currently theoretical models successfully predict or offer an account for such a phonological boundary.

There is a high degree of overlap in domains between processes. Collapsing the table into a single example, there are three different sizes of domains. In order to be successful, an interface approach needs to be able to account for each of the domains below. Moreover, it needs to do so in a theoretical valuable (predictive) way. To this end, these patterns are compared to current theoretical predictions in the following section.

- (219) Saulteaux Phonological Domains

Clause: [[[Pronom=Tense-Mod(s)-Stem-Infl₁]-Infl₂=Obj.No.] [Obj.] [Subj.]]

Compound: [Root₁] + [Root₂]

Process	Clause Verb Complex	Object	Subject
Final Devoicing	[Pronom. = Tense - Mod(s) - Stem - Infl.*]	[Obj.]	[Subj.]
Nasal Assim.	[Pronom. = Tense - Mod(s) - Stem - Infl.]	[Obj.]	[Subj.]
Palatalization	[Pronom. = Tense - Mod(s) - Stem - Infl.]	Obj.	Subj.
V Truncation	[Pronom. = Tense - Mod(s) - Stem - Infl.]	[Obj.]	[Subj.]
FSVD	[Pronom. = Tense - Mod(s) - Stem - Infl.*]	Obj.	Subj.
Glide Deletion	[Pronom. = Tense - Mod(s) - Stem - Infl.]	[Obj.]	[Subj.]
Final Prominence	[Pronom. = Tense - Mod(s) - Stem - Infl.]	[Obj.]	[Subj.]
Pausing	[Pronom. = Tense - Mod(s) - Stem - Infl.]	Obj.	Subj.]

Process	Compound Root ₁ + Root ₂
Final Devoicing	Root₁ Root ₂
Nasal Assim.	Root ₁ Root ₂
Palatalization	Root₁ Root ₂
V Truncation	Root₁ Root ₂
FSVD	Root ₁ Root ₂
Glide Deletion	[Root ₁] [Root ₂]
Final Prominence	Root ₁ Root ₂

Table 5.1: Saulteaux Phonological Processes and Domains

Subj. and Obj. correspond with suffixed nouns
 Black Text: Process's application spans morpheme string
 [: Process is blocked from applying across this boundary
~~Strike-Out~~: Process does not apply
 Gray: No direct evidence of process's application available

5.4 Testing Current Approaches

In this section, the phonological domains of Saulteaux are compared to each of the predictive models' predictions (repeated below).

(220) Summary of Predictions for Saulteaux Clause

RM: $[[[\text{Pronom.}=\text{Tense}-[\text{Mod(s)}]_{\omega}-[\text{Stem-Infl}]_{\omega}=\text{Obj. No.}]_{\kappa}]_{\varphi} [[\text{Obj.}]_{\omega}]_{\varphi} [[\text{Subj.}]_{\omega}]_{\varphi}]_{\iota}$

SD: $[[[\text{Pronom.}=\text{Tense-Mod(s)-STEM-Infl}=\text{Obj.No.}]_{\omega}]_{\phi} [[\text{Obj.}]_{\omega}]_{\phi} [\text{Subj.}]_{\omega}]_{\phi}]_{\iota}$

SO: $[\text{Pronom.}=\text{Tense}-[\text{Mod(s)}]_a-[\text{Stem-Infl}=\text{Obj.No.}]_v]_C [\text{Obj.}]_n [\text{Subj.}]_n$

(221) Summary of Predictions for Saulteaux Compounds

RM: $[[\text{Root}_1]_{\omega} + [\text{Root}_2]_{\omega}]_{\kappa}$

SD: $[[\text{Root}_1]_{\omega} + [\text{Root}_2]_{\omega}]_{\omega}$

SO: $[[\text{Root}_1]_n + [\text{Root}_2]_n]_n$

(222) Saulteaux Phonological Domains

Clause: $[[[\text{Pronom}=\text{Tense-Mod(s)-Stem-Infl}_1]-\text{Infl}_2=\text{Obj.No.}] [\text{Obj.}] [\text{Subj.}]]$

Compound: $[\text{Root}_1] + [\text{Root}_2]$

As mentioned earlier in the chapter, the approaches differ primarily in terms of whether or not they predict verb-internal phonological domains. As the previous section confirms, the Saulteaux verb may form up to two domains (one including all suffixes and one with the boundary between inflectional suffixes). As was the case with Kiowa, Relational Mapping and the Syntactic Spell-Out Approach predict verb-internal domains. Syntax-Driven Mapping does not.

Match Theory's reliance on X^0 at the surface for Match-Word again predicts the verb complex will form a single domain. No amount of phonological adjustment through Markedness Constraints allows for the introduction of an entirely new domain. If Match-Word applied prior to Merge, Preverbal Modifiers and the Stem would form separate ω s. There is no positive evidence showing Modifiers do pattern separately for the examined processes in the current corpus, but it is not explicitly ruled out. In order to account for the two observed domains in the verb complex, though, Match-Word would need to be allowed to apply again at the surface. Therefore, ω domains would

be mapped for the Modifier(s), Stem, and the larger X^0 on the surface. The Stem's smaller ω allows for phonological adjustment using Markedness constraints in order to derive the smaller verb-internal domain (up to Infl_2). If mapping does not apply both times, however, there are still not enough relevant domains to account for the split in the inflectional suffixes.

Syntactic Spell-Out successfully predicts verb-internal phonological domains, but the split between inflectional suffixes again poses an issue. In order to predict enough domains, phase heads would need to be redefined (perhaps the Mode head is its own phase head). Such a language-specific phase head is unexpected, and such a proposal would also require extensive syntactic analysis and justification. Secondly, Syntactic Spell-Out correctly predicts the verb complex to form its own phonological domain only due to the Pronominal Argument Hypothesis. Namely, the Subject and Object are spelled-out separately from the whole clause and therefore are not involved in the full CP. If, however, a more configurational analysis were found to be necessary, though, the same Saukteaux data faces the same issue as Kiowa in the previous chapter.

In fact, Relational Mapping is the only current approach which can account for the verb's domains in Saukteaux. Its success, however, hinges on two major assumptions. First, it must be assumed that the Pronominal and Object Number clitics are not in fact clitics. This is unfounded as there are clitic-specific processes reported, and therefore no reason to separate them from other affixes (Oxford, personal communication). Second, the Modifier(s) must not form independent ω domains. If Modifier(s) do form independent ω s (as predicted in Relational Mapping and the Syntactic Spell-Out Approach), the Stem's ω cannot be adjusted to span from the Pronominal element through to Infl_1 (nesting the Modifier ω s within a larger ω). Given the current data available, then, Relational Mapping is successful in accounting for the observed patterns in Saukteaux.

While it is true Relational Mapping is presently successful, it should be noted that no current approach is equipped to account for stem (and stem-internal) domains. Smaller phonological domains (or constituents) are necessary in order to maintain the

above analysis. Previous work has gone as far as analyzing the Ojibwe stem as a full φ with complex layered phonological domains (see work by Slavin for discussions). Given the predictions presented in this chapter, and the fact that even those face notable issues in Saulteaux, a complex stem-internal phonology is a critical area for future research.

5.5 Discussion and Conclusions

This chapter presented nine phonological processes in Saulteaux Ojibwe and detailed the application domain of each. These results were summarized and then compared directly to the model-specific predictions of Relational Mapping, Syntax-Driven Mapping, and the Syntactic Spell-Out Approach. As with Kiowa in Chapter 4, Relational Mapping is the most successful approach when accounting for the data. Its success is tenuous at best, though, relying on assumptions and a lack of positive evidence.

Relational Mapping's continued success, no matter how strong, confirms the results (and subsequent implications) presented in Chapter 4. In the next chapter, these results are discussed together focusing on Relational Mapping's success. Specifically, it is asked if the model's success necessarily shows the need for a morphological module or if it is possible to find the same level of success referencing only syntax.

Chapter 6

TOWARDS A NEW MAPPING STRATEGY

6.1 Overview of Main Findings

This dissertation examined phonology and its interface with morphology and/or syntax, focusing specifically on the relationship between (morpho-)syntactic structure and phonological domains. Data from two languages (Kiowa and Saulteaux Ojibwe) was used to test current approaches to delimiting phonological domains. Due to extreme levels of morpho-syntactic complexity, each language often blurs the lines between words, phrases, and clauses, offering a crucial test case for current interface models. Through comprehensive phonological analysis of each language, focusing on syllables and larger strings up to full clauses, it is shown that Relational Mapping (c.f. Nespor and Vogel, 1986) is the only approach which may successfully account for the data in both languages (though its success is subject to several assumptions in Saulteaux).

Relational Mapping's consistent success over other interface approaches is notable, as it is the only approach which assumes a strict separation of morphology and syntax. As discussed throughout the entire dissertation, there is pressure for a linguistic theory to be maximally economic or simple. Thus, a model is preferred if it captures the observed data with the fewest grammatical modules possible. This is to avoid too much power in a model, which may lead to overgeneration and predict structures which are in fact not possible cross-linguistically. Thus, if it is possible to predict and account for the mapping and patterning of phonological domains referencing only syntax, that approach is automatically preferred.

Thus, a new proposal is put forward in the next section (here called Phase-Based Prosodic Phonology or PPP). PPP is an Indirect Reference model, defining prosodic

constituents with different types of phases (morphological and clause-level) as well as existing prosodic structure (i.e. referencing previously mapped prosodic constituents when mapping others). PPP achieves the same level of success as Relational Mapping in accounting for the language data in Kiowa and Saulteaux.

In addition to what is referenced to map prosodic structure, the results in this dissertation bear on what exactly should be included in the Prosodic Hierarchy and how common each constituent should be. Specifically, it is clear that both languages require an intermediate constituent between ω and φ . Because of unique phonological characteristics, recursion is not a sufficient analysis for either language. As discussed in Chapter 4, however, there are definitional issues with κ . As the domain of idiosyncrasy, different κ domains are defined differently in terms of syntactic and semantic composition. This adds a level of theoretical complication that is dispreferred.

Building on the issue of which constituents must be included in the Prosodic Hierarchy is whether or not those constituents should be considered universal. As the unlimited proliferation of domains in the Phenomenon-Based approach leads to such problems, some level of universality is needed in order to make cross-linguistic predictions about phonological domains. What is not yet clear is if that requires defined prosodic constituents be universally *present* in all languages or whether the defined prosodic constituents are universally *available* to all languages. If it is found that Saulteaux does need to use the Prosodic Stem, it is thus an open issue if the Prosodic Stem should be used cross-linguistically.

6.2 Towards a New Mapping Strategy

As previously discussed, a syntax-only approach is theoretically preferred over Relational Mapping. This section asks if it is possible to appeal to syntax only, and differently than other current proposals, in a way that is as effective as Relational Mapping. A new and preliminary proposal is put forward and applied to Kiowa and Saulteaux data in the following subsections. Its overall success compared to Relational Mapping and directions for future research are then discussed in Section 6.3.

6.2.1 Phase-Based Prosodic Phonology

Prosodic-Based Prosodic Phonology (henceforth PPP) is a blended approach, combining positive aspects from all three current interface approaches. PPP assumes phonology may only reference syntax, offering the simplest possible account of grammatical modules. Of the two current syntax-only approaches, the Syntactic Spell-Out Approach is the most successful. This is largely due to the fact that phases more closely correspond to observed phonological domains. Thus, phonology references phases in PPP.

PPP also assumes an Indirect Referencing strategy, as Direct Reference was not properly predicting intermediate structures. As in other Indirect Reference Spell-Out accounts (e.g. Cheng and Downing, 2007; Kratzer and Selkirk, 2007; Ishihara, 2007; Dobashi, 2003, 2004a,b; Compton and Pittman, 2007; Piggott and Newell, 2006; Ahn, 2015), morpheme level phases map to ω and clause level phases map to φ . Phonologically motivated restructuring may then occur including or excluding various elements within the tree. The ι is defined as the highest spell-out domain through the whole tree (e.g. the full complement of C regardless of lower Spell-Out Domains).

In order to account for intermediate structure between ω and φ , a constituent (i.e. κ) must be prosodically defined. That is, the definition must reference prosodic structure (e.g. ω s and unmapped elements that pattern together phonologically) rather than syntactic structure. By prosodically defining the constituent, PPP remains syntax-only while also bypassing the need for a morphological module.

6.2.2 Revisiting Kiowa and Sauteaux

Consider PPP-specific predictions for Kiowa and Sauteaux, compared to the observed patterns in Chapters 4 and 5. In (223), morphological phases successfully predict verb-internal domains like Relational Mapping and the Syntactic Spell-Out Approach. The Stem's ω may then be readjusted to include the I/M suffix(es) based on phonological patterns. PPP also predicts a φ domain (the lower vP), which may

be readjusted to form the verb complex's full phonological domain, thus fixing a major issue for the Syntactic Spell-Out Approach. Finally, phonological patterns across compounds will form a κ given the definitions in the preceding subsection.

(223) PPP Predictions for Kiowa

Clause: $[[\text{Subject}]_\omega [[\text{Object}]_\omega \text{Ppfx-}[\text{Adv}]_\omega\text{-}[\text{N}]_\omega\text{-}[\text{V}]_\omega\text{-}[\text{Stem}]_\omega\text{-I/M-Synt}]]_{\varphi\iota}$

Compound: $[[\text{Root}_1]_\omega + [\text{Root}_2]_\omega]_\kappa$

(224) Kiowa Phonological Domains

Clause: $[[\text{Subject}] [\text{Object}] [[\text{Ppfx}]\text{-}[\text{Adv}]\text{-}[\text{N}]\text{-}[\text{V}]\text{-}[\text{STEM-I/M}]\text{-}[\text{Synt}]]$

Compound: $[[\text{Root}_1] + [\text{Root}_2]]$

Though PPP correctly predicts the Subject and Object to form ω domains, it does not predict that they will each form φ domains. They clearly do, however, as they both exhibit Tone Lowering like the verb complex. PPP's failure here is largely due to the fact that morpheme-level and clause-level phases are hardly ever the same size. Therefore, unless a vP (clause-level phase) consists of exactly one categorizing phrase (morpheme-level phase), PPP does not ever predict a single element will form both an ω and φ . A combination of requirements like Vogel's *Principle of Minimal Distance* and *Proper Headedness* may bypass this issue. Namely, PPP must require that each ω be a part of a larger κ and each κ be a part of a larger φ . Therefore, while initial mapping only predicts the Subject and Object for ω s, further requirements map the elements to κ s and φ s of the same size. With these requirements, PPP accounts for the Kiowa data as effectively as Relational Mapping but only referencing syntax. It is therefore theoretically preferable.

As with all other current approaches, PPP falls short when accounting for Saulteaux's phonological patterns. It however falls short in the exact same way Relational Mapping does. Namely, it may only account for the data if Modifiers never form independent ω s. A combination of the two different types of phases and the prosodic restrictions mentioned in the paragraph above, PPP successfully predicts verb-internal

domains and also bypasses the Syntactic Spell-Out Approach's failure to properly predict φ domains. The inflectional suffix split, however, is still problematic.

(225) PPP Predictions for Saulteaux

Clause: $[[\text{Pronom}=\text{Tense}-[\text{Mod}(\text{s})]_{\omega}-[\text{Stem}]_{\omega}-\text{Infl}=\text{Obj.No.}]_{\kappa}]_{\varphi} [[\text{Obj.}]_{\omega}]_{\kappa}]_{\varphi} [[\text{Subj.}]_{\omega}]_{\kappa}]_{\varphi}]_{\iota}$

Compound: $[[\text{Root}_1]_{\omega} + [\text{Root}_2]_{\omega}]_{\kappa}$

(226) Saulteaux Phonological Domains

Clause: $[[[\text{Pronom}=\text{Tense}-\text{Mod}(\text{s})-\text{Stem}-\text{Infl}_1]-\text{Infl}_2=\text{Obj.No.}] [\text{Obj.}] [\text{Subj.}]]$

Compound: $[\text{Root}_1] + [\text{Root}_2]$

6.3 Summary and Discussion

As seen in the previous section, it is in fact possible to achieve the same level of success as Relational Mapping without appealing to a separate morphological module. The same level of success, though, still means falling short for a sufficient account of Saulteaux phenomena in the present study. Future research therefore needs to focus on this particular boundary and any potential explanations or re-analyses which may unite the two language analyses.

While PPP does not require a separate morphological module, referencing prosodic structure in constituent definitions adds complexity in terms of theoretical machinery. Thus, PPP offers marked theoretical advantages over Relational Mapping in being syntax-only, but future research must address this "exchange of complexity" or asking whether fewer grammatical modules or simpler definitional criteria is overall more preferred when accounting for phonological domains at the phonology-syntax interface.

REFERENCES

- Adger, D. (2006). Stress and phasal syntax, ms. Queen Mary College, University of London.
- Adger, D. and Harbour, D. (2007). Syntax and syncretisms of the Person Case Constraint. Syntax, 10(1):2–37.
- Adger, D., Harbour, D., and Watkins, L. J. (2009). Mirrors and microparameters: Phrase structure beyond free word order. Cambridge University Press.
- Ahn, B. T. (2015). Giving reflexivity a voice: Twin reflexives in English. PhD thesis, University of California, Los Angeles.
- Ahn, B. T. (2016). Syntax-phonology mapping and the Tongan DP. Glossa: a journal of general linguistics, 1(1).
- Archer, J. (2005). The First Fire: Stories of the Cherokee, Kickapoo, Kiowa, and Tigua. Lanham: Taylor Trade Publications.
- Arnhold, A. (2014). Prosodic structure and focus realization in West Greenlandic. Prosodic Typology, 2.
- Arnhold, A., Compton, R., and Elfner, E. (2016). Prosody and wordhood in South Baffin Inuktitut. In Keough, M., editor, Proceedings of the Workshop on Structure and Constituency in the Languages of the Americas, volume 21. University of British Columbia Working Papers in Linguistics 40.
- Baker, M. C. (1985). The mirror principle and morphosyntactic explanation. Linguistic inquiry, 16(3):373–415.

- Baker, M. C. (1996). The polysynthesis parameter. Oxford University Press.
- Baraga, F. and Nichols, J. D. (1878/1992). A dictionary of the Ojibway language. Minnesota Historical Society Press.
- Barrie, M. and Mathieu, E. (2016). Noun incorporation and phrasal movement. Natural Language & Linguistic Theory, 34(1):1–51.
- Bartlett, J. H. (1861). Miscellaneous vocabularies of 32 different tribes. Bureau of American Ethnology. NAA MS. No. 1627. Archived at the National Anthropological Archives, Smithsonian Institution.
- Beauchamp, D. and Boulanger, A. (1995). Anishinaabemowin ? Ojibwe Language Program S1-S4. Winnipeg, MB: Winnipeg School Division No. 1.
- Béjar, S. (2003). Phi-syntax: A theory of agreement. PhD thesis, University of Toronto.
- Belcourt, G. A. (1839). Principes de la langue des sauvages appelés Sautaux. [Québec?: sn], 1839 (Québec.
- Bestal, P. A. and Schultes, R. E. (1939). The Economic Botany of the Kiowa Indians as it Relates to the History of the Tribe. Cambridge: Botanical Museum.
- Bickel, B., Hildebrandt, K., and Schiering, R. (2009). The distribution of phonological word domains: a probabilistic typology. Phonological domains: universals and deviations, pages 47–75.
- Bickel, B. and Nichols, J. (2001). Autotyp database. <http://www.autotyp.uzh.ch/>.
- Bishop, C. A. (2015). Ojibwa. retrieved from <http://www.thecanadianencyclopedia.ca/en/article/ojibwa/>.
- Bloomfield, L. (1946). Algonquian. In Linguistic structures of Native America, eds. Harry Hoijer and Cornelius Osgood, pages 85–129. New York: Viking Fund Publications in Anthropology.

- Bloomfield, L. (1958). Eastern Ojibwa: grammar, texts, and word list. C. Hockett, ed. University of Michigan Press.
- Bloomfield, L. (1962). The Menomini Language. Yale University Press.
- Bobaljik, J. and Wurmbrand, S. (2013). Suspension across domains. Distributed Morphology Today: Morphemes for Morris Halle, pages 185–198.
- Borer, H. (2005). Structuring sense: an exo-skeletal trilogy. Oxford University Press.
- Boyd, M. (1981). Kiowa Voices: Ceremonial dance, ritual, and song, volume 1. Fort Worth, Tex.: Texas Christian University Press.
- Boyd, M. (1983). Myths, Legends and Folktales, volume 2. Fort Worth, Tex.: Texas Christian University Press.
- Branigan, P. (2012). Macroparameter learnability: An algonquian case study. Ms. Memorial University of Newfoundland.
- Bresnan, J. (1982). The mental representation of grammatical relations, volume 1. The MIT Press.
- Bresnan, J. and Mchombo, S. A. (1995). The lexical integrity principle: Evidence from Bantu. Natural Language & Linguistic Theory, 13(2):181–254.
- Bruening, B. (2014). Word formation is syntactic: Adjectival passives in English. Natural Language & Linguistic Theory, 32(2):363–422.
- Bruening, B. (2018). The lexicalist hypothesis: Both wrong and superfluous. Language, 94(1):1–42.
- Canada Constitution Act (1982).
- Cassimjee, F. and Kisseberth, C. (1998). Optimal domains theory and Bantu tonology. Theoretical aspects of Bantu tone, pages 33–132.

- Cheng, L. and Downing, L. J. (2007). The prosody and syntax of Zulu relative clauses. SOAS Papers in Linguistics, 15:51–63.
- Chomsky, N. (1957). Syntactic structures. the hague: Mouton. 1965. aspects of the theory of syntax. Cambridge, Mass.: MIT Press.(1981) Lectures on Government and Binding, Dordrecht: Foris.(1982) Some Concepts and Consequences of the Theory of Government and Binding. LI Monographs, 6:1–52.
- Chomsky, N. (1965). Aspects of the theory of syntax. Cambridge, Massachussetts: MIT Press.
- Chomsky, N. (1970). Remarks on nominalization. In Jacobs, R. A., editor, Readings in English transformational grammar, pages 184–221. Ginn and Company.
- Chomsky, N. (2000). Minimalist inquiries: The framework. In Roger Martin, D. M. and Uriagereka, J., editors, Step by step: Essays on minimalist syntax in honor of Howard Lasnik, pages 89–155. Cambridge, MA: MIT Press.
- Chomsky, N. (2001). Derivation by phase. Ken Hale: A life in language, pages 1–52.
- Chomsky, N. (2008). On phases. Current Studies in Linguistics Series, 45:133.
- Chomsky, N. and Halle, M. (1968). The Sound Pattern of English. New York: Harper and Row.
- Citko, B. (2014). Phase theory: An introduction. Cambridge University Press.
- Collier, D. (1944). Conjuring among the kiowa. Primitive Man, 17(3/4):45–49.
- Collins, C. and Stabler, E. (2016). A formalization of minimalist syntax. Syntax, 19(1):43–78.
- Compton, R. and Pittman, C. (2007). Affixation by phase: Inuktitut word-formation. In 81st annual meeting of the Linguistic Society of America, Anaheim.

- Comrie, B. (1989). Language universals and linguistic typology: Syntax and morphology. University of Chicago press.
- Cook, C. E. (2008). The syntax and semantics of clause-typing in Plains Cree. PhD thesis, University of British Columbia.
- Cote, L. L. (2012). An Analysis of the Discourse Function of Saulteaux /mi-/ As Exemplified In A Traditional Cote First Nation Teaching Text. PhD thesis, University of Regina.
- Cote, M. (1985). Nahkaw?win: Saulteaux (Ojibway dialect of the Plains). Regina SK: Saskatchewan Indian Federated College.
- Cote, M. R., Ratt, S., and Klokeid, T. (1987). Conditional sentences in Cree and Saulteaux. In Eighteenth Algonquian Conference, ed. William Cowan, pages 49–58.
- Crowell, E. E. (1949). A preliminary report on Kiowa structure. International Journal of American Linguistics, 15(3):163–167.
- Crowhurst, M. J. (1991). Minimality and foot structure in metrical phonology and prosodic morphology.
- Crowhurst, M. J. (1996). An optimal alternative to conflation. Phonology, 13(3):409–424.
- Dahlstrom, A. (1995). Topic, focus, and other word order problems in Algonquian. The Belcourt Lecture, delivered before the University of Manitoba on 25 February 1994. Winnipeg: Voices of Rupert’s Land.
- Déchaine, R.-M. (1997). Nominal predication in plains cree. Algonquian Papers-Archive, 28.
- Denny, J. P. (1978a). The semantic roles of medials within Algonquian verbs. International Journal of American Linguistics, 44(2):153–155.

- Denny, J. P. (1978b). Verb class meanings of the abstract finals in Ojibway inanimate intransitive verbs. International Journal of American Linguistics, 44(4):294–322.
- Denny, J. P. (1986). The semantic role of noun classifiers. Noun classes and categorization, pages 297–308.
- Di Sciullo, A.-M. and Williams, E. (1987). On the definition of word, volume 14. Springer.
- Dobashi, Y. (2003). Phonological phrasing and syntactic derivation. PhD thesis, Cornell University.
- Dobashi, Y. (2004a). Multiple spell-out, label-free syntax, and pf-interface. Exploration in English Linguistics, 19.
- Dobashi, Y. (2004b). Restructuring of phonological phrases in japanese and syntactic derivation. manuscript, Kitami Institute of Technology.
- Downing, L. J. (2016). The prosodic hierarchy in chichewa: How many levels? Prosodic Studies, 1:1–44.
- Elfner, E. J. (2012). Syntax-prosody interactions in Irish. PhD Thesis, University of Massachusetts Amherst.
- Ellis, C. (2002). The Kiowas and the Legend of Kicking Bird, with Three Kiowa Tales by Col. WS Nye. Duke University Press.
- Elordieta, G. (2006). Binariness at the left edge of intonational phrases. In GLOW Workshop on Prosodic Phrasing.
- Elordieta, G. (2007). A constraint-based analysis of the intonational realization of focus in northern Bizkaian Basque. Tones and tunes, 1:199–232.
- Emonds, J. E. (1976). A transformational approach to syntax-root, structure preserving and local transformations. New York, Academic.

- Epstein, S. D. and Seely, T. D. (2002). Rule applications as cycles in a level-free syntax. Derivation and explanation in the minimalist program, pages 65–89.
- Epstein, S. D. and Seely, T. D. (2006). Derivations in minimalism, volume 111. Cambridge University Press.
- Etxeberria, U. (2007). Composicionalidad y cuantificadores generalizados. In Las lenguas y su estructura, vol. IIb of Actas del VI Congreso de Lingüística General, pages 2091–2100.
- Fiero, C. (1976). Style manual for syllabics.
- Fortescue, M. (1994). Polysynthetic morphology. In Encyclopaedia of Language and Linguistics. Pergamon Press.
- Fortescue, M. (2007). The typological position and theoretical status of polysynthesis. Tidsskrift for Sprogforskning, 5(1):1–27.
- Fortescue, M., Mithun, M., and Evans, N. (2014). What are the limits of polysynthesis? Keynote talk at the International Symposium on Polysynthesis in the World’s Languages. February 20-21, 2014. NINJAL, Tokyo.
- Gatschet, A. S. (1880). Linguistic material february-march 1880. Bureau of American Ethnology. NAA MS. No. 3783. Archived at the National Anthropological Archives, Smithsonian Institution.
- Gatschet, A. S. (1882). Phonetics of the Kāyowé language. American Antiquarian and Oriental Journal, 4:280–285.
- Gatschet, A. S. (1884a). Vocabulary and notes on the Kayowe language October, November, December 1884. Bureau of American Ethnology. NAA MS. No. 520-a. Archived at the National Anthropological Archives, Smithsonian Institution.

- Gatschet, A. S. (1884b). Vocabulary October, November, December 1884. Bureau of American Ethnology. NAA MS. No. 520-b. Archived at the National Anthropological Archives, Smithsonian Institution.
- Gatschet, A. S. (1886). A.S. Gatschet vocabularies and other linguistic notes ca. 1881-1886. Bureau of American Ethnology. NAA MS. No. 1449. Archived at the National Anthropological Archives, Smithsonian Institution.
- Goddard, I. (1988). Post-transformational stem derivation in Fox. Papers and Studies in Contrastive linguistics, 22:59–72.
- Goddard, I. (1990). Primary and secondary stem derivation in Algonquian. International Journal of American Linguistics, 56(4):449–483.
- Golla, V. (2007). North america. In Moseley, C., editor, Encyclopedia of the World's Endangered Languages, pages 1–96. London & New York: Routledge.
- Gonzales, A. K. (2001). Thaum khoiye tdoen gyah: Beginning Kiowa language. University of Science and Arts of Oklahoma Foundation.
- González, C. (2005). Phonologically-conditioned allomorphy in panoan: Towards an analysis. Papers in phonology, 6:39–56.
- González, C. (2007). Typological evidence for the separation between stress and foot structure. TRENDS IN LINGUISTICS STUDIES AND MONOGRAPHS, 189:55.
- Hale, K. (1962). Jemez and Kiowa correspondences in reference to Kiowa-Tanoan. International Journal of American Linguistics, 28(1):1–5.
- Hale, K. and Keyser, S. J. (1993). On argument structure and the lexical expression of syntactic relations. In Hale, K. and Keyser, S. J., editors, The view from building 20: Essays in linguistics in honor of Sylvain Bromberger, pages 53–109. Cambridge, MA: MIT Press.

- Hale, K. and Selkirk, E. (1987). Government and tonal phrasing in Papago. Phonology Yearbook, 4:151–183.
- Halle, M. and Marantz, A. (1993). Distributed morphology and the pieces of inflection. In Hale, K. and Keyser, S. J., editors, The view from building 20: Essays in linguistics in honor of Sylvain Bromberger. Cambridge, MA: MIT Press.
- Halle, M. and Vergnaud, J.-R. (1987). Stress and the cycle. Linguistic Inquiry, 18(1):45–84.
- Hammond, M. (1984). Constraining metrical theory: a modular theory of rhythm and destressing. Indiana University Linguistics Club.
- Harbour, D. (2002). On the metrical nature of Kiowa tone.
- Harbour, D. (2003). The Kiowa case for feature insertion. Natural Language & Linguistic Theory, 21(3):543–578.
- Harbour, D. and Guoladdle, C. (ms). Carrie’s Kiowa correspondence course. MIT and Riverside Indian School.
- Harrington, J. P. (1910). On phonetic and lexical resemblances between Kiowa and Tanoan. Archaeological Institute of America.
- Harrington, J. P. (1928). Vocabulary of the Kiowa language. Bureau of American Ethnology Bulletin 84. Washington, D.C.: Government Printing Office.
- Harrington, J. P. (1946). Three Kiowa texts. International Journal of American Linguistics, 12(4):237–242.
- Hayes, B. (1985). Iambic and trochaic rhythm in stress rules. In Annual Meeting of the Berkeley Linguistics Society, volume 11, pages 429–446.
- Hayes, B. (1995). Metrical stress theory: Principles and case studies. University of Chicago Press.

- Heinz, J. and Idsardi, W. (2011). Sentence and word complexity. Science, 333(6040):295–297.
- Hewitt, M. (1992). Vertical Maximization and Metrical Theory. PhD thesis, Brandeis University.
- Hildebrandt, K. A. (2007). Prosodic and grammatical domains in Limbu. Himalayan Linguistics, 8.
- Hogue, S., Bear, I., and Guimond, B. (1975). The Anamikakweini Reader’s Primer (Supplementary) Books, volume 1-6. Winnipeg, MB: Manitoba Education and Training.
- Idsardi, W. (1992). The computation of stress. PhD thesis, MIT.
- Inkelas, S. and Zec, D. (1995). The phonology-syntax interface. Handbook of Phonological Theory.
- Ishihara, S. (2007). Major phrase, focus intonation, multiple spell-out (map, fi, mso). The Linguistic Review, 24(2-3):137–167.
- Itô, J. and Mester, A. (1999). Realignment. The prosody-morphology interface, 79:188.
- Itô, J. and Mester, A. (2009a). The extended prosodic word. Phonological domains: Universals and deviations, pages 135–194.
- Itô, J. and Mester, A. (2009b). The onset of the prosodic word. Phonological argumentation: Essays on evidence and motivation, pages 227–260.
- Jackendoff, R. and Pinker, S. (2005). The nature of the language faculty and its implications for evolution of language (reply to Fitch, Hauser, and Chomsky). Cognition, 97(2):211–225.
- Jackendoff, R. S. (1972). Semantic interpretation in generative grammar. MIT Press.

- Jelinek, E. (1984). Empty categories, case, and configurationality. Natural Language & Linguistic Theory, 2(1):39–76.
- Johns, A. (1982). A unified analysis of relative clauses and questions in Rainy River Ojibwa. In Thirteenth Algonquian Conference, pages 161–168.
- Johns, A. (2007). Restricting noun incorporation: root movement. Natural Language & Linguistic Theory, 25(3):535–576.
- Johnston, B. (1978). How the Birds Got Their Colours — Gah w’indinimowaut binaesheehnyuk w’idinauziwin-wauh. Toronto, ON: Kids Can.
- Kabak, B. and Vogel, I. (2001). The phonological word and stress assignment in Turkish. Phonology, 18(3):315–360.
- Kager, R. (2012). Stress in windows: Language typology and factorial typology. Lingua, 122(13):1454–1493.
- Kager, R. W. J. (1989). A metrical theory of stress and destressing in English and Dutch. PhD thesis, University Utrecht.
- Kahnemuyipour, A. (2005). Towards a phase-based theory of sentential stress. MIT Working Papers in Linguistics, 45:125–146.
- Kaye, J. (1973). Odawa stress and related phenomena. Odawa Language Project: Second Report, Centre for Linguistic Studies, University of Toronto, pages 42–50.
- Kaye, J. and Piggott, G. L. (1973a). Odawa Language Project, Second Report. Centre for Linguistic Studies, University of Toronto.
- Kaye, J., Piggott, G. L., and Tokaichi, K. (1971). Odawa language project: first report. Toronto, Department of Anthropology, University of Toronto Press.
- Kaye, J. D. and Piggott, G. L. (1973b). On the cyclical nature of Ojibwa t-palatalization. Linguistic inquiry, pages 345–362.

- Kewaquado, S. (1989). Ojibwe/English Colouring Book — Wildlife Series. Toronto, ON: Ontario Ministry of Education.
- Kiparsky, P. (1982). Word-formation and the lexicon. Mid-America Linguistics Conference.
- Kisseberth, C. (1994). On domains. Perspectives in phonology, 133:166.
- Kisseberth, C. W. (1970). On the functional unity of phonological rules. Linguistic inquiry, 1(3):291–306.
- Ko, E.-S. (2008). A minimalist approach to Korean prosodic phonology. Harvard studies in Korean linguistics, 12:210–223.
- Kotay, R. (2005). Kiowa Hymns. Lincoln: University of Nebraska Press.
- Kratzer, A. and Selkirk, E. (2007). Phase theory and prosodic spellout: The case of verbs. The Linguistic Review, 24(2-3):93–135.
- Ladd, D. R. (1986). Intonational phrasing: the case for recursive prosodic structure. Phonology, 3(1):311–340.
- Latham, R. G. (1862). Elements of comparative philology. Walton and Maberly.
- Legate, J. A. (2003). Some interface properties of the phase. Linguistic inquiry, 34(3):506–515.
- Lesser, A. (1929a). Kinship origins in the light of some distributions. American Anthropologist, 31(4):710–730.
- Lesser, A. (1929b). Kinship terms in languages of the Southwest. Unpublished field notes.
- Lesser, A., editor (1935). Kinship terms in languages of the Southwest. Kiowa field school. Unpublished field notes.

- Lieber, R. (1988). Phrasal compounds in English and the morphology-syntax interface. CLS, 24:398–405.
- Lieber, R. (1992). Deconstructing morphology: Word formation in syntactic theory. University of Chicago Press.
- Linn, M. S. (2011). State of the state: Oklahoma native languages in the 21st century. Presented at the Oklahoma Workshop on Native American Languages. Tahlequah, OK.
- Lochbihler, B. and Mathieu, E. (2007). Phrasal noun incorporation in Ojibwe. In Thirty-ninth Algonquian Conference, York University, Toronto.
- Logan, H. J. (2001). A collection of Saulteaux texts with translations and linguistic analyses. MA Thesis, University of Regina.
- Lowie, R. H. (1923). A note on kiowa kinship terms and usages. American Anthropologist, 25(2):279–281.
- Lowie, R. H. et al. (1916). Societies of the Kiowa. Anthropological papers of the AMNH, 11. New York: Published by order of the Trustees [of the American Museum of Natural History].
- Marriott, A. (1945). The Ten Grandmothers. Norman: University of Oklahoma Press.
- Marriott, A. (1968). Kiowa Years: A Study in Culture Impact. New York: The MacMillan Company.
- Marvin, T. (2002). Topics in the stress and syntax of words. PhD thesis, Massachusetts Institute of Technology.
- Mathieu, É. (2007). Petite syntaxe des finales concrètes en Ojibwe. In Thirty-Eighth Algonquian Conference, ed. by HC Wolfart, pages 295–321.

- Mathieu, E. and Barrie, M. (2010). Noun incorporation as nominal restructuring. In Workshop on Structure and Constituency in the Languages of the Americas (WSCLA 15), University of Ottawa.
- Mattissen, J. (2004). A structural typology of polysynthesis. Word, 55(2):189–216.
- McCarthy, J. J. and Prince, A. (1996). Prosodic morphology 1986. Linguistics Department Faculty Publication Series, page 13.
- McCarthy, J. J. and Prince, A. S. (1993). Prosodic morphology: Constraint interaction and satisfaction. Rutgers Optimality Archive.
- McGinnis, M. (1995). Word-internal syntax: evidence from ojibwa.
- McKenzie, A. (2010). Subject domain restriction and reference-tracking. In Semantics and Linguistic Theory, volume 20, pages 269–288.
- McKenzie, A. (2015). Deriving topic effects in Kiowa with semantics and pragmatics. Methodologies in Semantic Fieldwork.
- McKenzie, A. R. (2012). The role of contextual restriction in reference-tracking. PhD Dissertation, University of Massachusetts Amherst.
- McKenzie, P. (2002). The Parker McKenzie Collection. Oklahoma History Center. Oklahoma City, OK.
- McKenzie, P. and Harrington, J. P. (1948). Popular account of the Kiowa Indian language. School of American Research.
- McKenzie, P. P. and Meadows, W. C. (2001). The Parker P. McKenzie Kiowa orthography: How written Kiowa came into being. The Plains Anthropologist, pages 233–248.
- McPherson, L. and Heath, J. (2016). Phrasal grammatical tone in the Dogon languages. Natural Language & Linguistic Theory, 34(2):593–639.

- McPherson, L. E. (2014). Replacive grammatical tone in the Dogon languages. PhD thesis, UCLA.
- Meadows, W. C. (2010). Kiowa ethnogeography. University of Texas Press.
- Merrifield, W. R. (1959a). Classification of Kiowa nouns. International Journal of American Linguistics, 25(4):269–271.
- Merrifield, W. R. (1959b). The Kiowa verb prefix. International Journal of American Linguistics, 25(3):168–176.
- Merrill, W. L., Hansson, M. K., Greene, C. S., and J., R. F. (1997). A guide to the Kiowa collections at the Smithsonian Institution, volume 1. Washington D.C.: Smithsonian Institution Press.
- Michaels, J. (2013). To alternate or not to alternate: What is the boundary. In Proceedings of 40th Meeting of the North East Linguistics Society.
- Michailovsky, B. (1997). Catégories verbales et intransitivité duale en Limbu. Studi italiani di linguistica teorica e applicata, 26(2):307–325.
- Miller, T. (2016). Re-examining the front vowels in Saulteaux Ojibwe: the role of short [e]. Paper presented at the 48th Algonquian Conference. University of Wisconsin - Milwaukee. October 2016.
- Miller, T. L. (2015). A prosodic analysis of the word in Kiowa. University of Pennsylvania Working Papers in Linguistics, 21(1):20.
- Miller, T. L. (in prep). Moving past polysynthesis and turning to heterogeneous morpho-syntactic complexity.
- Miller, T. L. (u.r.a). The prosodic structure of the Kiowa verb: from the word to the phrase. Submitted to *Linguistic Discovery*.

- Miller, T. L. (u.r.b). Revisiting prosodic prominence in Saulteaux Ojibwe. Submitted to the Papers of the Algonquian Conference, Volume 49.
- Miller, T. L. (u.r.c). The role of computational implementation in linguistic theory: the case of Kiowa prefixes. Submitted to Journal of Language Modelling.
- Miller, W. R. (1959). A note on Kiowa linguistic affiliations. American Anthropologist, 61(1):102–105.
- Mithun, M. (1983). The genius of polysynthesis. North American Indians: Humanistic Perspectives. University of Oklahoma Papers in Anthropology, 24(2):221–242.
- Mithun, M. (2001). The languages of native North America. Cambridge University Press.
- Mithun, M. (2014). Chasing the essence of polysynthesis. Talk at the International Symposium on Polysynthesis in the World’s Languages. February 20-21, 2014. NIN-JAL, Tokyo.
- Mohanan, K. P. (1986). The Theory of Lexical Phonology. Dordrecht: Reidel.
- Mooney, J. (1896). The ghost-dance religion and the Sioux outbreak of 1890, volume 176. U of Nebraska Press.
- Mooney, J. (1898/1979). Calendar history of the Kiowa Indians, volume 17. US Government Printing Office.
- Müller, S. (2013). Unifying everything: Some remarks on simpler syntax, construction grammar, minimalism, and HPSG. Language, 89(4):920–950.
- Müller, S. and Wechsler, S. (2014). Lexical approaches to argument structure. Theoretical Linguistics, 40(1-2):1–76.
- Murdoch, J. (1981). Syllabics-a successful educational innovation. Masters Thesis: University of Manitoba.

- Neeleman, A. and van de Koot, J. (2006). On syntactic and phonological representations. Lingua, 116(10):1524–1552.
- Neely, A. A. and Palmer Jr., G. (2009). Which way is the Kiowa way? orthography choices, ideologies, and language renewal. Native American language ideologies: Beliefs, practices, and struggles in Indian country, pages 271–297.
- Nespor, M. and Vogel, I. (1986). Prosodic phonology. Dordrecht: Foris. reprinted as Nespor and Vogel 2007.
- Newell, H. (2008). Aspects of the morphology and phonology of phases. PhD thesis, McGill University Montreal, QC.
- Newell, H. and Piggott, G. (2014). Interactions at the syntax–phonology interface: Evidence from Ojibwe. Lingua, 150:332–362.
- Newmeyer, F. (2009). Current challenges to the lexicalist hypothesis. Time and Again: Theoretical Perspectives on Formal Linguistics, pages 91–117.
- Nichols, J. and Nyholm, E. (1995). A concise dictionary of Minnesota Ojibwe. University of Minnesota Press, Minneapolis.
- Nichols, J. D. (1980). Ojibwe Morphology. PhD thesis, Harvard University.
- Nichols, J. D. (1986). Anishinaabewibii?igewin: Ojibwe, Written for Language Teachers, Readers and Study Guides. Algonquian and Iroquoian Linguistics, Department of Native Studies, University of Manitoba.
- Nichols, J. D. (1996). The Cree syllabary. In Daniels, P. T. and Bright, W., editors, The world’s writing systems, pages 599–611. New York: Oxford University Press.
- Nichols, J. D. and Nyholm, E. (1979). Ojibwewi-Ikidowinan: an Ojibwe word resource book. St. Paul, MN: Minnesota Archaeological Society.

- Nichols, J. D. and White, L. (1987). Nishnaabebii'gedaa: exercises in writing for speakers of central Ojibwe and Odawa. Native Languages Programme, Department of Native Studies, University of Manitoba.
- Nye, W. S. (1962/1997). Bad medicine & good: tales of the Kiowas. Norman: University of Oklahoma Press.
- O'Meara, J. (1990). Delaware stem morphology. PhD thesis, McGill University.
- Oxford, W. (2013). Multiple instances of agreement in the clausal spine: Evidence from algonquian. In Proceedings of WCCFL, volume 31.
- Özçelik, Ö. (2012). Redefining the prosodic hierarchy. McGill Working Papers in Linguistics, 22.
- Paddlety, D. L. (1998). Conversational Kiowa. American Indian Studies, University of Science & Arts of Oklahoma.
- Pak, M. (2008). The postsyntactic derivation and its phonological reflexes. Unpublished doctoral dissertation, University of Pennsylvania.
- Palmer Jr., G. (2003). Telling stories the Kiowa way. University of Arizona Press.
- Parsons, E. W. C. (1929). Kiowa tales, volume 22. The American Folk-lore Society.
- Peers, L. L. (1994). The Ojibwa of Western Canada, 1780 to 1870, volume 8. Minnesota Historical Society Press.
- Piggott, G. (1989). Argument structure and the morphology of the Ojibwa verb. Theoretical perspectives on Native American languages, pages 176–208.
- Piggott, G. and Grafstein, A. (1983). An Ojibwa Lexicon. National Museum of Man, Mercury Series. Ottawa: National Museums of Canada.
- Piggott, G. and Newell, H. (2006). Syllabification and the spell-out of phases in ojibwa words. McGill Working Papers in Linguistics, 20(2):39.

- Piggott, G. and Newell, H. (2016). Syllabification, stress and derivation by phase in Ojibwa. McGill Working Papers in Linguistics, 20(2):39–64.
- Piggott, G. L. (1980). Aspects of Odawa morphophonemics. Taylor & Francis.
- Pinker, S. and Jackendoff, R. (2005). The faculty of language: what’s special about it? Cognition, 95(2):201–236.
- Powell, J. W. (1891). Indian linguistic families of American north of America. BAEAR 7. Washington, D.C.: Government Printing Office.
- Rachel, W. (1997). Mongolian stress, licensing, and factorial typology.
- Ramchand, G. and Reiss, C. (2007). The Oxford handbook of linguistic interfaces. Oxford University Press.
- Rhodes, R. (1980). On the semantics of the instrumental finals of Ojibwa. In Papers of the eleventh Algonquian Conference.
- Rhodes, R. (1981). On the semantics of Ojibwa verbs of breaking. In Cowan, W., editor, Papers of the Twelfth Algonquian conference, volume 47, page 56.
- Rhodes, R. (1986). The semantics of the Ojibwa verbs of speaking. International journal of American linguistics, 52(1):1–19.
- Rhodes, R. A. (1976). The morphosyntax of the Central Ojibwa verb. PhD thesis, University of Michigan Ann Arbor.
- Rhodes, R. A. (1985). Eastern Ojibwa-Chippewa-Ottawa Dictionary, volume 3. Walter de Gruyter.
- Rhodes, R. A. (1990). Relative root complements in Ojibwa. unpublished manuscript University of California, Berkeley.
- Rhodes, R. A. (1991). Ojibwa secondary objects. in grammatical relations: a cross theoretical perspective. In Grammatical Relations: a Cross Theoretical Perspective.

- Rhodes, R. A. (1994). Agency, inversion, and thematic alignment in Ojibwe. In Annual Meeting of the Berkeley Linguistics Society, volume 20, pages 431–446.
- Rhodes, R. A. (2006). Clause structure, core arguments, and the Algonquian relative root construction. Voices of Rupert's Land (Association).
- Rhodes, R. A. and Todd, E. M. (1981). Subarctic algonquian languages. Handbook of North American Indians, 6:52–66.
- Richards, N. W. (2004). The syntax of the conjunct and independent orders in wampanoag. International Journal of American Linguistics, 70(4):327–368.
- Richardson, J. (1940). Law and status among the Kiowa Indians, volume 1. University of Washington Press.
- Rogers, J. H. (1978). Differential focusing in Ojibwa conjunct verbs: On circumstances, participants, or events. International Journal of American Linguistics, 44(3):167–179.
- Russell, E. W. K. (1991). Authentic Kiowa Language. Springdale, AR: VIP Publishing.
- Sadock, J. M. (1980). Noun incorporation in Greenlandic: A case of syntactic word formation. Language, pages 300–319.
- Salmi, O. (nd). An unofficial practical orthography for the Kiowa language. <http://www.uusikaupunki.fi/olsalmi/kiowa.html>.
- Samuels, B. (2010). Phonological derivation by phase: Evidence from Basque. University of Pennsylvania Working Papers in Linguistics, 16(1):19.
- Samuels, B. D. (2009). The structure of phonological theory. PhD Thesis, Harvard University.
- Samuels, B. D. (2011). Phonological architecture: A biolinguistic perspective, volume 2. Oxford University Press.

- Sapir, E. (1921). *Language: An introduction to the study of speech*. New York: Harcourt, Brace & Company.
- Sato, Y. (2008). Multiple spell-out and contraction at the syntax–phonology interface. MS, University of Arizona.
- Sato, Y. (2009). Spelling-out prosodic domains: a multiple spell-out account. In Grohmann, K., editor, InterPhases: Phase-theoretic Investigations of Linguistic Interfaces, pages 234–59. Oxford: Oxford University Press.
- Sato, Y. (2012). Multiple spell-out and contraction at the syntax–phonology interface. Syntax, 15(3):287–314.
- Schiering, R., Bickel, B., and Hildebrandt, K. A. (2010). The prosodic word is not universal, but emergent. Journal of Linguistics, 46(3):657–709.
- Schiering, R., Hildebrandt, K. A., and Bickel, B. (2007). Cross-linguistic challenges for the prosodic hierarchy: evidence from word domains. Ms. University of Leipzig.
- Scott, M. E. e. a. (1995). The Saulteaux Language Dictionary. Kinistin First Nation and Duval House Publishing.
- Selkirk, E. (1974). French liaison and the x notation. Linguistic Inquiry, pages 573–590.
- Selkirk, E. (1980). Prosodic domains in phonology: Sanskrit revisited. Juncture, 7:107–129.
- Selkirk, E. (1986). On derived domains in sentence phonology. Phonology, 3(1):371–405.
- Selkirk, E. (1995). The prosodic structure of function words. Signal to syntax: Bootstrapping from speech to grammar in early acquisition, 187:214.
- Selkirk, E. (2000). The interaction of constraints on prosodic phrasing. In Prosody: Theory and experiment, pages 231–261. Springer.

- Selkirk, E. (2011). The syntax-phonology interface. The handbook of phonological theory, 2:435–483.
- Selkirk, E. and Shen, T. (1990). Prosodic domains in Shanghai Chinese. The phonology-syntax connection, 313:37.
- Selkirk, E. and Tateishi, K. (1991). Syntax and downstep in Japanese. In Interdisciplinary approaches to language, pages 519–543. Springer.
- Selkirk, E. O. (1981a). On prosodic structure and its relation to syntactic structure. In Fretheim, T., editor, Nordic Prosody II: Papers from a Symposium Nordic Prosody II: Papers from a Symposium, pages 111–140. Trondheim:TAPIR.
- Selkirk, E. O. (1981b). On the nature of phonological representation. Advances in Psychology, 7:379–388.
- Shrofel, S. M. (1982). Island Lake Ojibwa morphophonemics. PhD thesis, University of Toronto.
- Shwayder, K. (2015). Words and subwords: Phonology in a piece-based syntactic morphology. PhD thesis, University of Pennsylvania.
- Simpson, J. H. (1983). Aspects of Warlpiri morphology and syntax. PhD thesis, Massachusetts Institute of Technology.
- Sivertsen, E. (1956). Pitch problems in Kiowa. International Journal of American Linguistics, 22(2):117–130.
- Slavin, T. (2005). Evidence for layered morphology: the case of the preverb nihtaa-in Ojibwe. In Proceedings of Workshop on Structure and Constituency of Languages of America.
- Slavin, T. (2007). In search of the event argument: a semantic analysis of the preverb ishi-in Oji-Cree. In Proceedings of the 4th Conference on the Semantics of

Underrepresented Languages in the Americas. University of Massachusetts, Amherst: GLSA Publications.

Slavin, T. (2012a). Phonological and syntactic evidence for stem structure in Oji-Cree. International Journal of American Linguistics, 78(4):497–532.

Slavin, T. (2012b). The syntax and semantics of stem composition in Ojicree. PhD thesis, University of Toronto.

Sproat, R. W. (1985). On deriving the lexicon. PhD thesis, Massachusetts Institute of Technology.

Sugimura, M. (2008). Phasehood of DPs. Proceedings of ConSOLE XVI, 199:216.

Surkalovic, D. (2011). Modularity, linearization and phase-phase faithfulness in Kayardild. Iberia: An International Journal of Theoretical Linguistics, 3(1).

Šurkalović, D. (2013). Modularity, phase-phase faithfulness and prosodification of function words in English. Nordlyd, 40(1):301–322.

Sutton, L. (2010). Noun class and number in Kiowa-Tanoan: Comparative-historical research and respecting speakers' rights in fieldwork. In Andrea L. Berez, J. M. and Rosenblum, D., editors, Fieldwork and linguistic analysis in indigenous languages of the Americas, pages 57–89. Manoa: Univ. of Hawaii Press.

Sutton, L. (2014). Kiowa-Tanoan: A synchronic and diachronic study.

Svenonius, P. (2004). On the edge. In D. Adger, C. d. C. and Tsoulas, G., editors, Peripheries, pages 259–287. Dordrecht: Kluwer.

Swadesh, M. (1950). Salish internal relationships. International Journal of American Linguistics, 16(4):157–167.

Swadesh, M. (1952). Lexico-statistic dating of prehistoric ethnic contacts: with special reference to north american indians and eskimos. Proceedings of the American philosophical society, 96(4):452–463.

- Swadesh, M. (1955). Towards greater accuracy in lexicostatistic dating. International journal of American linguistics, 21(2):121–137.
- Swadesh, M. (1971). The origin and diversification of language. Transaction Publishers.
- Takahashi, J. (1984). Case Marking in Kiowa: A Study of Organization of Meaning. PhD thesis, City University of New York.
- Tallman, A. J. (2011). Acoustic correlates of lenis and fortis stops in Manitoba Saulteaux. University of Manitoba (Canada).
- Tṓéàkút, H. H. (2000). Remember, We Are Kiowas: 101 Kiowa Indian Stories. 1st Books Library.
- Tṓéàkút, H. H. (2002). A Kothondo: 101 Kiowa Indian Poems. 1st Books Library.
- Todd, E. M. (1972). Ojibwa syllabic writing and its implications for a standard ojibwa alphabet. Anthropological Linguistics, pages 357–360.
- Tomlin, R. and Rhodes, R. (1979). An introduction to information distribution in Ojibwa. In Papers from the Fifteenth Regional Meeting Chicago Linguistic Society, volume 15, pages 307–320.
- Trager, E. C. (1960). The Kiowa Language: A Grammatical Study, unpublished Ph. D. PhD thesis, dissertation, University of Pennsylvania, PA.
- Trager, G. L. and Trager, E. C. (1959). Kiowa and Tanoan. American Anthropologist, 61(6):1078–1083.
- Trager-Johnson, E. C. (1972). Kiowa and English pronouns: contrastive morpho-semanites. Studies in Linguistics in Honor of Raven I. McDavid, Jr.
- Truckenbrodt, H. (1995). Phonological phrases—their relation to syntax, focus, and prominence. PhD thesis, Massachusetts Institute of Technology.

- Truckenbrodt, H. (1999). On the relation between syntactic phrases and phonological phrases. Linguistic inquiry, 30(2):219–255.
- Truitner, K. L. and Dunnigan, T. (1975). Palatalization in Ojibwa. Linguistic Inquiry, pages 301–316.
- Uriagereka, J. (1999). Multiple spell-out. Current Studies in Linguistics Series, 32:251–282.
- US Census (2010). American Indian & Alaska Native Tribes in the United States and Puerto Rico. retrieved from <https://www.census.gov/population/www/cen2010/cph-t/t-6tables/TABLE>
- Valentine, J. R. (nd). Ojibwe and Cree syllabic writing. retrieved from <http://imp.lss.wisc.edu/jrvalent/glolangiss/pdfs/syllabics>.
- Valentine, R. (1994). Ojibwe dialect relationships. PhD Dissertation, University of Texas Austin.
- Valentine, R. (2001). Nishnaabemwin reference grammar. University of Toronto Press.
- Valentine, R. (2011). Western Ojibwe dictionary database.
- Van der Hulst, H. (2010). A note on recursion in phonology. Recursion and human language, 104:301.
- Van Driem, G. (1987). A grammar of Limbu, volume 4. Walter de Gruyter.
- Vigário, M. (2010). Prosodic structure between the prosodic word and the phonological phrase: Recursive nodes or an independent domain? The Linguistic Review, 27(4):485–530.
- Vogel, I. (1999). Subminimal constituents in prosodic phonology. Issues in phonological structure, pages 249–267.

- Vogel, I. (2008). The morphology-phonology interface: Isolating to polysynthetic languages. Acta Linguistica Hungarica, 55(1-2):205–226.
- Vogel, I. (2009a). The status of the clitic group. Phonological domains: universals and deviations, 16:15.
- Vogel, I. (2009b). Universals of prosodic structure. Universals of language today, pages 59–82.
- Vogel, I. (2012). Recursion in phonology? In Bert, B. and Noske, R., editors, Phonological Explorations. Empirical, Theoretical and Diachronic Issues., pages 41–61. Berlin/Boston: De Gruyter.
- Vogel, I. (to appear). Life after the Strict Layer Hypothesis. In Zhang, H., editor, Prosodic Studies: Challenges and Prospects. Routledge.
- Voll, R. (2006). Prosodic Domains in Richtersveld Nama. PhD thesis, University of Leipzig.
- Voorhis, P. (1976). A Saulteaux (Ojibwe) phrase book based on the dialects of Manitoba. Brandon, MB: Department of Native Studies, Brandon University.
- Wagner, M. et al. (2005). Prosody and recursion. PhD thesis, Massachusetts Institute of Technology.
- Walker, W. B. (1996). Native writing systems. In Goddard, I., editor, Handbook of North American Indians, volume 17, Languages, pages 390–439. Washington, D.C.: Smithsonian Institution.
- Warren, W. W. (1885). History of the Ojibways, based upon traditions and oral statements, volume 5. Minnesota Historical Society.
- Watkins, L. J. (1976). The syntax and semantics of Kiowa switch-reference. In Brown Jr., R. L., editor, Proceedings of the 1976 Mid-American Linguistics Conference, pages 429–436.

- Watkins, L. J. (1977). Kiowa-Tanoan internal relationships. In Lance, D. M. and Gulstad, D. E., editors, Proceedings of the 1977 Mid-American Linguistics Conference, pages 423–431.
- Watkins, L. J. (1978a). On *w and *y in Kiowa-Tanoan. In Proceedings of the Annual Meeting of the Berkeley Linguistics Society 4, pages 32–43.
- Watkins, L. J. (1978b). Subject, empathy, and switch-reference in Kiowa. In Cooley, R., Barnes, M. R., and Dunn, J. A., editors, Proceedings of the 1978 Mid-American Linguistics Conference, pages 32–43.
- Watkins, L. J. (1982). Passives and verb agreement in Kiowa-Tanoan. Kansas Working Papers in Linguistics, 7.
- Watkins, L. J. (1984). A grammar of Kiowa. With the assistance of Parker McKenzie. Lincoln: University of Nebraska Press.
- Watkins, L. J. (1987). Switch-reference in Kiowa discourse. In Henderson, M., editor, Papers from the 1987 Mid-American Linguistics Conference, pages 319–326.
- Watkins, L. J. (1990). Noun phrase versus zero in Kiowa discourse. International Journal of American Linguistics, 56(3):410–426.
- Watkins, L. J. (1993). The discourse functions of Kiowa switch-reference. International Journal of American Linguistics, 59(2):137–164.
- Watkins, L. J. (1995). Comparative Kiowa-Tanoan: Ling. 490.365/554.367. University of New Mexico, Linguistics Summer Program.
- Watkins, L. J. (1996). Reconstructing person and voice in Kiowa-Tanoan: Pitfalls and progress. In Annual Meeting of the Berkeley Linguistics Society, volume 22, pages 139–152.
- Watkins, L. J. (2009). Kiowa texts. Unpublished.

- Watkins, L. J. and Harbour, D. (2010). The linguistic genius of Parker McKenzie's Kiowa alphabet. International Journal of American Linguistics, 76(3):309–333.
- Whipple, A. W. L., Ewbank, T., and Turner, W. W. (1855). Report upon the Indian Tribes. (Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean, Volume III.). U.S. War Department. Washington: Beverley Tucker Printer.
- White, L. (1983). Explore Ojibwe — A Practicial Reference Workbook for Teachers. Masters Thesis: Lakehead University.
- White, L. (1988). Ojibwe Structure Reference Booklet.
- Williams, E. (2007). Dumping lexicalism. The Oxford handbook of linguistic interfaces, pages 353–382.
- Wolfart, H. C. (1973). Plains Cree: A grammatical study. Transactions of the American Philosophical Society, 63(5):1–90.
- Wolvengrey, A. (1996). Evaluating a standard roman orthography for Saulteaux. Algonquian Papers-Archive, 27.
- Wonderly, W., Gibson, L. F., and Kirk, P. L. (1954). Number in Kiowa: nouns, demonstrative, and adjectives. International Journal of American Linguistics, 20:1–7.

Appendix A
ABBREVIATIONS

1PE	first person
2PE	second person
3PE	third person
ABS	absolutive
AGT	agent
AND.DIFF	switch-reference marker
AND.THEN/SAME	switch-reference marker
CL	clitic
COND	conditional
DU	dual
DUB	dubitative
ERG	ergative
FUT	future
FV	final vowel
FW	function word
GEN	genitive
H	high tone
HAB	habitual
HSY	hearsay
IMP	imperative
IPFV	imperfective
INSTRU	instrumental

INV	inverse
L	low tone
LOC	locative
NEG	negation, negative
NOM	nominalizer
NOM.BAS	basic nominalizer
OBJ	object
OBV	obviative
OPT	optative
PAST	past
PAT	patient
PF	perfective
PL	plural
POSS	possessive
PP	past participle
PT	preterit
Q	question particle
REFL	reflexive
REL	relativizer
SG	singular
SUB	subjunctive
WHEN.DIFF	switch-reference marker
YET.DIFF	switch-reference marker

Appendix B
IRB APPROVAL LETTER

Please note that University of Delaware IRB has taken the following action on IRBNet:

Project Title: [909341-1] The Phonological Structure of Polysynthetic Languages
Principal Investigator: Taylor Miller, MA

Submission Type: New Project
Date Submitted: May 17, 2016

Action: APPROVED
Effective Date: July 7, 2016
Review Type: Expedited Review

Should you have any questions you may contact Nicole Farnese-McFarlane at nicolefm@udel.edu.

Thank you,
The IRBNet Support Team
www.irbnet.org