

Summer 7-17-2019

He Spoke, I Spoke: A Usage-Based Examination of Homophony in the Navajo Verb Complex

Michael Peter Drinkwater

University of New Mexico - Main Campus

Follow this and additional works at: https://digitalrepository.unm.edu/ling_etds

 Part of the [Linguistics Commons](#)

Recommended Citation

Drinkwater, Michael Peter. "He Spoke, I Spoke: A Usage-Based Examination of Homophony in the Navajo Verb Complex." (2019).
https://digitalrepository.unm.edu/ling_etds/66

This Thesis is brought to you for free and open access by the Electronic Theses and Dissertations at UNM Digital Repository. It has been accepted for inclusion in Linguistics ETDs by an authorized administrator of UNM Digital Repository. For more information, please contact amywinter@unm.edu.

Michael Peter Drinkwater

Candidate

Linguistics

Department

This thesis is approved, and it is acceptable in quality and form for publication:

Approved by the Thesis Committee:

Melissa Axelrod , Chairperson

Mary Willie

Melvatha Chee

**HE SPOKE, I SPOKE:
A USAGE BASED EXAMINATION OF THE NAVAJO VERB
COMPLEX**

by

MICHAEL PETER DRINKWATER

**B.S.B.A. IN MANAGEMENT, UNIVERSITY OF WEST
FLORIDA, 2009**

**MASTERS IN DIVINITY, GENERAL THEOLOGICAL
SEMINARY OF THE EPISCOPAL CHURCH, 2012**

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

**Master of Arts
Linguistics**

The University of New Mexico
Albuquerque, New Mexico

July, 2019

He Spoke, I Spoke: A Usage-Based Examination of Homophony in the Navajo
Verb Complex

Michael Peter Drinkwater

B.S.B.A., Management, University of West Florida, 2009

M. Div., General Theological Seminary of the Episcopal Church, 2012

M.A., Linguistics, University of New Mexico, 2019

ABSTRACT

This study examines homophony between first and third person verbs and between second and third person verbs in Navajo. The typical paradigm for person-marking in Navajo has a sh- prefix for first person, a ni- prefix in second person, and a zero-marked third person. In some phonological environments, however, the first and second person pronouns are elided, producing cases of homophony between first and third and between second and third persons.

I examine all cases of this in Navajo and also provide data from Jicarilla Apache, Hupa (a Pacific Coast Athabaskan language), and three Northern Athabaskan languages: Chilcotin, Koyukon, and Ahtna to provide a cross-family historical approach to this interesting phenomenon. The study is based in cognitive and functional approaches. Results indicate that there is a strong relationship between frequency and homophony in the Navajo Verb Complex and across Athabaskan languages.

Table of Contents

List of Figures	vi
List of Tables	vii
1. Introduction.....	1
2. The Navajo verb structure	3
3. Theoretical Framework.....	10
3.1 Overview of Functional and Cognitive Linguistics.....	10
3.2 Trends in usage.....	14
3.3 Diachronic Processes	16
3.4 Usage-Based approaches to sound change and the Neogrammarians ..	21
3.5 Analogy, Entrenchment, and Frequency Effects.....	22
3.6 Usage-Based definitions of “word” and “construction”	24
3.7 Descriptions of the Athabaskan verb	26
3.8 Summary of theoretical framework	29
4. Navajo Data.....	31
4.1 Typical Subject Marking in Navajo.....	32
4.2 /s/ and /ʃ/ absorption in the first person in Navajo	33
4.3 /n/ and /ni/ absorption in the second person in Navajo	36
4.4 Summary	38
4.5 Conclusions	39
5. Athabaskan Data	41
5.1 Jicarilla Apache (Southern Athabaskan).....	41

5.2 Hupa (Pacific Coast Athabaskan).....	47
5.3 Chilcotin (Northern Athabaskan).....	52
5.4 Koyukon (Northern Athabaskan)	55
5.5 Ahtna (Northern Athabaskan)	57
5.6 Conclusions drawn from the data on other Athabaskan languages	58
6. Summary and conclusions.....	59

List of Figures

Figure 1. Sentence Structure in Navajo.....	4
Figure 2. The Athabaskan Language Family.....	5
Figure 3. Navajo Prefix Positions.....	7
Figure 4. Positional Analysis at Work.....	27
Figure 5. Bipartite Approach at Work.....	28

List of Tables

Table 1. Homophony in Navajo	1
Table 2. Old English <i>scip</i> ‘ship’	14
Table 3. Long versus Shortened Vowels in English.....	18
Table 4. Long Vowels	18
Table 5. Grammaticalization in Romance Languages	19
Table 6. Change by Analogy in English <i>choose</i>	23
Table 7. Basic Verb According to Bipartite Model.....	31
Table 8. Typical Subject Marking in Navajo.....	32
Table 9. First Person Subject Reduction in Navajo	34
Table 10. First Person Reducation with Positional Analysis	34
Table 11. Alternative Analysis of Reduced First Person Forms.....	35
Table 12. First Person Prefix and /l/ Classifier Assimilation.....	36
Table 13. Second Person Subject Prefix Reduction in Navajo	37
Table 14. Typical Subject Marking in Jicarilla	42
Table 15. First Person Reduction in Jicarilla	43
Table 16. Parallels in Navajo and Jicarilla First Person Reduction.....	44
Table 17. Second Person Reduction in Jicarilla	45
Table 18. First Person Perfective Vowel Change in Jicarilla	46
Table 19. Typical Subject Marking in Hupa	48
Table 20. First Person Reduction in Hupa.....	49
Table 21. Second Person Reduction in Hupa in the Perfective	50
Table 22. Second Person Reduction in Hupa.....	50
Table 23. Typical Subject Marking in Chilcotin	52
Table 24. First Person Reduction in Chilcotin.....	53
Table 25. Second Person Reduction in Chilcotin.....	54
Table 26. Typical Subject Marking in Koyukon	55
Table 27. Second Person Reduction in Koyukon	56

Table 28. Typical Subject Marking in Ahtna58

Introduction

This study examines cases of zero-marking for third person singular subject in Navajo, producing homophony with first and second person forms. In particular, I focus on identical marking of 1st and 3rd person in the perfective mode, e.g.:

yícha	<i>I cried</i>
yícha	<i>She/he cried</i>

Table 1. Homophony in Navajo

We see this phenomenon most clearly in undirected activities, like ‘cry’ and also ‘read’, where there is frequently an overlap between first and third person.

My hypothesis is this homophony is a result of grammaticalization and lexicalization, involving frequency effects and trends in usage. The study presents the situation in Navajo, and then examines other Athabaskan languages in order to see how these processes may differ in the different branches of the family

I begin with an overview of the grammar of Navajo and of Athabaskan languages in general, focusing in particular on the verb. I then present the theoretical framework for the study, which is based in the literature from functional and cognitive approaches to language structure and language change.

In the sections that follow this introduction to Navajo and to my theoretical framework, I present the data and analysis of third person marking Navajo, and of other Athabaskan languages, to demonstrate how this person marking system serves as an example of the processes of diachronic linguistics outlined in usage-based and cognitive approaches to grammar.

2. The Navajo verb structure

In order to provide some context for our findings, some time will be taken here to cover some essential background regarding the Navajo language (Diné Bizaad). It has the most self-identified speakers of any Native American language in the United States, with around 167,000 speakers according to the 2015 census, though of these less than 8000 are monolingual. It is primarily spoken in the Southwestern United States in the states around the four-corners area (New Mexico, Utah, Arizona, Colorado).

Phonologically, Navajo has a relatively rigid syllable structure, something that it has in common with most other members of the Athabaskan language family. Almost all syllables follow a CV or CVC structure, where *C* can be a consonant, digraph, or digraph-glottal stop combination perceived as a single sound and *V* can be a short vowel, long vowel, nasal vowel, high-tone vowel, or a diphthong combination thereof (Yazzie and Speas 2007). This rigid syllable structure is part of what contributes to the morphophonological complexity of the Navajo Verb Complex, and has a number of consequences which bear on the current study.

Syntactically, the Navajo language uses a Subject-Object-Verb word order like that shown in the example below, and has many of the predictable grammatical and morphological traits of other OV languages.

Max	gohwééh	yi.dlá
Max	coffee	3s.imp.drink
Max is drinking coffee		
S	O	V

Figure 1. Sentence Structure in Navajo

The Navajo language uses postpositions rather than prepositions and primarily uses prefixes for the purposes of morphological inflection (Young and Morgan 1987).

Navajo is a member of the Athabaskan language family. It is grouped, along with San Carlos Apache, Mescalero Apache, Chiricahua Apache, Jicarilla Apache, Lipan Apache, and Plains Apache, into the Southern Athabaskan (or Apachean) branch of this language family (Young and Morgan 1987, Phone et al. 2007).

There are two other branches to this language grouping: Northern Athabaskan and Pacific Coast Athabaskan (Cook 2013, Golla 1970a, Hoijer 1956, Jette et al. 2000, Kari 1990). The following graphic is from Axelrod (pc).

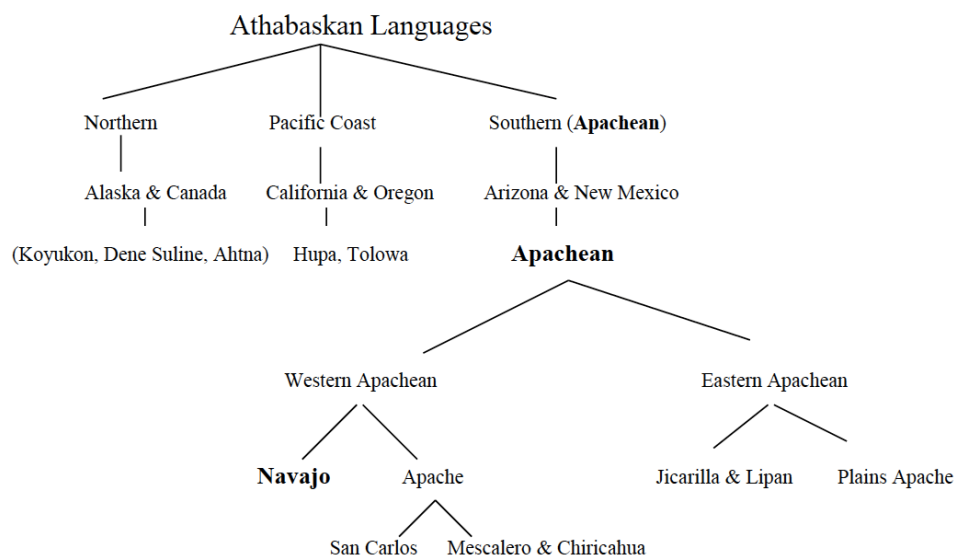


Figure 2. The Athabaskan Language Family

As an Athabaskan language, there are a number of terms associated with the study of Navajo. These terms have, at times, been used inconsistently, so time will be taken here to clarify the definition of a few of them. The verb stem is usually the right-most part of the verb word in Navajo, making it the last portion of the verb complex to be read or heard (Young 2000, Young and Morgan 1987, Young et al. 1992). These stems are changed according to mode and aspect, and while some have made the claim that they are changed in regular ways (Leer 1979, Li 1930, Li 1933), others have proposed suffixes for certain modes and aspects; the phonological processes involved in these changes are so complex as to be virtually unpredictable (Eddington and Lachler 2006). This is largely due to the fact that the stem is far and away the most phonologically intricate part of the verb complex, insuring that even the most benign and

straightforward stem derivation rules proposed by linguists are realized in complex and unintuitive ways (McDonough 2003).

Directly adjacent to the verb stem is what most Athabaskanists call the classifier prefixes, even though most agree that this is a misnomer. These prefixes have also been called valence prefixes because derivationally, the /h/ and /d/ function as markers of valence change in Northern Athabaskan languages (Phone et al. 2007, Givon 2000). These prefixes undoubtedly had great value in the derivation of Proto-Athabaskan verbs, a fact evident from their preservation in almost every Athabaskan language, but their lexical use has made it so that we can only draw broad groupings of meaning around them as they are found in most Athabaskan languages, leading to some to say that they are “trending toward grammatical meaninglessness (Golla 1970a).” That being said, these classifiers (referred to this way for ease of reference) are still used derivationally to mark passive, middle, reflexive, and reciprocal meanings in combination with certain verb stems. The classifiers /zero/ and /h/ can be said to correspond to more active verbs. The classifiers /d/ and /l/ can be said to correspond to more passive verbs.

Many Athabaskanists, for the purposes of teaching the verb, suggest memorizing stems and classifiers as a unit (Phone et al. 2007). In the bipartite model proposed by Joyce McDonough, the combination of the traditional stem and classifier positions is referred to as the verb stem (2000). This paper will maintain the older definition of verb stem for the purposes of continuity with older

publications. This distinction is important to the present work because the presence or absence of certain classifiers provides the phonological environment necessary for many of the examples of homophony and semi-homophony.

The traditional approach to the classification of Navajo verb prefixes is widely referred to as positional analysis (sometimes referred to as the slot-and-filler approach), and it has been adapted to most of the members of the Athabaskan language family (Cook 2013, Hymes 1956, Golla 1970a, Phone et al. 2007). In Young and Morgan's slot-and-filler model, there are ten positions in the verb complex, including the stem (which is the number 10 position) (Young and Morgan 1987, Young et al. 1992, Young 2000).

0	1	2	3	##	4	5	6	7	8	9	10
post	derivational/ thematic	reflexive reversionary semiliterative iterative	distributive plural	disjunct boundary	DO	Subject (3rd)	derivational/ thematic	modal/ conjugation	Subject (1st and 2nd sg & pl)	valence	stem

Figure 3. Navajo Prefix Positions

Exhaustive research has gone into what prefixes can co-occur and in what order. A summary of the slot-and-filler approach to the Navajo verb is to follow. The verb stem and classifier make up the two prefix positions farthest to the right. After these two come the conjunct prefixes, named thus because of their contiguous relationship to the stem and classifier. Conjunct prefixes in Navajo take up positions 4 through 8. This group of prefixes includes person marking,

prefixes which specify mode and aspect, and a handful of other prefixes whose identity is obscured by the high level of polysemy among conjunct prefixes. McDonough points out that parts of the verb that are “necessary” are found in the conjunction domain (McDonough 2003). The left-most and final grouping of prefixes take up positions 1 through 3 and are called disjunct prefixes because they always appear separated from the stem. The right-most disjunct prefix is the distributive plural prefix, something that Navajo has in common with many other Athabaskan languages included in this study (Phone et al. 2007, Golla 1970a, Cook 2013). Disjunct prefixes vary greatly in form when compared to their conjunct counterparts, and are not as susceptible to phonological reduction. Of specific interest to the research in this paper are the conjunct prefixes, whose phonological reduction often creates moments of homophony and semi-homophony between the third person singular and either the first-person singular or second-person singular depending on the case presented. Phone et al. in their *Dictionary of Jicarilla Apache* rightly equate the conjunct prefixes with inflectional information (Phone et al. 2007).

It has been said that the third-person singular is zero-marked in Navajo and many other Athabaskan languages (Gunlogson 1995, Li 1930, Howren 1968, McDonough 2000, Davidson 1963, Golla 1970b). While it is right to say that third person singular prefixes are zero-marked in the position where other personal subjects are marked, this paper prefers the approach taken by Golla in his *Hupa Grammar*, when he states that: “Various subcategories of impersonal subject

(deictic subject) are marked by prefixes of position 8 (1970a).” Golla’s position 8 corresponds roughly to Young’s position 5 (2000). All of this is to say that the third-person singular subject markings are ordered differently from other subject markings in the verb complex and third-person personal subjects are zero-marked in position 4. This zero-marked third person personal subject is consistent with our expectations based on our theoretical framework and consistent with typological data (Bybee 1985, Hapselmath 2008, Siewierska 2005). This ordering of third-person markers, coupled with the zero-marking in position 4 are two more of the factors which create unique phonological environments which invite homophony.

3. Theoretical Framework

In order to explain the many instances of homophony and near-homophony present in the verb complex of the Athabaskan languages examined in this paper, this paper makes certain assumptions central to cognitive and functional linguistics. Thus, in order to make sure that the proposals are as useful to as many fellow researchers and Athabaskanists as possible, it is necessary to review these assumptions in light of their larger theoretical framework.

3.1 Overview of Functional and Cognitive Linguistics

The basic assumption of cognitive and functional linguistics is that form and meaning are not mutually-exclusive (Croft 2012). They rather represent different levels of generalization over the same data (Bybee 2001). Or, to put it in a different way:

What we think of as grammar is a complex of memories we have of how our speech community has resolved communicative problems. ‘Grammar’ is a name for the adaptive, complex, highly interrelated and multiply categorized sets of recurrent regularities that arise from doing the communicative work humans do. In other words, the sense of a verb or predicate is related to the lexico-grammatical schemas that it can occur in and argument structure can be seen as essentially a subset of these schemas.” (Thompson and Hopper, 2001:48)

More and more, linguists are finding that semantics, syntax, morphology, phonology, pragmatics, etc. are not neatly organized, mutually exclusive

compartments of language, but are interrelated generalizations over the same body of knowledge, known as the lexicon (Bybee 2001). As such, changes in the morphology of a language often find their roots in the simpler building blocks, like phonology. Bybee explains this in her book *Language Change*:

Sound changes start for phonetic reasons,..., but the basic function of language is the expression of meaning, so differences in sounds that arise for phonetic reasons tend to become associated with meaning, if conditions are right. (Bybee 2015:76)

This paper uses research on frequency effects and trends in usage to explain the morphological and phonological changes which have led to many of the homophonous forms presented in the data. By frequency effects I mean type frequency, the number of times a pattern appears in the data; token frequency, the number of times a lexical item or morpheme appears in the data; and how these two forces interact, because these two building blocks of frequency effects interact in a variety of ways, to be discussed in just a moment. By trends in usage, I mean notions like markedness, how semantically or morphologically an item is marked in a paradigm when compared to other items in that paradigm, the basic-derived relationship, where one item within the paradigm is transparently the base form for the other items, and autonomy, the ease of which an item can be accessed directly in the lexicon. These trends are given a fuller treatment later as well. They are also examined in their relationship to frequency effects.

This paper is about an ongoing change in the morphology and phonology of a language within a language family. The basic assumption here, as in any paper situated within Usage-Based theory, is that changes within a language are driven by how a language is used. As Bybee (2006:730) puts it, "... there can be no strict separation of grammar and usage. Grammar is built up from specific instances of use that marry lexical items with constructions; it is routinized and entrenched by repetition and schematized by the categorization of exemplars." Usage-based linguistic assumptions like those found in the work of Bybee (2001, 2006, 2015), Pierrehumbert (2001), Bush (2001) and others form the core of theoretical assumptions for this work.

There are several definitions which are absolutely essential to the understanding of frequency effects. The basic building blocks of frequency effects lie in the two types of frequency: token frequency and type frequency. Token frequency is simply the number of times an item appears in the data. Type frequency is the number of times a pattern appears in the data. Different frequency effects can often be explained through a combination of these two types of frequency.

A fairly common example given of these two working at cross-purposes within a language occurs in the English past-tense. The most common way to form the English past-tense is by adding *-ed* to the end of a verb, as in the verb *shave* (shaved). This is an example of a pattern with high type-frequency. However, there are several verbs with high token frequency which resist this pattern, *made*,

was, *had* are just a few examples. This is a good illustration of another important factor in frequency effects: entrenchment. These three verb forms resist certain frequency effects because of their high token frequency when compared to the past tense forms of other verbs. The high token frequency of these three forms causes them to be entrenched and they resist the more schematic way of forming the past tense. Schemas tend to arise as a result of high type frequency (Bybee 2015). The *-ed* past tense would be an example of a schema in English.

An example of token frequency and type frequency working hand-in-hand can be found in the grammaticization of the English phrase *be going to*, which Bybee examines in *The Handbook of Historical Linguistics*:

A much-noted property of grammaticizing constructions is this increase in type frequency of co-occurring lexical items. As a consequence, the token frequency of units such as *going to* or *gonna* also increases dramatically. As important as the increase in type frequency or generality is, it is the high token frequency of grammaticizing phrases which provides the triggering device for many of the changes that occur in the form and function of the grammaticizing construction. (Bybee 2003: 602)

It can thus be seen that token frequency can lead to a strengthening of certain schemas when token and type frequency effect the same items or a resistance of some forms against newer schemas when token and type frequency effect different items in the lexicon.

These concepts are also an integral part of how frequency effects are used to explain morphological changes. For example, Bybee, in her book *Language*

Change examines the change from the inflectional Old English nouns to the almost totally uninflectional Modern English nouns. The following table is taken from Bybee (2015: 35).

	Singular	Plural
nominative	<i>scip</i>	<i>scipu</i>
accusative	<i>scip</i>	<i>scipu</i>
genitive	<i>scipes</i>	<i>scipa</i>
dative	<i>scipe</i>	<i>scipum</i>

Table 2. Old English *scip* 'ship'

As is evident from the table, Old English nouns were commonly inflected for number and case using suffixes. Bybee notes that “by Middle English these had all reduced to schwa, and by Early Modern English most of these schwas had deleted (Bybee 2015: 35).” Thus, phonological trends, like the reduction of final vowels to a schwa and then, in the case of the example from English above, the deletion of said schwa, can have a profound impact on the morphology of a language.

3.2 Trends in usage

The example above, involving the Old English *scip*, also affords us an opportunity to highlight several other trends in usage connected to frequency.

The theory of markedness states that, within a paradigm, one member is simpler

than the rest morphologically and semantically. In the example provided from Bybee (2015) above, *scip* fits this description. This is more or less expected, as *scip* is both singular and nominative. Nominative in this case is simpler because it does not have any syntactically complex roles in an utterance.

Another distinction that is valuable to this work is the basic/derived relationship. To illustrate this difference, we can yet again use the example above, where *scip* is transparently the form on which the other forms are based. To put it another way, in order to convert the noun to its plural form, it is necessary to add the suffix *-u* to the basic form *scip*.

Yet another relevant distinction has to do with the concept of Autonomy. A form that is autonomous has its own strong representation in the mental lexicon. It can be accessed independently of the other forms. We can tell that *scip* has a high degree of autonomy within this paradigm because it is the most closely related to the surviving form *ship*.

All of these notions are related to the idea of token frequency. Bybee, in her book *Frequency of Use and the Organization of Language*, suggests that the forms within a paradigm that are unmarked, basic, and autonomous also tend to be the members with the highest token frequency (Bybee 2007). The most common (token frequency) forms within the verb complex tend overwhelmingly to be forms inflected for third person singular subjects. Bybee, using frequency counts from

Juilland and Chang-Rodriguez (1964) and Rodriguez Bou (1952), shows that a typical ordering of subjects in Spanish according to frequency follows one of two tracks: 3s, 1s, 2s, 3p, 1p, and 2p; or 3s, 1s, 3p, 2s, 1p and 2p.

It is an assumption of this paper that this general pattern holds true for Navajo and other Athabaskan languages. There are several reasons for this assumption. The first is that it explains the lack of a third person subject marking in the position where we would expect it. Third person singular subjects are zero-marked in position 8, where we find the other subject prefixes. This zero-marking is what we would expect from the most frequent, most autonomous, and most basic member of a paradigm. The singular subject prefixes, as will be demonstrated later in this paper, are also subject to a number of phonological reduction processes when compared to their duoplural and distributive plural counterparts. This is also something we should expect from the most frequent members of a paradigm. Bybee notes that more frequent forms are more likely to undergo change due to phonological reduction (2007). This paper will examine these concepts and their relationship to the data found in the verb complexes of several Athabaskan languages in the later sections.

3.3 Diachronic Processes

Croft (2012) points out that many synchronic processes cannot be separated from the “dynamic, diachronic matrix” of language. Pierrehumbert paints a

complicated, yet comprehensive picture of exemplar theory using the opposed forces of lenition and entrenchment (2001), and Bybee places these processes both within the realm of synchronic phonological processes and in the realm of larger diachronic trends (2001). Bybee reminds us that phonemes maintain maximum perceptual distance from one another and is thus able to explain diachronic phenomena from a Usage-Based perspective (Bybee 2015, Liljencrants and Lindblom 1972, Martinet 1952). The picture of language that emerges from the functional point of view is one of language as a dynamic, diachronic system where frequency affects each language differently based on how speakers use it, but where trends in usage allow linguists to explain synchronic and diachronic processes of lenition and entrenchment that were beyond the grasp of prior schools of linguistic thought. Frequency effects work both with and against other frequency effects in a fluid, but measurable way. In fact, this is one of the strengths of usage-based theory: language does not need to be separated from its context as an ever-changing, ever-innovating system of communication.

Frequency effects can be used to explain synchronic processes, like the resistance of certain English verbs to the more common past tense schema (shown above), but they can also be used to explain diachronic processes. One such diachronic process is morphologization. Bybee gives an example of morphologization in her book *Language Change*. She notes that, “prior to the

Great Vowel Shift, long vowels that were in the third syllable from the end of the word shortened (Bybee 2015:77).”

Original long vowel	Shortened vowel
<i>vain</i>	<i>vanity</i>
<i>crime</i>	<i>criminal</i>
<i>sign</i>	<i>signify</i>
<i>clean</i>	<i>cleanliness</i>
<i>cone</i>	<i>conical</i>
<i>pronounce</i>	<i>pronunciation</i>

Table 3. Long versus Shortened Vowels in English

The Great Vowel Shift changed the relationship between the original long vowels and the shortened vowels by changing their quality. The relationship between the original forms and shortened forms of the vowels in these two sets of words became so obscured that new forms, even those with the same suffixes no longer carry the corresponding short vowel change (Bybee 2015:77).

<i>obese</i>	<i>obesity</i>
<i>pirate</i>	<i>piracy</i>

Table 4. Long Vowels

The sound change has been relegated to the morphological connection between certain words and their derivations. Thus, the sound change can be said to have morphologized. “What was earlier a single sound change may divide according to

morphological function and reverse its direction of change only in certain categories (Bybee 2015:82).” Using frequency effects, it is possible to suggest that these longer forms had enough token frequency to become entrenched, but the pattern of changing the quality of the vowel did not have enough type frequency to be productive in new forms.

Another Diachronic process, which bears mentioning here is grammaticalization, “the process by which new grammatical morphemes come into being (Bybee 2015:117).” Once such example given in Bybee’s book is the “romance inflectional futures”. Bybee traces the history of romance inflectional futures back to a lexical item: *habere* ‘to have, hold’. Illustrated in the table below (Bybee 2015:120-121):

Construction	Meaning	Step
essere habetis	you will be	generalization of meaning
venire abes	you will come	loss of /h/
cantar + ás	you will sing	loss of /b/ and affixation

Table 5. Grammaticalization in Romance Languages

It is once again possible to explain this process using frequency effects. Overtime, the generalization of the meaning of *habere* and its increased amount of use with other verbs leads to an increase in token frequency and a large amount of phonological reduction, until we find ourselves with the inflectional futures of today.

Lexicalization as a process in this paper closely aligns with the term demorphologization in the literature on lexicalization and grammaticalization. This term describes “a movement from morphology either into phonology or into syntax (Joseph and Janda 1988, Brinton and Traugott 2005).” To put it a different way:

Here we consider some of the changes known as demorphologization whereby a morpheme loses (most of) its grammatical-semantic contribution to the word and becomes an indistinguishable part of the construction of the word, while retaining part of its original phonological substance. (Hopper 1990: 1954, Brinton and Traugott 2005:52)

One such example of lexicalization is given in Ramat 1992, in the examination of old comparatives like *elder* and *mayor*, which have lost their status as comparative modification constructions and remain in the inventory of English only as nouns. The loss of type frequency in the adjectival constructions these comparatives once participated in have left them with a lack of schematic meaning, so that only lexical meaning remains.

Such definitions of lexicalization, morphologization, and grammaticalization are relevant to any study of the Athabaskan verb complex, because these diachronic processes are in constant tension. Morphological elements closer to the stem within the conjunct domain become subject to more and more phonological reduction processes over time and lose the specificity of their meaning among the nearly countless homophonous prefixes (see, as an example, the many

definitions of -di- in Robert Young's prefix chart [2000:23-24]). Postpositions, found on the opposite end of Young's positional analysis in the disjunct domain, are becoming a vital part of the argument structure of the verb complex, moving away from the nouns within their postpositional phrases in favor of a place closer to the verb (see Young's position 10).

3.4 Usage-Based approaches to sound change and the Neogrammarians

Another important piece of linguistic theory to discuss here is the Neogrammarian hypothesis. The Neogrammarian approach to sound change can be broken down into two parts. First, sound change is always regular, applying to all lexical items that have the phonetic conditioning (Wilbur 1977, Bybee 2015). Second, sound change as a process covers the lexicon all at once, regardless of grammatical or lexical factors (Wilbur 1977, Bybee 2015). This view helps to explain many of the phenomena witnessed in the field of phonology, especially from a typological point of view. According to this view, sound change is not grammatically conditioned (Bybee 2015).

The irresolvable challenge posed by the Neogrammarian Hypothesis in light of present-day knowledge is the body of work on lexical diffusion, particularly the work on frequency-driven lexical diffusion. Lexical diffusion is the process by which sound changes affect the lexicon. Bybee in her work *Frequency of Use and the Organization of Language*, speaks extensively on a two-part process

where frequent words are more susceptible to reductive phonological processes, and less frequent words are more susceptible to changes driven by analogy (2007). To recap, the assumption that sound change is regular is upheld by much of the research done by Joan Bybee. Indeed, nearly every morphological change examined by Bybee is found to have its roots in phonetic change (Bybee 2001, 2007, 2015). It is the process by which sound changes spread through the lexicon, which is the largest point of difference between Usage-based theory and the Neogrammarian Hypothesis.

3.5 Analogy, Entrenchment, and Frequency Effects

One other relevant diachronic process to the present work is that of *analogy*. Analogy is the remaking of a form based on its similarity to other existing forms in a language (Bybee 2015). There are two major trends in morphological changes rooted in analogy. The first is “a tendency toward more overt marking, toward the clarification or maximalization of morphological contrast” and the second is a tendency toward simplification and regularization of the more phonological aspects of morphology (Hock 1986). Hock also provides an example of change by analogy from Old English and Modern English. The following table is taken from Hans Heinrich Hock’s work, *Principles of Historical Linguistics* (1986: 168).

	<u>Old English</u>	<u>Modern English</u>
Pres.	ceozan	choose
Past sg.	ceas	chose
Past pl.	curon	chose
Past pple.	(ge-)eoren	chosen

Table 6. Change by Analogy in English *choose*

We can see in this example that the stem of the Old English verb now translated ‘choose’ contained three alternants: /s/, /z/, and /r/. The only alternant present in Modern English is the alternant /z/. Analogy is relevant to the present work because Bybee states that lower frequency forms are subject to analogical change (2007).

Analogical change in low frequency forms helps to explain what Eung-Do Cook calls the “Third person anomaly” in his Chilcotin grammar (2013). This ‘anomaly’ arises when comparing the verb *šedah*, the 3s subject form of the verb translated “to sit”, to *lha hešdash*, the negative form of the same verb stem. The 3s subject form of the positive verb is irregular in a number of ways. The 3s subject form of the negative verb is not. To explain this anomaly, let us first assume that the negative form of the verb is used less frequently by speakers than the positive form. Many of the facts about this example point to such an assumption. Bybee has already drawn the connection between high frequency forms and markedness (2007). The nature of this connection is that highly frequent forms tend to be the least marked. We can also assume, based on Jakobson’s

definition of *unmarked* and *marked*, that the most likely case to be unmarked is the affirmative and the most likely to be marked is the negative (1957).

If the negative forms of the verb are less frequent, it would mean that they are more likely to be affected by analogical change and less likely to hold onto phonological irregularities and reductions. In this case, the positive form is irregular. This paper makes no claims as to the reason for the irregularity in the positive form, as more research needs to be done on the subject. It could be the remnant of an older schema for the si-perfective. This is supported by the presence of a similar irregularity in the verb translated “to sit” in other Athabaskan languages (Phone et al. 2007, Young 2000). In any case, the irregular form of the si-perfective 3s affirmative verb *šedah* seems to be resistant to the analogical changes which would eliminate its irregularity. The negative form is not resistant to such changes, due to its low frequency of use, leading to the abandonment of the irregularity in favor of a more type-frequent si-perfective paradigm.

3.6 Usage-Based definitions of “word” and “construction”

The use of the term word in this paper lends itself easily to the definition used by Bybee, who defines it as a frequently occurring stretch of speech (2001). This definition is easy to distinguish from that of construction defined here: “a conventionalized pattern with some fixed elements and some schematic

positions (Bybee 2015).” These two definitions are helpful, as construction has a slightly more schematic meaning than what we are using for word, but this definition could prove difficult for researchers more accustomed to the appearance of written words.

To illustrate this meaning of word, two examples are given here. The first is in English, and it is the same example used in Bush 2001, which examines the frequent reduction in the phrase *would you*, which in this case involves the palatalization of /d/. His findings support the following statement: “word-boundary palatalization is more likely between two words if those words occur together with high frequency.” In this case, Bush is using a more traditional definition of word, but according to our working definition, this is not a case of word-boundary palatalization at all. This is a case where *would* and *you* occur so frequently together as to be subject to the kind of palatalization which is normally present within word boundaries, thus indicating to us that speakers chunk them together as one word. *Would you* is a stretch of speech that occurs so often as to be considered one word according to our working definition of word.

There is also a fairly frequent example of this in Navajo when a postposition frequently co-occurs with a verb. Let us consider the present state of variation between *yaa yi'aah* and *yei'aah* (Yazzie and Speas 2007). Both of these phrases have the same meaning *She is giving the self-contained object to him*. In one of these examples, however, the postposition, a part of the sentence normally

considered a separate word from the verb, is subject to the vowel-raising rules frequent within the disjunct prefixes of the verb complex. According to a more traditional definition of the term “word”, this vowel-raising would be taking place at a word-boundary. According to our working definition of word, however, this anticipatory assimilation is taking place within a single word. Both *yaa yi'aah* and *yei'aah* are frequently occurring stretches of speech and fit Bybee’s definition of word. The lack of schematicity in this expression precludes it from being considered a construction, as there is only one schematic piece: the object of the postposition. This definition is particularly useful in Navajo, which contains lexical items that do not conform easily to traditional notions of word.

3.7 Descriptions of the Athabaskan verb

There has been very limited work done from a functional perspective on Navajo and other Athabaskan languages (Axelrod 1990, Chee 2017, Givon 2000, Rice 1989, Thompson 1977). However, the polysynthetic nature of Navajo and its richly interconnected and interrelated collection of prefixes lends itself easily to a conception of lexicon rich with relationships and layers of meaning, like the one described by Bybee and other Usage-Based linguists (2001). One possible reason for the lack of functional analyses of Athabaskan languages could be a lack of frequency data.

The verb is by far the most complex lexical category in Navajo and in other Athabaskan languages. This has led linguists like Hoijer and Sapir, and later Robert Young to adopt a positional analysis of the verb (Young 2000, Young and Morgan 1987, Young et al. 1992). In Robert Young's slot-and-filler approach, there are ten positions for morphemes within the Navajo verb complex. A typical slot-and-filler verb chart is given in the table below, the example verb described is *yisdádeiiiltj́*, translated as *we carried the animate object to safety*.

0	1	2	3	##	4	5	6	7	8	9	10
post positions	derivational/ thematic	reflexive reversionary semiliterative iterative	distributive plural	disjunct boundary	DO	Subject (3rd)	derivational/ thematic	modal/ conjugation	Subject (1st and 2nd sg & pl)	valence	stem
Position0	1	2	3	4	5	6	7	8	9	10	
	yisdá		da				yí	iid	ł	tj́	

Figure 4. Positional Analysis at Work

The surface form of the verb is then deduced from this model using phonological rules. Robert Young's model for explaining the relative positions of prefixes within the Navajo verb complex is similar to those used by other linguists to describe other Athabaskan languages.

More recently, other linguists have begun to seek alternative ways of representing the interaction of prefixes within the Navajo Verb Complex, and with good reason (Chee 2017, Hargus 1986a, Phone et al. 2007, McDonough 2000).

The slot-and-filler approach to the Athabaskan verb captures a great deal of

detail, much of which is useful to linguists, but the model is unintuitive for native speakers. Joyce McDonough, in her book *The Navajo Sound System*, states the following.

Some morphemes are necessary to the word; they represent the minimum morphosyntactic represent that a fully inflected verb form requires. These are the rightmost morphemes, positions VII, VIII, IX and X, the Mode, subject, 'classifier' and verb stem respectively, the core verb. The rest of the positions represent morphemes which are not essential. (McDonough 2003)

If we take another look at the previous example, for instance, positions 2, 4, 5, and 6 remain vacant. McDonough's alternative, known as the bipartite approach, splits the verb into two parts: the Aux stem, made up of conjunct and disjunct prefixes (to be discussed at length later), and the verb stem, made up of the classifier and stem. The table below is an attempt to represent the same verb using the bipartite approach.

Position	D	Aux	Verb
	yisdáda	yiid	łtǫ́

Figure 5. Bipartite Approach at Work

This approach to the verb lends itself much more easily to usage-based linguistics, which seeks to understand phonology, grammar, and syntax as related layers of meaning spread over the same information (Bybee 2001). In addition, it is more intuitive than the positional analysis for native speakers, which

sometimes requires as many as 8 steps to get from the phonology of the prefixes to the phonology of the surface form (McDonough 2003).

The classical slot-and-filler approach, however, does capture some necessary details for our study, for example, positions 1-3 seem to naturally group together due to the relatively transparent phonological processes to which these prefixes are subject, while positions 4-9 seem to naturally group together due to the almost uniform nature of the shape of most of the prefixes which appear there and the opacity of the phonological rules to which they are subject (McDonough 2000, Young 2000). This paper will use tools provided by both approaches, with the awareness that the level of detail surpasses that which is useful to native speakers.

3.8 Summary of theoretical framework

A summary of our theoretical framework will now be given. There are two assumptions on which most of functional and usage-based linguistics is based. The first is that language is not made up of neatly compartmentalized sections, but rather that things like phonology and morphology represent different levels of generalization over the same data (Bybee 2001). The second is that how a language is used determines its structure and how it changes. Frequency effects help us to measure use and its effect on structure, and there are two basic types of frequency used in this kind of study: type frequency, the number of times a

pattern appears in the data, and token frequency, the number of times a lexical item appears in the data.

Using frequency effects, it is possible to explain synchronic processes and trends in usage like entrenchment, markedness, derivation, and autonomy. It is also possible to explain diachronic processes like lexicalization, grammaticalization, morphologization and analogical change. A necessary component to the usage-based approach to diachronic change within a language is the Neogrammarian assertion that most language change can be traced to phonetic changes, even though more recent work on lexical diffusion has cast a healthy amount of doubt on the idea that sound changes affect the entire lexicon at once. Frequency effects can also help us in our our analysis of the Athabaskan verb, which lends itself easily to a conception of the lexicon as a complex network of relationships.

4. Navajo Data

Now that the relevant details of the theoretical framework have been covered, as well as details about the Navajo language itself, it is time to proceed to the data gathered for this study. A cursory examination of the verb paradigms covered in Robert Young's book *The Navajo Verb System: An Overview* reveals a system replete with homophony and semi-homophony. A summary of the relevant paradigms will now be presented. This summary will be broken up into several pieces. The first item to be covered is the typical person marking encountered in position 8 in Young's slot-and-filler model (Young and Morgan 1987, Young et al. 1992, Young 2000). According to the bipartite model, person marking occurs on the right-most edge of the Auxiliary Stem, demonstrated here using one of the forms given in the next section (McDonough 2000).

Surface form	Aux Stem	Verb Stem	Gloss
yishłeeh	yish	łeeh	I am becoming

Table 7. Basic Verb According to Bipartite Model

Second, this paper will examine instances where the marking of the first-person singular subject undergoes absorption (Kari 1975). Third, similar instances involving the second-person singular subject will be examined. Fourth, observations will be summarized. Finally, conclusions will be drawn based on the data from Navajo.

4.1 Typical Subject Marking in Navajo

The typical person marking in the Navajo Verb complex is best seen in the Null-Imperfective paradigm. This is the same paradigm McDonough uses to discuss her bipartite model (McDonough 2000). This paradigm is the least marked, and is also believed to be the most type frequent. This paradigm necessarily has null values in every position except for positions 8 (subject marking), 9 (classifier), and 10 (verb stem) (Young 2000). The paradigm is presented in the table below (Young 2000: 87).

Subject	Surface form	Subject Prefix	Gloss
1s	yishłeeh	sh	I am becoming
2s	nileeh	ni	You are becoming
3s	yileeh	zero	He or she is becoming

Table 8. Typical Subject Marking in Navajo

It may be noticed that in the first and third person singular forms there is a -yi- prefix. Young puts this prefix in position 7 and refers to it as a “peg” prefix (2000).

This is in accordance with scholars who have studied other Athabaskan languages with similar phonotactic constraints (Phone et al. 2007, Hale 2001, Rice 2011, Tuttle 1994). This is merely a mechanism to keep the phonological shape of the syllables within the verb complex consistent across verb forms.

Navajo verbs must be at least two syllables, something that distinguishes Navajo

from some of the Northern Athabaskan languages (Kari 1990, McDonough 2003). Each syllable has very specific rules regarding its shape, as Navajo prefers syllables in the shape of CV and CVC.

Aside from the peg prefix, we can see in this example that the typical marking for first person singular in the verb complex is -sh-. Likewise, second person is usually marked by -ni-. Third person is not marked at all in position 8, and is thus said to be zero-marked. These person markings remain consistent across paradigms except where phonological processes (or frequency effects in the case of some) cause changes. In this paper, we are particularly interested in paradigms where phonological processes cause either the first or second person prefix in position 8 to change beyond recognition.

After this examination, two things will be clear. The first is that each change in the singular subject prefixes is the result of absorption and thereby, lenition. Secondly, it will be clear in each of these special cases that phonological processes result in forms which are more similar in pronunciation to the third person than their unaffected counterparts.

4.2 /s/ and /j/ absorption in the first person in Navajo

There are a number of places in the Navajo Perfective Mode where the consonant marking first person singular subjects is absorbed into the vowel of

the syllable of the Auxiliary stem (Willie 1991). A short recap of forms with this deletion is given in the table below (Young 2000: 166, 196, 217, 260)

	First person	Third person	Conjugation marker	Gloss
1	yícha	yícha	yí-perfective	cry
2	níná	níná	ní-perfective	move
3	sézǫ́	sizǫ́	sí-perfective	stand
4	yiizǫ́	yiizǫ́	yí-null-perfective	stand

Table 9. First Person Subject Reduction in Navajo

Each of these forms represent a very specific phonological environment. Robert Young proposes that the phonological value of the marker of the yi-perfective is a -yí- prefix in position 7 (Young 2000: 166). He refers to the prefix in position 7 for the ni-perfective as a “ní allomorph.” A summary of his breakdown is given in the table below.

	Surface form	Young's positional analysis
1	yícha	yí-7-cha-10
2	níná	ní-7-ná-10
3	sézǫ́	sé-7-zǫ́-10
4	sizǫ́	si-7-zǫ́-10
5	yiizǫ́	yii-6c-zǫ́-10

Table 10. First Person Reducation with Positional Analysis

This analysis does not seem complete for two reasons. The first is that the values *sé-* and *sí-* are both assigned to position 7 for different members of the same paradigm. This is inconsistent with the how Young organizes most of the other paradigms in his work. Members of the same paradigm which have a different person marking share the same values in most of the other positions. The derivation of *sé-* clearly has something to do with the *sh-* of the first person, but no explanation is given for its deletion. The second is the value *yí-*. This value appears in the explanation for the forms in the Yi-null-perfective, but it does not appear on Young's list of prefixes organized by position. Furthermore, if it did it would be the only prefix with the shape "Cii-". This paper proposes a slightly different analysis of the forms above, given in the table below.

	Surface form	7a	7b	8	10
1	yícha	null	ni	sh	cha
2	níná	ni	ni	sh	ná
3	sézǐ	si	ni	sh	zǐ
4	yiizǐ	yi	ni	sh	zǐ

Table 11. Alternative Analysis of Reduced First Person Forms

In this explanation, the null-, ni-, si-, and yi- values of position 7, which we know well from Young's explanation of the null-, ni-, si-, and yi- imperfective are preserved. Also in this approach, we get one historical morpheme which is used to derive perfective forms. The other benefit of creating a value for an imperfective morpheme is that it supplies us with the phonological environment in

which the first-person prefix would delete: following the high tone vowel which comes about as a result of the combination of the imperfective morpheme and /ni/ and when succeeded by a zero or barred l classifier. This is similar to the “fricative deletion rule” noted by Tenenbaum in an examination of the Tanaina Verb (1977). The perfective form of verbs with a /d/ or // classifier follows a different set of conjugations, one that leaves the first person singular prefix intact.

It would be easy for critics of the assertion that sound change is not morphologically conditioned to suggest that the presence of certain classifiers and their relationship to the absorption of the first person subject prefix is a morphologically conditioned change, but the phonological connection between /j/ and /h/ is well documented even in cases where the classifier is not ///. Note the following example of anticipatory assimilation where an // classifier is changed to a /h/ when preceded by the first person subject prefix (Yazzie and Speas 2007).

1s	3s	stem	gloss
iishłaa	ayiilaa	laa	Perfective of “make”

Table 12. First Person Prefix and // Classifier Assimilation

4.3 /n/ and /ni/ absorption in the second person in Navajo

There are also a number of places in the Navajo Verb complex where the /n/ or /ni/ of the second-person prefix is absorbed into the final vowel of the Auxiliary

stem. A short recap of these forms, along with their third-person singular counterparts, relevant morphological information, and the gloss for their stems is given in the table below.

	2s	3s	Position 7	Other Prefixes	Gloss
1	níljjíd	niljjíd	zero	Ci conjunct prefix	squat
2	ní'aah	yí'aah	ni	none	give SRO
3	ná'iidzíít	ná'iidzíít	yi	none	turn white

Table 13. Second Person Subject Prefix Reduction in Navajo

The phonological condition for the deletion of the second-person prefix is pretty straightforward based on the observations here. When the /ni/ of the second-person prefix is preceded by a prefix with the form Ci, the /ni/ is assimilated in form of a high tone on the previous syllable. This is very similar to absorption rules highlighted by other Athabaskanists (Hargus 1988). Alderete (2005) shows that these seemingly small differences in tone are not subtle and, thus insure a healthy distinction between second and third person singular subjects in Tahltan. The case is likely similar here.

Admittedly, this does not explain the forms of the yi-imperfective, which must have some other phonological process in place which negates the high-tone of the /ni/ prefix and causes the homophony seen in the third row of table 5.c. Considering the fact that the yi-null perfective resists the high tone associated with perfective forms associated with other markers in position 7a, this paper

proposes that in the case of yi-imperfective, the absorption process takes place before the process with negates the high tone.

It is worth noting here that this process does not take place in the environment where /ni/ comes after a syllable in the shape of Cí. This makes the case for some historical perfective prefix even stronger, as it provides the explanation for why the “ni-“ is preserved in each of the perfective forms, but not the imperfective forms.

If there is any truth in the Neo-Grammarians assertion that sound changed is not morphologically conditioned, then there must be some reason why the prefix is preserved in one group of forms and deleted in others. The high tone associated with many of the perfective forms in Young 2000, and generalized here to apply to each of them in table 5.b.3 provides us with an explanation that is phonologically driven, not morphologically driven.

4.4 Summary

To summarize the previous two sections: the first person subject prefix of position 8 is absorbed into the vowel of the Auxiliary stem's final syllable when preceded by the high tone of the perfective marker and when succeeded by a zero or barred I classifier. This creates paradigms where the first person and third person forms of the verb are made to sound very like or, in many cases, completely homophonous. A list of exemplary forms is given in table 5.b.

The second person subject prefix of position 8 is absorbed into the vowel of the Auxiliary stem's final syllable when preceded by a conjunct prefix with the shape Ci. Many times, this leads to second and third person forms which sound alike. Sometimes, in the case of the yi- imperfective, it leads to total homophony between second and third person forms.

4.5 Conclusions

Several conclusions can be drawn based on the data from Navajo. The first is that this pattern of phonological reduction in the first and second person singular prefixes is consistent with Bybee's assertion that more frequent members of a paradigm are most likely to change by undergoing phonological reduction (Bybee 2007). All three person markings examined thus far involve singular subjects, the least semantically marked number category. Third person is zero-marked where other subjects are marked. This means that any case of phonological reduction involving first or second person singular subjects will lead to a greater degree of homophony between that form and the third person singular form.

The second is that in most cases reduction processes are kept from the creation of too many ambiguous forms by nature of a kind of semantic entrenchment, but there are cases of total homophony between first person and third person singular subjects in the perfective mode. These are limited to situations where

the verb is intransitive. The arguments of intransitive verbs are frequently marked with postpositions, all of which have a special y/b alternation when a 3rd person singular personal subject is interacting with a 3rd person singular object of the postposition (Yazzie and Speas 2007). Admittedly, this does not deal with every instance of possible ambiguity, but it deals with many of them. The first person subjects have no such y/b alternation in their postpositions, leading to one possible way that speakers cope with the ambiguity in the verb complex.

Cases of total homophony between second and third person singular subjects are mostly limited to the yi- imperfective. Young highlights that the most productive (or to put it a different way, the most type-frequent) imperfective paradigm is the zero imperfective (2000). This is consistent with what we would expect based on the correlation between a lack of markedness and frequency. One possible explanation for the lack of distinction between second and third person singular subjects across the board in the yi- imperfective paradigm is its seeming lack of type-frequency. Patterns with higher type frequency often show a kind of entrenchment which prevents the creation of ambiguity within the forms (Pierrehumbert 2001). If the yi- imperfective is lacking in type frequency, it would also lack the entrenchment necessary to prevent the phonological reduction processes in the interaction of /ni/ with other conjunct prefixes.

5. Athabaskan Data

The paradigms from the Navajo Verb complex discussed above show several interesting cases when phonological reduction in the first and second person singular forms causes key parts of the subject prefixes to delete or assimilate. These changes always seem to bring them closer in form and pronunciation to the third person singular, which is unmarked in position 8.

In this section, I look at key members of other branches of the Athabaskan language family to show that similar processes take place throughout, though to different degrees. I begin with a look at another southern Athabaskan language, but Eastern rather than Western Apachean: Jicarilla Apache. I then present data from a Pacific Coast Athabaskan language, Hupa. The Northern Athabaskan languages Chilcotin, Koyukon, and Ahtna, are then discussed.

5.1 Jicarilla Apache (Southern Athabaskan)

One language that is very closely related to Navajo is Jicarilla Apache. Jicarilla Apache is the language of the Jicarilla Apache tribe, native to Northern New Mexico. According to the last census, the Jicarilla Apache language has 510 semi-speakers. Like Navajo, within the Jicarilla Verb complex, there is a great deal of homophony and near-homophony. Also like Navajo, this homophony is linked to deletion and assimilation processes which mainly apply to the first and

second person singular subject prefixes. Similar to how this paper approached Navajo, typical subject markings will be discussed first, then this paper will examine instances of consonant absorption in the first and second-person singular.

While not explained as such in the grammatical sketch provided by Phone et al. in *Dictionary of Jicarilla Apache*, Jicarilla has paradigms which behave in similar ways to the zero-imperfective of Navajo. One such verb is the stem *-cha* which can be translated *to cry* in English. The singular subject forms of this verb are given in the table below (Phone et al. 2007: 34).

Subject	Surface form	Subject Prefix	Gloss
1s	hishcha	sh	I am crying
2s	ncha	n	You are crying
3s	hicha	zero	He is crying

Table 14. Typical Subject Marking in Jicarilla

If we eliminate the peg prefix /hi/ from the paradigm, we can see a conjugation pattern similar to Navajo, where /sh/ marks the first person, /n/ is second person prefix, and the simple third person is zero-marked in the prefix position closest to the verb root.

It is worth noting here that the shape of the second person singular subject prefix in Jicarilla is different from Navajo. The second person prefix /ni/ is the only

subject prefix in position 8 in the Navajo verb complex with the shape CV-. This means that many of the processes which affect other subject prefixes in Navajo affect the 2nd person singular subject prefix differently, allowing it to keep its shape when other forms change. Comparatively, the second person subject prefix in Jicarilla is /n/ rather than /ni/, giving it the shape -C- rather than -CV-. Thus, it is far more susceptible to phonological processes which cause it to reduce or delete, as we will see in the sections to come.

As in Navajo, there are a number of places within the Jicarilla verb complex where the First person subject marker is absorbed. Examples of this process are given in the table below.

	First person	Third person	Mode	English Gloss
1	eelhaash	<u>ii</u> haash	Perfective	sleep
2	hédzé	yiiłdzé	Perfective	scrape the hide
3	yałki	yáálki	Perfective	talk

Table 15. First Person Reduction in Jicarilla

It can be assumed that, like in Navajo, there was once a historical phonological environment in which the first-person singular subject prefix was deleted in the perfective mode. It seems now, however, that this phonological environment has been obscured by other historical sound changes and phonological processes. While more study would be needed to illustrate the precise nature of these sound changes, some insights can be gained by looking at these Jicarilla verb forms

alongside their Navajo counterparts. The table below displays precisely that. All forms in 6.a.ii.2 are in the perfective mode.

	Jicarilla	Navajo	Subject	Gloss
1	eelhaash	'iithaazh	1s	I slept
2	<u>ii</u> haash	'iithaazh	3s	He/she slept
3	hél dzé	yííł dzá	1s	I scraped the hide
4	yiildzé	yiyííł dzá	3s	She/he scraped the hide

Table 16. Parallels in Navajo and Jicarilla First Person Reduction

From these forms it is only possible to speculate, but it is possible that Jicarilla has a more specific /j/-absorption rule than Navajo, and one rule to maximize perceptual distance between the first and third-person singular forms in the perfective. Rather than merely deleting the /j/, it appears that this rule also changes the vowel sound from /i/ to /e/. We catch a glimpse of a similar process in Navajo, where in the si-perfective the first person is marked by a high-tone /e/ sound, but in Jicarilla this process is conditioned by the first-person subject prefix rather than the /si/ of the si-perfective as in Navajo.

Jicarilla also has many places where the /n/ of the second-person singular is absorbed or assimilated in the form of nasalization on the previous vowel.

Several examples of this can be found in the table below.

	2s	3s	Mode	Gloss
1	ɨ́hosh	ɨ́hosh	imperfective	sleep
2	ɨ́hášh	ɨ́hášh	future	sleep
3	na'íizii	na'íizii	imperfective	work
4	na'íikáh	na'íikáh	imperfective	sew

Table 17. Second Person Reduction in Jicarilla

It can be seen from these examples that the phonological environment for /n/ absorption is very similar to those in Navajo. When /n/ is preceded by the vowel of another prefix, it is absorbed. When that vowel is word-initial, it is nasalized in the second and third person singular forms. In other cases, the vowel is lengthened in the second person when compared to the third person. In still other cases, the /n/ is absorbed with no obvious remnant left to reconstruct its presence.

Jicarilla, as demonstrated in the previous section, has very similar processes at work within its verb complex when compared to Navajo. Given the close nature of these two languages, this is precisely what we would expect. Several things stand out in these data from Jicarilla. The first is that, while very similar processes take place, there are very limited instances of pure homophony between the second and third person singular subject forms and none between the first and third person singular forms.

A possible explanation for the vowel change which keeps this homophony from taking place between the first and third person singular forms is a more general /sh/ absorption schema with an accompanying vowel change and with a great deal more type frequency than its Navajo counterpart. In Navajo, the lowering of the vowel happens in conjunction with the absorption of the /sh/ prefix marking the first person only in the si-perfective paradigm. In Jicarilla, this schema is more general, as can be seen in the figure below.

Navajo

	Surface form	Gloss
1	sézǫ́	I was standing
2	yiizǫ́	I stood up

Jicarilla

	Surface form	Gloss
3	eelhaash	I slept
4	hédzé	I scraped the hide

Table 18. First Person Perfective Vowel Change in Jicarilla

I propose an explanation for the pure homophony here which is very similar to the one proposed for Navajo. The Jicarilla verbs which show homophony are most likely those whose conjugation patterns lack type frequency, and thus also lack the entrenchment mechanisms necessary to prevent purely homophonous forms. Since we lack specific frequency data on these verbs, however, the evidence for this claim is based on their apparent cognate relationship with the

verbs which Young points out as belonging to less common paradigms in Navajo. Their apparent connection to the Navajo verbs in the previous section could be due to a common ancestor among the conjugations of Porto-Athabaskan, but that is mere speculation without a more in depth study of Jicarilla conjugation patterns.

5.2 Hupa (Pacific Coast Athabaskan)

The branch of the Athabaskan language family most closely related to the Southern Athabaskan (also called “Apachean”) languages is the Pacific Coast grouping of Athabaskan languages. This paper will use data from the Hupa language to investigate instances where the First and second person singular subject markings delete and where forms appear either similar or identical to the third person singular, which is unmarked in the position closest to the verb root. Hupa is a language spoken in the Hoopa valley in Northern California. It has less than 100 L1 and L2 speakers combined according to Golla (1970a).

Hupa, like the languages we have examined so far, has typical subject markings in the prefix position which occurs closest to the verb stem and classifier position. This typical subject marking paradigm for singular subjects is summarized in the table below (Goddard 1905:114).

Subject	Surface form	Subject prefix	Gloss
1s	o:u:wxai	-w-	I am buying
2s	o:n:xai	-n-	You are buying
3s	tso:xai	-zero-	He is buying

Table 19. Typical Subject Marking in Hupa

While the /w/ of the first person is certainly not what we would expect based on the data from Southern Athabaskan, we will see in the sections to come that it undergoes similar phonological change to its Navajo counterpart. It is also worth noting that, like we noted in Jicarilla, the prefix for second-person singular subjects is an /n/ rather than the /ni/ of Navajo. Taking the shape of -C- rather than -CV- seems to make it much more susceptible to phonological reduction and deletion.

There are a number of places in the Hupa Verb complex where the /w/ of the first person singular subject is absorbed by the previous vowel. Despite the phonological differences between the first person singular subject marking in Hupa and the other languages we have examined so far, the deletion of /w/ occurs in many of the same places as the deletion of the first person markings in Navajo and Jicarilla. The table below details such places (Goddard 1905: 97, 117, 122).

	1s	3s	Classifier	Mode	Gloss
1	wexan	tcu:wifxan	zero	Win-perfective	caught it
2	tce:neyai	tceninyai	zero	Nin-perfective	went out
3	seloi	tcisloi	zero	Si-perfective	tied

Table 20. First Person Reduction in Hupa

It is clear in the table above that, as in Navajo, the grammatical conditions for the deletion of /w/ in the First person are intimately connected to the historical phonological environment tied to the Perfective mode. While the phonological shape of the markers of the perfective mode is different in Hupa when compared to languages we have examined so far (/nin/, /si/, and /win/ as opposed to /ni/, /si/ and /yi/), the resulting surface form is remarkably similar to that found in Jicarilla. The /i/ is changed to an /e/ when the /W/ is absorbed into the previous syllable. This change is also limited to the phonological environment provided by the zero and barred I classifiers.

The deletion of the /n/ of the second person subject marker in Hupa is far more widespread than that of the /w/ deletion in the previous section. This is not altogether unexpected, given the information on how widespread the phenomenon is in Navajo. The table below details examples of /n/ deletion.

	2s	3s	Classifier	Mode	Stem Gloss
1	wiñxan	tcu:wíñxan	zero	Win-perfective	caught it
2	tceninyai	tceninyai	zero	Nin-perfective	went out
3	silloi	tcisloi	zero	Si-perfective	tied

Table 21. Second Person Reduction in Hupa in the Perfective

As it was said in the first paragraph, the absorption on /n/ by other prefixes happens in a number of places. The following table details such places (Golla 1970a).

2s	3s	Classifier	Mode/Aspect
ʔi-	ʔi-	‡	Imperfective
ʔi-	ʔi-	l	Imperfective
niŋ-	niŋ-	zero	Nin-Perfective
ni-	ni-	‡	Nin-Perfective
ni-	ni-	l	Nin-Perfective
nin-	nin-	di	Nin-Perfective
si-	si-	‡	Si-perfective
si-	si-	l	Si-perfective
win-	win-	zero	win-perfective
wi-	wi-	‡	win-perfective
wi-	wi-	l	win-perfective

Table 22. Second Person Reduction in Hupa

The table above does not represent an exhaustive list of the instances where the 'n' of the second person is deleted, but it is enough to talk about the phonological environment where this absorption occurs. The first phonological environment where the /n/ of the second person singular subject deletes is when it precedes an /l/ or /l̄/ (Golla 1970a: 71). The second is when it is preceded by a modal/aspectual prefix with the shape /Cin-/ (Golla 1970a, Goddard 1905).

As it was reported above, the absorption of the first person subject prefix in Hupa seems to be a part of how the perfective mode is formed. This more general rule of lowering the /i/ to an /e/, which we encountered only in specific verb paradigms in Navajo, could be a result of a more general /w/-absorption schema for the formation of the perfective mode which includes the lowering of the vowel.

The absorption of the second person subject prefix in Hupa happens along much the same lines as we experienced in Navajo and Jicarilla. Hupa seems to have an additional situation where the /n/ is absorbed before the l and barred-l classifiers. An interesting part of the data in Hupa is that, though /w/ and /n/ absorb in some cases more readily than in other languages we have examined, this reduction most of the time does not result in homophony. The third person prefixes of the Hupa Verb complex seem to play a much greater role in differentiating the third person from other singular subjects.

5.3 Chilcotin (Northern Athabaskan)

Chilcotin is the first Northern Athabaskan language examined in this paper. It is one of three. The reason for including more than one Northern Athabaskan language is that members of this grouping of Athabaskan languages vary strongly in the way that they mark their verbs and cope with phonotactic change. Northern Athabaskan languages differ strongly with their southern counterparts due to the great geographic and chronological separation between them and the other members of the Athabaskan language family. Chilcotin is a language of Southwestern Canada. It is spoken by a population of 860 people according to the 2014 Canadian Census.

The most typical subject marking in Chilcotin is found in the imperfective. The data in this table is taken from Cook 2013.

Subject	Surface form	Gloss
1s	hesjen	I am singing
2s	henjen	You are singing
3s	hejen	He is singing

Table 23. Typical Subject Marking in Chilcotin

According to Cook (2013), First person singular subjects are marked by an /s/ or /i/ morpheme in position two of Cook's slot and filler model. Second person singular subjects are marked by an /n/ or /ne/ morpheme. Third person singular

subjects have no prefix. They are phonologically zero. Perhaps it is more correct to say that third person singular subjects are typically unmarked in position 2, as there do seem to be other prefixes which mark third person subjects. This is consistent with what we have experienced with Athabaskan verbs so far. Third person is zero-marked in the normal subject marking position, but more often than not marked in other places in the verb complex.

Cook describes a number of places where the /s/ marking first person singular subjects is absorbed. These more or less correlate with the /s/ absorbed in the perfective paradigms of the Navajo Verb system. A typical example is given in table 6.c.ii.

	Surface form	Gloss	Classifier	stem
1	ghesjen	I sang	d	yen
2	ghiyən	I ate it	zero	yən

Table 24. First Person Reduction in Chilcotin

Similar to the pattern of the perfective in the Navajo Verb system, the /s/ of the first person singular subject marker is absorbed in the perfective mode when it precedes a zero or bar-I classifier.

This will come as little surprise, based on what has already been said about Chilcotin, but the absorption of /n/ happens in a very specific phonological environment very similar to the absorption of /ni/ in Navajo. /n/ or /ne/ deletes

when it interacts with other conjunct prefixes. The following examples are taken from Cook's grammar of Chilcotin. In both cases, the /ne/ prefix of the second person singular subject deletes upon being placed next to a prefix of the same shape. The result is usually very similar to the third person singular form of the verb or results in homophony.

	2s	3s	gloss of stem
1	ninaɣ̃	nenəɣ̃	to be tall.
2	ghinzɯ	ghinzɯ	to be good

Table 25. Second Person Reduction in Chilcotin

Both of these verbs are stative verbs, with meanings that correspond to English adjectives. The /n/ of the second person prefix assimilates, causing the preceding vowel to shift higher. In the event that the vowel is /i/, there is no change between the second and third person singular subjects.

The data from Chilcotin support a similar analysis as the data from Jicarilla and Navajo. The frequency of singular forms within the paradigm leads to phonological reduction processes not triggered in the duoplural and distributive plural forms. The zero-marked nature of the third person means that reduction processes in the first and second person singular forms will lead to examples of homophony and near-homophony. In most cases, pure homophony is kept from occurring by entrenchment processes, except where less type-frequent paradigms do not allow for such entrenchment.

5.4 Koyukon (Northern Athabaskan)

Koyukon will be the second Northern Athabaskan language examined in this paper. Koyukon is a language spoken in Alaska along the Koyukuk and middle Yukon rivers. According to the 2015 census, it is a language that has 65 speakers. It differs significantly from the other Athabaskan languages examined so far through many morphological and phonological processes, but its marking of subjects in the verb complex is more or less compatible with what we have found so far.

The marking of subject pronouns in the Koyukon verb complex can be seen in this “normal paradigm” from Jette et al (2000).

Person	Verb form	Subject Prefix	Gloss
1s	No'es'oyh	s	I am taking it down
2s	None'oyh	n	You are taking it down
3s	No'e'oyh	zero	He is taking it down

Table 26. Typical Subject Marking in Koyukon

It is important to note that the second person singular subject prefix has two shapes, depending on the phonological environment: /n/ and /ne/. While there are certain places where the second person singular subject marker is assimilated or deleted, it is also important to say that the first and second person singular subject prefixes in Koyukon are remarkably entrenched when compared

to other languages we have examined, and are subject to very few phonological processes when compared to conjunct prefixes from other Athabaskan languages. There is no first person /s/-absorption in the perfective or any other verb paradigm. There is also very limited second person /n/-absorption and when it does occur it does not necessarily lead to homophony with the third person singular form.

The phonological processes which result in the absorption of second person /n/ in Koyukon are similar to those examined in the other Athabaskan languages in this paper, but it does not have the type frequency that it does in other Athabaskan languages. The table below shows two paradigms where the /n/ of the second person singular subject prefix is absorbed (Jette et al. 2000).

	Surface form	Gloss
1	Nonee'oyh	You are taking it down (bead or ring)
2	None'oyh	He is taking it down (bead or ring)
3	Noghee'oł	You are handling it
4	Noghe'oł	He is handling it

Table 27. Second Person Reduction in Koyukon

In row 1, another /ne/ prefix occurs preceding the second person singular prefix causing the second person to be marked only with a lengthened vowel. In row 3, this change is caused by the prefix for the progressive mode. In both cases, the /n/ of the second person singular subject prefix is absorbed when placed

between two vowels. In Navajo, this change is accompanied by a raising of the vowel's tone. There is no such accompanying vowel raising in this case.

Though significantly more limited in scope than the homophony noted in previous sections, the mechanics at work are essentially the same in Koyukon as in the other languages examined so far in the one place where we find near-homophony. The phonological reduction processes in the second person singular lead to an absorption of the /n/ of the second person, but these forms are kept from being purely homophonous by entrenchment mechanics typical of paradigms with high type frequency.

5.5 Ahtna (Northern Athabaskan)

Ahtna is a Northern Athabaskan language with 45 speakers according to the 2015 census. It is spoken in Alaska and Washington state. It is included here as an outlier among Athabaskan languages. Ahtna does not have a parallel process of deletion or assimilation of singular subject prefixes. This is largely due to the fact that Ahtna does not have the same phonological environments in which these changes can occur. The Ahtna verb can occur in just one syllable, rather than the minimum of two encountered in most other Athabaskan languages. Practically, this means that there is no peg prefix (Kari 1990). This begs the question as to whether or not the phonological reduction processes noted in the other Athabaskan languages are somehow tied to their phonotactic constraints,

but more research is needed on that score. The following is an example of a verb paradigm taken from Kari (1990).

	Surface form	Gloss
1	nic'a'es'aan	I lifted it up
2	nic'a'i'aan	You lifted it up
3	nic'ayi'aan	He lifted it up

Table 28. Typical Subject Marking in Ahtna

These are the markings typical for subjects in Ahtna, and they do not seem to be subject to the same phonological changes we have noticed in other Athabaskan languages.

5.6 Conclusions drawn from the data on other Athabaskan languages

As demonstrated in the data gathered from across the Athabaskan language family, when reduction does occur in the first and second person singular subjects, it can be explained using similar frequency effects to those found in Navajo. This seems to be especially true of the second person singular forms, the singular form with the least token frequency according to Bybee's work. This would seem to support the argument that frequency effects can be used to describe the mechanisms of phonological reduction and entrenchment within the Athabaskan verb complex.

6. Summary and conclusions

The argument here has aimed to account for the homophony between second and third person singular subjects in Navajo as a result of frequency effects. The homophony occurs only in the *yi-* imperfective which has low type frequency. Low type frequency leads to a lack of entrenchment, which in other imperfective paradigms prevents phonological reduction of /ni/ with other conjunct prefixes. This argument is supported by the data from other languages in the Athabaskan family which also show that phonological reduction processes causing homophony among person markers are blocked by entrenchment in paradigms with high type frequency. This finding supports the work by Bybee and others on the central role of frequency effects in language change.

The homophony between the first and third person singular forms in the perfective is harder to account for, as homophony is unexpected between the two most common forms in a paradigm. Similar reduction processes in the first person were found in other Athabaskan languages, but these did not lead to homophony. This leads me to believe that, whereas the zero marking in the third person can be attributed to frequency effects, the marking of the first person is rule derived, a possibility also noted in Bybee's work on frequency effects within verb paradigms.

REFERENCES

- Alderete, John. 2005. On tone and length in Tahltan (Northern Athabaskan). *Athabaskan Prosody*, ed. by Sharon Hargus and Keren Rice. Amsterdam: John Benjamins. 185-207.
- Alderete, John and Thomas McIlwraith. 2008. An annotated Bibliography of Tahltan Language Materials. *Northwest Journal of Linguistics*. 2.1-26.
- Axelrod, Melissa. 1990. Incorporation in Koyukon Athapaskan. *International Journal of American Linguistics*. 56(2).179-195
- Axelrod, Melissa. 1993. *The Semantics of Time: Aspectual Categorization in Koyukon Athabaskan*. University of Nebraska Press.
- Bird, Sonya. 2004. Lheidli intervocalic consonants: Phonetic and morphological effects. *Journal of the International Phonetic Association*. 34.69-91.
- Boas, Franz. 1917. Grammatical Notes on the Language of the Tlingit Indians. University of Pennsylvania Museum. Anthropological Publications 8.
- Brinton, Laurel J. and Elezabeth Closs Traugott. 2005. *Lexicalization and Language Change*. Cambridge: University Press.
- Bybee, Joan. 1985. *Morphology: A Study of the relation between meaning and form*. Philadelphia: John Benjamins Publishing Company.
- Bybee, Joan, Revere Perkins and William Pagliuca. 1994. *The evolution of grammar: tense, aspect and modality in the languages of the world*. Chicago: University of Chicago Press.
- Bybee, Joan, and Hopper, P. J. eds. 2001. *Frequency and the emergence of linguistic structure*. John Benjamins Publishing.
- Bybee, Joan. 2003. The Role of Frequency. *The Handbook of Historical Linguistics*. Eds. Joseph, B. and Janda, R. John Wiley & Sons.
- Bybee, Joan, 2006. From usage to grammar: The mind's response to repetition. *Language*, pp.711-733.
- Bybee, Joan. 2007. *Frequency of use and the organization of language*. Oxford University Press on Demand.
- Bybee, Joan. 2015. *Language change*. Cambridge University Press.

- Carter, R. M. 1976. Chipewyan classificatory verbs. *International Journal of American Linguistics*. 42.24-30
- Chee, M. 2004. Grammaticization of tense in Navajo: the evolution of nt'ee. *Santa Barbara Papers in Linguistics*. 15.76-90
- Chee, M. 2017. *A Longitudinal Cross-Sectional Study on the Acquisition of Navajo Verbs in Children Aged 4 years 7 Moths through 11 Years 2 Months*. Ann Arbor: ProQuest Dissertations & Theses=
- Cook, Eung-Do. 1971a. Vowels and tones in Sarcee. *Language*. 47.164-179
- Cook, Eung-Do. 1971b. Phonological change and syntactic rule. *Linguistic Inquiry*. 2.465-479
- Cook, Eung-Do. 1977. Syllable weight in three Northern Athabaskan languages. *International Journal of American Linguistics*. 43.259-268
- Cook, Eung-Do. 1978. The synchronic and diachronic status of Sarcee Y, *International Journal of American Linguistics*. 44.192-196
- Cook, Eung-Do. 1983a. Chipewyan vowels. *International Journal of American Linguistics*. 49(4).413-427
- Cook, Eung-Do., 1983b. Chilcotin flattening. *Canadian Journal of Linguistics/Revue canadienne de linguistique*, 28(2), pp.123-132.
- Cook, Eung-Do. 1984. *A Sarcee Grammar*. Vancouver: University of British Columbia Press.
- Cook, Eung-Do. 1996. Third-Person Plural Subject Prefix in Northern Athapaskan. *International Journal of American Linguistics*. 62.86-110
- Cook, Eung-Do. 2013. *A Tsilhqut'in Grammar*. Vancouver: University of British Columbia Press.
- Croft, William. 2012. *Verbs: Aspect and causal structure*. Oxford University Press.
- Davidson, William. 1963. A preliminary analysis of active verbs in Dogrib. *Studies in Athapaskan Languages*, ed. H. Hoijer, pp. 48-56. Berkeley: University of California Press.
- Dinkin, A.J., 2008. The real effect of word frequency on phonetic variation. *University of Pennsylvania Working Papers in Linguistics*, 14.1.

- Eddington, D. and Lackler, J. 2006. A computational analysis of Navajo verb stems. *Empirical and Experimental Methods in Cognitive/Functional Research*. CSLI Publications
- Faltz, Leonard M. 1998. *The Navajo Verb: A Grammar for Students and Scholars*. Albuquerque: University of New Mexico Press.
- Givón, T., 2000. Internal reconstruction: As method, as theory. *Typological Studies in Language*, 43, pp.107-160.
- Goddard, P. E. 1905. The morphology of the Hupa language. *American Archaeology and Ethnology*, vol. 3. Berkeley: The University Press.
- Goddard, P. E. 1918. Has Tlingit a genetic relation to Athapaskan? *International Journal of Linguistics*. 1.266-279
- Golla, Victor. 1970a. *Hupa Grammar*. Berkeley: University of California Press.
- Golla, Victor. 1970b. Tututni (Oregon Athapaskan). *International Journal of American Linguistics*. 42:217-228
- Golla, Victor. 1977. A Note on Hupa Verb Stems. *International Journal of American Linguistics*. 43.355-358.
- Gunlogson, Christine. 1995. Pronominal prefixes in Babine-Witsuwit'en. University of Washington.
- Gunlogson, Christine. 2001. Third-person object prefixes in Babine-Witsuwit'en. *International Journal of American Linguistics*. 67.365-395.
- Haas, Mary R. 1968. Notes on a Chipewyan dialect. *International Journal of American Linguistics*. 34(3).165-175.
- Hale, K., 2001. Navajo verb stem position and the bipartite structure of the Navajo conjunct sector. *Linguistic Inquiry*, 32(4), pp.678-693.
- Haspelmath, M. 2008. Creating economical morphosyntactic patterns in language change. *Language universals and language change*, pp.185-214.
- Hardy, Frank W. 1979. *Navajo aspectual stem variation*. Albuquerque: University of New Mexico.
- Hardwick, Margaret. 1984. *Tahltan Morphology and Phonology*. University of Toronto.

- Hargus, Sharon. 1986a. Phonological evidence for prefixation in Navajo verbal morphology. *Proceedings of the West Coast Conference on Formal Linguistics* 5, ed. M. Dalrymple et al., pp. 53-67. Palo Alto, Calif.: Stanford Linguistics
- Hargus, Sharon. 1986b. Infixation and bracketing erasure in Sekani. *University of Washington Working Papers in Linguistics* 9, ed. L. Kenton and S. Weinberger, pp. 83-117.
- Hargus, Sharon. 1988. *The lexical phonology of Sekani*. New York: Garland Publications
- Hargus, Sharon. 1991. The Disjunct Boundary in Babine-WitsuWit'en. *International Journal of American Linguistics*. 57.487-513
- Hargus, Sharon and Tuttle, S.G. 1997. Augmentation as affixation in Athabaskan languages. *Phonology*, 14(2), pp.177-220
- Hargus, Sharon. 2007. *Witsuwit'en grammar: phonetics, phonology, morphology*. Vancouver: UBC press.
- Henry, Dave. 1980. Word shortening in Snowdrift Chipewyan. *Calgary Working Papers in Linguistics*. 6.61-67
- Hock, H. H. 1986. *Principle of historical linguistics*. Berlin: Mouton de Gruyter.
- Hoijer, H. 1943. Pitch accent in the Athabaskan languages. *Language*. 19.38-41
- Hoijer, H. 1946. Chiricahua Apache. *Linguistic Structures of Native America*, ed. H. Hoijer, pp. 55-85. New York: Viking
- Hoijer, H. 1948. The Apachean Verb, Part IV: Major Form Classes. *International Journal of American Linguistics*. 14.247-259
- Hoijer, H. 1956. The chronology of the Athapaskan languages. *International Journal of American Linguistics*. 22.219-232
- Hoijer, H. 1966. Galice Athapaskan, a grammatical sketch. *International Journal of American Linguistics*. 32.320-327
- Holton, Gary. *The phonology and morphology of the Tanacross Athabaskan language*.

- Hopper, Paul J. 1990. Where do words come from? *Studies in Typology and Diachrony: Papers presented to Joseph H. Greenberg on his 75th Birthday*. Croft et al. eds. Amsterdam and Philadelphia: John Benjamins.
- Howren, Robert. 1968. Stem phonology and affix phonology in Dogrib (Northern Athabaskan). *Fourth Regional Meeting of the Chicago Linguistic Society*, ed. By BJ Darden et al. 120-129.
- Howren, Robert. 1971. A Formalization of the Athabaskan 'D-effect'. *International Journal of American Linguistics*. 37.96-113
- Howren, Robert. 1979. The Phonology of Rae Dogrib. *Contribution to Canadian Linguistics*, by E. P. Hamp et al., 7-40. Mercury Series Paper No. 50. Ottawa: National Museum of Man.
- Hymes, D. H. 1955. Positional Analysis of categories: a frame for reconstruction. *Word*. 11:10-23
- Hymes, D. H. 1956. Na-Dene and Positional Analysis of Categories. *American Anthropologist*. 4.624-638.
- Jakobson, R. 1957. Shifters, verbal categories and the Russian verb. In *Roman Jakobson, Selected writings*, vol. 2, 130–147. The Hague: Mouton.
- Jette, Jules et al. 2000. *Koyukon Athabaskan Dictionary*. Fairbanks: Alaska Native Language Center.
- Joseph, Brian D. and Richard D. Janda. 1988. The how and why of diachronic morphologization and demorphologization. *Theoretical Morphology: Approaches in Modern Linguistics*. Hammond, Michael and Michael Noonan, eds. San Diego: Academic Press.
- Juilland, A., and F. Chang-Rodriguez. 1964. Frequency dictionary of Spanish words. The Hague: Mouton.
- Kari, James. 1975. The disjunct boundary in the Navajo and Tanaina verb prefix complexes. *International Journal of American Linguistics*, 41(4), pp.330-345.
- Kari, James. 1979. *Athabaskan Verb Theme Categories: Ahtna*. Alaska Native Language Center Research Papers, no. 2. Fairbanks: Alaska Native Language Center
- Kari, James. 1989. Affix Positions and Zones in the Athapaskan Verb Complex: Ahtna and Navajo. *International Journal of American Linguistics*. 55.424-454.

- Kari, James. 1990. *Ahtna Athabaskan dictionary*. Fairbanks: Alaska Native Language Center
- Krauss, Michael E. 1964. Proto-Athapaskan-Eyak and the Problem of Na-Dene I: Phonology. *International Journal of American Linguistics*. 30.118-131
- Krauss, Michael E. 1965. Proto-Athapaskan-Eyak and the Problem of Na-Dene II: Morphology. *International Journal of American Linguistics*. 31.18-28
- Krauss, Michael E. 1979. Athabaskan tone. *Athabaskan Prosody*, ed. by Sharon Hargus and Keren Rice. Amsterdam: John Benjamins. 55-136
- Leer, Jeff. 1979. Proto-Athabaskan Verb Stem Variation, Part One: Phonology. Fairbanks: Alaska Native Language Center research papers.
- Li, Fang-Kuen. 1930. A study of Sarcee verb-stems. *International Journal of American Linguistics*. 6.3-27.
- Li, Fang-Kuen. 1930. *Mattole, an Athabaskan Language*. Chicago: University of Chicago Press.
- Li, Fang-Kuei. 1933. A list of Chipewyan stems. *International Journal of American Linguistics*. 72(4): 122-151
- Li, Fang-Kuei. 1946. Chipewyan. *Linguistic Structures of Native America*, ed. H. Hoijer. 398-423. New York: Viking Fund.
- Liljencrants, J. and Lindblom, B. 1972. Numerical simulation of vowel quality systems: the role of perceptual contrast. *Language*. 48.839-862.
- Martinet, A. 1952. Function, structure and sound change. *Word*. 8.1-32.
- McDonough, Joyce. 1996. Epenthesis in Navajo. *Athabaskan Language Studies: Essays in Honor of Robert W. Young*, ed. by Eloise Jelinek, Sally Midgette, Keren Rice and Leslie Saxon. Albuquerque, New Mexico: University of New Mexico Press. 235-257.
- McDonough, Joyce M. 2000. On a bipartite model of the Athabaskan verb. *The Athabaskan languages: Perspectives on a Native American language family*. 139-166
- McDonough, Joyce M. 2003. *The Navajo sound system*. Springer Science & Business Media.

- Midgette, Sally. 1995. *The Navajo Progressive in Discourse: A Study in Temporal Semantics*. New York: Peter Lang.
- Morice, Adrian G. 1932. *The Carrier Language*. Collection Internationale de Monographs Linguistiques, Anthropos, vol. 9-10. Vienna.
- Naish, C. and G. Story. 1973. *Tlingit Verb Dictionary*. Fairbanks: Alaska Native Language Center.
- Nater, Hank. 1989. Some comments on the phonology of Tahltan. *International Journal of American Linguistics*. 55(1):25-42.
- Palgrave, C. ca 1902. *A grammar and Dictionary of the language spoken by the Tahltans on the Stikine River, British Columbia*. Chicago: University of Chicago.
- Poser, B. 2001. *A sketch of the grammar of the Lheidli dialect of the Carrier language*. Prince George, British Columbia.
- Phone, W., Olson, M., and Martinez, M. 2007. *Dictionary of Jicarilla Apache*. Albuquerque: University of New Mexico Press.
- Ramat, Paolo. 1992. Thoughts on degrammaticalization. *Linguistics*. 30:549-560.
- Randoja, Tiina. 1989. *The phonology and morphology of Halfway River Beaver*. University of Ottawa.
- Rice, Keren D. 1978. *Hare Dictionary*. Ottawa: Northern Social Research Division, Department of Indian and Northern Affairs.
- Rice, K.D. 1993. The structure of the Slave (northern Athabaskan) verb. In *Studies in lexical phonology* (pp. 145-171).
- Rice, Keren D. 1989. *A Grammar of Slave*. Berlin: Mouton.
- Rice, Keren D. 2011. Principles of affix ordering: An overview. *Word Structure*, 4(2), pp.169-200.
- Richardson, Murray. 1968. *Chipewyan Grammar*. Cold Lake: Northern Canada Evangelical Mission.
- Ridley, Ruth. 1983. *Eagle Han Huch'inn Hodok*. Fairbanks: Alaska Native Research Center.

- Rodriguez Bou, J. 1952. Recuento de vocabulario español, vol. 2. Río Piedras: Universidad de Puerto Rico.
- Sapir, Edward. 1914. *Notes on Chasta Costa Phonology and Morphology*. University Museum Anthropological Publications, vol. 11, no. 2. Philadelphia: University of Pennsylvania.
- Saxon, Leslie. 1986. *The syntax of pronouns in Dogrib (Athapaskan): some theoretical consequences*. San Diego: University of California
- Siewierska, A. 2005. *Verbal person marking*.
- Story, G. 1984. *Babine and Carrier Phonology: A Historically Oriented Study*. Arlington, TX: Summer Institute of Linguistics
- Tenenbaum, Joan M. 1977. *Morphology and semantics of the Tanaina verb*. New York: Columbia University.
- Thompson, Chad. 1977. *Koyukon verb prefixes*. University of Alaska.
- Thompson, Chad. 1993. The areal prefix hu in Koyukon Athabaskan. *International Journal of American Linguistics*. 59.315-324.
- Thompson, Chad. 1989. Pronouns and Voice in Koyukon Athapaskan: A Text-Based Study. *International Journal of American Linguistics*. 55.1-24.
- Thompson, S.A. and Hopper, P.J., 2001. argument structure: Evidence from conversation [J]. *Frequency and the emergence of linguistic structure*, 45.
- Tuttle, S., 1994. The peg prefix, the foot and the word minimum: evidence form Salcha Athabaskan. Ms. *University of Washington*.
- Wilbur, T. H. 1977. *The Lautgesetz-controversy: a documentation (1885-1886)*. Amsterdam: John Benjamins.
- Willie, M. 1991. *Navajo pronouns and obviation*.
- Yazzie, E. P. and Speas, M. 2007. *Diné Bizaad Bínáhoo'aah: rediscovering the Navajo language*. Flagstaff: Salina Bookshelf.
- Young, Robert W. 2000. *The Navajo verb system: An overview*. Albuquerque, NM: University of New Mexico Press.

Young, Robert W. and William Morgan, Sr. 1987. *The Navajo Language: A Grammar and Colloquial Dictionary*. Albuquerque: University of New Mexico Press. Revision of Young and Morgan 1984.

Young, Robert W., William Morgan, Sr., and Sally Midgette. 1992. *Analytical Lexicon of Navajo*. Albuquerque: University of New Mexico Press.