In Defense of Tone Reversal: *the*-conjugation in Northeast Dene Languages[1]

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1.0 Introduction

This paper re-visits the issue of tone reversal in Dene languages—that is, the problem of why some Dene languages with tone have the opposite tones of other languages—especially in cases where two or more languages are very closely related and to a large extent mutually intelligible, despite having opposite tones. The languages Dogrib[2], Slave, and Dëne Sųłıné,[3] all spoken in Canada's Northwest Territories, present just such a situation. Through a careful analysis of the prosody and morphophonemics of the conjugation marker *the* in these languages, and both internal and comparative reconstruction, I will demonstrate that the most recent common ancestor of these three languages, which I call Proto Northeast Dene (PNED), was tonal and High-marked, with a mobile pitch accent. It follows that Dogrib, which is presently Low-marked, has undergone tone reversal.

In treating these three languages, Dogrib, Slave, and Dëne Sųłıné, as a group, to the exclusion of, for example, Sekani and Beaver, I am following earlier work by Howren (1971), Ackroyd (1976), and Marinakis (2004). While this classification may not be universally accepted (cf. Mithun 1999, Hargus & Tuttle 2004), I believe that the existence of a mobile pitch accent in these languages, to be described in §6.0, is itself an important isogloss which supports treating these languages as their own subgroup.

1.1 What is "tone reversal"?

Some Dene languages with tone have the opposite tones of other Dene languages. For example, the Yellowknives Dene speak two closely related Dene languages, Weledeh (Dogrib) and Taltsą̀ot'ıné (the dialect of Dëne Sųłıné spoken in Yellowknife and Łútsël k'é). These languages have opposite tones of each other, as illustrated in (1).

[1] Following the decision of the 2012 Athabaskan Languages Conference to officially change its name to the Dene Languages Conference, in this paper I have substituted the word "Dene" wherever "Athabaskan" would normally occur. Thus *Proto Dene = Proto Athabaskan, Proto Northeast Dene = Proto Northeast Athabaskan,* etc. No difference in meaning is intended.

[2] I will use the term Dogrib rather than *Tłı̨chǫ Yatìı* throughout this paper, as many Yellowknives Dene regard the term *Tłı̨chǫ* as referring only to those Dogrib-speaking communities belonging to Treaty 11, i.e. to the exclusion of Dettah and Ndılǫ (Treaty 8). *Weledeh* refers to the dialect of Dogrib spoken in Dettah and Ndılǫ, which some speakers regard as a separate language.

[3] The name of this language is commonly spelled *Dëne Sųłıné*, with a LLH tone pattern (e.g. Cook 2004, Gessner 2005). However, in my experience in the Northwest Territories, native speakers almost always pronounce a High tone on the first syllable. Thus the Chipewyan language program in Fort Resolution uses the spelling *Dëne Súłın Yatı* [sic], while the spelling *Denesúlınë* [sic] is used in *Weledeh Yellowknives Dene: a history* (Weledeh Yellowknives Dene 1997). This tone pattern is likely historically older, cf. Dogrib *dǫ̀ sǫ̀łı̨̀* 'aboriginal person'. However, these spelling differences may also reflect dialect variation.

(1) Examples of words with opposite tones

Weledeh (Dogrib)	**Taltsą́ot'ıné (Dëne Sųłıné)**	**Gloss**	
tsà	tsá	'beaver'	
setà	setá	'my father'	
ekwǫ̀	etthén	'caribou'	
xàtł'ì	xátł'ír	'it falls out'	(IMP)
whìke	thíke	'we (2) sit'	(IMP)
shègezhe	shéhelyı	'they eat'	(IMP)
eghàlaehda	eghálaasna	'I work'	(IMP)

Dogrib is said to be a *Low-marked* language, while Dëne Sųłıné is a *High-marked* language. Thus, words in one language have opposite tones of their cognate words in the other language. Furthermore, it is clear that the two languages are very closely related: in some cases, pairs of cognate words are identical apart from their tones, which suggests that the languages share a fairly recent common ancestor. How did this situation come about? Three previous explanations have been proposed, which will be outlined in the next section.

1.2 Previous views on tones and tone reversal

Previous proposals in the literature regarding the development of tone in Dene languages, and in particular with reference to the Northeast Dene languages, fall into three main groups. These are reviewed briefly below, roughly in chronological order.

1.2.1 Hypothesis A: Proto-Dene as Low-marked

The first proposal regarding Dene (Athabaskan) tone was by Edward Sapir (1915, 1922, 1936; see also Krauss 2005 for comment). Based on his statements, Sapir seems to have believed that Proto Dene was tonal and Low-marked, that is, it had the same tones as modern Dogrib, while High-marked languages such as Dëne Sųłıné had reversed their tones: "So fundamental is tone to Sarcee morphology that it is well nigh inconceivable that it should be entirely absent in any other Athabaskan dialect" (Sapir 1922: 391). Under this view, Proto Dene (PD) **setà* > Dogrib *setà* 'my father', with no change, whereas PD **setà* > Dëne Sųłıné *setá*, with tone reversal. There are a number of facts which this view fails to explain, including why there are Dene languages without contrastive tone, but with syllable-final glottals, e.g. Ahtna, Tolowa and Hupa. For example, the Ahtna word for 'my father' is *sta'* (Kari 1990).

1.2.2 Hypothesis B: The Constriction Hypothesis

Under the Constriction Hypothesis (Leer 1999, 2001; Krauss 2005), those vowels which exhibit High tone in the High-marked languages, and the vowels with Low tone in the Low-marked languages, both come directly from Proto Dene vowels with glottal constriction (itself the suprasegmentalization of an earlier glottal stop). The development of these vowels in High-marked, Low-marked, and non-tonal Dene languages is illustrated in (2), again using the example 'my father'.

(2) Development of constricted vowels, under Constriction Hypothesis

PD **seta'* > Dogrib *setà*	(glottal stop becomes Low tone)
PD **seta'* > Dëne Sųłınné *setá*	(glottal stop becomes High tone)
PD **seta'* > Ahtna *sta'*	(glottal stop is retained)

However, even if Proto Dene had constricted vowels rather than contrastive tone, what is the evidence that Low tones in Dogrib come *directly* from PD constricted vowels, rather than via an intermediate High-marked stage? Three arguments have been made: a simplicity argument (Krauss 2005), a typological argument against flip-flop rules (Leer 1999), and, most recently, phonetic evidence of the effect of laryngealized coda consonants on preceding vowel nuclei (Hargus 2007, 2011)—these are cited below.

> "One obvious possible solution to the problem of conflicting tones in Sarcee-Kutchin-Navajo (S-K-N) and Chipewyan-Hare (C-H) is the admission of a tonal 'flip-flop' rule [α high] > [-α high], i.e. low becomes high while high becomes low, in one of the two tone-language groups. I obviously did not in 1964 and do not in 1979 favor this type of explanation…. For one thing, ***true 'flip-flop' rules are theoretically problematical,*** but for another, a far better explanation is available, first suggested by Leer (p.c.). The [±glottal] feature can be easily suprasegmentalized in a form which is still glottal but not tonal, and which then in some languages (C-H) becomes high tone, and in others low (S-K-N)….***This theory seems simpler than any of the alternatives proposed,*** e.g. PA tone contours becoming registers (levels), or a PA register system giving rise to glottalization, and in some languages a 'flip-flop'" (Krauss 2005: 66-67; emphasis added—A.J.).

However, simplicity arguments and formal arguments should not carry the same weight as internal reconstruction—that is, reconstruction based on morphophonological patterns in verb paradigms. The simpler of two explanations is to be preferred only if both explanations account for the same facts. As I will show in this paper, the morphophonemic properties of the conjugation marker *the* in the Northeast Dene languages are one important set of facts which the Constriction Hypothesis cannot explain. Another argument against tone reversal is a typological argument, given by Leer:

> "One [hypothesis] would be a "tone flip-flop" type of hypothesis, whereby high tone could somehow have traded places with low tone. But if spontaneous tone reversal is a natural occurrence, we should have some evidence of it by now. Surely there are enough speakers of tone langauges in the world that if spontaneous tone reversal did occur, say as the result of some kind of speech disorder, perhaps akin to dyslexia or a propensity for metathesis, linguists would have by now have observed instances of this happening sporadically among at least a few individuals in the real world" (Leer 1999: 61).

Yet I have observed precisely this in my fieldwork with speakers of Weledeh. Although we expect Weledeh to be Low-marked, as a dialect of Dogrib, I have worked with two Weledeh speakers who regularly reverse tones when speaking. Thus 'you work' (IMP) can be pronounced *eghálaɻda* or *eghàlaɻda,* 'fox', *nǫgée* or *nǫgèe*, and 'tent' *tł'ombàa* or *tł'ombáa*.[4] When I asked a third speaker about this phenomenon, she said, "the elders do that all the time." While this variation is likely an effect of bilingualism, i.e. all of the speakers in question either understand or are fluent in the High-marked Taltsą́ot'ınné, any feature which can vary synchronically, can also, in principle, be the target of sound change. Furthermore, in Bantu linguistics, it is well-

[4] Of these, only the former of each pair is found in the Dogrib dictionary (Saxon & Siemens 1996). However, the High-marked variant *nǫ̀gé* 'fox' is cited by Krauss (2005: 103).

accepted that there are "reversive" languages, i.e. languages which have reversed the lexical tones of Proto-Bantu (Hyman 2001). These include Ruwund (Nash 1994), Tembo (Kaji 1996), Ciluba (van Spaandonck 1971), Kanyok (Stappers 1986), Fuliiru (van Otterloo 2011), Shi (Polak-Bynon 1975), Kete (Kamba 1994), and several dialects of Luyia: Bukusu (Austen 1974), Marachi and Wanga (Marlo & Odden 2011, Marlo 2012). Thus, tone reversal in Dene languages cannot be ruled out on typological grounds.

Finally, Sharon Hargus has recently provided phonetic evidence from within the Dene language family that, for those languages which still preserve Proto-Dene syllable-final glottal consonants, these consonants condition higher F0 for some speakers ("pitch raisers") and lower pitch for other speakers ("pitch lowerers")—this has been observed in both Witsuwit'en (Hargus 2007) and Deg Xinag (Hargus 2011).

> Like the Athabaskan family as a whole, final glottalic segments have both pitch raising and pitch lowering effects in Witsuwit'en, and indivudual speakers, while they are characterized here as pitch raisers or lowerers on the basis of their means, actually exhibit some variation in this respect (Hargus 2007: 132).

Given the existence of pitch variation within a single language, it would seem possible that such variation might have existed between two closely related languages, at the time when tone was phonologized. While I agree this is a possible scenario, the issue concerns the relative chronology of sound changes. In Dogrib, did Low tone develop directly from glottal constriction, or via some intermediate stage? If tone were a static and inert phonological feature—which did not affect, and was not affected by, the complex morphophonemic rules of Dene languages—then we should certainly be inclined to adopt a strong version of the Constriction Hypothesis, on account of its simplicity. In fact, however, tone in the Northeast Dene languages is intimately connected with the morphophonemics of these languages, and interacts both with other prosodic features (stress and syllable weight) as well as segmental processes. Dogrib shares at least two morphophonological patterns with its close relatives, Slave and Dëne Sųłıné, which, from the standpoint of contemporary phonological theory, would be considered natural in a High-marked system, but not in a Low-marked system—what I call *empty morph insertion* (§5.0) and *pitch accent retraction* (§6.0). Until an account of these processes can be provided under the constriction hypothesis, one cannot dismiss the possibility of tone reversal.

1.2.3 Hypothesis C: Constriction followed by Tone Reversal

Finally, the view which I will advocate in this paper is essentially the same as in Kingston (2005), namely that Proto Dene constricted vowels first evolved into High tone in all of the Northeast Dene languages (Dëne Sųłıné, Dogrib, and Slave), and the tones were later reversed in Dogrib.

> "…***high-marked languages must have recently turned into low-marked languages and vice versa***….This proposal entails that the high tones in Tanacross and Northern Tutchone on the Cordillera's low-marked west side are recent innovations, compared to the corresponding low tones in the other members of the Tanana and Tutchone subgroups, as is the low tone in Dogrib on the high-marked east side, compared to the corresponding high tones in the other members of the Mackenzie River subgroup. ***Therefore, tones have reversed value recently in both directions***" (Kingston 2005: 166-167—emphasis added A.J.).

The development of tones, in Dëne Sųłıné and Dogrib, under this hypothesis, is illustrated in (3).

(3) Development of constricted vowels, under Hypothesis C
PD **seta'* > PNED *setá* > Dëne Sųłıné *setá* (glottal stop becomes High tone)
PD **seta'* > PNED *setá* > Dogrib *setà* (glottal stop becomes High tone, then reverses)

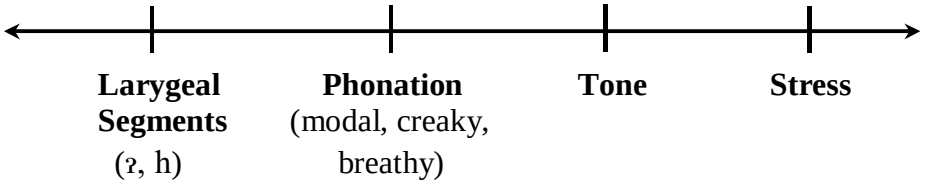
That is, first the Proto-Dene syllable-final glottal constriction evolved into High tone in Proto Northeast Dene (PNED), the most recent common ancestor of Dogrib, Slave, and Dëne Sųłıné, and then later reversed in Dogrib. At this point, a question arises concerning the potential role of redundant features in a hypothetical tone-reversal scenario. For example, in Slave, words with High tone word-finally are realized phonetically with a glottal stop, which is inserted automatically, e.g. /ya/ → [ya] 'sky', vs. /yá/ → [yáʔ] 'louse' "This glottal stop is not indicated in the orthography since it is compoletely predictable (Rice 1989: 44). Kingston, in fact, suggests that some tone reversals may have occurred from "persistent glottalic articulations," i.e. while historical glottal stops were still present, although he notes some problems with this scenario (2005: 168-170). I have no objection in principle to redundant phonological features, particularly if these are inserted postlexically, as part of the language's phonetic implementation (e.g. Rice 1994). In the case of Proto Northeast Dene, however, according to the present proposal, it is necessary that the feature which is lexically represented and phonologically active be tone, not constriction or the presence of a glottal stop, and that glottalic features, if present at all, be predictable and synchronically derived from tone, and not the other way around.

2.0 Overview of proposal

I claim that, through a careful analysis of relevant morphophonemic data from Dogrib, Slave, and Dëne Sųłıné, it can be demonstrated that the most recent common ancestor of all three languages, Proto Northeast Dene, was tonal and High-marked, with a mobile pitch accent. Note that this claim in no way refers to Proto Dene (Proto-Athabaskan)—I do not dispute that Proto Dene possessed constricted vowels, rather than marked High tone. The Low tones of contemporary Dogrib, however, do not derive directly from these Proto Dene constricted vowels, but rather from the marked High tones of Proto Northeast Dene. In other words, PD constricted vowels first developed into High tone in PNED, which remained High in Dëne Sųłıné and Slave, but later reversed in Dogrib. This tone reversal in Dogrib occurred fairly recently—in fact, it may be possible to give an approximate date for this sound change, as sometime after 1823—see §5.3.

In addition to morphophonemic evidence, the argument also rests on certain assumptions regarding phonological rules (or constraints) and phonetic naturalness. Leer (1999), following Matisoff (1974), notes that there is a continuum between phonation and tone, with no strict dividing lines. I suggest that this continuum may be extended further—that is, beyond phonation to laryngeal segments (h and ʔ) on one end, and beyond tone to stress on the other. This is graphically illustrated in (4).

(4) Continuum of Prosodic Features.



Just as there is no sharp dividing line between phonation and tone, there is also no sharp dividing line between tone languages and stress languages, with so-called "pitch accent" systems combining elements of tone and stress systems (Hyman 2001, 2009). But while there are no sharp dividing lines, languages *do* exhibit different types phonological patterns based on the point on the continuum at which they lie. In this context, my use of the term "pitch accent" is meant to suggest that the Northeast Dene languages are a group of languages with well-developed metrical stress systems (§3.0), in which High tone is restricted in its distribution in relation to the metrical stress grid, and in which High tone itself exhibits stress-like properties.

The evidence for this view largely centers around the phenomenon of *stress attraction*. By stress attraction, I mean any process by which High tone attracts stress, or, conversely, stress attracts High tone (Tuttle 1998, Gordon 1999, DeLacy 2002, Hargus 2005). Phonation does not attract stress, nor does Low tone, even in Low-marked Dene languages such as Sekani (Hargus 2005) or Dogrib (Jaker 2012). High pitch accent in Northeast Dene languages, insofar as it is mobile, seems to align itself with an alternating stress pattern. A schematic illustration of this type of process is given in (5a).

(5a) Tone mobility conditioned by stress
/(ta.tá)(taa)/ → (tá.ta)(taa)

In (5a), the input contains a trochaic foot (stressed on the first syllable, which is indicated by underlining), followed by a monosyllabic, stressed, heavy syllable, which constitutes a foot by itself. In the input, the foot (ta.tá) consists of a stressed syllable with Low tone, followed by an unstressed syllable with High tone, a kind of double-mismatch, under the assumption that High tone and stress naturally go together. This is repaired in the output by keeping the stress in the same place, but moving the tone: (tá.ta) has a stressed syllable with High tone, followed by an unstressed syllable with Low tone. This is precisely the analysis which I reconstruct for PNED, and which gave rise to the mobile pitch accent in Slave as described by Rice (1989). However, in Slave, pitch accent mobility has been obscured by a number of later sound changes, and is no longer synchronically productive in the modern language—a complete exposition is given in §6.

Another type of tone-stress interaction which occurs in NE Dene languages involves the outright *deletion* of High tone. This occurs, generally, when the *the*-conjugation marker is preceded by a 'non-local subject', i.e. the prefixes **qe* or **ts'e*. An example is the Taltsą́ot'ıné form *heke* 'they (2) sit'. Since this is a neuter verb which uses *the* in the imperfective, we would expect the underlying form to be /he-the-ke/, which would yield *héke* or *héhke*, by otherwise independently motivated rules. Instead, the High tone on *he* is deleted. This is illustrated in (5b).

(5b) Tone deletion in unstressed syllables
/(hé.ke)/ → (he.ke)

In (5b), the input foot is an iamb, which consists of an unstressed syllable with High tone, followed by a stressed syllable with Low tone—again, a sort of double-mismatch. In the output, this mismatch is corrected, by deleting the High tone on the first syllable (although the second syllable, *ke*, does not acquire High tone). The reason for this is that unstressed vowels do not make good tone-bearing units for High tone—High tone prefers to associate to a stressed vowel. The input in (5b) is especially bad because it occurs right before a stressed syllable, within the same foot. The foot (hé.ke) exhibits conflicting prominences: tonal prominence on the first syllable, and stress-prominence on the second syllable, a sort of ambiguous prominence within the foot. Deleting the High tone corrects this, which creates an unambiguous (weak-strong) prominence pattern.

An even more striking case is when an entire syllable is inserted to accommodate the desired tone and stress pattern, when the number of syllables in the input is insufficient. I call this process *empty morph insertion*, which will be described in §5. Briefly, in cases similar to those in (5b), where a tone is present underlyingly from the prefix *the*, but it is preceded by *he* (<**qe*) or *ts'e*, which cannot function as tone-bearing syllables, a semantically empty prefix *de*, which is not part of the verb theme, is inserted. This is illustrated with the form *heréłchëth* 'they tied (it) up'.

(5c) Empty morph insertion
/he-the-ł-chëth/ → (he.réł)(chëth)

That the syllable *re* is not part of the verb theme can be seen by comparing related forms: *thełchëth* 'I tied up,' *thɣłchëth* 'you tied up,' *thełchëth* 'he/she tied up', *thílchëth* 'we tied up,' and *thułchëth* 'you (pl) tied up.' This pattern serves to resolve the conflicting demands made by the prefixes in the input: *the* brings with it a floating tone which wants to dock to its left, while *he* does not want to function as a tone bearing unit. Therefore, *de* (pronounced *re*) is inserted to support the tone.

All of the above examples may be characterized, broadly, as exhibiting an *alternating* pattern between prominent and non-prominent syllables. Alternation, of the form (weak-strong)(weak-strong), is a property most often associated with stress (Hayes 1995). Tone itself does not generally alternate or group itself into feet (on the contrary, tones can spread over long distances), although tones can follow an alternating pattern insofar as High tones are aligned with stresses. However, I am not aware of any reported cases of alternating phonation systems, such as (breathy-creaky)(breathy-creaky), nor of stress attracting creaky voice, for example. Therefore, we may use these generalizations as a diagnostic: if the reflex of Proto Dene glottal constriction has moved away from its expected position, to align itself with an alternating stress pattern, then it was most likely realized as High tone at the time the rule applied. In other words, I assume that there is a different set of rules which are phonetically natural for constricted vowels as opposed to vowels bearing High tone, and phonological rules are always phonetically natural at the time they apply.

3.0 Theoretical background

This section explains the background assumptions which will be used in §4-6 to analyze the morphophonemics of Northeast Dene languages, and to argue for tone reversal. The approach used here represents a synthesis of two traditions within phonological theory: the framework of *Lexical Phonology* (e.g. Kiparsky 1982) and the theory of *metrical phonology* (e.g. Hayes 1995). Both sets of ideas have been previously applied to phonological problems within Dene languages. Thus, a Lexical Phonology framework is assumed for Slave by Rice (1982, 1989) and for Sekani (1988) by Hargus, while a metrical account of Slave is proposed by Rice (1990). The remainder of this section is organized as follows. In §3.1 I provide background on the Lexical Phonology framework, and how it has been applied to Dene languages. In §3.2, I provide background on metrical phonology, in particular the metrical analysis of Weledeh (Dogrib) presented in Jaker (2012), as well as the sources of evidence used to determine the location of stress in Dene languages. Finally, in §3.3 I propose an autosegmental representation of the conjugation marker *the* in Proto Northeast Dene, which will form the basis of the prosodic analyses in §4-6 of this paper.

3.1 Lexical Phonology and the Dene verb

A Lexical Phonology approach to Dene verbs has been used for a number of languages, including Sekani (Hargus 1988), Slave (Rice 1982, 1989), and most recently Dogrib (Jaker 2012). This approach is itself a synthesis of two originally separate sets of ideas: the verbal *template*, from the Athabaskanist tradition, and *level ordering*, from the generative tradition. Loosely speaking, the traditional distinction between *conjunct* and *disjunct* prefixes (Li 1946) corresponds to the distinction between *Stem Level* and *Word Level* in Lexical Phonology (Kiparsky 1982, Mohanan 1986).

3.1.1 The Dene verb template, conjunct and disjunct prefixes

It is traditionally assumed that the prefixes of the Dene verb are organized into a series of positions called a *template* (Hoijer 1945, Kari 1989). Specifically, I assume the template model in (6), originally proposed for Slave (Rice 1989), for all three of the NE Dene languages.

(6) Template model of NE Dene verb structure
preverb_1 – distributive_2 – iterative_3 – incorporate_4 – number_5 – object_6 – deictic subject_7 – qualifier_8 – aspect_9 – conjugation_{10} – mode_{11} – subject_{12} – classifier_{13} – stem

It was noticed early on, however, that these template positions within the verb also seem to have some sort of internal constituency. To describe this constituency, the terms *conjunctive* and *disjunctive* were first used by Fang-Kuei Li (1946) in his grammatical sketch of Chipewyan:

> "There are two classes of prefixes, the conjunctive and the disjunctive. The conjunctive prefixes occur immediately before the stem and after the pronominal objective prefixes, and a conjunct form of the second person (singular) subjective prefix is used after them. There are also frequent contractions of these prefixes when they come together. The disjunctive prefixes occur before the pronominal objects and are less connected with the stem, they require a disjunct form of the second person subjective and do not as a rule contract with the conjunctive prefixes" (Li 1946: 409).

That is, Li notes that there are certain phonological processes which affect only conjunct prefixes, or which happen only when a conjunct prefix is preceded by another conjunct prefix. In particular, Li is referring to nasalization with shortening and nasal raising in 2nd person

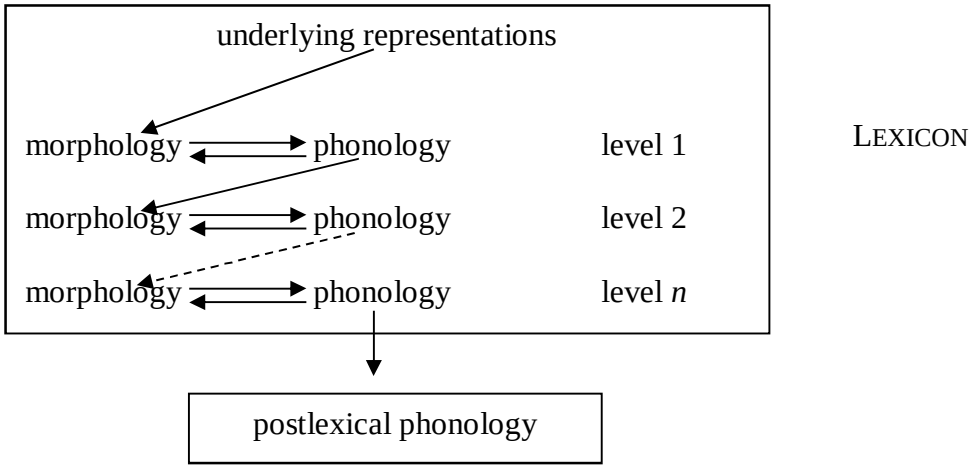
singular forms, which occurs when the 2nd person singular subject prefix *ne* is preceded by another conjunct prefix (/ghe-ne/ → *ghį*) but not a disjunct prefix (/ná-ne/ → *nane*). Interestingly, Li states that the third person pronominal subjects (**qe*, **ts'e*) and pronominal objects are "in between" the conjunct and disjunct prefixes (Li 1946: 410)—these correspond to positions 6 and 7 of the template in (6). Although Li does not provide any arguments as to why these prefixes should be distinguished from other conjunct prefixes, this distinction has been supported by later work (Hargus 1988, Rice 1989, 2000, Jaker 2012).

In the Lexical Phonology model to be described below, I refer to positions 8-12 of the verbal template as the *inner conjunct prefixes*, which are added at the *Inner Stem Level*. Positions 6 and 7 (**qe* and **ts'e*, as well as object agreement) are the *outer conjunct prefixes*, which are added at the *Outer Stem Level*. Finally positions 1-5 are the *disjunct prefixes*, added at the *Word Level*. These levels will be explained in greater detail below.

3.1.2 The theory of Lexical Phonology

Lexical Phonology, first developed in the early 1980's (Kiparsky 1982, 1985, Mohanan 1986) is a theory of phonology and the phonology-morphology interface. In the Lexical Phonology model, phonology and morphology are interleaved: when an affix is added to a root (or stem), it is subject to some set of phonological rules; the output of these rules is then sent back to the morphology, where more affixes are added, and these comewhat larger constituents undergo phonological rules again, and so on. The concept of *level ordering* refers to the observation that affixes may belong to one of several different groups, each with its own properties, and which undergo different set of phonological rules. This is illustrated schematically in (7).

(7) Level ordering within the lexicon (based on Kaisse & Shaw 1985: 9)



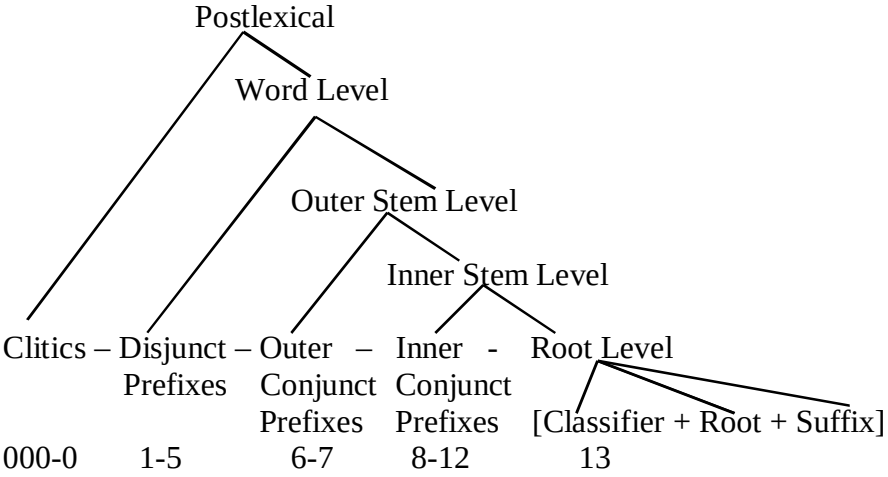
As Kaisse & Shaw explain, "Items from the lexicon are subjected to certain morphological processes and phonological rules. They are then resubmitted to the next stratum of morphological rules. In each stratum, phonological rules are ordered with respect to each other, though morphological rules presumably are not" (1985: 9). From the point of view of Dene languages, the model in (7) may be understood as follows: one starts with the stem (or root), one first adds the inner conjunct prefixes, which undergo certain phonological rules (e.g. /ghe-ne/ → ghį), next one adds the outer conjunct prefixes (**qe*, **ts'e*), which also trigger certain

rules, and finally one adds the disjunct prefixes. Thus, the verb is built in stages, inside-out, from right to left, with phonological rules applying at each stage. Putting this all together, we get what is called the "Stem-Core" model of Dene verb structure (Halpern 1992), described in §3.1.2.

3.1.2 The Stem-Core model

The term "Stem-Core model" was introduced by Halpern (1992) to describe Lexical Phonology approaches to Dene verb structure (as described above), and to distinguish them from the "Compounding Model" (see also McDonough 1990). Under the Stem-Core model, the Dene verb is built inside-out, from right to left, so that the structure of the whole word has the appearance of a right-branching tree, as in (8). Template position numbers (Rice 1989) are given under each group of prefixes.

(8) Stem-core model (complete)



From the point of view of metrical phonology—that is, the view that the morphophonemic patterns of Dene languages are largely driven by stress—it is important to note that stress assignment rules can be different at different levels, and stress can move around in the course of the derivation (just as, in some cases, it moved around historically). For example, it is possible for main stress to fall on the stem at the Inner Stem Level, but when the prefix *he* or *ge* is added (3rd person plural), stress shifts onto the penult. This same phenomenon occurs in English with suffixes such as *–ity*, e.g. *módern ~ modérnity*, *néutral ~ neutrálity*, etc. This fact will become important in evaluating evidence for stress, to be discussed in §3.2.

3.2 Metrical phonology and the morphophonemics of Dene verbs

This section provides an overview to the prosodic approach to Dene morphophonemics, that is, an approach which posits prosodic constituents, i.e. feet, as the major driver of morphophonemic alternations in these languages. §3.2.1 Provides explains the motivation for adopting a prosodic approach, and the types of evidence used in positing feet. §3.2.2 Provides some background on prosodic typology, i.e. what types of feet exist, and how they behave. Finally, §3.2.3 situates metrical phonology in the context of the Lexical Phonology account of Dene languages, discussed in §3.1.

3.2.1 Why prosodic structure?

Dene languages are widely regarded as highly complex, particularly in their verbs and verb morphology. At times, the morphophonology of verbs in Dene languages seems so complex and irregular that it becomes questionable whether it is appropriate to speak of a phonological *system* at all, or whether it would be more efficient to simply compile a list of surface forms for each verb. The problem centers largely on the role of *morphologically conditioned phonology*—that is, ostensibly phonological rules (delete a consonant, nasalize a vowel) which are conditioned by morphological categories (perfective, 3rd person, semelfactive, etc.). The traditional style of grammatical description for Dene languages, as exemplified in (9), suggests that morphological conditioning is quite pervasive.

> (9a) "Further checking is required on the *wh* perfectives, especially the third plural and first person plural/indefinite forms. The low tone which results from deletion of the perfective prefix at a conjunct boundary does not always appear. Also, where more than one prefix precedes the perfective marker, low tone or stress sometimes appears on the second syllable to the left of the mode in non-third person forms" (Ackroyd 1982: 116).

> (9b) "When the verb has the Ø or *h-* classifier and is in the perfective mode, the perfective is marked by nasalization and raising in the third person with conjugation markers other than *w-* (except when *í-* is present…). With the *w*-conjugation marker, nasalization and raising do not occur" (Rice 1989: 475).

> (9c) "In short, the conjunct form of *the-* is either zero as in the forms with a local subject or *H(h)-* as in the forms with a non-local subject, where *h-* (which derives from *the-*) is subject to deletion by another constraint, i.e. *CCC (prohibition of a tri-consonantal sequence)" (Cook 2004: 159).

The phonological processes such as those described in (9) often seem phonetically unnatural—why, for example, should deletion of *wh* result in a Low tone which floats two syllables leftwards, as in (9a)? Or why should the prefix *the* delete only in the 1st and 2nd person, but not in the 3rd person, as in (9c)? Furthermore, such statements, if taken literally, entail a serious theoretical problem: if we allow any phonological process to be triggered, or blocked, in almost any morphological environment, then we will have abandoned, in effect, the structuralist view of phonology as a coherent system—that is, we should not expect phonological rules to apply in any general way throughout the language.

A way out of this problem was first suggested by Rice (1990), who used foot structure to account for a variety of phonological patterns in the Bearlake and Hare dialects of Slave, including vowel epenthesis, vowel syncope, vowel assimilation, and tone placement.

> "…an understanding of this structure, the prosodic structure, will provide fresh insight into the basic operation of Athapaskan languages and will ultimately yield an understanding of Athapaskan languages that makes them look less bizarre and more like better understood languages" (Rice 1990: 243).

In my dissertation, I extended this approach, to claim that there is in fact no such thing as morphologically conditioned phonology in Dene languages, i.e. morphosyntactic features which influence phonological rules in a direct way. While morphological factors may determine whether a particular affix is present or absent from the underlying representation in a certain form, the way an affix behaves is determined entirely by the phonology, which is blind to

categories such as "1st person" and "perfective" (Jaker 2012: 3-4). To better understand this claim, it is necessary to distinguish three types of situations that arise in describing the phonology and morphology of Dene verbs.

(10) Three ways to categorize morphophonological patterns in Dene verb paradigms
Type 1: *Morphologically motivated selection and blocking.* These are cases where two affixes are required to occur together, or, conversely, are prohibited from occurring together in the same form, due to their morphosyntactic or semantic properties.
Type 2: *Historical phonological conditioning.* These are cases where some pattern has no morphosyntactic or semantic motivation, but was phonologically conditioned in an earlier stage of the language. This phonological conditioning is no longer derivable in the modern language, however, and the process must be treated as a morphological irregularity—that is, a special portmanteau morpheme, or an arbitrary (i.e. semantically unmotivated) selection or blocking restriction.
Type 3: *Synchronic phonological conditioning.* In these cases, the pattern is in fact fully regular in the synchronic grammar, if the proper phonological (i.e. prosodic) environment can be defined.

Examples Type 1 include the behavior of the perfective prefix *ne* or *ñ*, which does not occur in *d*- or *l*-classifier verbs—this is because the latter are middle voice (Rice 2000: 142-168) and the combination of perfectivity and middle voice is marked cross-linguistically (Hopper & Thompson 1980). Another case is the pattern by which certain preverbs select certain conjugation markers (Rice 2000: 262-268)—for example, in Dogrib, *k'e* ('repetitive') selects *ghe*-conjugation, *nà* ('continuative') selects *whe*-conjugation, and *nì* ('terminative') selects *ne*-conjuation (Ackroyd 1982: 145-149). These selectional restrictions have no phonological motivation, and there is no reason to believe they ever did historically. An example of Type 2 is the prefix *ɪ*, the special allomorph of the 1st person singular perfective which occurs in Ø- and *ɬ*-classifier verbs, in a great many Dene languages. It is generally agreed that this prefix arose historically from some combination of the perfective marker with neighboring prefixes, by a regular phonological process, though accounts differ somewhat (e.g. Krauss 1976, Krauss & Leer 1981: 40-46, Rice 1989: 517). However, it is unlikely that this *ɪ* should be derived synchronically from the perfective prefix *ne* or *ñ* in any of the modern languages—it is best treated as a special portmanteau morpheme which occurs in a particular morphological environment. Finally, examples of Type 3 include the numerous cases of stress conditioned vowel syncope and vowel lengthening that occur in Weledeh. For example /ge-ghe-d-shɻ/ → (ge.aa)jɻ 'they sang' (PERF), where *ghe* → *ghaa* → *aa* in strong position of an iambic foot, or /nà-ge-whe-l-zè/ → nà(geh)zè, where *whe* → *wh* → *h*, in weak position of a trochaic foot.

Given the typology in (10), in the remainder of this paper, I make the following methodological assumption: if some pattern found in verb paradigms has no discernible semantic or morphosyntactic motivation (as in Type 1), then it was phonologically derived at some point historically. That is, statements such as in (9), though observationally adequate, do not explain the patterns they describe, since they are unnatural and unmotivated from both a semantic and phonological point of view. That being the case, if some pattern does not belong to Type 1, the question often arises whether it ought to be assigned to Type 2 or Type 3—that is, is the pattern still part of the synchronic phonology of the language, or has it become so opaque that it is now best regarded as a morphological irregularity? Patterns associated with *the*-

conjugation in NE Dene languages are often ambiguous in this regard, and the answer depends to a large extent on what degree of abstractness one is willing to allow in synchronic phonological descriptions (Kiparsky 1968, 1973, 2000, Hyman 1972). This question will therefore be addressed on a case-by-case basis (§4-6).

Finally, assuming some observed pattern is phonologically motivated (i.e. Type 2 or 3 above), what is the evidence that stress, i.e. metrical structure, is involved? In the history of phonology, there have been two major types of evidence used to diagnose stress. One is distributional: in Prague School phonology, stress is a *position*, whose main role is to license more contrast: phonological oppositions which exist in stressed syllables are often neutralized in unstressed syllables (Trubetzkoy 1957: 255-258). Under this view, stress is to be determined on a language-particular basis, based on the phonological processes which are conditioned, or blocked, in stressed or unstressed position. More recently, it has become customary to identify stress directly with its phonetic correlates such as greater intensity, duration and F0—see for example Tuttle (1998) on Tanana and Hargus (2005) on Sekani and Witsuwit'en. In this paper, I will base my arguments for prosodic structure almost entirely on distributional criteria, mainly because, for most of the dialects to be surveyed, instrumental data on stress are not currently available. Furthermore, even impressionistic descriptions of stress in NE Dene languages are relatively rare. Thus, although Rice (1990) describes the stress pattern of the Bearlake and Hare dialects of Slave (the former being iambic, the latter trochaic), and a detailed description of the surface stress pattern of Weledeh is provided in Jaker (2012: 386-391), Ackroyd (1982) does not mark stress for the Behchokǫ̀ dialect of Dogrib, nor does Cook (2004) anywhere mark surface stress in Dëne Sųłıné. Therefore, for historical-comparative studies such as in the present paper, stress must be inferred from morphophonemics, until instrumental data from a wider range of dialects become available.

3.2.2 Background on metrical phonology

Metrical phonology is the branch of phonology that studies stress and prosodic constituency (Hayes 1995). It is generally agreed that groups of stressed and unstressed syllables are grouped together into units called *feet*. The two main types of feet are the *iamb* and the *trochee*. The definition of iamb and trochee in modern metrical phonology is somewhat different from that found in classical metrics (where they are defined in terms of quantity). In metrical phonology, feet are defined in terms of *stress*. Thus, any group of syllables with initial stress is a trochee, and any group with final stress ia an iamb, by definition. The most well-formed, i.e. 'canonical' feet, are illustrated in (11). Stress is indicated here by underlining, except in monosyllabic feet, where the underlining is omitted.

(11) Basic foot typology
a. Iambic feet: (ta.ta) *or* (ta.taa) *or* (taa)
b. Trochaic feet: (ta.ta) *or* (taa)

The feet in (11) represent the so-called 'canonical' feet in iambic systems (11a) and moraic trochee systems (11b), that is, the most well-formed feet that are allowed in most or all such systems. Which other types of feet if any should be allowed, both cross-linguistically and within particular languages, is a point of debate within metrical phonology (Hyde 1999, Mellander 2003). However, note that feet are defined as iambs or trochees strictly in terms of stress. Thus, a foot such as (ta.taa), is still a trochee, by definition, because it has initial stress,

whereas (taa.ta) is an iamb, by definition, by virtue of its final stress, even though their weight pattern does not match the stress pattern. This differs, again, from classical metrics, where feet are defined quantitatively, and the same feet would be defined as an iamb and a trochee, respectively.

Next we will consider certain phonological processes that occur within feet. These processes are so common cross-linguistically, in fact, that they can be used as diagnostics: if a certain phonological process has applied, it is evidence that a certain type of foot was present.

(12a) Processes affecting iambic feet

Input		**Output**	**Name of process**
(ta.ta)	→	(ta.taa)	iambic lengthening
(ta.taa)	→	(taa)	iambic syncope

(12b) Processes affecting trochaic feet

Input		**Output**	**Name of process**
(ta.taa)	→	(ta.ta)	shortening ("iambic shortening")
(ta.ta)	→	(tat)	trochaic syncope

All of the processes in (12) are attested in the NE Dene languages. For example, iambic lengthening is the source of the long *aa* vowel that occurs in *ghe*-conjugation verbs in Weledeh.e.g /ge-ghe-jį/ → (ge.ghe)jį → (ge.ghaa)jį → (ge.aa)jį 'they sang' (PERF), or /ge-ghe-dǫ/ → (ge.ghe)dǫ → (ge.ghaa)dǫ → (ge.aa)dǫ 'they drank' (PERF). It has been claimed that lengthening of this type occurs only in iambic feet (Hayes 1995, Kager 1993), although this claim has been disputed (Mellander 2003). This is because of the *Iambic/Trochaic Law* (Hayes 1995: 80, Kager 1993: 382). Therefore, cases of vowel lengthening may taken as evidence of the presence of an iambic foot: the lengthened vowel must be in the strong branch of an iambic foot, which also includes the syllable to its immediate left. Syncope processes occur in both iambic and trochaic systems, though under somewhat different circumstances. I have claimed elsewhere that, in iambic systems, syncope occurs in the weak branch only if the strong branch is already heavy (Jaker 2012: 174-177). This type of syncope occurs, at a certain derivational stage, in the 2nd person singular perfective forms of Ø/*h*-classifier verbs in Weledeh: (ghe.ne)(ne.tè) → (ghe.nee)(ne.tè) → (ghe.nee)tè → (nee)tè 'you slept' (PERF). Syncope in the weak branch of trochaic feet is attested in the Hare dialect of Slave, e.g. shé(ku.zhe) → shé(kuzh) 'they will eat' (OPT) (Rice 1990: 222). Because syncope (that is, vowel deletion) can occur in both iambic and trochaic feet, independent is necessary, from other phonological processes in the language, to determine what kind of feet are conditioning syncope in some particular case. Finally, in trochaic feet which are of the shape (Light-Heavy) in the input, such as (ta.taa), there is a process which is somewhat confusingly called "iambic shortening" in classical metrics (*brevis brevians*)—this is because a foot such as (ta.taa) is defined as an iamb in classical metrics (because it is Light-Heavy) but is a trochee in modern metrical stress theory (because it is stressed-unstressed). This processes occurs in variably in Taltsą́ot'ıne, when a long vowel is preceded by a High tone, e.g. *eghálaasna ~ eghálasna* 'I work' (IMP), or *shéheelyı ~ shéhelyı* 'they ate' (PERF). In these cases, we can say that the latter variant is shortened in the weak branch of a trochaic foot: e(ghá.laas)na → e(ghá.las)na,

(shé.heel)yı → (shé.hel)yı. This type of shortening is a good diagnostic for the presence of trochaic feet—that is, that the first syllable of the foot is stressed—because, in iambic feet, this shortening would be unmotivated. In fact, it is often assumed that (Light-Heavy) iambs, such as (ta.taa) are the very best type of iambic foot (Prince 1990, 1991).

Finally, we come to the interaction of stress with High tone. It has been previously observed that there is a correlation between stress and High tone (Tuttle 1998, Gordon 1999, DeLacy 2002, Hargus 2005). However, in Dene languages, there is sometimes a problem in discerning whether it is High tone that attracts stress, or stress that attracts High tone. In some cases, it is clear that High tone has moved to accommodate stress, as can be seen by comparing Hare and Bearlake dialects of Slave, as in (13).

(13) Tone mobility in Hare (Rice 1990: 216)

Hare	**Bearlake**	**Stem**	**Gloss**
wéhshu	whehchú	chú	'clothlike object is located'
wíhk'e	whıhk'é	k'é	'I shot it'
néʔa	neʔá	ʔá	'you (sg) eat'
wódǫ	wodǫ́	dǫ́	's/he will drink, must drink'

The stems in (13) are underlyingly marked for High tone in both dialects. However, while the High tone is retained on the stem in Bearlake, it moves onto the prestem syllable in Hare. This difference is related to a difference in stress: in Bearlake, feet are iambic and the stem is stressed, whereas in Hare, feet are trochaic and the prestem syllable is stressed. Thus, the process of tone mobility, which I will call "pitch accent retraction," may be represented as follows: (wo.dǫ́) → (wó.dǫ). That is, tone moves from the unstressed syllable to the stressed syllable of the same foot, so that stress and High tone fall on the same syllable.

Elsewhere, however, it appears that the direction of causation is the opposite, that is, High tone attracts stress. An example of this is the variable vowel shortening found in *Taltsǫ́ot'ıné*, cited earlier. Although the language is generally iambic (see §3.2.3), it appears that, when High tone is present on the antepenultimate syllable, it attracts stress and forms a trochaic foot.

(14) Stress attraction and vowel shortening in Taltsǫ́ot'ıné (my field notes)

Without shortening		**With shortening**	**Gloss**	
eghál**aa**sna	~	eghál**a**sna	'I work'	(IMP)
eghál**aa**na	~	eghál**a**na	'he/she works'	(IMP)
shéh**ee**lyı	~	shéh**e**lyı	'they ate'	(PERF)
náh**ɻɻ**dhër	~	náh**ɻ**dhër	'they (2) lived'	(PERF)
náh**ɻɻ**dé	~	náh**ɻ**dé	'they (pl) lived'	(PERF)

In the above examples, the shortening which optionally occurs in the penultimate syllable is evidence that the penultimate and antepenultimate syllables, together, form a foot. Thus: e(ghá.laas)na → e(ghá.las)na, (shé.heel)yı → (shé.hel)yı, etc. Although antepenultimate stress is not the default position of stress in this dialect (the normal stress pattern is iambic, with main stress on the stem), stress can be attracted onto the penultimate syllable by the presence of a High

tone. This High tone then projects its own trochaic foot. Further evidence for this comes from the fact that, if the penultimate syllable has a long vowel as in (14), but High tone falls on the *penult*, whether on the 1st or 2nd mora of the vowel, the shortening shown in (14) is not found.

(15) No shortening if penultimate long vowel bears High tone (Jaker & Cardinal 2012)

Surface form	**Gloss**	
níile	'he/she sets down plural objects'	(IMP)
níila	'he/she set down plural objects	(PERF)
núule	'he/she will set down plural objects	(OPT)
shéetı̨	'he/she ate'	(PERF)
shúustı̨	'I will eat'	(OPT)
naáłchu	'he takes it back'	(IMP)
nı̨́ı̨́keth	'it got stuck'	(PERF)

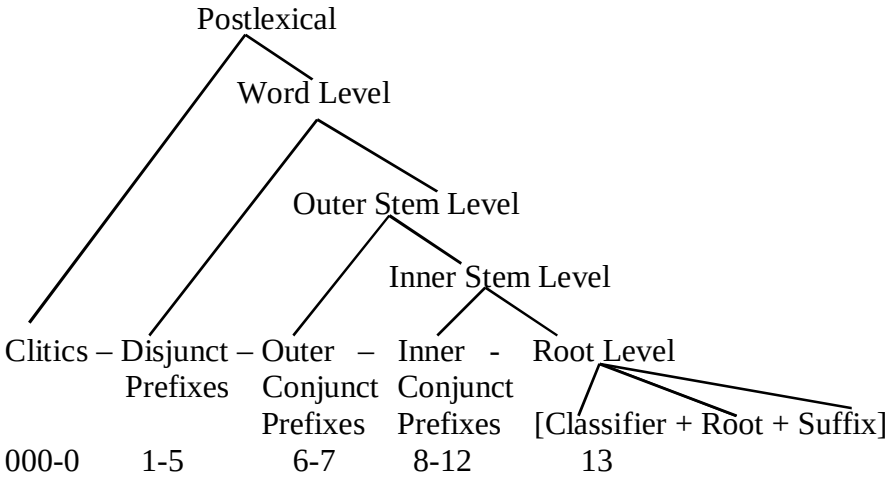
The reason that long vowels optionally shorten in (14) is the same reason they fail to shorten in (15): foot structure. In (14), vowel shortening repairs (Light-Heavy) trochaic feet by turning them into (Light-Light) feet—recall that (Light-Heavy) trochees are not part of the canonical foot typology in (11b). However, monosyllabic (Heavy) feet are perfectly fine according to this same typology, and so shortening of the examples in (15) would be unmotivated. Thus, the examples in (14) and (15) suggest trochaic footing: High tone attracts stress onto itself, and projects its own trochaic foot, which includes the High toned vowel itself and the vowel to its immediate right. This may in turn trigger other phonological processes, such as vowel shortening, as in (14).

To summarize, in the absence of direct phonetic evidence, a number of phonological processes may function as diagnostics for stress and foot structure. Vowel lengthening occurs in the strong position of iambic feet. Vowel shortening occurs in the weak position of trochaic feet. Vowel syncope may occur in the weak position of either iambic or trochaic feet, and so additional evidence is necessary in such cases, to determine whether iambic or trochaic feet are responsible for this process. In general, it is actually easier to find evidence for stress and foot structure at earlier levels of the derivation, i.e. with conjunct prefixes, than it is on the surface, i.e. with disjunct prefixes. This is simply because there are more phonological rules involving conjunct prefixes than disjunct prefixes. A form such as *nánelzé* 'you hunt' (IMP) or *yanełtı* 'you speak' (IMP) provides no phonological evidence for stress, since no phonological rule has taken place in these forms. In these cases one must rely on impressionistic annotations of stress, or, preferably, instrumental phonetic measurements.

3.2.3 Metrical phonology and Lexical Phonology in NE Dene languages

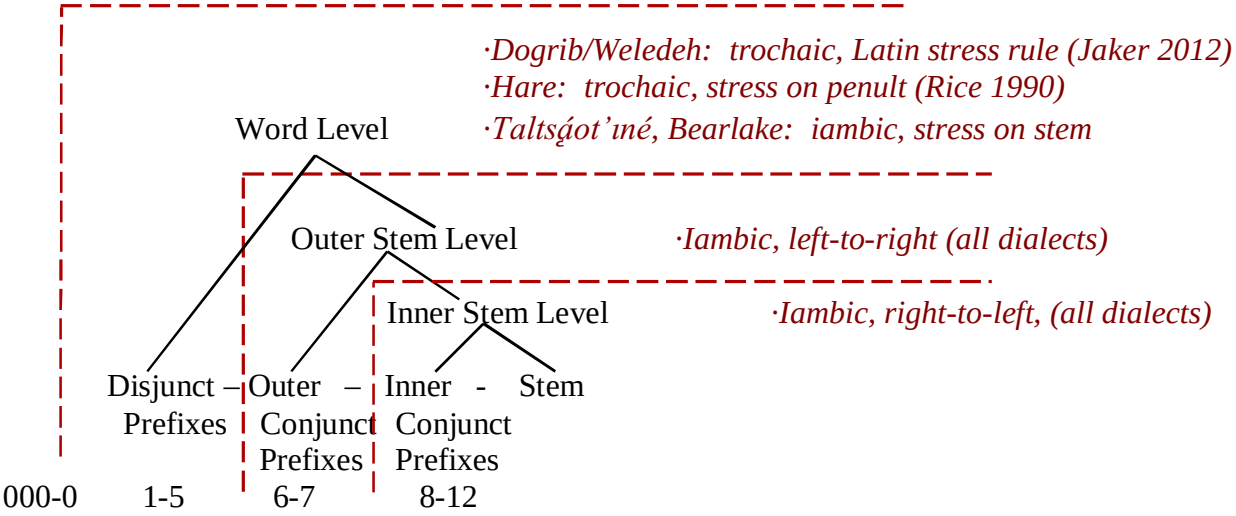
In §3.1, we examined the theory of Lexical Phonology, and how it has been applied to Dene languages. Specifically, the Lexical Phonology model and the Dene verbal template have been synthesized in what is termed the Stem-Core model. In this model, the verb is built from right to left, inside-out, starting with the root, classifier, and tense/mode aspect suffix. Recall also that, loosely speaking, the *conjunct* vs. *disjunct* distinction of the Athabaskan literature corresponds to the *stem level* vs. *word level* distinction of Lexical Phonology. The full synthesis of these two models was provided in (8), and is repeated in (16).

(16) Stem-core model (complete)



We may now integrate the model in (16) with the discussion of prosodic structure in §3.2.1-3.2.2, in the context of the NE Dene languages. The general model is that an affix is added, stress and foot structure are assigned, phonological rules apply, and more affixes are added at the next level. There are a total of 5 levels in the diagram in (16). However, we may exclude from discussion both the first and the last level. The Postlexical Level (Level 5) deals with phrasal phonology, and some types of variable or allophonic processes. Since this paper is concerned with the historical development if individual wordforms, we will generally not be concerned with postlexical phonology. At the other end, the Root Level (Level 1) deals with the phonology of stem variation and ablaut. Although historically stress was important in this domain, and was responsible for the reduction of word-final suffixes in many languages (Leer 2005), in all of the NE Dene languages, verb stems are monosyllabic: in Dogrib, all stems are of the shape CV, Slave allows CV and CVh stems, and Dëne Sųłıné allows stems ending in continuants such as *th*, *dh*, *l*, and *r* (Marinakis 2004, Cook 2004). Since all verb stems are monosyllabic in these languages, stress plays no role synchronicaly in the phonology of the stem itself. Therefore, for both the synchronic and comparative-historical phonology of the NE Dene languages, we may simplify the model in (16) by focusing only on levels 2-4: the Inner Stem Level, Outer Stem Level, and Word Level. In doing this, we find that the Inner and Outer Stem Levels are *iambic* in all of the NE Dene languages, while the Word Level shows some variation across languages and dialects. This is illustrated in (17).

(17) Lexical Phonology and prosodic structure in NE Dene languages



The diagram in (17) is simplified somewhat, but is a useful starting point for discussion. For many dialects, data on surface stress are not available, although it is likely that most dialects of Dëne Sųłıné are iambic. In general, the Word Level phonology of each language represents the truly productive, synchronic phonology of that language, whereas the Outer and Inner Stem Levels are to a large extent fossilized remnants of the prosody of earlier stages of the language. Accordingly, Word Level prosody shows a great deal of variation throughout the family, whereas Inner and Outer Stem Level prosody seems to follow an iambic pattern in all dialects, based on inference from available morphophonemic data (e.g. Rice 1989, Cook 2004), which suggests that PNED was also an iambic language.

Two points of clarification are necessary regarding the diagram in (17). The first is that the foot types and directionality described for each dialect represent merely the default pattern, i.e. what happens in a string of all light syllables with all unmarked tones. The presence of long vowels, High tones, and/or lexicall pre-specified stress can and does displace the normal stress pattern, in each language to be examined in this paper. The second is that, although the levels are ordered sequentially (Inner Stem Level, Outer Stem Level, Word Level), the stress pattern of later levels does not always obscure the stress pattern of earlier levels. When no new prefixes are added at a given level, the stress pattern of the earlier level is retained. This follows from the Strict Cycle Condition (Kiparsky 1982). Thus in words with only inner conjunct prefixes, the Inner Stem Level prosody is retained on the surface, while in words with both inner and outer conjunct prefixes, the Outer Stem Level prosody is retained on the surface. The Word Level stress pattern is used only if a disjunct prefix is present. A sample derivation is given in (18), and additional examples from Weledeh, with surface stresses, are given in (19).

(18) Level ordering and the Strict Cycle Condition

	----------Inner Stem Level----------		
Input	/łe-k'à/	/ge%ghe-jɻ/	/a#ne-t'e/
	8-stem	7-10-stem	1-12-stem
Footing	**(łe.k'à)**	**(ghe.jɻ)**	**(ne.t'e)**
Output	(łe.k'à)	(ghe.jɻ)	(ne.t'e)
	----------Outer Stem Level----------		
Input	/(łe.k'à)/	/ge%(ghe.jɻ)/	/a#(ne.t'e)/
Footing	**-----**	**(ge.ghe)jɻ**	**-----**
Iambic Lengthening	-----	(ge.ghee)jɻ	-----
Gamma Lowering	-----	(ge.ghaa)jɻ	-----
Output	(łe.k'à)	(ge.ghaa)jɻ	(ne.t'e)
	----------Word Level----------		
Input	/(łe.k'à)/	/(ge.ghaa)jɻ/	/a#(ne.t'e)/
Footing	**-----**	**-----**	**(a.ne)t'e**
gh-deletion[5]	-----	(ge.aa)jɻ	-----
Output	(łe.k'à)	(ge.aa)jɻ	(a.ne)t'e

(18) provides the derivation of 3 verb forms in Weledeh: *łek'à* 'he/she is fat' (IMP), *geaajɻ* 'they sang' (PERF), and *anet'e* 'you (sg) are' (IMP). Each of these forms surfaces with the stress pattern of one of the three levels under discussion. *łek'à* consists only of the stem *k'à* preceded by the qualifier *łe*, an inner conjunct prefix. Therefore it surfaces with the Inner Stem Level stress pattern (main stress on the stem), because footing at subsequent levels is blocked by the SCC. The forms *geaajɻ* and *anet'e* are also footed with main stress on the stem at the Inner Stem Level. However, the prefix *ge* in *geaajɻ* causes re-footing with a word-initial iamb at the Outer Stem Level, and the word surfaces as such, whereas the prefix *a* in *anet'e* causes re-footing with a trochee at the Word Level, and thus *anet'e* surfaces with antepenultimate stress. Additional examples of words in Weledeh which surface with the Inner Stem Level, Outer Stem Level, and Word Level stress patterns are given in (19).

(19a) Words with Inner Stem Level stress (stress on stem)

Input	**Output**	**Gloss**	
/de-ne-tɻ/	(dɻ.tɻ)	'you (sg) fall asleep'	(IMP)
/de-tɻ/	(de.tɻ)	'he/she falls asleep'	(IMP)
/ne-ʔì/	(ne.ʔì)	'you (sg) see'	(IMP)
/ghe-ne-ʔɻ/	(ɻ.ʔɻ)	'you (sg) saw'	(PERF)
/ghe-ne-ʔà/	(ɻ.ʔà)	'he/she ate'	(PERF)

[5] Strictly speaking, *gh*-deletion in *geaajɻ* and similar forms is a counterexample to the SCC—see Jaker 2012: 682-715, 775-789 for a more complete treatment.

(19b) Words with Outer Stem Level (Light-Heavy iamb before stem)

Input	**Output**	**Gloss**	
/ge-ghe-ʔɻ/	(ge.aa)ʔɻ	'they saw'	(PERF)
/ts'e%ghe-dǫ/	(ts'e.aa)dǫ	'we drank'	(PERF)
/ge%ghe-dǫ/	(ge.aa)dǫ	'they drank'	(PERF)
/ge%ghe-de/	(ge.aa)de	'they ate (several things'	(PERF)
/ts'e%ghe-jɻ/	(ts'e.aa)jɻ	'we sang'	(PERF)

(19c) Words with Word Level Stress (trochees, Latin stress rule)

Input	**Output**	**Gloss**	
/k'e#ne-da/	(k'e.ne)da	'you (sg) walk around'	(IMP)
/k'e#ge%t'à/	(k'e.ge)t'à	'they (2) walk around'	(IMP)
/k'e#ge%dè/	(k'e.ge)dè	'they (pl) walk around'	(IMP)
/se#h-le/	(seh)ɬe	'I fix (plural objects)'	(IMP)
/nà#h-dè/	(nàh)dè	'I live there'	(IMP)

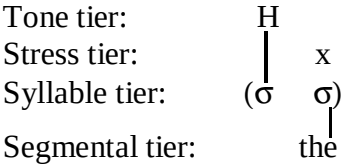
The examples in (19a) contain only the stem and inner conjunct prefixes—these surface as (Light-Light) iambs with main stress on the stem. In (19b), the forms all contain one of the outer conjunct prefixes *ge* or *ts'e*—these surface as (Light-Heavy) iambs, where main stress is on the syllable preceding the stem. Finally, the examples in (19c) contain a disjunct prefix, and so follow the Latin stress rule: they have penultimate stress if the penult is heavy, and antepenultimate stress if the penult is light.

The examples in (18) and (19) serve merely to illustrate the following point: stress in the NE Dene languages is not nearly as opaque as the model in (17) might suggest. Although there are different prosodic systems at different levels, the stress system of each level does surface transparently in some environment—generally, when no additional prefixes are added at later levels. Although prosodically driven morphophonemic alternations may be highly complex in some forms, they are not opaque in some forms, they are not opaque in all forms. This makes it relatively easier to uncover the prosodic structure of NE Dene languages, both synchronically and historically.

*3.3 The lexical representation of *the in PNED*

This paper is about the conjugation marker *the* in NE Dene languages, and the evidence which it provides that the common ancestor of all three languages, PNED, was tonal and High-marked. The preceding sections have served to contextualize our discussion of this prefix. To summarize the discussion so far: NE Dene languages have well-developed metrical stress systems. The verb is built right-to-left, inside-out, as described by the Stem Core model. The Inner and Outer Stem Levels are iambic in all of the daughter languages, which reflects the prosodic system of PNED. More recently, the Word Level prosody has switched to trochaic in some languages. Finally, stress and High tone interact. It is possible for a High tone to attract stress, as in the Taltsą́ot'ıné data in (14) and (15), or for stress to attract High tone, as in the Hare data in (13). Given this context, we may now state the most pivotal aspect of the current proposal, the reconstructed historical underlying form of **the* itself in Proto Northeast Dene. This is given in (20).

(20) Underlying representation of **the* in Proto Northeast Dene



In (20), the conjugation marker **the* is lexically pre-associated to an iambic foot, which is stressed on the second syllable, and bears a High tone on the first syllable, i.e. the syllable preceding *the* itself. Given the assertion that High tone, rather than Low tone, attracts stress (Tuttle 1998, Gordon 1999, DeLacy 2002), the lexical representation in (20) must be regarded as a highly marked prosodic configuration. From a historical perspective, this is both good and bad. It is good in the sense that the multitude of attested surface forms of this prefix, in different phonological and morphological environments, and across different dialects, can all be seen as different ways to repair this highly marked configuration. Indeed, the representation in (20) predicts that the repair strategy used will be different depending both the tone pattern and stress pattern of the environment in which *the* occurs. However, this does raise the question, how could such a badly mis-matched prosodic structure even arise in the first place? Although the underlying form of the *the* conjugation marker is usually treated as a single syllable with a floating tone to its left (Rice & Hargus 1989), it has also been suggested that the Proto Dene form of this prefix was disyllabic, i.e. **eʔsɪ* (Hargus 2005: 409, Leer 1979:13). If the latter is true, then the origin of (20) is amenable to a simple explanation. It is likely that, before tonogenesis, the ancestor of PNED had iambic prosody, with main stress on the stem, and iambic feet built from left to right on alternating syllables. That being the case, whenever **eʔsɪ* was word-initial, it would have been parsed as its own iambic foot, i.e. (eˀ.sɪ). Before tonogenesis, this would have posed no problem, since a constricted vowel eˀ has no special stress properties. When constriction evolved into High tone, however, a mismatch arose between tone and stress, i.e. (é.sɪ). In other words, regarding the representation in (20), it is likely that the special stress properties of *the* go all the way back to Proto Dene, whereas the lexical floating High tone, and the concomitant prosodic mis-match, are more recent.

The reason the phonology of *the* is so complex, therefore, is that (a) this prefix has its own pre-specified stress and tone properties, which disrupt the normal iambic prosody of the language, and (b), these lexically pre-specified properties are themselves mutually conflicting, in that they involve a mis-match between stress and tone. Thus the manner in which this conflict is resolved, as well as the manner in which the normal iambic prosody of the language is altered, will be different in different prosodic environments, depending on both the stress pattern and tone pattern of neighboring syllables. In the remaining sections I will examine three different processes which highlight different aspects of the representation in (20). §4.0 focuses in the lexically prespecified *stress* of *the*, and its role in blocking nasalization and raising in 2nd person singular forms. §5.0 focuses on the lexically pre-specified *tone* of *the*, specifically on the complications of tone-mapping with the prefixes **qe* and **ts'e*. Finally, in §6.0 I put everything together, to explain pitch accent mobility, which requires reference to both the stress properties and tonal properties of *the* in different phonological environments.

4.0 Blocking of nasalization and raising (*ne* → *ɻ*) in 2nd person singular forms

While most previous accounts of *the* in the NE Dene languages have focused on its segmental and tone properties—in particular, issues surrounding tone mapping—in (20), we saw that the reconstructed underlying form of **the* in PNED has both lexically pre-specified tone and stress properties. Thus, the focus of this section is on the stress properties of *the*, in particular as they manifest themselves in the *ne* ~ *ɻ* alternation in 2nd person singular forms.

In many Dene languages, the 2nd person singular has two different forms in different environments. Li (1946) referred to *ne* as the *disjunct form* and *ɻ* as the *conjunct form*—where, according to his analysis, *ne* is used word-initially and after a disjunct prefix, while *ɻ* is used after a conjunct prefix. In two of the three NE Dene languages, however, the facts are somewhat more complicated than this. In Weledeh, only the disjunct form *ne* is used after *whe* (<**the*), while in Slave, and in the *Behchokǫ̀* dialect of Dogrib, this phenomenon is classifier-dependent: *whe/fe/the* appears with the conjunct form *ɻ* in *d/l*-classifier verbs, but with the disjunct form *ne* in *Ø/h*-classifier verbs. I will argue that the underlying descriptive generalization of the *ne* ~ *ɻ* alternation is best stated not in terms of the conjunct/disjunct distinction *per se*, but rather in terms of prosodic structure: *ne* → *ɻ* is the result of a regular phonological process called the *iambic lapse rule*, which deletes the second of two vowels in a stress lapse. This process is blocked by presence of the prefix *the* in certain contexts, because of its lexically pre-specified stress, which disrupts the normal iambic pattern of the language.

4.1 Backround on ne ~ ɻ and the iambic lapse rule

It has long been observed that, in many Dene languages, the 2nd person singular subject prefix has two forms. In all three of the NE Dene languages, these are *ne* and *ɻ*. Li (1946) referred to *ɻ* as the conjunct form, which occurs after conjunct prefixes, and *ne* as the disjunct form, which occurs word-initially and after disjunct prefixes. In general, there have been two main approaches to explaining this alternation: phonological accounts involving vowel syncope (Ackroyd 1976, Rice 1989), and allomorph selection (Li 1946, Krauss & Leer 1981, Marinakis 2004). In this section I will present data which support a phonological analysis, in which *ɻ* is derived from *ne* via a prosodically conditioned phonological rule, called the *iambic lapse rule*. The argument will be that the iambic lapse rule is independently motivated in the language, while an allomorph selection analysis must refer to unnatural classes of morphological categories.

The first thing to observe is that the *ne* ~ *ɻ* alternation occurs not only with the 2nd person singular prefix /ne/, in position 12, but also with the perfective mode marker /ne/ in position 10. This was observed by Krauss & Leer (1981), who reconstruct both prefixes as having the full form *ŋe (with velar nasal) in pre-Proto Dene (Krauss & Leer 1981: 44-48). For morphological reasons, in the modern NE Dene languages, the perfective marker /ne/ is almost always preceded by a conjugation marker: *ghe-*, *ne-*, or *í-*, and thus amost always occurs in its conjunct form, *ɻ*. However, it has been suggested that the *ne* which occurs in stative/adjectival verbs such as (DS) *nezǫ* 'good', *nechá* 'big', and *nedáth* 'tall' was, at least historically, a manifestation of the perfective prefix, in "neuter adjectival verbs," which subsequently drifted leftwards to become a thematic prefix in some languages (Krauss & Leer 1981: 46, Rice 2000: 330-331). Some examples of the 2nd person singular prefix /ne/ in word-initial, disjunct, and conjunct positions

are given in (21a-c), while homophonous perfective prefix /ne/, in word-initial and conjunct positions, is given in (22a-b). Examples are from my own fieldnotes on Weledeh.

(21a) 2sg /ne/ in word-initial position

Input	**Output**	**Gloss**	
/ne-dǫ/	***ne***dǫ	'you (sg) drink'	(IMP)
/ne-jį/	***ne***jį	'you (sg) sing'	(IMP)
/ne-ʔà/	***ne***ʔà	'you (sg) eat'	(IMP)
/ne-ʔì/	***ne***ʔį	'you (sg) see'	(IMP)

(21b) 2sg /ne/ in disjunct position

Input	**Output**	**Gloss**	
/nà#ne-zè/	nà***ne***zè	'you (sg) hunt'	(IMP)
/k'e#ne-le/	k'e***ne***le	'you (sg) carry pl objects around'	(IMP)
/k'e#ne-mbe/	k'e***ne***mbe	'you (sg) swim around'	(IMP)
/se#ne-le/	se***ne***le	'you (sg) fix pl objects'	(IMP)

(21c) 2sg /ne/ in conjunct position

Input	**Output**	**Gloss**	
/tà#e-ne-dlà/	tà***ɻ***dlà	'you (sg) tear apart'	(IMP)
/te#kà#e-ne-le/	tekà***ɻ***le	'you (sg) take pl objs. out of water'	(IMP)
/ła#e-ne-h-wɪ/	ła***ɻ***whɪ	'you (sg) kill an animal'	(IMP)
/e-ne-jį/	***ɻ***jį	'you (sg) are afraid'	(IMP)

(22a) Perfective /ne/ in word-initial position (adjectival verbs)

Input	**Output**	**Gloss**	
/ne-dà/	***ne***dà	'it is heavy'	(IMP)
/ne-zį/	***ne***zį	'it is good'	(IMP)
/ne-chà/	***ne***chà	'it is big'	(IMP)

(22b) Perfective /ne/ in conjunct position

Input	**Output**	**Gloss**	
/ghe-ne-tè/	***ɻ***tè	'he/she was sleeping'	(PERF)
/ła-ghe-ne-h-wo/	ła***ɻ***who	'he/she killed an animal'	(PERF)
/ghe-ne-h-dlɪ/	***ɻ***hdlɪ	'he/she froze'	(PERF)
/ghe-ne-ʔà/	***ɻ***ʔà	'he/she ate'	(PERF)

It is clear that, at least historically, the 2nd person singular prefix and the perfective mode prefix were homophonous, and underwent the same morphophonemic alternations: **ŋe ~ *ɻ* or **ne ~ *ɻ*. These two prefixes in no way form a natural class semantically; rather, what they have in common is their phonological shape. This, in turn, suggests that the *ne ~ ɻ* alternation was, at least historically, phonologically rather than morphologically conditioned. Although it is debatable whether the examples in (22a) are still neuter perfectives in the modern NE Dene

languages, or if *ne* has been re-analyzed as a qualifier prefix (see Rice 2000: 250-251, 330-331), there is other evidence that the form of the perfective morpheme is still underlyingly /ne/, rather than *ɻ*, in the NE Dene languages. In both Dogrib and Slave, the conjunct form of the 2nd person singular is not used in the perfective forms of Ø/*h*-classifier verbs, i.e. those verbs in which both *ne*'s, 2sg and perfective, are present simultaneously in the underlying representation. Under these circumstances, in Slave, the syllable *ne* is found (Rice 1989: 517-520), whereas in Dogrib, the lengthened syllable *nee* occurs (Ackroyd 1982: 112). The Slave examples below are from Rice (1989: 517-520), although I have constructed the underlying forms, which in some ways differ from those proposed elsewhere by Rice. Weledeh examples are from my own field notes.

(23a) 2sg perfectives in Slave, Ø/*h*-classifier verbs

Underlying form	**Surface form**	**Gloss**	
/ye-**ne-ne-**ʔá/ 10-**11-12-**stem	ye**ne**ʔá	'you (sg) ate'	(PERF)
/e-**ne-ne-**h-xe/ 10-**11-12-**13-stem	e**ne**hxe	'you (sg) played drums'	(PERF)
/ká#ye-**ne-ne-**ʔǫ/ 1-10-**11-12-**stem	ká**ıne**ʔǫ	'you took out O'	(PERF)
/k'ína#ye-**ne-ne-**lee/ 1-10-**11-12-**stem	k'ínaye**ne**lee	'you carried around pl O'	(PERF)

(23b) 3sg perfectives in Slave, Ø/*h*-classifier verbs

Underlying form	**Surface form**	**Gloss**	
/ye-**ne-**ʔá/ 10-**11-**stem	y**ɻ**ʔá	'he/she ate'	(PERF)
/e-**ne-**h-xe/ 10-**11-**13-stem	**ɻ**hxe	'he/she played drums	(PERF)
/ká#ye-**ne-**ʔǫ/ 1-10-**11-**stem	ká**ɻ**ʔǫ	'he/she took out O'	(PERF)
/k'ína#ye-**ne-**lee/ 1-10-**11-**stem	k'ínay**ɻ**lee	'he/she carried around pl O'	(PERF)

(24a) 2sg perfectives in Weledeh, Ø/*h*-classifier verbs

Underlying form	**Surface form**	**Gloss**	
/ghe-**ne-ne-**ʔà/ 10-**11-12-**stem	**nee**ʔà	'you (sg) ate'	(PERF)
/ghe-**ne-ne-**h-dlı/ 10-**11-12-**13-stem	**nee**hdlı	'you (sg) froze'	(PERF)
/ghe-**ne-ne-**lì/ 10-**11-12-**stem	**nee**lì	'you (sg) caught with a snare'	(PERF)
/ghe-**ne-ne-**lè/ 10-**11-12-**stem	**nee**lè	'you (sg) were'	(PERF)

(24b) 2sg perfectives in Weledeh, Ø/*h*-classifier verbs

Underlying form	**Surface form**	**Gloss**	
/ghe-**ne-**ʔà/ 10-**11**-stem	**ɻ**ʔà	‘he/she ate’	(PERF)
/ghe-**ne-**h-dlı/ 10-**11**-13-stem	**ɻ**hdlı	‘he/she froze’	(PERF)
/ghe-**ne-**lì/ 10-**11**-stem	**ɻ**lì	‘he/she caught with a snare’	(PERF)
/ghe-**ne-**lè/ 10-**11**-stem	**ɻ**lè	‘he/she/it was’	(PERF)

The Slave and Dogrib forms in (23) and (24) are broadly similar, despite some minor differences. In (23b) and (24b), in both Dogrib and Slave, the perfective marker *ne* is preceded by the **gh*-conjugation marker (represented as either *ghe*, *ye*, or *e*—the choice here is not important), and surfaces with the conjunct form *ɻ*, just as we would expect, either under the prosodic analysis (§4.3), or an allomorph selection analysis, in which the allomorph *ɻ* is selected following any conjunct prefix. However, note that in both (23a) and (24a), this conjunct form *ɻ* does not occur. Instead, the underlying sequence /ne-ne/ yields *ne* in Slave, and *nee* in Dogrib. Two questions arise concerning this syllable *ne* or *nee*: (a) is it the reflex 2sg /ne/, perfective mode /ne/, or both? and (b) why is it used in place of the conjunct form *ɻ*? Note that both the 2sgS and perfective prefixes occur following another conjunct prefix in these forms. Under an allomorph selection analysis, therefore, we might expect either *ɻ*, or perhaps *ɻɻ*, in (23b) and (24b), under such an analysis. Indeed, in Dëne Sųłıné, all of the 2sg perfective forms in (23a) and (24a) would be homophonous with the 3sg forms of the same paradigm. Thus, in the Taltsą́ot’ıné dialect, the form *hɻtságh* means both ‘you cried’ and ‘he/she cried’ (PERF), and the form *hɻlé* means both ‘you were’ and ‘he/she/it was’ (PERF). However, an allomorph selection analysis, which selects between *ne* and *ɻ*, cannot explain the lengthened form *nee* which occurs in Dogrib, nor the lack of nasalization and coalescence, in the form *ne*, in Slave. I propose that the key generalization relates to syllable-count: when the Inner Stem Level domain contains a 3-syllable sequence (2 conjunct prefixes plus stem), the iambic lapse rule applies, and nasalization results: /ghe-ne-ʔà/ → ghe(ne.ʔà) → (ɻ.ʔà). This process occurs to repair a sequence of two unstressed syllables, known as a *stress lapse*. When, on the other hand, there are *four* syllables in the Inner Stem Level domain, there is no stress lapse, because four syllables can be footed as two full iambic feet: /ghe-ne-ne-ʔà/ → (ghe.ne)(ne.ʔà). This step is the same in both Dogrib and Slave. The two languages differ in later rules: in Dogrib, the vowel of the perfective marker is lengthened, in the strong position of an iambic foot, and the 2sg prefix, in the following syllable, as well as the conjugation marker, are syncopated: (ghe.ne)(ne.ʔà) → (ghe.nee)(ne.ʔà) → (ghe.nee)ʔà → (nee)ʔà. In Slave, lengthening of the perfective prefix does not occur, nor does syncope. Thus: (ye.ne)(ne.ʔà) → (ye.ne)ʔà, where only the second *ne* is syncopated. In both cases, however, the *ne* or *nee* which is observed on the surface is in fact not the 2nd person singular subject prefix, but rather the perfective mode prefix, which has been preserved, or lengthened, in the strong position of an iambic foot. This analysis will be formalized in §4.3.

To summarize the results so far, the underlying form of both the 2nd person singular subject prefix, and the perfective mode prefix, is /ne/. Because these two prefixes differ semantically, but have exactly the same phonological behavior, a phonological analysis is to be preferred. The phonological analysis is simple: *ne* is reduced to *ɻ* in 3 syllable sequences but not 4 syllable sequences, at the Inner Stem Level. This is because 3 syllable sequences constitute a stress lapse, whereas 4 syllable sequences do not, because 4 syllables can be exhaustively footed as two iambic feet. In the next section, we will see how this normal stress pattern is altered by the presence of *the*. When *the* is present, the descriptive generalization is effectively the opposite: *ne* → *ɻ* in 4-syllable sequences, but not 3-syllable sequences. This is because of the lexically pre-specified stress of *the*, which disrupts the normal iambic prosody of the language.

*4.2 Data on *the and the ne ~ ɻ alternation*

As suggested in §4.1, in two of the three NE Dene languages, Dogrib and Slave, under certain circumstances, *the* blocks the iambic lapse rule which reduces *ne* to *ɻ*. Or, to state the matter differently, *the* appears with the "disjunct form" *ne* of the 2nd person singular, even though *the* itself is a conjunct prefix, after which the "conjunct form" *ɻ* should be expected. There are in fact three patterns to be found regarding the interaction between *the* and *ne*. In all dialects of Dëne Sųłıné described by Cook (2004), as well as in the Taltsą́ot'ıné dialect (Jaker & Cardinal 2012), *the* has no effect on the *ne* ~ *ɻ* alternation: /the-ne/ always yields *thɻ*. In the Weledeh dialect of Dogrib, *whe (<*the)* always blocks the stress lapse rule, thus /whe-ne/ always surfaces as *whene*, in verbs of all classifiers. Finally, in Slave, and the Behchokǫ̀ dialect of Dogrib (as described by Ackroyd 1982), the effect of *the/fe/whe* on the *ne* ~ *ɻ* alternation is classifier-dependent: /the-ne/ surfaces as *thɻ* in *d/l*-classifier verbs, but /the-ne/ → *thene* in Ø/*h*-classifier verbs. These patterns are summarized in (25).

(25) Effect of **the* on the *ne* ~ *ɻ* alternation

	Slave, Dogrib (Behchokǫ̀ dialect)	**Dogrib (Weledeh dialect)**	**Dëne Sųłıné / Taltsą́ot'ıné**
***d/l*-classifier verbs**	/the-ne/ → thɻ /fe-ne/ → fɻ /whe-ne/ → whɻ etc.	/whe-ne/ → whene	/the-ne/ → thɻ
Ø/*ɬ*-classifier verbs	/the-ne/ → thene /fe-ne/ → fene /whe-ne/ → whene etc.		

Here I will provide some illustrative examples. We will begin with the two simpler patterns, Weledeh and Dëne Sųłıné. In Weledeh, generally, *whe* blocks *ne* → *ɻ* across-the-board, regardless of classifier (although there is some variation, perhaps due to dialect contact—see Jaker 2012: 326). Some examples are given in (26).

(26) Nasalization with shortening blocked by *whe* in Weledeh

Input	**Output**	**(expected)**	**Gloss**	
/whe-ne-tı̨/	whenetı̨	*?whı̨tı̨	‘you (sg) sleep’	(IMP)
/whe-ne-h-tsı̨/	whenehtsı̨	*?whı̨htsı̨	‘you (sg) made’	(PERF)
/nà-whe-ne-l-zò/	nàwhenezè	*?nàwhı̨zè	‘you (sg) hunted’	(PERF)
/nà-whe-ne-d-dlò/	nàwhenedlò	*?nàwhı̨dlò	‘you (sg) laughed’	(PERF)

By “expected,” I mean what we would expect under the null hypothesis, i.e. that *whe* had no special prosodic properties. From the point of view of Slave grammar (see below), the first two examples, *whenetı̨* and *whenehtsı̨*, are just as expected, while the latter two examples, *nàwhenezè* and *nàwhenedlò*, are unexpected. Dëne Sųłıné is essentially the reverse of (26): in Dëne Sųłıné, *the* behaves just like every other conjunct prefix with respect to the *ne* ~ *ı̨* alternation: /the-ne/ →*ı̨*. Data below are from the Taltsą́ot’ıné (Yellowknife/Lútsëlk’é dialect).

(27) Nasalization with shortening *not* blocked by *the* in Taltsą́ot’ıné (Jaker & Cardinal 2012)

Input	**Output**	**(expected)**	**Gloss**	
/the-ne-tı̨/	thı̨tı̨	thıtı̨	‘you (sg) sleep’	(IMP)
/the-ne-ł-tsı/	thı̨łtsı	thı̨łtsı	‘you (sg) made’	(PERF)
/ná#the-ne-l-zé/	náthı̨lzé	náthı̨lzé	‘you (sg) hunted’	(PERF)
/ná#the-ne-d-dlógh/	náthı̨dlógh	náthı̨dlógh	‘you (sg) laughed’	(PERF)

In Slave, the pattern is more complex. *the*, *whe*, or *fe* blocks *ne* →*ı̨* only in Ø/*h*-classifier verbs, as in (28a), but not in *d/l*-classifier verbs, as in (28b).

(28a) Nasalization blocked by *whe* in Ø/*h*-classifier verbs (Slave: Rice 1989: 529-545).

Input	**Output**	**(expected)**	**Gloss**	
/whe-ne-lú/	whenelú	*whı̨lú	‘you (sg) netted’	(PERF)
/the-ne-t’a/	thenet’a	*thı̨t’a	‘you (sg) cut around’	(PERF)
/ná#fe-ne-tı̨/	náfenetı̨	*náfı̨tı̨	‘you (sg) dreamt’	(PERF)
/dah#the-ne-h-k’éh/	dahthenehk’éh	*dahthı̨hk’éh	‘you (sg) shot flying’	(PERF)

(28b) Nasalization *not* blocked by *whe* in *d/l*-classifier verbs (Slave: Rice 1989: 529-545)

Input	**Output**	**Gloss**	
/whe-ne-d-łuh/	whı̨dlu	‘you (sg) became helpless from cold’	(PERF)
/we-ne-d-shon/	wı̨jǫ	‘you (sg) are old’	(PERF)
/ná#we-ne-l-sée/	ráwı̨sée	‘you (sg) hunted’	(PERF)
/tá#ne-whe-ne-d-ʔee/	tánawhı̨t’ee	‘you (sg) landed again by boat’	(PERF)

The same pattern as in Slave is also observed in Dogrib, in the Behchokǫ̀ dialect, based on the few examples provided by Ackroyd (1982).

(29) Classifier-dependent effect of *whe* in Behchokǫ̀ dialect (Ackroyd 1982: 112-113)

Input	**Output**	**(expected)**	**Gloss**
/nà#whe-ne-l-zè/	nàwhɻzè	nàwhɻzè	'you (sg) hunted' (PERF)
/tà#whe-ne-ʔe/	tàwheneʔe	*tàwhɻʔe	'you (sg) went ashore' (PERF)
/whe-ne-h-tsɻ/	whenehtsɻ	*whɻhtsɻ	'you (sg) made' (PERF)

The behavior of *the* in the 2nd person singular in Dëne Sųłıné/Taltsą́ot'ıné is very easy to describe: it behaves like every other conjunct prefix. In terms of the present proposal, we could interpret this to mean either that *the* has lost its lexically pre-specified stress in this language, or this stress is over-written by some other rule. Different dialects of Dogrib show different patterns in terms of whether or not there is a contrast between Ø/*h*- and *d*/*l*-classifier verbs. The Weledeh dialect, which is geographically closer to, and in contact with, Taltsą́ot'ıné, shows no effect of classifier on this alternation, whereas the Behchokǫ̀ dialect (and, presumably, other dialects farther west), being closer to Slave, show different patterns in Ø/*h*- and *d*/*l*-classifier verbs.

The system of the Weledeh dialect, where *whe* blocks *ne* →ɻ across-the-board, is very easy to explain, under the present proposal: because *whe* bears its own lexical stress underlyingly, 3-syllable sequences do not create a stress lapse: /whe-ne-tɻ/ → (whe.ne)tɻ 'you (sg) sleep' (IMP), /whe-ne-h-tsɻ/ → (whe.neh)tsɻ 'you (sg) made' (PERF)—indeed, these words surface with antepenultimate stress in the Weledeh dialect (Jaker 2012: 390). What is more puzzling, however, is the classifier-dependent system of Behchokǫ̀ dialect (Ackroyd 1982) and Slave (Rice 1989): there is no surface different between the Ø/*h*- and *d*/*l*-classifier verbs that would seem to explain this asymmetry—in particular, there seems to be no difference in syllable-count. However, it is known that, historically, what we call the "d" and "l" classifiers were in fact syllabic, i.e. **de* and **le* in Proto-Dene (Krauss 1969), as they still are in contemporary Koyukon (Thompson & Jones 1986, Jetté & Jones 2000). My proposal, therefore, is as follows: in PNED, at the time when the classifier-dependent pattern observed in (28) and (29) arose, the classifiers were still syllabic. Thus, the four classifiers were *Ø, **ł*, **de*, and **le*. The latter two affected the syllable count of the prefix + stem complex, which had a number of morphophonemic effects. In the case of the *ne* ~ ɻ alternation, the **de*- and **le*-classifiers re-introduced a stress lapse even where **the* was present. This is illustrated in (30).

(30) Effect of classifiers on **the* and the *ne* ~ ɻ alternation in PNED

	Input	**Footing**	**Output**
***de/le*-classifier**	* /the-ne-de-ghël/	(the.ne)(de.ghël)	(thɻ.de)(ghël)
***Ø/ł-classifier**	* /the-ne-ł-chëth/	(the.neł)(chëth)	(the.neł)(chëth)

(30) provides a reconstruction of two forms: **thɻdeghël* 'you (sg) walked' (PERF) and **thenełchëth* 'you (sg) tied down' (PERF), which correspond to the forms *thɻgël* and *thɻłchëth* in contemporary Taltsą́ot'ıné. The asterisks above the prefix *the* in the input represent a level-1 gridmark, i.e. the lexically pre-associated stress. This lexically pre-associated stress creates,

exceptionally, a trochee word-initially, even though the language is otherwise iambic by default. If main stress is still on the stem, this means that there will be a stress lapse—two unstressed syllables in a row—in **de/le*-classifier verbs, but not in Ø/*ɬ*-classifier verbs. Therefore, in the former case, *the-ne* reduces to *thɻ* to repair the stress lapse (by the stress lapse rule), whereas in the latter case it does not. This analysis will be formalized more precisely in the §4.3. The main point to observe, for now, is that *the* has special stress properties: nasalization with shortening (*ne* →*ɻ*) occurs in different environments when *the* is present than when it is not present. In fact, these environments are in some sense the opposite: when *the* is present, the stress lapse rule applies in 4-syllable but not 3-syllable sequences, but when *the* is not present, the rule applies in 3-syllable but not 4-syllable sequences. This pattern is evidence that *the* is lexically stressed underlyingly, and causes stress shift within the Inner Stem Level domain.

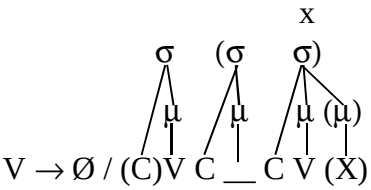
*4.3 Analysis: *the and the iambic lapse rule*

In this section I provide a formal analysis of the iambic lapse rule, and its interaction with *the* in PNED. §4.3.1 examines the effects of the rule by itself, how it is conditioned (or blocked) in sequences of 2, 3, or 4 syllables without *the*. In §4.3.2, I provide a formal analysis of 3 and 4-syllable sequences with *the*. Finally, in §4.3.3, I discuss some additional consequences and predictions of the analysis—in particular, I explore the predictions of claiming that, in PNED, the classifiers **de* and **le* were still syllabic, of the shape CV, as this predicts that *d/l*-classifier verbs will exhibit very different morphophonemics from Ø/*h*-classifier verbs, in an analysis based on stress and syllable count.

4.3.1 Formalizing the Iambic Lapse Rule

The iambic lapse rule is the rule which deletes the vowel in the weak position of an iambic foot, when it follows another unstressed vowel. Another way of stating this is that, in a string of two adjacent unstressed syllables, it deletes the vowel of the second syllable. This rule is formalized in (31).

(31) Iambic Lapse Rule



"Delete a vowel in weak position of an iambic foot, following another unstressed vowel."

This rule, in turn, triggers a sequence of segmental rules, when the preceding consonant is *n*: the preceding vowel is nasalized, *n* is deleted, and if the nasal vowel is *ę*, it is raised to *ɻ* (in Dogrib and Slave, *ą* is also raised to *ǫ*). Thus, in modern Weledeh, /ghe-ne-tè/ → ghe(ne.tè) → (ghen.tè) → (ghęn.tè) → (ghę.tè) → (ghɻ.tè) → (ɻ.tè) 'he/she slept' (PERF), and /ha-ne-t'e/ → ha(ne.t'e) → (han.t'e) → (hąn.t'e) → (hą.t'e) → (hǫ.t'e) 'he/she it is' (IMP). These rules are formalized in (32)-(34).

(32) Nasalization
$V \rightarrow V_{[nasal]} / V__ n]_{\sigma}$
"A vowel is nasalized before a syllable-final *n*."

(33) *n*-deletion
$n \rightarrow \emptyset / __]_{\sigma}$
"*n* is deleted syllable-finally."

(34) Nasal Raising (Inner Stem Level)
ą → ǫ (Dogrıb and Slave only, not PNED)
ę → į

This analysis, involving syncope, nasalization, and raising of the nasalized vowel, is essentially that proposed by Rice (1989: 517). Although the rule of raising nasalized vowels in Dene languages has been disputed in the literature (Cook 2004: 77), this rule is independently motivated in all three NE Dene languages by patterns of stem ablaut. In all three languages, there are cases of *e ~ į* alternation, e.g. Taltsą́ot'ıné *thetį* 'he/she is sleeping,' *hete* 'they are sleeping'; in addition, both Dogrib and Slave exhibit *a ~ ǫ* alternations, e.g. Weledeh *neèʔà* 'he picks up (heavy object),' *nį̀ʔǫ* 'he/she picked up (heavy object)' (see also Ackroyd 1982: 77-79, Rice 1989: 82-83). Furthermore this rule is motivated by the acoustics of nasal vowels (Delattre 1954, Beddor 1984, Feng & Castelli 1996, Chen 1997). Therefore I will assume this analysis in all subsequent derivations.

The derivation in (35) derives 2, 3, and 4-syllable sequences in Proto Northeast Dene, using reconstructed forms of the Ø-classifier verb *hetsagh* 'cry': **netsagh* 'you (sg) cry' (IMP), and **ghįtságh* 'he/she cried' (PERF), and **ghenenetságh* 'you (sg) cried' (PERF).

(35) Iambic Lapse Rule in PNED

	----------Inner Stem Level----------		
Input	/ne-tsagh/	/ghe-ne-tságh/	/ghe-ne-ne-tságh/
Foot Construction	(ne.tsagh)	ghe(ne.tságh)	(ghe.ne)(ne.tságh)
Iambic Lapse Rule	-----	(ghen.tságh)	-----
Nasalization		(ghęn.tságh)	-----
n-deletion	-----	(ghę.tságh)	-----
Nasal Raising	-----	(ghį.tságh)	-----
Output	(ne.tsagh)	(ghį.tságh)	(ghe.ne)(ne.tságh)

(35) illustrates that the Iambic Lapse Rule, and the segmental changes which follow as a consequence of it, occur only in 3-syllable sequences at the Inner Stem Level—that is, when the stem is preceded by exactly two inner conjunct prefixes, in positions 8-13. Note that, in my proposal, four-syllable sequences are left intact: no syncope, lengthening, or nasalization applies in these forms. This is perhaps somewhat counterintuitive, since, in all of the daughter languages, the reflex of this form is shortened in some way: *ghįtságh* or *hįtságh* in Dëne Sųłıné, *neetsè* in Dogrib, and *yenetsé* in Slave. Although each of these reflexes involve some type of vowel syncope, the exact syncope rule seems to be different in each of the three

languages, both in the rule itself and in its ordering with respect to other rules. This leads me to believe that, in the most recent common ancestor of the three daughter languages, the 2nd person singular perfective of Ø/*ɬ*-classifier verbs was still quadrisyllabic. We will return to this issue of quadrisyllabic inputs in §4.3.3, in the context of **de/le*-classifier verbs, as these generated four-syllable sequences in a number of other environments as well, under the current proposal.

4.3.2 *the* and the Iambic Lapse Rule

We may now examine the effect of *the* on the Iambic Lapse Rule, using inputs which consist of 2, 3, and 4 syllables. For these I will use the reconstructed forms **theda* 'he/she sits' (imp), **theneda* 'you (sg) sit' (imp), and **thɻdeghël* 'you (sg) walked' (perf)—these correspond to *theda, thɻda*, and *thɻgël*, respectively, in modern Taltsą́ot'ıné. These are derived in (36).

(36) Iambic Lapse Rule with **the*

	----------Inner Stem Level----------		
	*	*	*
Input	/the-da/	/the-ne-da/	/the-ne-de-ghël/
Foot Construction	(the.da)	(the.ne)(da)	(the.ne)(de.ghël)
Iambic Lapse Rule	-----	-----	(then.de)(ghël)
Nasalization	-----	-----	(thę̃n.de)(ghël)
***n*-deletion**	-----	-----	(thę̃.de)(ghël)
Nasal Raising	-----	-----	(thɻ.de)(ghël)
Output	(the.da)	(the.ne)(da)	(thɻ.de)(ghël)

In (36), the prefix *the* is marked with an asterisk (*) above it in the input—this represents the fact that it is lexically pre-specified as stress-bearing. In the 3-syllable and 4-syllable sequences (**theneda* and **thɻdeghël*), this means that *the* becomes the head of its own trochaic foot when foot construction applies (exceptionally, in an otherwise iambic system). However, note that I assume that the stem syllable also bears stress. Thus, in 2-syllable sequences, such as **theda*, the lexical stress on *the* is deleted. This is in order to avoid a *stress clash*, which, for present purposes, I define as a stressed, light syllable immediately followed by another stressed syllable. Thus, in 3- and 4-syllable inputs at the Inner Stem Level, *the* retains its stress in the output, while in 2-syllable sequences, i.e. when *the* immediately precedes the stem, it loses its stress. This distinction will become important in §6.0, in my analysis of pitch accent retraction: the pitch accent will move one syllable left where *the* has maintained its stress (i.e. in the non-3rd person forms) but will remain in place where *the* has lost its stress (in the 3rd person/impersonal forms). It should also be noted that the stress lapse environment, in which the Iambic Lapse Rule applies in **thɻdeghël*, is not exactly the same as that described in (31): In (31), the rule is targets the *second* of a sequence of two unstressed syllables, whereas in the form *thɻdeghël*, the *first* of two unstressed vowels has been deleted. On the other hand, the deleted vowel in *thɻdeghël* occurs in the weak position of a trochaic foot, whereas, in *ghɻtságh*, it is in the weak position of an iambic foot. Thus, most likely the rule in (31) needs to be reformulated, in such a way that is generalizable over both iambic and trochaic feet (perhaps, "delete the vowel in a stress lapse immediately adjacent to main stress").

The exact pattern of outputs in 2, 3, and 4-syllable sequences in (36) is not found in any of the three modern NE Dene languages. However, it is not difficult to see how the modern patterns may be derived from that in (36). In Slave, and Behchokǫ̀ dialect of Dogrib, one must merely delete the classifier syllable **de* > *d* > Ø and **le* > *l* > Ø, to derive the modern forms. Although I am not aware of a reflex of *thı̨deghël* in Dogrib or Slave (one would expect **whı̨go* in Dogrib, which would mean 'you (sg) crawled') we could derive other *d/l*-classifier forms by this means: thus, **náthı̨lezé → náthı̨lzé → náthı̨zé, náfı̨zé, náwhı̨zé,* etc., depending on the dialect. In Dëne Sųłıné dialects, the modern forms can be derived in a different way. Notice that both outputs in (36), **theneda* and **thı̨deghël*, consist of three syllables. These outputs also have two stresses (most likely, the initial stress is the main stress). To derive the modern Dëne Sųłıné forms, it is necessarily for stem stress to re-assert itself, so that the stress on *the*, and the trochaic foot built on it, is deleted. These forms will then contain a stress lapse, and will be fed back into the Iambic Lapse Rule: (the.ne)(da) → the(ne.da) → (thı̨.da) and (thı̨.de)(ghël) → thı̨(de.ghël) → (thı̨.gël).

To summarize, the conjugation marker **the* is lexically stressed underlyingly, and alters the stress pattern of 3 and 4-syllable sequences, and thus the Iambic Lapse Rule applies in different environments when *the* is present, compared to when it is not present. This analysis assumes that, in Proto Northeast Dene, the *d-* and *l*-classifiers were still syllabic, **de* and **le*. In §4.3.3, I will explore some additional consequences of positing CV-shaped classifiers in Proto Northeast Dene.

4.3.3 Predictions and further consequences

In §4.3.1, I introduced an analysis of the behavior of the prefixes /ne/ '2sgS' and /ne/ 'perfective' which relied crucially on syllable count: the Iambic Lapse Rule applies in 3 syllable sequences, but not 4 syllable sequences. In §4.3.2, I used this analysis to explain the different behavior of *d/l-* versus Ø/*h*-classifier verbs with the prefix *the*, by claiming that the former have an extra syllable which intervenes between *the* and the stem. In this section I explore some additional consequences of this analysis, i.e. the claim that, historically, there was an extra syllable in the input string. Specifically, this means that, in *d/l*-classifier verbs, many words which today appear to be 2-syllable inputs actually had 3-syllable inputs, and other words which today would be analyzed as 3-syllable inputs were actually 4-syllable inputs. I will argue that this is in fact not a problem, in that the reflexes of these forms in the modern languages can be derived from their historical forms by completely regular sound changes.

Let us first consider 2 and 3-syllable inputs involving the *d*-classifier. When the **de* or **le* classifiers were preceded by only one conjunct prefix, the result would have been a stress lapse, and the vowel of the classifer would have been syncopated by the Iambic Lapse Rule. In other words, we get the modern 2-syllable outputs "for free," without positing any additional rules. This is illustrated in (37) using the reconstructed forms **dezhën* 'he/she sings' (IMP), **nejën* 'you (sg) sing' (IMP) and *nedą* 'you (sg) drink' (IMP)—these correspond do the forms *hejën, nejën*, and *nedą*, respectively, in modern Taltsą́ot'ınné.

(37) Iambic Lapse Rule in **de/le*-classifier verbs, 2 and 3 syllable inputs

	----------Inner Stem Level----------		
Input	/de-shën/	/ne-de-shën/	/ne-de-dą/
Foot Construction	(de.zhën)	ne(de.zhën)	ne(de.dą)
Iambic Lapse Rule	-----	(ned.zhën)	(ned.dą)
Nasalization	-----	-----	-----
***n*-deletion**	-----	-----	-----
Nasal Raising	-----	-----	-----
***d*-effect**	-----	(ne.jën)	-----
***d*-deletion**	-----	-----	(ne.dą)
Output	(de.zhën)	(ne.jën)	(ne.dą)

What we see in (37) is that, when the **de* or **le* classifier was preceded by a single conjunct prefix, the classifier itself became the target of the Iambic Lapse Rule, as in the case of *nejën* or *nedą*. The case of *hejën* (<**dezhën*) 'he/she sings' (IMP) is somewhat less obvious: it is a perfectly well-formed iambic foot, so there is no rule, in the present analysis, that would make it a target for sound change. There are two ways to explain how the form *hejën* later evolved. One explanation involves analogy and re-structuring: since, as we have seen, the **de/le*-classifiers were always deleted following a single conjunct prefix (and, most likely, following two conjunct prefixes—see below), we may surmise that eventually their underlying form was re-structured: */de/ > /d/ and */le/ > /l/, as in the modern languages. In that case, the monosyllable **jën* would require the "peg syllable" to make it disyllabic: **dezhën > *jën > hejën*. The other possibility involves treating the peg syllable as an affix (Hargus & Tuttle 1997), in which case the addition of the peg syllable would also trigger the Iambic Lapse Rule: **dezhën > *hedezhën > hejën*. Although I favor the former explanation the choice makes no difference to the current proposal.

A somewhat more complicated situation is presented by sequences which we would analyze as trisyllabic inputs in all of the modern languages, but which would have been quadrisyllabic in PNED, under the current proposal. Under the current proposal, nothing happens to these sequences in PNED: they are quadrisyllabic in both the input and output. This is illustrated in (38), using the reconstructed forms **ghenedezhën* 'you (sg) sang' (PERF) and *ghenenetságh* 'you (sg) cried' (PERF).

(38) Behavior of quadrisyllabic sequences in PNED

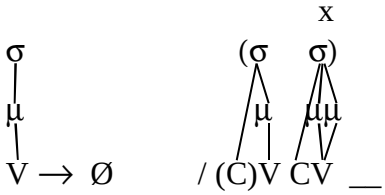
	----------Inner Stem Level----------	
Input	/ghe-ne-de-zhën/	/ghe-ne-ne-tságh/
Foot Construction	(ghe.ne)(de.zhën)	(ghe.ne)(ne.tságh)
Iambic Lapse Rule	-----	-----
Output	(ghe.ne)(de.zhën)	(ghe.ne)(ne.tságh)

The forms in (38) represent the two situations which comprise the vast majority of quadrisyllabic sequences in PNED: the 2nd person singular of **de/le*-classifier perfectives as in **ghenedezhën*, and of Ø/*ɬ*-classifier perfectives, as in **ghenenetságh*. None of these surface as

quadrisyllabic in any of the daughter languages. However, these two different constructions do behave differently in the daughter languages. In the former case, the 2nd person singular of **de/le*-classifier perfectives always surfaces with the 'conjunct form' of the 2nd person, in all three languages: *hɣjën* (Dëne Sųłıné), *ɻjɻ* (Dogrib), *yɻjɻ* (Slave). On the other hand, the 2nd person singular form of Ø/*ł*-perfectives shows different behavior in all three languages. In Dëne Sųłıné, the conjunct form of the 2nd person is used, i.e. *hɣtságh* (Taltsą́ot'ıné) or *ghɣtságh* (other dialects); in Slave, *ne* appears instead, i.e. *yenetsé*, and in Dogrib, the lengthened syllable *nee* appears: *neetsè* 'you (sg) cried' (PERF). In other words, the 2sg Ø/*ł*-classifier perfectives are shortened in all three daughter languages, but they are shortened in different ways; the 2sg **de/le*-classifier perfectives are shortened in the same way in all three languages: the conjunct form *ɻ* appears.

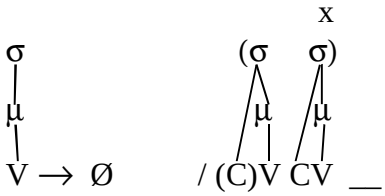
Because quadrisyllabic sequences show up differently in Dëne Sųłıné, Dogrib, and Slave, I believe that the sound changes which affected these forms occurred after the breakup of Proto Northeast Dene, i.e. separately in each of the daughter languages. However, lest it appear that my proposal cannot account for such forms, I will briefly outline how I believe they evolved in the daughter languages. All of the daughter languages, it seems, developed some sort of iambic syncope rule, which deletes an unstressed vowel immediately following an iambic foot. However, the rule must be formulated differently in Dëne Sųłıné as opposed to Dogrib and Slave. In Dëne Sųłıné, an unstressed vowel is deleted following any iambic foot (39), whereas in Dogrib and Slave, this deletion occurs only if the preceding syllable is heavy (40).

(39) Iambic Syncope (Dogrib and Slave version)



"An unstressed vowel is deleted following a stressed, heavy syllable."

(40) Iambic Syncope (Dëne Sųłıné version)



"An unstressed vowel is deleted following an iambic foot."

We will start with the Dëne Sųłıné derivation, which is simplest. With quadrisyllabic sequences, although the Iambic Lapse Rule fails to apply on the first pass, application of the Iambic Syncope rule creates a trisyllabic sequence, which in turn creates a stress lapse, which is fed back into the Iambic Lapse Rule. This is illustrated in (41).

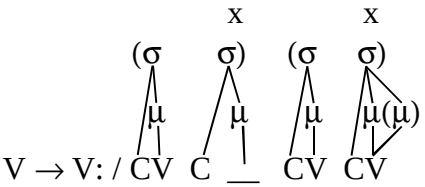
(41) Iambic Syncope and Iambic Lapse Rule (Dëne Sųłıné)

	----------Inner Stem Level----------	
Input	/ghe-ne-de-zhën/	/ghe-ne-ne-tságh/
Foot Construction	(ghe.ne)(de.zhën)	(ghe.ne)(ne.tságh)
Iambic Lapse Rule	-----	-----
Iambic Syncope	(ghe.ned)(zhën)	(ghe.nį)(tságh)
***d*-effect**	(ghe.ne)(jën)	-----
Foot Construction	ghe(ne.jën)	ghe(nį.tságh)
Iambic Lapse Rule	(ghį.jën)	(ghį.tságh)
Output	(ghį.jën)	(ghį.tságh)

In (41), I have subsumed the segmental rules such as Nasalization and Nasal Raising under the prosodic rules, Iambic Syncope and the Iambic Lapse Rule. The rule which requires particular comment is Foot Construction: note that this applies twice in the derivation in (41). This is because the outputs of the Iambic Syncope rule, (ghe.ne)(jën) and (ghe.nį)(tságh), each contain a *stress clash*, which, for the purposes of this paper, I define as a stressed, light syllable, followed by another stressed syllable. I assume that this type of stress clash is absolutely forbidden in the NE Dene languages. Therefore, these forms must be repaired by re-footing. Specifically, they are re-footed as normal 3-syllable sequences, with main stress on the stem. This creates a stress lapse, which in turn re-activates the Iambic Lapse Rule. Informally, we could say that, when a four-syllable sequence was shortened to 3 syllables, it was almost immediately—and automatically—reduced to 2, by the same set of rules already operating in Dëne Sųłıné. However, this entire process should not be reconstructed for PNED, since it operates only in Dëne Sųłıné.

In the common ancestor of Dogrib and Slave, which I will call "Proto-Mackenzian" (PM) for lack of a better term, the situation is somewhat more complicated. There, I propose, there existed an iambic syncope rule similar to that found in Dëne Sųłıné, but it applied only after heavy syllables (which, in this case, means only after long vowels). However, it is necessary that this Iambic Syncope rule have been *preceded* by an *iambic lengthening* rule, which lengthened the second vowel of four-syllable sequences. I propose that the iambic lengthening rule operated at the Outer Stem Level, since it is also conditioned by a preceding *ge* or *ts'e* in the daughter languages, and the Iambic Syncope rule applied near the end of the derivation, at the Word Level. The Iambic Lengthening rule is defined in (42), and the derivation is given in (43).

(42) Iambic Lengthening (Proto-Mackenzian)



"A short vowel lengthens in the strong position of an iambic foot, only if another syllable intervenes between it and the next stressed syllable."

(43) Iambic Lengthening and Iambic Syncope (PM)

	----------Inner Stem Level----------		
Input	/ghe-ne-de-zhį/	/ghe-ne-ne-tsé/	/ge%ghe-de-shį/
Foot Construction	(ghe.ne)(de.zhį)	(ghe.ne)(ne.tsé)	ghe(de.zhį)
Iambic Lapse Rule	-----	-----	--?--
Output	(ghe.ne)(de.zhį)	(ghe.ne)(ne.tsé)	ghe(de.zhį)
	----------Outer Stem Level----------		
Input	/(ghe.ne)(de.zhį)/	/(ghe.ne)(ne.tsé)/	/ge%ghe(de.zhį)/
Iambic Lengthening	(ghe.nee)(de.zhį)	(ghe.nee)(ne.tsé)	(ge.ghee)(de.zhį)
Gamma Lowering	-----	-----	(ge.ghaa)(de.zhį)
Output	(ghe.nee)(de.zhį)	(ghe.nee)(ne.tsé)	(ge.ghaa)(de.zhį)
	----------Word Level----------		
Input	/(ghe.nee)(de.zhį)/	/(ghe.nee)(ne.tsé)/	/(ge.ghaa)(de.zhį)/
Iambic Syncope	(ghe.nee)(jį)	(ghe.nee)(tsé)	(ge.ghaa)(jį)
Output	?*(ghe.nee)(jį)	(ghe.nee)(tsé)	(ge.ghaa)(jį)

The development of 4-syllable sequences in Dogrib and Slave does pose some challenges for the current proposal. The least problematic is the 2nd person singular of Ø/*ɬ*-classifier verbs, i.e. /ghe-ne-ne-tsé/ in (43) above. I propose that the output in Proto-Mackenzian was **gheneetsé*. This later evolved into *neetsè* in Dogrib (with syncope of the first syllable, and tone reversal) and *yenetsé* in Slave, with lenition of *gh* to *y*, and shortening of the second vowel. That is, I am suggesting that some vowels which are today pronounced as short in modern Slave dialects (e.g. Rice 1989) were long at an earlier stage of the language. It is necessary, for Proto-Mackenzian, that the vowel in question have been long at some stage historically, in order to trigger syncope of the second *ne* in the sequence at the Word Level—this enables the syncope rule to be restricted only to long vowels. If the Iambic Syncope rule were not restricted only to long vowels, we would predict syncope all over the place, any time a conjunct prefix was preceded by two disjunct prefixes, which would yield many incorrect outputs. For the 3rd person plural of **de/le*-classifier verbs, the derivation is similar. At the Outer Stem Level, (ge.ghe) lengthens to (ge.ghee), which is lowered to (ge.ghaa) by the rule of *gamma lowering*. This rule is defined in (44).

(44) Gamma Lowering (Outer Stem Level—cf. Hargus 1988)
e → a / gh __
"*e* lowers to *a* after *gh*."

Elsewhere, I have argued that the rule of Gamma Lowering in Weledeh is dependent upon lengthening (Jaker 2012: 352-362, 479-497)—that is, Gamma Lowering applies only when Iambic Lengthening has applied, and, accordingly, these forms always surface with a long *aa* in Weledeh: *geaajį* 'they sang' (PERF), *ts'eaajį* 'we sang' (PERF), *geaadǫ* 'they drank' (PERF), *ts'eaadǫ* 'we drank' (PERF), etc. Here again I suggest that, in Slave, this vowel *aa* was also long historically, even if it is pronounced as short in the modern dialects. In the present proposal, it is

necessary that this vowel be long, in order to trigger syncope of the classifier syllable, by the Iambic Syncope rule, at the Word Level. However, at the Outer Stem Level, it is necessary that the classifiers have still been syllabic, in order to enable lengthening to take place—otherwise the Iambic Lengthening rule would have been blocked. The main reason that the iambic lengthening rule in (42) is formulated as it is, i.e. requiring an extra syllable to intervene between the lengthened vowel and the next stress vowel, is stress clash avoidance. The rule could also be re-stated as "vowels lengthen in the strong position of an iambic foot, except in a stress clash". This stress clash restriction can also explain why the long vowels in these forms were later shortened in Slave: the Iambic Syncope rule does re-introduce a stress clash of sorts: (ghe.nee)(ne.tsé) → (ghe.nee)(tsé) and (ge.ghaa)(de.zhį) → (ge.ghaa)(jį). This type of stress clash is not as bad as the cases discussed previously, since it is a *heavy* syllable which precedes another stressed syllable. Nevertheless it is not hard to see why these long vowels would be likely candidates for de-stressing and shortening, if they occurred next to the stem, which was also stressed. One problem with the derivation of the form **geghaajį*, however, is why the Iambic Lapse Rule fails to apply at the Inner Stem Level: although the input /ge%ghe-de-shį/ contains a total of four syllables, the prefix *ge* '3rd person plural' is not added until the Outer Stem Level; thus, at the Inner Stem Level, this form contains a stress lapse. This could be an indication that the processes in question have been assigned to the wrong levels for Proto-Mackenzian, i.e. that the derivation in (43) should refer to the Outer Stem Level, Word Level, and Postlexical Levels instead. However, this would make different predictions for which prefixes would condition the phonological rules in question—for example, it would predict that a disjunct prefix before *ghe* should also be able to trigger Gamma Lowering—more data will be necessary in order to resolve this problem.

Finally, the most problematic case is that of the 2nd person singular form of **de/le*-classifier verbs, i.e. the input /ghe-ne-de-shį/. Here, the derivation has generated what truly seems to be the wrong result, **gheneejį* 'you (sg) sang' (PERF). The reflex of such a form, by regular sound change, would be **yenejį* in Slave and **neejį* in Dogrib, which is clearly incorrect—the actual forms are *yįjį* and *įjį*, respectively. Thus, it is clear that the modern forms are not descended from **gheneejį*. However, I would like to suggest that, although the modern forms are not derived from **gheneejį*, this does not mean that such a form never existed. Note that, based on the derivation in (43), the vowels of the classifiers **de* and **le* will be targeted for deletion by the Iambic Lapse Rule whenever preceded by a single conjunct prefix, and the Iambic Syncope Rule whenever preceded by two conjunct prefixes. Together, these two rules would have syncopated the classifiers in the vast majority of surface forms (i.e. everywhere except 3rd person imperfectives). Under such circumstances, the underlying form is likely to have been restructured: */de/ > d, and */le/ > l. After such restructuring, the input for 'you sang' would be reanalyzed as /ghe-ne-d-shį/, in which case it would transparently undergo the Iambic Lapse Rule at the Inner Stem Level, yielding the output **ghįjį*, from which the modern Slave and Dogrib forms *yįjį* and *įjį* can be derived. Thus, the derivation in (43) predicts that the modern forms *yįjį* and *įjį* could only arise if some restructuring had taken place at a later stage of the language; however, this same analysis also explains why this restructuring is likely to have happened.

The analysis in this section has relied very heavily on the claim that, in PNED, **de/le*-classifier verbs had a different syllable count than Ø/*ɬ*-classifier verbs, and that this resulted in

different morphophonemics for all combinations of conjunct prefixes, both with and without the conjugation marker **the*. Is such a claim plausible? Is there any modern Dene language which (a) preserves the classifiers as full CV syllables, and (b) where these extra syllables influence the morphophonemics of other conjunct prefixes? In fact such a language is found. In Koyukon, the classifiers are Ø, *ɬ, dı*, and *lı* (Thompson & Jones 1986, Jetté & Jones 2000). In the 2nd person singular imperfective forms of 'bare verbs' as I call them (i.e. verbs with no conjunct of disjunct prefixes in the verb theme), *nı* is used in Ø- and *ɬ*-classifier verbs, while *een* is used in *dı*- and *lı*-classifier verbs. This is illustrated in (45)—date are from Thompson & Jones (1986: 148-149).

(45a) *nı* in the 2nd person singular imperfective of Ø/*ɬ*-classifier verbs

atsah	**'cry' (Ø-classifier)**	**ałbaats**	**'boil' (*ɬ*-classifier)**
astsah	'I cry'	atłbaats	'I boil'
nıtsah	'you cry'	**nıłbaats**	'you boil'
atsah	'he/she cries'	ałbaats	'he/she boils'
ts'ıtsah	'we cry'	ts'ıłbaats	'we boil'
~~u~~htsah	'you cry'	~~u~~hłbaats	'you boil'
hatsah	'they cry'	hałbaats	'they boil'

(45b) *een* in the 2nd person singular imperfective of *dı/lı*-classifier verbs

dıdzakk	**'be dirty' (*dı*-classifier)**	**lıtsuł**	**'be clean' (*lı*-classifier)**
asıdzakk	'I am dirty'	agıtsuł	'I am clean'
eendıdzakk	'you are dirty'	**eenlıtsuł**	'you are clean'
dıdzakk	'he/she is dirty'	lıtsuł	'he/she is clean'
ts'ıdıdzakk	'we are dirty'	ts'ıltsuł	'we are clean'
~~u~~hdıdzakk	'you are dirty'	~~u~~hlıtsuł	'you are clean'
hadıdzakk	'they are dirty'	haltsuł	'they are clean'

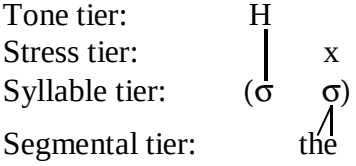
The Koyukon system maybe characterized as follows: *nı* appears in underlying 2-syllable sequences, while *een* appears in 3-syllable sequences. The purpose of this is to avoid a stress lapse: *nı(dı.dzakk) and *nı(lı.tsuł) would contain stress lapses at the left edge of the word. In Koyukon, the repair strategy is different: instead of syncopating the vowel of the second syllable, the first syllable is strengthened, through some kind of metathesis and lengthening, so that the output contains two iambic feet: (een)(dı.dzakk) 'you (sg) are dirty' (IMP) and (een)(lı.stuł) 'you (sg) are clean' (IMP). These facts merely serve to illustrate that, in a language where the **de*- and **le*-classifiers are still syllabic, they do in fact have morphophonemic effects, even in very simple verb forms. It seems perfectly reasonable, then, to hypothesize that Proto Northeast Dene may have had a similar system.

To conclude, in this section, I have explored the consequences of the claim that the conjugation marker **the* was stressed underlyingly in Proto Northeast Dene. In §5.0 and §6.0, we will explore the tonal properties and tone mapping processes associated with this prefix which, as we shall see make crucial reference to this lexically pre-specified stress as well.

5.0 Tone mapping, *the*~tone alternations, and empty morph insertion **qe, *ts'e*

In §3.3, I proposed a representation of the conjugation marker **the* in PNED in which this prefix is pre-associated to an iambic foot, with a lexical stress on *the* itself (i.e. the strong branch of the iambic foot), and a High tone on the immediately preceding syllable. This representation is repeated in (46).

(46) Underlying representation of **the* in Proto Northeast Dene



In §4.0 I explored on the consequences of this lexical stress on *the,* i.e. its effect on the *ne* ~ *ɻ* alternation in 2nd person singular forms. In this section I will focus on issues of tone and tone mapping, in particular, some peculiarities of tone mapping with "non-local subjects," i.e. **qe* (3rd person plural) and **ts'e* (impersonal, later 1st person plural). There are a number of possible outcomes when **qe* or **ts'e* precede **the* in NE Dene languages: deletion of the lexical High tone of *the*, insertion of an "empty morph" *de* or *re*, *the* being reduced to *h*, and outright deletion of the prefix *the* itself, i.e. with no trace, tonal or segmental. In §5.1 I will survey the relevant data, including data from my own fieldwork on the Weledeh and Taltsą́ot'ıné languages. In §5.2 I will present an analysis of these facts, where I will argue that the patterns described in §5.1 could only have arisen, historically, in a High-marked language, and the patterns observed in Weledeh, which is Low-marked, can no longer be derived phonologically as part of the synchronic grammar, but were likely borrowed from the neighboring High-marked language Taltsą́ot'ıné, prior to tone reversal.

5.1 Data on tone mapping in NE Dene languages

In this section, I will present data on the behavior of *the* following *qe* or *ts'e* in three languages: Slave as described in Rice (1989), Taltsą́ot'ıné (Dëne Sųłıné) based on my own fieldnotes, and Weledeh (Dogrib), also based on my own fieldnotes. The Behchokǫ̀ dialect of Dogrib, as described by Ackroyd (1982), seems to exhibit most of the same patterns as Slave regarding *whe (<*the)* conjugation, while the Weledeh dialect patterns more closely with Taltsą́ot'ıné. I will also refer, when appropriate, to data on *the*-conjugation in other Dëne Sųłıné dialects as presented in Cook (2004)—however given the relatively small number of examples it is difficult to draw any conclusions about *the* in these other dialects. An overview of the data to be presented is given in (47).

(47) Behavior of *the* following *ɋe, ts'e,* and *ɤe* in NE Dene languages

	Slave, Dogrib (Behchokǫ̀ dialect)	**Dogrib (Weledeh dialect)**	**Taltsą́ot'ıné**
Ø/ɬ-classifier	/ge-whe/ → ge /ge-fe/ → ge /ge-the/ → ge etc.	/ge-whe/ → geè	/he-the/ → heré
***d/l*-classifier**	/ge-whe/ → geh /ge-fe/ → geh /ge-the/ → geh etc.	/ge-whe/ → geh	/he-the/ → he

In *d/l*-classifier verbs, the prefix *the* is reduced to *h* following *ge/ke* or *ts'e* in both Slave in Dogrib, while in the Taltsą́ot'ıné dialect of Dëne Sųłıné, *the* is deleted without a trace. In Ø/*ɬ*-classifier verbs, the segmental portion of *the* is deleted in all three languages. In Slave, and Behchokǫ̀ dialect, *the/fe/whe* is deleted with no trace. In Weledeh it is replaced with a Low toned vowel *è*, while in Taltsą́ot'ıné, we see a related phenomenon, a prefix *ré* with High tone, in the position where *the* would be expected. These last two patterns, highlighted in grey in (47), are of greatest interest, as they provide the most direct evidence for tone reversal—in particular, I will argue that the Weledeh pattern /ge-whe/ → geè was borrowed from Taltsą́to'ıné, at a time when Weledeh was still High-marked.

Note that the slashes // in (47) should not be taken literally as claims about synchronic underlying representations. In particular, in the Weledeh case, I will argue that the surface form *geè* involves special *whe ~ è* allomorphy, i.e. in the modern language, *è* is an allomorph of *whe* that occurs in certain morphological environments, such as following *ge* and *ts'e*. Other patterns in (47) may also involve allomorphy—thus, /ge-the/ in slashes should be interpreted as, "environments where we would expect *the* to follow *ge*, if paradigms were morphologically regular underlyingly."

5.1.1 Slave: deletion of conjugation tone following *ge/ke* and *ts'e*

Recall the representation of the conjugation marker *the* presented in (46). Based on this representation, we would expect that the prefix *the* should result in a High tone on whatever vowel occurs to its immediate left—except, of course, word or phrase-initially. However, in NE Dene languages, this is often not the case. In Slave, whenever *the/fe/whe* is preceded by one of the 'deictic subject' prefixes, *ke/ge* or *ts'e*, and also the unspecified object marker *ɤe*, the tone of *the* is not realized—indeed, in Ø/*h*-classifier verbs, both the tone and the segmental content of *the* are completely deleted. Some examples are given in (48): in *et'áh* 'cut around' in (48a), the prefix *the* occurs word-initially (except when preceded by *ke* or *ts'e*), while in *dahk'éh* 'shoot in flying' in (48b), *the* is preceded by a disjunct prefix.

(48a) Perfective of *et'áh* 'cut around' (Rice 1989: 537).

	singular	dual	plural
1st person	thıt'a	thít'a	thít'a
2nd person	thenet'a	that'a	that'a
3rd person	thet'a	**ge**t'a	**ge**t'a
Impersonal:	**ts'e**t'a		

(48b) Perfective of *dahk'éh* 'shoot in flying' (Rice 1989: 538)

	singular	dual	plural
1st person	dahthıhk'éh	dahthík'éh	dahthíhk'éh
2nd person	dahthenehk'éh	dahthahk'éh	dahthahk'éh
3rd person	dahthehk'éh	dah**ge**hk'éh	dah**ge**hk'éh
Impersonal:	dah**ts'e**hk'éh		

In (48b), the *h* which appears immediately preceding the stem is in all cases the *h*-classifier (< *ɬ*), not a a reduced form of the conjugation marker *the*, even in the 3du/pl and impersonal forms—this is clear from numerous other examples which Rice provides. Thus, following *ge* and *ts'e*, the segmental portion of *the* is deleted entirely. What is of more interest here, however, is the fate of conjugation tone: based on the representation of *the* in (46), we would expect the forms *gét'a* and *ts'ét'a*, rather than the actual attested forms, *get'a* and *ts'et'a* in (48a). Further, we would expect all of the forms in (48b) to show High tone somewhere, either on *ge* and *ts'e*, or on the preceding disjunct prefix *dah*. The failure of conjugation tone to map onto a disjunct prefix can easily be described in a Lexical Phonology model: the rule of tone mapping can be assigned to the Outer Stem Level (Level 3, in the current model), and any unmapped tones are deleted by stray erasure before the disjunct prefixes are added (Hargus 1988). What is more puzzling, however, is the failure of tone to map onto *ge, ts'e,* and the unspecified object prefix *ɤe*: tone *does* map onto other prefixes in positions 6 and 7, i.e. all other object agreement prefixes. A very similar pattern has also been observed in Sekani (Hargus 1988). Harugs's solution to this problem was to add an extra level between the Outer Stem Level and the Word Level, which Hargus calls Level 4 (disjunct prefixes are added at Level 5, in Harugs's model, which corresponds to Level 4 of the present model). The prefixes *ge, ts'e,* and *ɤe* are added at this level, whose main purpose is to account for the exceptional tone mapping properties of these prefixes (Hargus 1988: 157-161). In this paper I will propose an alternative explanation, namely that the prefixes **qe, *ts'e,* and **ɤe* were, already in PNED, lexically pre-associated to the *weak* branch of an iambic foot—i.e. they are lexically *un*stressed. This also made them dispreferred as tone-bearing units: High tone is attracted to stressed syllables, and stressed syllables attract High tone. On these lexically unstressed prefixes, High tone was deleted. This analysis will be formalized in §5.2.

5.1.2 Taltsą́ot'ıné: insertion of an empty morph *de*

In this section, I will provide data on the behavior of *the* in Taltsą́ot'ıné, i.e. the Yellowknife dialect of Dëne Sųłıné. There are two main patterns for the behavior of *the* with deictic subjects (*he* and *ts'e*) in this dialect. In *d/l*-classifier verbs, *the* is deleted entirely with deictic subjects, leaving no trace. In Ø/*ɬ*-classifier verbs, an empty morph *de* is inserted, which

surfaces as *ré*. Examples of *d/l*-classifier verbs which take *the*-conjugation are the verbs *hegël* 'walk' in (49), and the verb *nálzé* 'hunt' in (50).

(49) Perfective of *hegël* 'walk', *d*-classifier

	singular	dual	plural
1st person	thessël	thít'ás	thídél
2nd person	thɻgël	thuht'ás	thuhdél
3rd person	thegël	**he**t'ás	**he**dél
Impersonal:	**ts'e**dél		

(50) Perfective of *nálzé* 'hunt', *l*-classifier

	singular	dual	plural
1st person	nátheszé	náthílzé	náthílzé
2nd person	náthɻlzé	náthułzé	náthułzé
3rd person	náthelzé	ná**hel**zé	ná**hel**zé
Impersonal:	ná**ts'el**zé		

Although the prefixes *he* and *ts'e* precede *the* in terms of their position in the verb template, and thus we would expect the High tone of *the* to be realized on these prefixes, this High tone is not present, as can be seen in (49). In (50), we also see that, in Taltsą́ot'ıné, the *l*-classifier does not de-voice in environments where *the* was reduced or deleted, unlike other dialects described by Cook (2004: 47). Rather, the *the*-conjugation marker is deleted without a trace in these forms, both tonal and segmental. Also note, that the High tone on the preverb *ná* in (50) is not derived from the conjugation marker *the*, but is part of the underlying representation of this prefix, i.e. it occurs even in the imperfective—*nászé* 'I hunt'. In general, the tone of *the*-conjugation does not map onto a disjunct prefix in Taltsą́ot'ıné. There is, however, one exception to this generalization, the verb *nada* 'go to a specific place'. In this verb, the underlying High tone of *the* maps onto both a preceding deictic subject, as well as a preceding disjunct prefix. The imperfective of this verb is given in (51a), and the perfective in (51b).

(51a) Imperfective of *nada* 'go to a specific place'

	singular	dual	plural
1st person	nasda	naít'ás	naídél
2nd person	naneda	noht'ás	nohdél
3rd person	nada	nahet'ás	nahedél

(51b) Perfective of *nada* 'go to a specific place'

	singular	dual	plural
1st person	náthıya	náthít'as	náthídel
2nd person	náthɻya	náthuht'as	náthuhdel
3rd person	nátheya	nahét'as	nahédel

Based on (51a), we can see that the prefix *na*, which is part of the verb theme, underlyingly has Low tone, not High tone; it acquires a High tone only when it occurs immediately preceding the conjugation marker *the*, as in (51b). Also, in (51b), *he* bears a High tone when it occurs immediately before where *the* would be in the underlying representation. A paradigm identical to that in (51b) is also used as the perfective paradigm of the verb *naadal* 'go back' (Jaker & Cardinal 2012)—at present, I am aware of no other verb that exhibits the tone mapping pattern in (51b). Note that the verb "go" is a very high-frequency verb. It seems likely, in my opinion, that this verb has preserved an archaic pattern that has been lost in the rest of the language; it is, for the modern language, an irregular pattern which has been *entrenched* due to high frequency of use (Bybee 1985, 2001). The tone mapping pattern in the verb *nada* must therefore have originated at a time when conjugation tone regularly mapped onto disjunct prefixes (i.e. it was a Word Level or Level 4 rule), and conjugation tone was also not deleted on **qe*, **ts'e*, or **ɂe*—in terms of the present proposal, this means the pattern likely dates from PNED or earlier.

The preceding examples have focused on *d/l*-classifier verbs, where the main empirical question is whether the underlying tone of *the* is realized on the surface or not. In Ø/*ɬ*-classifier verbs, we see a much more striking example of tone mapping with *he* and *ts'e*: what I call an "empty morph" *de* is inserted in these forms, which acquires High tone from /the/, and *d* is lenited to *r* by a regular phonological process intervocalically. This can be seen in the verb *heɬchëth* 'tie down' in (52), without a disjunct prefix, and the verb *xáaɬt'éth* 'cook' in (53), with a disjunct prefix.

(52) Perfective of *heɬchëth* 'tie down' (*ɬ*-classifier)

	singular	dual	plural
1st person	thıɬchëth	thílchëth	thílchëth
2nd person	thɻɬchëth	thuɬchëth	thuɬchëth
3rd person	theɬchëth	**heréɬ**chëth	**heréɬ**chëth
Impersonal:	**ts'eréɬ**chëth		

(53) Perfective of *xáaɬt'éth* 'cook' (*ɬ*-classifier)

	singular	dual	plural
1st person	xáthıɬt'eth	xáthílt'eth	xáthílt'eth
2nd person	xáthɻɬt'eth	xáthuɬt'eth	xáthuɬt'eth
3rd person	xátheɬt'eth	xá**heréɬ**t'eth	xá**heréɬ**t'eth
Impersonal:	xá**ts'eréɬ**t'eth		

The pattern described in (52) and (53) seems to apply to all *the*-conjugation, Ø/*ɬ*-classifier verbs in Taltsą́ot'ıné, based on my data collected so far (~100 full verb paradigms). Just as before, however, there is one exception, the verb *theda* 'sit'. The imperfective of this verb is given in (54).

(54) Imperfective of *theda* ‘sit’ (Ø/*ɬ*-classifier)

	singular	dual	plural
1st person	thıda	thíke	díltth’ı
2nd person	thı̨da	thuhke	duɬtth’ı
3rd person	theda	heke	heréɬtth’ı

In this verb, we would expect to find *heré* or *heréɬ* before the stem, in both the dual and plural. Instead, this verb is exceptional in two ways. In the dual, the prefix *the* is deleted entirely, leaving no trace, just as in *d*/*l*-classifier verbs. Thus the form for ‘they (2) are sitting’ is *heke*, not **heréke.* In the plural, the form *heréɬtth’ı* ‘they (pl) are sitting’ is what we would expect, except, in this form, the syllable *ré* is not, as in the previous examples, an empty morph—rather, this prefix appears to be part of the verb theme in the plural. Note that the prefix *de*- also occurs in the 1st and 2nd person plural forms, *díltth’ı* and *duɬtth’ı*, whose underlying forms can be analyzed as /de-íd-ɬ-tth’ı/ and /de-uh-ɬ-tth’ı/, respectively.

Just as was the case with the verb *nada* ‘go’, the verb ‘sit’ is a high frequency verb, whose irregular forms are likely to represent vestiges of an older pattern. I would like to suggest, in fact, that the thematic prefix *de*- which occurs in the plural forms of this verb is, in fact, the historical source of the empty morph *de/ré* which occurs in the 3pl/impersonal forms of the other verbs we have seen previously. That is, this prefix *de*- spread from the verb ‘sit’ to other *the*-conjugation Ø/*ɬ*-classifier verbs, by lexical diffusion. The question then becomes, *why* would this semantically empty prefix *de*- spread in this way? Recall that, in §5.1.1, we observed two seemingly contradictory descriptive generalizations: (1) the prefix *the* comes with a floating High tone to its left, and (2) the prefixes *he/ge/ke* and *ts’e* are unable to bear this tone. Insertion of the prefix *de*- then, as in Taltsą́ot’ıné, is a way to resolve this contradiction: *de* is inserted in between *he/ge/ke* and *the*, in order to support the tone. Thus, /he-de-the/ → *hedédhe* → *hedée* → *heré*. When *de* is not present, tone mapping does not occur: /he-the/ → *hedhe* → *hee* → *he*. This analysis will be developed in greater detail in §5.2.

One final question regarding this pattern of empty morph insertion is, how widespread is this pattern, in dialects of Dëne Sųłıné?[6] Cook twice cites the paradigm of the verb *nádlógh* ‘laugh,’ which contains an “irregular process” involving the presence of *de* in the 3rd person forms, both singular and plural, i.e. *náréhdlógh* ‘he/she laughed’ and *náheréhdlógh* ‘they laughed’ (Cook 2004: 158-9, 175). Although Cook does not indicate which dialect the forms are from, they appear to be from Black Lake, based on comparison with his other examples from that dialect. Since it is not clear, at present, how widespread this process of empty morph insertion is in other Dëne Sųłıné dialects, I will assume that it is a relatively recent innovation in Taltsą́ot’ıné and perhaps a few other neighboring dialects, i.e. not to be reconstructed for Proto Dëne Sųłıné, and certainly not PNED. Its presence in Taltsą́ot’ıné is important, however, because from there, this pattern spread into the Weledeh dialect of Dogrib as well, as will be described in §5.1.3.

[6] Add data from LeGoff 1889.

5.1.3 Weledeh: *whe* ~ *è* allomorphy

In this section, I will provide data on the behavior of *whe* (< **the*) conjugation in Weledeh, a dialect of Dogrib spoken by the Yellowknives Dene First Nation, who are traditionally bilingual in both this dialect of Dogrib, as well as the Taltsą́ot'ıné dialect of Dëne Sųłıné, as are many elders to this day. In Weledeh, we observe an alternation between the full form of the conjugation marker, *whe*, and a reduced form, *è*, which occurs in certain morphological environments. I call these morphological environments because I will provide evidence that, in the present-day Weledeh language, the choice between *whe* and *è* is morphologically controlled, and these two forms must be regarded as separate, lexically listed allomorphs. Of these two, *whe* is the default form, and *è* occurs in under a specific set of circumstances. Specifically, the è allomorph is chosen in:

(a) the 1st person plural and 3rd person dual/plural forms of Ø/*h*-classifier verbs;
(b) for verbs of all classifiers, whenever object agreement is present;
(c) for some speakers, in all inceptive forms.

We will begin with *d/l*-classifier verbs. An example of a *d*-classifier, *whe*-conjugation verb is the verb *edze* 'shout (for one's self)', while an *l*-classifier *whe*-conjugation verb is *nàzè* 'hunt'. These are given in (55) and (56).

(55) Perfective of *edze* 'shout (for one's self)' (*d*-classifier)

	singular	dual	plural
1st person	whehdze	whìdze	**ts'eh**dze
2nd person	whenedze	whahdze	whahdze
3rd person	whedze	**geh**dze	**geh**dze

(56) Perfective of *nàzè* 'hunt' (*l*-classifier)

	singular	dual	plural
1st person	nàwhehzè	nàwhìzè	nà**ts'eh**zè
2nd person	nàwhenezè	nàwhahzè	nàwhahzè
3rd person	nàhzè	nà**geh**zè	nà**geh**zè

In Ø- and *h*-classifier verbs, on the other hand, we see *geè* and *ts'eè* in the 3du/pl and 1pl forms, respectively. This is illustrated using the verbs *ehmbe* 'boil' in (57), and *xàeht'è* 'cook' in (58).

(57) Perfective of *ehmbe* 'boil (if paying close attention)' (*h*-classifier)

	singular	dual	plural
1st person	whıhmbe	whìmbe	**ts'eè**hmbe
2nd person	whenehmbe	whahmbe	whahmbe
3rd person	whehmbe	**geè**hmbe	**geè**hmbe

(58) Perfective of *xàeht'è* 'cook (if paying close attention)' (*h*-classifier)

	singular	dual	plural
1st person	xàwhıht'e	xàwhìt'e	xà**ts'eè**ht'e
2nd person	xàwheneht'e	xàwhaht'e	xàwhaht'e
3rd person	xàwheht'e	xà**geè**ht'e	xà**geè**ht'e

The pattern for Ø/*h*-classifier *the*-conjugation verbs in Weledeh, in which we observe *geè* and *ts'eè* in the 3du/pl and 1pl forms, respectively, is very similar to the Taltsą́ot'ıné pattern described in §5.1.2, which makes use of *heré* and *ts'eré*, respectively, in the cognate forms. Indeed, I propose that the Weledeh pattern was borrowed from Taltsą́ot'ıné, prior to tone reversal, i.e. *ts'eré* > *ts'erè* > *ts'eè*, the last sound change being a recent process of intervocalic *r*-deletion, which has been documented elsewhere (Ackroyd 1982). However, in Weledeh this pattern has been further re-analyzed, so that it is clearly no longer phonologically conditioned: whenever object agreement is present, the *è* allomorph is selected throughout the entire paradigm, even if object agreement does not immediately precede the conjugation marker in the underlying string (I do not have data, at present, on *the*-conjugation verbs with object agreement in Taltsą́ot'ıné). Some examples are given below of *whe*-conjugation verbs in Weledeh, both *d/l*- and Ø/*h*-classifier, without object agreement in (59), and the same verbs with object agreement in (60).

(59a) Perfective of *nàedlò* 'laugh' (*d*-classifier)

	singular	dual	plural
1st person	nàwhehdlò	nàwhìdlò	nàts'ehdlò
2nd person	nàwhenedlò	nàwhahdlò	nàwhahdlò
3rd person	nàwhedlò	nàgehdlò	nàgehdlò

(59b) Perfective of *nàelı* 'sew' (Ø-classifier)

	singular	dual	plural
1st person	nàwhıhɬı	nàwhìdlı	nà**ts'eè**lı
2nd person	nàwhenelı	nàwhahɬı	nàwhahɬı
3rd person	nàwhelı	nà**geè**lı	nà**geè**lı

(60a) Perfective of *nàʔeedlò* 'laugh at O' (*d*-classifier)

	singular	dual	plural
1st person	nà**ʔeè**hdlò	nà**ʔıì**dlò	nàʔe**ts'eè**dlò
2nd person	nà**ʔı̨ı̨**dlò	nà**ʔaà**hdlò	nà**ʔaà**hdlò
3rd person	nà**ʔeè**dlò	nàʔe**geè**dlò	nàʔe**geè**dlò

(60b) Perfective of *nàʔeelı* 'sew O' (Ø-classifier)

	singular	dual	plural
1st person	nà**ʔeè**hɬı	nà**ʔıì**dlı	nàʔe**ts'eè**lı
2nd person	nà**ʔɻ̨ɻ̨**lı	nà**ʔaà**hɬı	nà**ʔaà**hɬı
3rd person	nà**ʔeè**lı	nàʔe**geè**lı	nàʔe**geè**lı

In (59), the *è* allomorph is chosen only in the 3du/pl and 1pl forms of Ø/*h*-classifier verbs. In (60), however, *è* is used throughout the whole paradigm, in all persons and numbers, and in both Ø/*h*- and *d/l*-classifier verbs, when the unspecified object prefix *ʔe* is present. Note, also, that *ʔe* does not always occur in the immediate phonological environment of *whe ~ è*: this is true for the forms *nàʔets'eèdlò* 'we laughed at something' and *nàʔegeèdlò* 'they laughed at something': the prefixes *ts'e* and *ge* intervene between *ʔe* and the conjugation marker *è*. Furthermore, this choice of the *è* allomorph is not restricted to the unspecified object prefix *ʔe*, but occurs with all object agreement prefixes. This can be seen by comparing forms of the verb *nàehdì* 'buy, pay for something', both with and without object agreement, in (61a-b).

(61a) Perfective of *nàehdì* 'buy, pay for something' (*h*-classifier)—without object agreement

	singular	dual	plural
1st person	nàwhıhdì	nàwhìdì	nàts'eèhdì
2nd person	nàwhenehdì	nàwhahdì	nàwhahdì
3rd person	nàhdì	nàgeèhdì	nàgeèhdì

(61b) Perfective of *nàyeehdì* 'buy it, pay for it' (*h*-classifier)—with object agreement

	singular	dual	plural
1st person	nàweèhdì	nàwıìdì	nàwets'eèhdì
2nd person	nàwɻ̨ɻ̨hdì	nàwaàhdì	nàwaàhdì
3rd person	nàyeèhdì	nàyegeèhdì	nàyegeèhdì

To summarize, the choice between the two allomorphs, *whe* and *è*, is morphologically rather than phonologically controlled in Weledeh. *whe* is the default allomorph, while *è* is selected in the 3rd person dual/plural and 1st person plural of Ø/*h*-classifier verbs, as well as whenever object agreement is present, and (for some speakers) in inceptive verbs as well (not shown here). Although the choice of allomorphs is morphologically conditioned, it is also clearly related—in those verbs without object agreement—to the Taltsą́ot'ıné pattern described in the previous section, in verbs without object agreement. That is, *whe* in Weledeh occurs where *the* occurs in Taltsą́ot'ıné, and similarly *è* corresponds to *ré*. Thus, a pattern that was phonologically conditioned in a dialect of Dëne Sųłıné (High-marked) was borrowed into a dialect of Dogrib (Low-marked), was reanalyzed as a morphological pattern, and then extended to other morphological domains. The question is, why was the *whe ~ è* alternation re-analyzed as morphological in Weledeh? In general, we can expect a phonological pattern to be re-analyzed as morphological either when it becomes too opaque, or its conditioning environment ceases to be phonologically natural. I suggest that, in Weledeh this alternation ceased to be phonologically natural as soon as the tones reversed, from High-marked to Low-marked: empty

morph insertion, as described in §5.1.2, is natural only in a High-marked system, but not a Low-marked system. We will see why in the formal analysis in §5.2.

5.2 Analysis: iambic feet and tone reversal

In this section, I will provide the outlines of a formal analysis of the behavior of *the*-conjugation and tone following the prefixes **qe*, **ts'e*, and **ɾe* in NE Dene languages—I call this a sketch, because there are many dialects, especially of Dëne Sųłıné, for which complete data on *the*-conjugation are not available at present, and thus certain details of the present proposal must be regarded as tentative, until more data become available. Nevertheless, I believe it is possible to make some basic descriptive generalizations, based just on the dialects I have examined. Recall the summary of the data in (47), repeated in (62).

(62) Behavior of *the* following *qe, ts'e,* and *ɾe* in NE Dene languages

	Slave, Dogrib (Behchokǫ̀ dialect)	**Dogrib (Weledeh dialect)**	**Taltsą́ot'ıné**
Ø/ɬ-classifier	/ge-whe/ → ge /ge-fe/ → ge /ge-the/ → ge etc.	/ge-whe/ → geè	/he-the/ → heré
***d/l*-classifier**	/ge-whe/ → geh /ge-fe/ → geh /ge-the/ → geh etc.	/ge-whe/ → geh	/he-the/ → he

If we restrict our focus momentarily to the Ø/ɬ-classifier verbs, we can formulate a set of descriptive generalizations about Slave, Dogrib, and Taltsą́ot'ıné in terms of three very informally stated "constraints," as shown in (63). These "constraints" are intended only to provide a very general overview of the analysis, and should not be taken literally as OT constraints.

(63) Generalizations about *the* stated as constraints.

	No tone on *qe, ts'e, ɾe* (i.e. **qé, *ts'é, *ɾé*)	**Preserve the underlying tone of *the***	**Don't epenthesize prefixes.**
Slave, Dogrib (Behchokǫ̀ dialect): /ge-the/ → ge	✓	*	✓
Taltsą́ot'ıné: /he-the/ → heré	✓	✓	*

The first "constraint" prohibits the prefixes *qe* (3rd person plural subject), *ts'e* (impersonal subject) and *ɾe* (unspecified object) from bearing High tone. We see that all of the dialects in our survey obey this constraint, which suggests that the constraint was already present

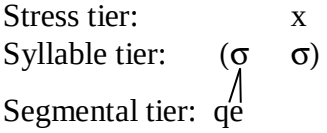
in Proto Northeast Dene, and perhaps earlier, since this restriction has also been observed outside the immediate NE Dene sub-group, in Sekani (Hargus 1988). Regarding the other two constraints, however, there is variation among languages and dialects. In Slave, as described by Rice, and Dogrib (Behchokǫ̀ dialect) as described by Ackroyd, the tone of the *the/fe/whe* conjugation marker is deleted, which violates a constraint on preserving conjugation tone. On the other hand, in Taltsą́ot'ıné, as well as some other dialects of Dëne Sųłıné, conjugation tone is preserved in 3pl and impersonal forms, but at the expense of epenthesizing an empty morph *de* or *re*, which is not part of the verb theme. Thus, "epenthesis" in this context is not true phonological epenthesis, but epenthesis at the morphological level: an extra prefix is present in the underlying string in certain verb forms, which is not part of the verb's lexical entry, and which is also not present in other related forms of the same paradigm. This morphological epenthesis is, however, phonologically motivated, in that it provides a syllable which is a suitable host for conjugation tone, which *qe* is not. Thus, Dogrib (Behchokǫ̀) and Slave avoid epenthesis by deleting conjugation tone, while Taltsą́ot'ıné does the opposite—the two constraints are thus conflicting and complementary.

5.2.1 Deletion of conjugation High tone

In formalizing these intuitions more precisely, the greatest uncertainty surrounds the issue of the *segmental* portion of the *the*-conjugation marker. Note that, in the examples in (63), the segmental portion of *the* is deleted. Historically, this happened via an intervocalic voicing process, i.e. *ethe* > *edhe* > *ee* > *e*. In general, *the* is deleted, through this process, in all of the daughter languages following conjunct prefixes as well as *qe*, *ts'e*, and *ʔe*, but is retained, as voiceless *the/fe/whe*, following disjunct prefixes or other pronominal object prefixes. What complicates this picture is that, while all of the daughter languages seem to have undergone this intervocalic fricative voicing and deletion process, the reconstruction of mobile pitch accent in PNED, to be developed in §6.0, requires that *the* have still been fully syllabic, of the shape CV, in order to derive the correct syllable count for this rule. Thus in Proto Northeast Dene, intervocalic fricative voicing and deletion had not yet applied. What makes the formalization of the patterns in (63) difficult is that we do not know in what period, exactly, this process of empty morph insertion arose, and whether or not intervocalic *th* had already voiced and deleted at that time. In what follows, I will construct derivations in which *the* is still fully syllabic in all forms, at the time that tone deletion and/or empty morph insertion apply, as these allow for the simplest and most transparent phonological derivations, even though the main points of my analysis in no way depend on this assumption.

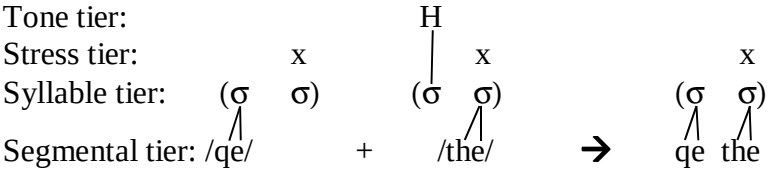
In my analysis, the "constraint" that High tone does not appear on *qe*, *ts'e*, or *ʔe* is expressed as a representation, namely, that these prefixes come pre-associated to their own iambic foot. This proposal is very similar to the proposal I make for the prefix *the* itself, as in (46), except, in the case of *qe*, *ts'e*, and *ʔe*, these prefixes are linked to the *weak* position of the foot. Stated differently, one could say that they are lexically *un*-stressed. The representation I propose for the prefix **qe* in PNED is given in (64).

(64) Representation of **qe* in PNED



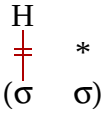
At this point, it is apparent that the representations of *qe/ts'e/ɂe*, on the one hand, and *the*, on the other, are actually very much compatible: they both belong to an iambic foot, *qe/ts'e/ɂe* must appear in weak position, while *the* must appear in strong position. That being the case, it should be no problem to combine the representation of *qe* in (64) with the representation of *the* in (46), through *unification*, as is used in syntactic theories such as HPSG and LFG (Sells 1995, Nordlinger 1997). This procedure is illustrated in (65) (though the actual derivation is somewhat more complicated—see (68) below).

(65) Lexically pre-specified prosody and unification



The one fact which remains unexplained regarding the unification procedure in (65) is the role of tone: the High tone which is lexically specified in the input of *the* deletes in the output. Why should this be? I propose a rule which deletes High tone in the weak position of an iambic foot. This rule is stated in (66).

(66) High tone deletion rule



"A High tone is deleted in the weak position of an iambic foot."

This rule follows from general principles of prosodic typology: High tone attracts stress, while stress attracts High tone (Tuttle 1998, Gordon 1999, DeLacy 2002). Thus, the existence of the High tone deletion rule is key evidence for the claim that Proto Northeast Dene was tonal and High-marked, since this rule only makes sense in a High-marked system: in a Low-marked system, it would actually be preferable to keep Low tone in unstressed position, i.e. a (Low-High) iambic foot would enhance the prominence of the stressed syllable. Such a rule is also unlikely to exist in a phonation-based system since, to my knowledge, creaky voice phonation does not attract stress.

Recall that all three of the morphemes which are forbidden to bear High tone, *qe, ts'e,* and *ɂe*, belong to the Outer Stem Level, or Level 3: *qe* and *ts'e* are in position 7, while *ɂe* is in position 6 (Rice 1989). Thus before proceeding with a derivation, which illustrates the High tone deletion rule, we should compare the behavior of these prefixes with that of other prefixes in the same positions, to demonstrate that High tone deletion applies only in *qe, ts'e,* and *ɂe*, and not all prefixes at the Outer Stem Level. Consider the following paradigm from Slave, the perfective of the verb *ík'éh* 'shoot'.

(67) Perfective of *ík'éh* 'shoot' (Rice 1989: 540).

néwhıhk'é	'I shot you (sg)'
séwhenehk'é	'you (sg) shot me'
séhk'é	'he/she shot me'
néwhík'é	'we shot you (sg)'
séwhahk'é	'you (pl) shot me'
sekehk'é	'they shot me'

Let us contrast, as examples, the verb forms *séhk'é* 'he/she shot me' (perf) in (67), with the related form *kehk'é* 'they shot (O)' (perf) (cf. *sekehk'é* 'they shot me' (perf) in (67), and *dahkehk'éh* 'they shot in flying' (perf) in (48b)). These two verb forms, *séhk'é* and *kehk'é*, form a minimal pair: the High tone of *the*-conjugation maps onto *se*, but not *ke*, because the latter is lexically pre-specified as un-stressed. This contrast is illustrated in the derivation in (68), where I use the corresponding reconstructed PNED forms, **séthełq'é* and **qethełq'é* (it is necessary, for independent reasons, that *the* conjugation have been fully syllabic in PNED—see §6.0).

(68) Derivation of the forms **séthełq'é* 'he shot me' and **qethełq'é* 'they shot' in PNED

----------Inner Stem Level----------

	H | * (σ σ)	H | * (σ σ)
Input	/ the-ł-q'é/	/ the-ł-q'é/
Foot Construction	(theł.q'é)	(theł.q'é)
Output	H(theł.q'é)	H(theł.q'é)

----------Outer Stem Level----------

		* (σ σ)
Input	/se% H(theł.q'é)/	/qe% H(theł.q'é)
Tone Mapping	sé(theł.q'é)	qé(theł.q'é)
Foot Construction	(sé.theł)(q'é)	(qé.theł)(q'é)
High tone deletion	-----	(qe.theł)(q'é)
Output	(sé.theł)(q'é)	(qe.theł)(q'é)

Recall that the prefixes *qe* (3plS) and *ts'e* (impersonal subject) are located in position 7, while the object agreement prefixes, including *se* (1sgO), *ne* (2sgO) and *ɤe* (unspO) are located on position 6, all of which are added at the Outer Stem Level (Level 3). Thus, at the Inner Stem Level, conjugation High tone is not mapped onto either *se* or *qe*; rather, it is left as a floating tone in the output. Note also, that, at the Inner Stem Level, the lexically pre-specified iambic foot is over-written, and the lexical stress on *the* deleted. This is because the stem must be stressed, and *the* is adjacent to the stem. Since stress clash is not allowed stem stress takes precedence. Thus, in this instance, the lexically pre-specified prosody of *the* is largely over-

written at the Inner Stem Level, except for the High tone which remains as a floating tone in the output.

At the input to the Outer Stem Level, both inputs contain the foot (theɬ.q̲'é̲) preceded by the floating tone H. However, the inputs differ in one key property: the prefix *qe* is lexically pre-specified as belonging to the weak position of an iambic foot, while the prefix *se* is not. This predicts that *se* will be footed according to the normal prosodic rules of the language, while *qe* will be footed exceptionally, as necessary, to accommodate its lexically pre-specified prosody. More precisely, the footing of *qe* in this case is the exception to an exception: the normal prosody of the Outer Stem Level in PNED, just like all of the daughter languages, was left-to-right iambic (evidence for this comes, for example, from gamma lowering—§4.3.3). But because the prefix *se* acquires High tone as the result of tone-mapping, *sé*, it then attracts stress onto itself and heads its own trochaic foot. The prefix *qe* also acquires a High tone via tone mapping but, because it comes with its own lexically pre-specified iambic foot, it maintains its iambic prosody, and the High tone is subsequently deleted, as a result of the High tone deletion rule.

In the preceding discussion, I have argued that the reason that conjugation High tone does not map onto *qe*, *ts'e*, or *ʔe*, in PNED or in its daughter languages, is on account of a special lexical property of these prefixes. A very similar pattern has also been observed, however, in the Low-marked language Sekani (Hargus 1988). In Sekani, the cognate prefixes *ghə*, *ts'ə*, and *ʔə* also do not bear conjugation tone under most circumstances. However, Hargus states:

> "The prefixes *ʔə*, *ts'ə*, and *ghə* cannot simply be marked as impossible tone bearers (or perhaps analyzed as underlyingly linked to high tone) because conjugation tone does appear on the deictic subject prefixes if a direct object prefix other than *ʔə* occurs to the left of the deictic prefix" (Hargus 1988: 159).

Consider the form *sekehk'é* 'they shot me' in (67). If Slave followed the same pattern as Sekani, this form would be *sekéhk'é*—that is, the prefix *ke* (cognate with Sekani *ghə*) is preceded by another direct object prefix, *se*, and therefore *ke* would be allowed to bear High tone under these conditions. That the prefixes *ʔə*, *ts'ə*, and *ghə* in Sekani are not impossible tone-bearers I believe is a very important observation. However, in my view, this observation actually supports the claim that these three prefixes are lexically pre-associated to the weak position of a foot. Recall from §3.2.3 that, in a cyclic approach to phonology, the prosody of the input is generally maintained unless more affixes are added, in which case the input prosody is over-written. Recall also that, in a left-to-right iambic system, we expect the leftmost prefix to occur in prosodically weak position, and the next prefix to be in strong position, as part of a general alternating (weak-strong)(weak-strong) prosodic pattern. That being the case, if an extra prefix is added to the left of *qe* at the Outer Stem Level, doing so will over-write the lexically pre-specified prosody of *qe*, and place *qe* in prosodically strong position. I believe that this pattern—as described by Hargus for Sekani—was also true of Proto Northeast Dene. This is illustrated in (69), which adds the form **seqétheɬq'é* (reconstructed form of Slave *sekehk'é*, 'they shot me'), alongside the other two forms seen earlier.

(69) Derivation of **séthełq'é*, **qethełq'é*, and **seqéthełq'é*

----------Inner Stem Level----------

	H * (σ σ)	H * (σ σ)	H * (σ σ)
Input	/ the-ł-q'é/	/ the-ł-q'é/	/ the-ł-q'é/
Foot Construction	(theł.q'é)	(theł.q'é)	(theł.k'é)
Output	H(theł.q'é)	H(theł.q'é)	H(theł.k'é)

----------Outer Stem Level----------

		* (σ σ)	* (σ σ)
Input	/se% H(theł.q'é)/	/qe% H(theł.q'é)	/se%qe% H(theł.q'é)
Tone Mapping	sé(theł.q'é)	qé(theł.q'é)	se.qé(theł.q'é)
Foot Construction 1	(sé.theł)(q'é)	(qé.theł)(q'é)	se(qé.theł)(q'é)
Foot Construction 2	-----	-----	(se.qé)(theł.q'é)
High tone deletion	-----	(qe.theł)(q'é)	-----
Output	(sé.theł)(q'é)	(qe.theł)(q'é)	(se.qé)(theł.q'é)

The analysis in (69) implies a certain serialism even within a stratum, with respect to affixation and foot construction. In the form **seqéthełq'é* 'they shot me', after tone mapping has applied, first an iambic foot (qé.theł) is constructed, according to the lexically pre-specified prosody of /qe/ with *qé* in weak position (despite its High tone). This is just like in the form **qethełq'é*. However, the next step is to prosodify the prefix *se*. This creates a new iambic foot, (se.qé), which over-writes the previous foot, and puts *qé* into strong position. Because *qé* is stressed at the end of the derivation, when High tone deletion applies, this rule is blocked, and *qé* maintains its tone in the output.

In (69), I have suggested that a tone-mapping pattern which is observed in present-day Sekani also existed in PNED, even though Sekani is outside the immediate PNED subgroup as I have described it, and the reflex of **seqéthełq'é* in Slave, *sekehk'é*, does not show High tone on *ke*. Is there any evidence from the NE Dene languages themselves that tone-mapping was, historically, conditioned by cyclic foot construction? I believe there is. Recall the perfective paradigm of the verb 'go' in Taltsą́ot'ıné, in which, exceptionally, High tone maps onto a disjunct prefix, as well as onto the 3pl subject marker *he*, as shown in (70).

(70) Perfective of *nada* 'go to a specific place'

	singular	dual	plural
1st person	**ná**thıya	**ná**thít'as	**ná**thídel
2nd person	**ná**thɨya	**ná**thuht'as	**ná**thuhdel
3rd person	**ná**theya	na**hé**t'as	na**hé**del

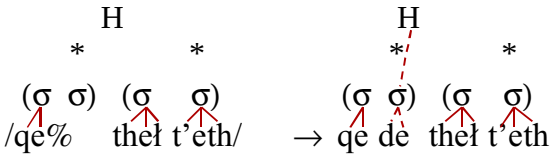
In Lexical phonology, it is widely accepted that when phonological processes first arise, they are fully general in the language, even applying across word boundaries, but over time

become restricted to smaller and smaller domains (Kiparsky 2013, Bermudez-Otero 2013). Thus earier, I suggested that the perfective of *nada*, a high-frequency verb, may represent a remnant of an earlier stage of the language, in which conjugation High tone could be realized on disjunct prefixes (formally, conjugation tone mapping was a Word Level process). That being the case, if the Word Level prosody of Proto Northeast Dene was left-to-right iambic, then the word-initial prefix *na* would have been in prosodically weak position, and the prefix *he* (*<qe) would have been in strong position, just as with **seqéthełq'é* in (69). This analysis, if taken to its logical conclusion, would suggest that, in a hypothetical *pre*-Proto Northeast Dene, conjugation High tone was deleted on *qe*, *ts'e*, and *ʔe* when they were word-initial or preceded by an even number of syllables, but not when these prefixes were preceded by an odd number of syllables—in other words, it was just a regular phonological process, which deleted High tone on unstressed syllables. The seemingly special prohibition of *ke/ge, ts'e*, and *ʔe* bearing conjugation High tone in NE Dene languages, then, was originally just a regular property of these prefixes in word-initial position, which was later lexicalized and generalized to all positions.

5.2.2 Empty morph insertion

Next we come to the process which I call "empty morph insertion". The precise formal representation of this process is problematic in a number of ways: it is not clear if the prefix *de*, which is inserted, is even a morph at all (i.e. an instance of the thematic prefix *de*), and, if it is, whether it is inserted by the phonological or morphological component of the grammar. A first attempt at representing this process is shown in (71), in which I derive a reconstructed earlier form **qedéthełt'eth* 'they cooked' (PERF), based on the modern Taltsą́ot'ıné form *herélt'eth*.

(71) Representation of empty morph insertion (Outer Stem Level)



The representation in (71) illustrates that the main function of *de*-insertion is to fill in an empty prosodic position. The prefix *qe* comes pre-associated to its own iambic foot, as we saw in §5.2.1, whose strong position is empty. At the same time, the conjugation marker *the* comes with a floating H tone to its left, which also lacks a segmental host. This H tone cannot attach to *qe*, because *qe* is unstressed, and H would be deleted in this position. Inserting *de*, therefore, solves both of these problems simultaneously: it fills in the iambic foot built on *qe*, and also supports the High tone.

While at an intuitive level this process is very simple and well-motivated, it is also theoretically problematic. If *de* is to be identified with the thematic/aspectual prefix *de* (i.e. inceptive subsituation aspect, cf. Rice 2000), it should be noted that *de* is located in position 9 (Rice 1989), which makes it an Inner Stem Level, or Level 2 prefix. *qe, ts'e*, and *ʔe*, however, are Outer Stem Level, or Level 3 prefixes, in positions 7, 7, and 6, respectively. This *de*-insertion is therefore problematic, because it constitutes a counterexample to level-ordering: how could a Level 3 prefix condition the insertion of a Level 2 prefix? Furthermore, how could the presence of a morpheme be conditioned by phonology at all? The idea of morph-insertion is problematic even in OT, since it is usually assumed that the input consists of a string of morphemes, and there are no constraints on inputs (Richness of the Base—Prince & Smolensky

1993). Here, however, it seems that the input string itself is somehow influenced by prosodic structure. Thus, one way or another, the process of *de*-insertion involves some sort of look-ahead: even if level-ordering were eliminated, it seems that the morphology is looking ahead to the phonology, to determine which morphemes will go into the input string.

One possible solution, which might seem to solve the level-ordering problem, must be excluded immediately—namely, to treat *de* as a Level 3 (Outer Stem Level) prefix, added at the same level as *qe*. That is, *de*-insertion should not be regarded as a case of infixation, or "endocyclicity" (Hyman 2002). The reason for this is that, although the presence of absence of *de* is conditioned by *qe*, *de* also undergoes Level 2 (Inner Stem Level) phonology. Specifically, when we look at data from the modern, daughter languages, we see that *de* conditions intervocalic voicing and deletion of *the* (i.e. *ethe* > *edhe* > *e*; or, *ethe* > *edhe* > *edh* > *e*) in a way that other conjunct prefixes do, but object agreement (Level 3) prefixes do not. Recall from previous examples that *the* does not undergo intervocalic voicing and deletion when preceded by a disjunct prefix (e.g. (70)), nor when it is preceded by an object agreement marker in position 6 (cf. (67)). However, conjunct prefixes always cause *the* to undergo intervocalic voicing and, usually, deletion in the daughter languages.[7] Consider the following data from Li (1946), based on data which he collected in Fort Chipewyan in 1928, which show the prefix *the* preceded by a conjunct prefix. Consonant voicing and vowel length are exactly as given by Li, although I have re-analyzed his underlying representations.

(72a) Perfective of *netéıh* 'lie down' (based on Li 1946: 413), Ø-classifier

nııtı̨	{ne-the-ı-tı̨}	'I lay down'
nı̨tı̨	{ne-the-ne-tı̨}	'you (sg) lay down'
nédhtı̨	{ne-the-tı̨}	'he/she lay down'
néthíítez	{ne-the-íd-tez}	'we lay down'
nuhtez	{ne-the-uh-tez}	'you (pl) lay down'
henédhtez	{he%ne-the-tez}	'they lay down'

(72b) Perfective of helze 'start to hunt' (based on Li 1946: 414), *l*-classifier

heszé	{he-the-s-l-zé}	'I started out hunting'
hı̨lzé	{he-the-ne-l-zé}	'you started out hunting'
héłzé	{he-the-l-zé}	'he/she started out hunting'
hílzé	{he-the-íd-l-zé}	'we started out hunting'
hułzé	{he-the-uh-l-zé}	'you (pl) started out hunting'
hehéłzé	{he%he-the-l-zé}	'they started out hunting'

The general pattern in Dëne Sųłıné dialects, following an inner conjunct prefix, is that *the* reduces to *h* (or a voiceless feature on neighboring *l*) in the 3rd person forms of *d*/*l*-classifier verbs, to *dh* or Ø, depending on dialect, in the 3rd person forms of Ø/*ł*-classifier verbs, and is deleted entirely in the 1st and 2nd person forms. The exact process by which this reduction takes place, in different languages and dialects in the NE Dene family, will be addressed in §6.2.2. For now, it is sufficient to note that this reduction generally happens only after inner conjunct

[7] An apparent exception to this is 1st person dual/plural forms, cf. (72a) *néthíítez*.

prefixes (Level 2), not outer conjunct prefixes (Level 3) or disjunct prefixes (Level 4). In Taltsą́ot'ıné, in forms like *heréłchët* 'they tied down' (PERF) and *xáheréłt'eth* 'they cooked' (PERF), the segmental portion of *the* has been deleted. Although I assume that this deletion is the result of a later process, which had not yet occurred in PNED (and probably also not at the time that *de*-insertion applied), this deletion process shows that *de* must be treated as an inner conjunct (Level 2) prefix. Therefore, what we have is a true counterexample to level ordering: the Level 3 prefixes *qe, ts'e,* and *ɂe* condition the presence of a Level 2 prefix, *de*. That this conditioning is phonological, rather than morphological or semantic, makes this phenomenon additionally problematic, as discussed previously. Effectively, this looks like phonologically conditioned morphology combined with a level-ordering paradox.

The only way around this problem, in a Lexical Phonology framework, is to allow for optionality at the Inner Stem Level, after which the Outer Stem Level phonology acts as a filter. That is, at the Inner Stem Level, there are two derivations: one with *de*, and the other without *de*; subsequently, at the Outer Stem Level, the derivation without *de* crashes, with no output. We will use as an example the Taltsą́ot'ıné form *heréłchët* 'they tied down', which I will reconstruct as **qedéthełkyëth* at the time the process applied[8]. The two (parallel) derivations of this form are given in (73).

(73) Derivation of **qedéthełkyëth*, with or without *de*

----------Inner Stem Level----------

	H | * | (σ σ)	H | * | (σ σ)
Input	/de- the-łkyëth/	/ the-łkyëth/
Tone Mapping	dé.theł.kyëth	theł.kyëth
Foot Construction	(dé.theł)(kyëth)	(theł.kyëth)
Output	(dé.theł)(kyëth)	H(theł.kyëth)

----------Outer Stem Level----------

	* | (σ σ)	* | (σ σ)
Input	/qe% (dé.theł)(kyëth)/	/qe% H(theł.kyëth)
Tone Mapping	-----	qé(theł.kyëth)
Foot Construction	(qe.dé)(theł.kyëth)	(qé.theł)(kyëth)
High Tone Deletion	-----	*****CRASH*****
Output	(qe.dé)(theł.kyëth)	Ø

In (73), I have posited variation at the Inner Stem Level. There are two possible inputs: /de-the-ł-kyëth/ and /the-ł-kyëth/. In the input without *de*, the High tone of *the* remains as a floating tone in the output of the Inner Stem Level, whereas in the input with *de*, it is mapped onto *de*. The High tone then attracts stress onto this syllable *dé*, which heads its own trochaic

[8] I am reconstructing uvulars and velars (rather than velars and palatals, respectively) in these forms, following Krauss 1981, based on philological evidence from 18th century sources.

foot (see §6.2.2.2 for further evidence of trochaic footing in this context). At the Outer Stem Level, for the input with *de*, the derivation is very simple: although foot boundaries are displaced by the affixation of *qe*, the stressed and unstressed syllables remain in the same place: *dé* goes from being the head of a trochaic foot, to an iambic foot, but still retains its stress and High tone. For the input without *de*, however, a different scenario obtains. The derivation proceeds very much as in (68) and (69). The only difference is that, at the point of the derivation where High tone deletion would apply, the derivation crashes, resulting in a null output. Thus, while the Inner Stem Level generates optionality, the Outer Stem Level acts as a filter, allowing only one derivation to make it to the surface, while the other crashes and leaves a null output. Such derivations also have an analogue in OT, where, for example, the constraint MAX(TONE) could be ranked above MPARSE, so that a null output would be preferable to deletion of High tone (McCarthy & Wolf 2005).

While the preceding analysis works formally, it does raise a number of questions. If a semantically empty *de* is present optionally in the input, for 3du/pl and impersonal forms of Ø/*ɬ*-classifier *the*-conjugation verbs, why is it not optionally present in other forms as well? This analysis seems to predict that there should be doublets of numerous verb forms, both with and without a semantically empty thematic prefix. If such doublets are not found, then what rule (or constraint) is responsible for filtering them out? While these problems may be solveable in a formal sense, it is difficult to escape the intuition that, at some level, some kind of look-ahead is involved with *de*-insertion, and so this process does seem to present a real challenge to level-ordering in phonology.

5.2.3 Conjugation vowel deletion in *d/l*-classifier verbs

The discussion of *de*-insertion in §5.3.2 was focused entirely on Ø/*ɬ*-classifier verbs because, in Taltsą́ot'ıné, *de*-insertion occurs only in these verb classes. However, this raises the question, what happens in the 3rd person dual/plural and impersonal forms of *d/l*-classifier verbs? In this regard, Taltsą́ot'ıné is unique and exceptional, in that the prefix *the* is deleted without a trace in these forms, either tonal or segmental. In all other dialects of the NE Dene languages, in the 3rd person singular and impersonal forms of Ø/*ɬ*-classifier verbs, *the* is reduced to a syllable-final voiceless fricative: either *th*, as reported by LeGoff (1889) and Li (1946) for Dëne Sųłıné, or *h*, as reported by Rice (1989) for Slave, Ackroyd (1982) for Dogrib, and Cook (2004) for modern Dëne Sųłıné dialects. These patterns are summarized again in (74).

(74) Behavior of *the* following *qe, ts'e,* and *ɂe* in NE Dene languages

	Slave, Dogrib (Behchokǫ̀ dialect)	**Dogrib (Weledeh dialect)**	**Taltsą́ot'ıné**	**Other DS dialects (LeGoff 1889, Li 1946, Cook 2004)**
Ø/ɬ-classifier	/ge-whe/ → ge /ge-fe/ → ge /ge-the/ → ge etc.	/ge-whe/ → geè	/he-the/ → heré	/he-the/ → hedédh, hedé /he-ne-the-ɬ/ → henéɬ
***d/l*-classifier**	/ge-whe/ → geh /ge-fe/ → geh /ge-the/ → geh etc.	/ge-whe/ → geh	/he-the/ → he	/he-the-l/ → heɬ /he-the-d/ → heth, heh

The topic of this section is the reflex of underlying /the/ in all of the other dialects, where it surfaces as syllable-final *th* or *h*. The voicelessness of these consonants *th* and *h*, can be explained by rule ordering. That is, voicing of *th* to *dh* occurred intervocalically, and, in these forms, the vowel of the prefix *the* deleted before intervocalic voicing had a chance to apply. So the sequence of sound changes was *ethe* > *eth*, rather than *ethe* > *edhe*. But *why* would the vowel of *the* delete only in these forms, i.e. in *d/l*-classifier verbs? A solution to this problem was noted very early on by Krauss (1969), who proposed, very much in the same spirit as the present analysis, that when these classifiers were syllabic, **de* and **le*, they triggered vowel syncope of the **se (>the)* conjugation marker, by altering the overall syllable count of the word.

> "Another phenomenon related to, and explained by the syllabicity of the də classifier is the voicelessness and desyllabification of the reflex of an immediately preceding s-perfective prefix sə-, by a syncope rule V-sə-də-C > V-s-də-C (where C is a stem-initial consonant), after which the voicing rule does not operate on -s-. With zero classifier, on the other hand, the voicing operates instead, thus V-sə-C > V-zə-C, in languages with voiceable s: Navaho sıtį́ (< sə-te-n) *he's prone,* ǯıztį́ (kw'ə-sə-te-n) *he* (4th) *is prone* (cf. Eyak sə-the-ł *he's prone,* k'u-sə-te-ł *someone is prone*), Chipewyan θetı *he's prone*, néδtı (<nə-sə-te-n, Navajo ne˙ztį́) *he lay down*" (Krauss 1969: 55).

This proposal is almost certainly correct, regarding the historical origins of vowel syncope in **s*-conjugation, *d/l*-classifier verbs. The question, however, is when, exactly this syncope process applied, and how it should be formally characterized. It is clear, first of all, that this particular syncope process cannot be derived in the synchronic phonology of any of the modern NE Dene languages. We established in §4.3 that, while the *d*- and *l*-classifiers were syllabic in PNED, i.e. **de* and **le*, they are no longer syllabic in the modern NE Dene languages, either on the surface or underlyingly. Thus for the modern languages, it is necessary to posit two lexially listed allomorphs for *the*: a reduced allomorph, *th*, which occurs in the 3rd person and impersonal forms of *d/l*-classifier verbs, and the full form, *the*, which occurs elsewhere, both of which are associated with a floating tone to their immediate left. A formal representation of these two allomorphs, using LFG notation (Bresnan 2001, Dalrymple 2001) is given in (75).

(75a) Lexical entry for *th* (in 3du/pl and impersonal forms)

H : (↑ SITUATIONASPECT) = ACCOMPLISHMENT
th (↑ VOICE) =$_c$ MIDDLE
((↑ SUBJ) PERS) =$_c$ 3 ∨ IMPERSONAL

(75b) Lexical entry for *the* (elsewhere)

H
|
(σ σ): (↑ SITUATIONASPECT) = ACCOMPLISHMENT
*
|
the

The above representations assume that the conjugation marker *the* represents accomplishment situation aspect (Rice 2000: 251-260) and that the *d*- and *l*-classifiers represent middle voice (Rice 2000: 126-170). The analysis in (75), based on morphologically conditioned

allomorph selection, replaces an earlier analysis in Jaker (2012), which claimed that reduction of *whe* to *h* in Weledeh was conditioned by a phonological rule called *trochaic syncope* (Jaker 2012: 499)—this analysis is untenable outside of Weledeh, however, for reasons mentioned above. The representation of the reduced allomorph *th* in (75a) describes a dialect in which *th* occurs in all 3rd person and impersonal forms, even 3rd person singular forms word-initially, as in Slave, as shown in (76). However, the exact set of morphological environments in which the reduced allomorph occurs can and does very between dialects. In Taltsą́ot'ıné, for example, the special allomorph occurs only in the 3du/pl and impersonal forms, and its phonological form is Ø.

(76a) Perfective of *hedluh* 'become helpless from cold', *d*-classifier (Rice 1989: 528-529)

whehdlu	'I became helpless'
whı̨dlu	'you (sg) became helpless'
hehdlu	'he/she became helpless'
whídlu	'we became helpless'
whahdlu	'you (pl) became helpless'
kehdlu	'they became helpless'
ts'ehdlu	'one became helpless'

(76b) Perfective of *helú* 'net, snare', Ø-classifier (Rice 1989: 536-537)

whılú	'I snared'
whenelú	'you (sg) snared'
whelú	'he/she snared'
whídlú	'we snared'
whalú	'you (pl) snared'
kelú	'they snared'
ts'elú	'one snared'

The *d*-classifier form *hehdlu* 'he/she became helpless from cold' is especially revealing, especially when contrasted with the Ø-classifier form *whelú* 'he/she netted, snared'. It is not possible to analyze the initial *he* in this form as an affix or imperfective prefix (cf. Hargus & Tuttle 1997), because this *he* does not occur in other forms of the same paradigm. Therefore, *he* must be an epenthetic "peg syllable". On the other hand, if the underlying representation of this form were /whe-d-lu/, epenthesis would be unmotivated, since the underlying string is already disyllabic. Therefore, it must be that *h* is a special allomorph of *whe/the* used in this form, such that the underlying form is /h-d-lu/, to which *he* is added to satisfy a two-syllable word minimality requirement. Thus, in the case of Slave, it appears that *h* is an allomorph of *the/fe/whe* used in all 3rd person forms of *d/l*-classifier verbs, with no reference to number.

Thus far we have established that the alternation between the full form *the* and the reduced form *th* or *h* in the modern NE Dene languages is conditioned morphologically, not phonologically. On the other hand, as explained in the Krauss quote above, it was originally phonologically conditioned, by the extra syllable contributed by the **de* and **le* classifiers. The question now becomes: was the *the* ~ *th* alternation phonologically conditioned in Proto

Northeast Dene? At first glance, the answer would seem to be yes, since we have already established, in §4.3, that the classifiers were still syllabic at this stage of the language. However, upon closer examination, problems emerge. Recall also that, in PNED, just as in the modern daughter languages, the iambic lapse rule targets the second in a sequence of two unstressed syllables. Now consider the two hypothetical sequences in (77), where "STEM" stands for any verb stem.

(77) Syncope of *the* in PNED?
a. *de*-classifier: qe-the-de-STEM
b. Ø-classifier: qe-the-STEM

Assuming the representation I have argued for in this paper, (cf. (20)), in which *the* is lexically stressed, then there is no stress lapse in either (77a), which would be footed as (qe.the)(de.STEM). There is also no stress lapse in (77b), where *qe* comes pre-associated with its own iambic foot, and also puts *the* in stressed position, i.e. (qe.the)(STEM). Thus, under the prosodic analysis of PNED developed in this paper thus far, it is impossible to explain why the vowel of *the* would syncopate in *d/l*-classifier verbs, even at a time when the classifiers were syllabic **de* and **le*.

I conclude based on this not that Krauss's (1969) analysis is incorrect, but rather that this syncope happened at a still earlier period than Proto Northeast Dene. That is, the *the* ~ *th* alternation in PNED was already lexically listed allomorphy, similar to that described in (75). The syncope process described by Krauss (1969) must have occurred at a time when: a) main stress was fixed on the stem syllable, b) *the* (< *s) did not bear lexical stress, and c) a secondary stress fell on the word-initial syllable. Such a scenario is presented in (78).

(78) Prosodic structure at the time of *se* > *s* syncope
a. *de*-classifier: /qe-ʔse-de-stem/ → (qeʔ)se(de.STEM) → (qeʔs)(de.STEM)
b. Ø-classifier: /qe-ʔse-stem/ → (qeʔ)(se.STEM)

Can this state of the language be identified with Proto-Dene? Krauss further states,

> "To return to the first syncope rule V-sə-də-C > V-s-də-C, the reflex of the s-perfective prefix immediately preceding də classifier remains voiceless probably everywhere in Athapaskan: Chipewyan nahéθdja *he has returned*, Navaho náˑdeˑsʒá, Minto notaθdeyo < nɑ-təˑs-də-yɑ *he started off back*" (Krauss 1969: 56).

So it appears the answer is yes. Finally, note that, in order for (qeʔ) to constitute a foot by itself, it is necessary either that glottalization somehow add to syllable weight, or that the following *s* be geminated, so as to lengthen the preceding syllable, i.e. (qeʔs)(se.STEM)—the choice is not important for our present purposes. What is clear, however, is that the prosodic system of the most recent common ancestor of Dogrib, Slave, and Dëne Sųłıné, which I call Proto Northeast Dene, had already changed dramatically from Proto-Dene, such that morphophonemic alternations inherited from Proto-Dene could no longer be analyzed phonologically. This observation lends further support to an early date for tonogenesis in the NE Dene languages.

5.3 Summary

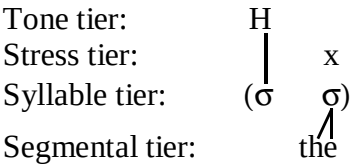
In this section, we have surveyed a number of complications that arise when the prefixes *qe*, *ts'e*, and *ɂe*, in positions 6 and 7, precede the *the*-conjugation marker. In *d/l*-classifier verbs, *the* is reduced to *h* in this environment in most NE Dene dialects, except in Taltsą́ot'ıné, where it is deleted entirely. This, I have argued, is a form of lexically listed allomorphy, which cannot be derived phonologically in any of the modern NE Dene languages, nor even in PNED. In *Ø/ɬ*-classifier verbs, we see a number of possible outcomes when *qe* and *ts'e* precede *the* in NE Dene languages. These different outcomes all serve to repair an essential contradition, which is that, while *the* wants to map a High tone on the vowel to its immediate left, *qe, ts'e*, and *ɂe* are lexically unstressed, which make them unattractive as High-tone bearing syllables. In Slave, as well as the Behchokǫ̀ dialect of Dogrib, this situation is repaired by deleting High tone on *qe, ts'e,* and *ɂe*. In Tɑltsą́ot'ıné, and at least some other dialects of Dëne Sųłıné, a semantically empty morph *de* is inserted between *qe/ts'e/ɂe* and *the*, in order to support the tone. This syllable is pronounced *ré* on the surface. Finally, in Weledeh, a process which is historically related to *de*-insertion occurs, where *whe* is replaced by a Low tone vowel *è* (< *rè* < *dè* < *dé*), in the same environments where *de*-insertion occurs in Taltsą́ot'ıné, plus other morphological environments (i.e. wherever object agreement is present) to which this allomorph has been analogically extended.

It is clear, as we saw in §5.1.3, that, in Weledeh, the *whe* ~ *è* alternation is conditioned morphologically, not phonologically, even though it is clearly historically related to an earlier, phonologically conditioned process. It is still uncertain at this point whether the *the* ~ *ré* alternation in modern Taltsą́ot'ıné is phonological or morphological, more data are needed. What is clear, however, is that such an alternation could only originate in a phonological system that was High-marked—that is, in which the reflex of Proto-Dene vowel constriction was stress-attracting, and was forbidden to appear on unstressed syllables. While Weledeh appears to have borrowed this process from Taltsą́ot'ıné, this process could only have been borrowed before tone reversal, under the assumption that morphological irregularities are unlikely to be borrowed (Dixon 1997: 22). At the same time, we know that widespread bilingualism and linguistic borrowing between Dogrib and Yellowknife speakers did not begin until after the peace treaty of 1823, between Edzo and Akaitcho (Weledeh Yellowknives Dene 1997). Therefore, tone reversal in Dogrib most likely occurred sometime in the 19th century.

6.0 Stress clash, syncope, and mobile pitch accent in PNED

In this paper, I have argued for a representation of the prefix *the* in Proto Northeast Dene in which this prefix is lexically pre-associated to the strong position of an iambic foot, and projects a High tone on the syllable to its immediate left. This representation is repeated in (79).

(79) Underlying representation of **the* in Proto Northeast Dene



That is, this prefix comes with an underlying prominence mis-match between the stress tier and the tone tier: it is accented on the stress tier, but *pre*-accented on the tone tier. In §4.0 I described the consequences of the underlying stress on *the*, and its consequences for the *ne* ~ *ɻ* alternation in 2nd person singular forms in NE Dene languages. In §5.0 we focused on the tonal properties of *the*: when preceded by the prefixes *qe*, *ts'e*, or *ʔe*, the High tone of *the* is sometimes deleted, or sometimes an epenthetic syllable *de* or *re* is inserted, depending on the dialect. In this section, we come to the most complicated of the three phonological processes involving *the*, what I call *pitch accent retraction* or *mobile pitch accent*. This is a process by which the High tone of *the* moves one syllable farther to the left than its underlying position, so that it is two syllables back from the vowel of the conjugation marker. This process is complex, because it requires us to refer simultaneously to both the tonal and stress properties of *the*, which interact in complex ways: stress attracts High tone, and High tone attracts stress, and both of these are often displaced from their underlying position in the course of the derivation.

6.1 Data on mobile pitch accent in Northeast Dene languages

In this section I will present data which show that the most recent common ancestor of Slave, Dogrib, and Dëne Sųłıné, Proto Northeast Dene, had a mobile pitch accent. By "mobile pitch accent," in this case, I mean that the High tone of the *the*-conjugation marker was able to move one syllable to the left of its underlying position, in order to align itself with the stress pattern of the language. Thus, High tone behaves as a "pitch accent" in this case, because its distribution is restricted by an independently existing metrical struture (Hyman 2009). Having demonstrated that this pitch accent aligns itself with metrical structure—that is, with the strong position of a foot—I will then conclude, on typological grounds, that this pitch accent must have consisted of *High* tone, not Low tone or glottalization, due to the natural affinity between High tone and stress (Tuttle 1998, Gordon 1999, DeLacy 2002).

The data in this section will focus on cases in which the conjugation marker *the* is preceded by a thematic aspectual or qualifier prefix in position 8 or 9 (e.g. *de*, *ne*), since it is in this environment that pitch accent mobility is most transparent in the daughter languages. The general pattern is that, in 3rd person and impersonal forms, conjugation High tone will fall on the thematic prefixes themselves (i.e. *dé*, *né*), whereas in 1st and 2nd person forms, the tone will move one syllable to the left. This process is most transparent in Slave, where conjugation High tone is allowed to appear on a disjunct prefix. In Dogrib and Dëne Sųłıné, the result of this process is that, in most cases, conjugation High tone appears on the theme/aspect prefix in the 3rd person forms, but is deleted in the 1st and 2nd person forms.

6.1.1 Slave

It seems that the most conservative system of morphophonemics of *the* is that described by Rice for Slave (1989: 528-547). As mentioned previously, the property of pitch accent mobility is best illustrated by those verbs which have a thematic/aspectual prefix *de* or *ne* in position 9. Two examples are given in (80) and (81) below.

(80) Perfective of *xadedzéeh* 'eat up pl. object', *d*-classifier (Rice 1989: 532).

	singular	dual	plural
1st person	x**á**dehdze	xad**é**wídze	xad**é**wídze
2nd person	x**á**dęędze	x**á**dahdze	x**á**dahdze
3rd person	xad**éh**dze	xaked**éh**dze	xaked**éh**dze
impersonal	xats'ed**éh**dze		

(81) Perfective of *dadetł'ų* 'tie up bundle', Ø-classifier (Rice 1989: 541).

	singular	dual	plural
1st person	d**á**detł'ų	dad**é**thítł'ų	dad**é**thítł'ų
2nd person	d**á**dętł'ų	d**á**datł'ų	d**á**datł'ų
3rd person	dad**é**tł'ų	daged**é**tł'ų	daged**é**tł'ų
impersonal	dats'ed**é**tł'ų		

In both (80) and (81), the disjunct prefix *xa* or *da* is underlyingly toneless (or Low toned, depending on one's analysis). Therefore, any High tone which appears on these prefixes must come from the conjugation marker *the*. The key observation to be made about these paradigms is the position of tone: High tone appears on the thematic prefix itself (*dé*) in the 3rd person and impersonal forms, but one syllable farther back (*dáde*, *xáde*) in the 1st and 2nd person forms. An exception to this are the 1st person dual/plural forms, *xadéwídze* and *dadéthítł'ų*, which are also problematic in other ways—see §6.2.2.

While the Slave paradigms in (80) and (81) are conservative in preserving the mobile pitch accent of PNED, they also appear to be innovative in at least two respects. The first concerns the segmental portion of the *the*-conjugation marker itself. In §6.2, I will argue that, in order to derive the correct stress pattern and syllable count at the time when pitch accent retraction applied, it is necessary that *the* have been fully syllabic in all forms at this stage of the language. For example, *xádahdze* 'you (pl) ate up' would have been **qádethahdze*—i.e. *th* had not yet undergone intervocalic voicing and deletion at the time when this process applied. Secondly, note that, in (81), the syllable final *h* of the 1st person singular and 2nd person dual/plural forms has been deleted, in *dádetł'ų* and *dádatł'ų*. This, I believe, is also an innovation, by analogy with the Ø/*h*-classifier perfectives of *gh* and *n*-conjugation verbs. In PNED, it is necessary that these consonants have still been present, syllable-finally, in order to derive the correct syllable weight—arguments will be presented in §6.2.

6.1.2 Dogrib

The Dogrib and Dëne Sųłıné data are similar to Slave, except that these languages have added one additional restriction, namely that conjugation tone may not map onto a disjunct prefix. Thus, in these languages, conjugation tone is present on *de* or *ne* in the 3rd person, impersonal, and sometimes 1st person dual forms, but is deleted in the remaining forms. Stated differently, in Slave, conjugation tone sometimes remains in its original position and sometimes moves one syllable to the left; in Dogrib and Dëne Sųłıné, rather than move leftwards, tone is deleted instead. Some examples from Behchokǫ̀ dialect are given in (82)-(84).

(82) Perfective of *dezè* 'start to hunt', *l*-classifier (Ackroyd 1982: 114)

dehzè	'I started to hunt'
dęzè	'you (sg) started to hunt'
dèhzè	'he/she started to hunt'
dèwìzè	'we (2) started to hunt'
dahzè	'you (pl) started to hunt'
ge**rèh**zè	'they started to hunt'
ts'e**rèh**zè	'we (pl) started to hunt'

(83) Perfective of *deʔe* 'start out by boat', Ø-classifier (Ackroyd 1982: 115)

deʔe	'I started out by boat'
nęʔe	'you (sg) started out by boat'
dèʔe	'he/she started out by boat'
dèwìt'e	'we (2) started out by boat'
daʔe	'you (pl) started out by boat'
ge**rè**ʔe	'they started out by boat'
ts'e**rè**ʔe	'we (pl) started out by boat'

(84) Perfective of *xàrehtǫ* 'teach', *h*-classifier (Ackroyd 1982: 115-116)

xàrehtǫ	'I taught'
xànęhtǫ	'you (sg) taught'
xà**rè**htǫ	'he/she taught'
xà**rè**wìtǫ	'we (2) taught'
xàrahtǫ	'you (pl) taught'
xàge**rè**htǫ	'they taught'
xàts'e**rè**htǫ	'we taught'

What we observe in the Dogrib data in (82)-(84) is that the segmental portion of the conjugation marker, which is *whe* in Dogrib, is deleted everywhere following a conjunct prefix. The tonal portion of the conjugation marker, which consists of Low tone in Dogrib, is present in the 3rd person singular, 3rd person dual/plural, 1st person dual, and 1st person plural forms—these have been highlighted in bold. Conjugation tone is deleted in the remaining forms. However, there is some uncertainty in how to interpret the data in (82), because (82) and (83) are verbs

without a disjunct prefix, while in (84) the disjunct prefix *xà* already has an underlying lexical Low tone. What is needed is an example in which *whe* is preceded both by a conjunct prefix and as well as a disjunct prefix which is underlyingly toneless (or High-toned), in order to tell whether conjugation tone is truly deleted in the 1sg, 2sg, and 2du/pl forms, or whether it moves one syllable leftwards, as in Slave.

6.1.3 Dëne Sųłné

In Dëne Sųłné there is also some uncertainty in the Dëne Sųłné data on *the*-conjugation, mainly because there is a great deal of dialect variation in this language while, at the same time, most of the data comes from a small number of dialects. In addition, none of the published sources on *the*-conjugation in Dëne Sųłné (Goddard 1912, Li 1946, Cook 2004) undertake an exhaustive description of *the* in all possible environments. Thus, the available data must be treated with some caution. At present, the most conservative Dëne Sųłné dialect, with respect to *the*-conjugation, appears to be that described by Fang-Kuei Li (1946), based on his 1928 fieldwork in Fort Chipewyan, Alberta. Some examples are given in (85)-(87). The tones and vowel lengths of the surface forms are exactly as reported by Li; the underlying representations, supplied to the right in curly braces { } are my own.

(85) Perfective of *netéıh* 'lie down' (based on Li 1946: 413), Ø-classifier

nııtı̨	{ne-the-ı-tı̨}	'I lay down'
nı̨tı̨	{ne-the-ne-tı̨}	'you (sg) lay down'
nédhtı̨	{ne-the-tı̨}	'he/she lay down'
néthíítez	{ne-the-íd-tez}	'we lay down'
nuhtez	{ne-the-uh-tez}	'you (pl) lay down'
he**nédh**tez	{he%ne-the-tez}	'they lay down'

(86) Perfective of *helze* 'start to hunt' (based on Li 1946: 414), *l*-classifier

heszé	{he-the-s-l-zé}	'I started out hunting'
hı̨lzé	{he-the-ne-l-zé}	'you started out hunting'
hélzé	{he-the-l-zé}	'he/she started out hunting'
hílzé	{he-the-íd-l-zé}	'we started out hunting'
hułzé	{he-the-uh-l-zé}	'you (pl) started out hunting'
he**hél**zé	{he%he-the-l-zé}	'they started out hunting'

(87) Perfective of *tunedį́* 'be drowned' (based on Li 1946: 414), *d*-classifier

tunesdą	{tu#ne-the-s-d-ną}	'I am drowned'
tunı̨dą	{tu#ne-the-ne-d-ną}	'you (sg) are drowned'
tu**néth**dą	{tu#ne-th-d-ną}	'he/she is drowned'
tu**né**thíídą	{tu#ne-the-íd-d-ną}	'we are drowned'
tunuhdą	{tu#ne-the-uh-d-ną}	'you (pl) are drowned'
tuhe**néth**dą	{tu#he%ne-th-d-ną}	'they are drowned'

In the example in (87), *tu* is a disjunct prefix, an incorporated noun meaning "water" in position 4. That being the case, it is clear that, in the dialect described by Li, conjugation High tone does not map onto a disjunct prefix, but rather is deleted in the 1sg, 2sg, and 2du/pl forms. However, the most interesting feature of Li's data is that he reports a voicing distinction in the 3rd person forms: *the* is reduced to a voiceless *th* in the 3rd person forms of *d/l*-classifier verbs (as discussed in §5.2.3), but surfaces as a voiced *dh* in the 3rd person forms of Ø/*ɬ*-classifier verbs. In the remaining forms, *the* is deleted intervocalically, by a process of fricative voicing followed by deletion. However, this classifier-conditioned voicing distinction is illuminating, in that it provides a clue into the exact process by which *the* was voiced and later deleted (§6.2.2). Finally, it is difficult to explain why *th* does not undergo intervocalic voicing and deletion in the 1st person dual/plural forms, e.g. *tunéthíídą* 'we are drowned' and *néthíítez* 'we lay down'. However, note that *th* does in fact delete in the 1du/pl form *hílzé* 'we started out hunting'. I suggest that forms such as *hílzé* are in fact historically older, and in forms such as *tunethíídą* and *néthíítez*, *th* has been restored analogically. We will return to the question of intervocalic fricative voicing and deletion in §6.2.2.

6.1.4 Summary of data

In both Dogrib and Dëne Sųłıné, there is some uncertainty as to whether conjugation tone—whether High in the case of Dëne Sųłıné, or Low in the case of Dogrib—can be realized on a disjunct prefix or not. In Dogrib, this is due to the particular choice of examples provided by Ackroyd, while in Dëne Sųłıné it is because there are many dialects for which we do not have data on *the*-conjugation. Nevertheless, it is clear that all three languages exhibit broadly the same pattern: when *the* is preceded by a conjunct prefix *de* or *ne*, the tone of *the* (whether High or Low) maps directly onto *de* or *ne* in the 3rd person, 1st person dual, and 1st person plural/impersonal forms. In the remaining forms, it either moves one syllable farther to the left, as in Slave, or is deleted, as in Dogrib and Dëne Sųłıné.

It is clear that the pattern in all three languages stems from a common source—that is, that the most recent common ancestor of all three languages, Proto Northeast Dene, had some kind of tonal mobility, i.e. mobile pitch accent. What I will argue in §6.2 is that this tone mobility served to align conjugation tone with stress. Since High tone is stress-attracting and vice versa, this particular pattern could only have arisen in a High-marked language. Since PNED was High-marked, and modern Dogrib is Low-marked, it follows that Dogrib has undergone tone reversal.

6.2 Analysis: stress clash and pitch accent retraction

In this section I will propose an analysis of the pitch accent retraction rule in PNED. In proposing such a rule, it is important to remember that language is constantly changing, and the state of the language I am calling "Proto Northeast Dene" is but a single point in time: many sound changes occurred between Proto-Dene and PNED (in particular, changes of a segmental nature), and many more changes occurred after the breakup of PNED into the three daughter languages. For present purposes, we are chiefly interested in reconstructing the *prosodic shapes* of PNED—that is, whether a particular prefix was of the shape C, CV, or CV, how many syllables were in a word, the position of main stress, etc. That being the case, there are two particular features of my reconstruction that should be noted at the outset. First, I assume that the *d-* and *l*-classifiers were still syllabic and of the shape CV at this stage of the language, just as in Proto-Dene, i.e. **de* and **le*. Arguments for this assumption were presented in §4.3. Second,

I assume that the *the*-conjugation marker was also always fully syllabic, of the shape CV, even following an inner conjunct prefix—in other words, is shape was always **the* (the only exception is the 3rd person forms of *d/l*-classifier verbs, where it is reduced to *th*). While we saw some evidence for this assumption in §4.3, the main evidence that *the* was always of the shape CV comes from the process of pitch accent retraction itself, that is, that it is impossible to derive the correct pattern and syllable count for pitch accent retraction to apply, unless *the* counted as an entire syllable.

That being the case, it is also true that in all three of the daughter languages—Dogrib, Slave, and Dëne Sųłıné, the **de* and **le* classifiers are reduced to *d* and *l*, and *the* almost always undergoes intervocalic voicing and deletion following a conjunct prefix. For example, /ne-the-ne-tı̨/ → *nı̨tı̨* in Dëne Sųłıné, as we saw in (85). Under my proposal, these developments happened independently in all three daughter languages, after the breakup of PNED, perhaps spreading across language boundaries by borrowing and diffusion. Nevertheless, the present-day surface forms of Dogrib, Dëne Sųłıné, and Slave must be accounted for somehow. Therefore, in §6.2.1 I will present a reconstruction of PNED proper, in which **de*, **le*, and **the* were of the shape CV, while in §6.2.2 I will explore the later developments of vowel syncope and intervocalic voiced fricative deletion, and their broader implications for the phonological system.

6.2.1 Reconstruction of PNED system

The reconstructed examples I will use in my analysis will be based off of the Slave examples from Rice (1989), as shown in (80) and (81). Reconstructed surface stresses are indicated by underlining, except in monosyllabic feet; foot boundaries are indicated by parentheses ( ).

(88) Perfective of **qádedezé* 'eat up pl. objects,' *de*-classifier (PNED, reconstructed)

	singular	dual	plural
1st person	(qá.de)(thes)(de.ze)	(qá.de)(thí.de)(ze)	(qá.de)(thí.de)(ze)
2nd person	(qá.de)(thı̨.de)(ze)	(qá.de)(thax^{w})(de.ze)	(qá.de)(thax^{w})(de.ze)
3rd person	(qa.déth)(de.ze)	qa(qe.déth)(de.ze)	qa(qe.déth)(de.ze)
impersonal	qa(ts'e.déth)(de.ze)		

(89) Perfective of **dadetł'ų* 'tie up bundle,' Ø-classifier (PNED, reconstructed)

	singular	dual	plural
1st person	(dá.de)(thes)(tł'ų)	(da.dé)(thí.tł'ų)	(da.dé)(thí.tł'ų)
2nd person	(dá.de)(the.ne)(tł'ų)	(dá.de)(thax^{w})(tł'ų)	(dá.de)(thax^{w})(tł'ų)
3rd person	da(dé.the)(tł'ų)	(da.qe)(dé.the)(tł'ų)	(da.qe)(dé.the)(tł'ų)
impersonal	(da.ts'e)(dé.the)(tł'ų)		

It should be noted that the position of stress and foot boundaries in (88)-(89) is not based on direct evidence from stress in any of the three daughter languages, but rather is inferred from morphophonemic patterns, i.e. vowel syncope and pitch accent retraction, which are observed in the daughter languages, and can thus be reconstructed for the proto-language. In addition, it should be noted that the evidence for the position of stress is generally more clear than evidence for the position of foot boundaries. A sequence of three syllables, whose stress pattern is weak-strong-weak, could be footed either as (weak-strong)weak, or weak(strong-weak). The former is

an iamb followed by an unfooted syllable, while the latter is an unfooted syllable followed by a trochee. For the most part, the analysis below depends on the position of stress rather than feet per se, although evidence for feet will be mentioned when appropriate (§6.2.2).

There are two major differences between the reconstructed paradigms in (88)-(89), and the Slave paradigms on which they were based in (80)-(81), aside from regular sound changes. The first difference is in the reconstructed form **qádethídeze* 'we ate up pl. objects' (perf), based off of the Slave form *xadéthídze*. In this instance, the form which I have reconstructed exhibits pitch accent retraction, while its Slave reflex does not. This is what the analysis predicts due to the extra syllable contributed by the **de*-classifier, which was still syllabic at this stage of the language. The same analysis predicts that, in Ø/*ɬ*-classifier verbs, pitch accent retraction in 1du/pl forms will not occur, e.g. **dadéthítɬ'ų* 'we tied up' (perf) in (89). The other major difference is that I have reconstructed the forms *dádethestɬ'ų* 'I tied up' and **dádethax^{w}tɬ'ų* 'you (pl) tied up', with syllable-final *s* and *xw*, whereas these are deleted in the Slave forms *dádetɬ'ų* and *dádatɬ'ų* respectively. The *s* and *x^{w}* in these reconstructed forms are necessary in order to achieve the correct syllable weight, which will yield the correct stress pattern, and thus the correct surface tone pattern. Another way of stating the issue is that, if we assume that the position of tone was related to syllable structure in a regular way in PNED, then the reflexes of the PNED forms in (88)-(89) in the daughter languages are not all perfectly regular: in some cases, there has been analogical leveling in the daughter languages. We will return to this issue again in the course of the analysis.

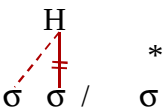
An overiew of my analysis of pitch accent retraction in PNED is given in (90), roughly working backwards from surface forms to the underlying forms.

(90) Overview of analysis of pitch accent retraction in PNED
a. Pitch accent retraction occurs wherever the syllable immediately preceding the thematic prefix *de* or *ne* is stressed, while *de/ne* itself is unstressed: (da.dé) → (dá.de).
b. This stress pattern occurs if and only if *the* itself is stressed.
c. *the* is stressed only when it is part of a heavy syllable (e.g. *thes, thax^{w}*) or when another syllable intervenes between *the* and the stem: *the.ne.tɬ'ų*.
d. *the* is unstressed whenever it is a light syllable immediately preceding the stem: (the.tɬ'ų)

In other words, whether or not pitch accent retraction occurs depends ultimately on whether or not *the* is stressed, at the point in the derivation when pitch accent retraction applies. In my presentation, therefore, we will also work backwards, in a sense: I will first present a series of Word Level derivations, which illustrate the environments in which pitch accent retraction does or does not apply, based on the surface stress pattern, and then I will show how that stress pattern was itself derived at earlier derivational levels (the Outer Stem Level and Inner Stem Level).

The first step is to define the pitch accent retraction rule itself. This is given in (91).

(91) Pitch Accent Retraction



"A High tone moves one syllable leftwards before a syllable bearing a level-1 gridmark."

This rule, in turn, is dependent on the foot construction rule or rules, i.e. the position of stress. I will not define these rules here as they are rather complicated. Briefly, however, the key observation is that surface stress in PNED seemed to follow a simple *alternating* stress pattern, with main stress on the stem, where a heavy syllable counts as two light syllables. Thus, this language could also be described by an alternating stress rule that makes no reference to feet (Gordon 2002), although some later sound changes seem to support the existence of feet (§6.2.2).

We will begin by deriving the Ø-classifier paradigm of **dadetɬ'ų* 'tie up bundle' in (89). Those forms which undergo the pitch accent retraction rule are derived in (92).

(92) Pitch accent retraction in Ø-classifier verbs

	----------Word Level----------		
Input	/da#(dé.thes)(tɬ'ų)/	/da#(dé.the)(ne.tɬ'ų)/	/da#(dé.thax^{w})(tɬ'ų)/
Foot Construction	(da.dé)(thes)(tɬ'ų)	(da.dé)(the.ne)(tɬ'ų)	(da.dé)(thax^{w})(tɬ'ų)
Pitch Acc. Retr.	(dá.de)(thes)(tɬ'ų)	(dá.de)(the.ne)(tɬ'ų)	(dá.de)(thax^{w})(tɬ'ų)
Output	(dá.de)(thes)(tɬ'ų)	(dá.de)(the.ne)(tɬ'ų)	(dá.de)(thax^{w})(tɬ'ų)

An explanation of the input foot structure posited (i.e. how it is derived at the Outer Stem Level), and its theoretical consequences, will be given at the end of this section. For present purposes, the derivation in (92) may be described informally as follows: the foot construction rule assigns alternating stresses from right to left, where a heavy syllable counts as two light syllables, and is insensitive to tone. Subsequently, where there is a mismatch between stress and High tone, the Pitch Accent Retraction rule moves High tone one syllable to the left, so that stress and tone coincide. Note that the reason why *the* is stressed in these forms is that it is either part of a heavy syllable, *thes* or *thax^{w}*, or another syllable intervenes between *the* and the stem, i.e. *thene.*

Next, we will derive those forms that do not undergo pitch accent retraction: the 3rd person singular, 3rd person dual/plural, and 1st person dual/plural forms (the impersonal form is just like the 3rd plural, and so will be omitted here).

(93) No pitch accent retraction in 3sg, 3du/pl, and 1du/pl forms of Ø-classifier verbs

	----------Word Level----------		
Input	/da#(dé.the)(tɬ'ų)/	/da#(qe.dé)(the.tɬ'ų)/	/da#(dé.thí)(tɬ'ų)/
Foot Construction	da(dé.the)(tɬ'ų)	(da.qe)(dé.the)(tɬ'ų)	(da.dé)(thí.tɬ'ų)
Pitch Acc. Retr.	-----	-----	-----
Output	da(dé.the)(tɬ'ų)	(da.qe)(dé.the)(tɬ'ų)	(da.dé)(thí.tɬ'ų)

In **de*-classifier verbs, the same rules apply, although the derivations will be slightly different for two reasons: 1) there is a special allomorph of *the*, *th*, that occurs in the 3rd person forms of **de/le*-classifier verbs (§5.2.3), which reduces the syllable count by one syllable, and 2) the **de*-classifier itself increases the syllable count by one syllable. The derivation of the 1sg, 2sg, and 2du/pl forms of **de*-classifier verbs, all of which undergo pitch accent retraction, are given in (94).

(94) Pitch accent retraction in **de*-classifier verbs

	----------Word Level----------		
Input	/qa#(dé.thes)(de.ze)/	/qa#(dé.thɻ)(de.ze)/	/qa#(dé.thax^{w})(de.ze)/
Foot Construction	(qa.dé)(thes)(de.ze)	(qa.dé)(thɻ.de)(ze)	(qa.dé)(thax^{w})(de.ze)
Pitch Acc. Retr.	(qá.de)(thes)(de.ze)	(qá.de)(thɻ.de)(ze)	(qá.de)(thax^{w})(de.ze)
Output	(qá.de)(thes)(de.ze)	(qá.de)(thɻ.de)(ze)	(qá.de)(thax^{w})(de.ze)

The derivation in (94) operates just as with Ø-classifier verbs: 1sg, 2sg, and 2du/pl forms exhibit pitch accent retraction. In general, the foot construction rule leaves stresses in the same place as in the input, even though the foot boundaries may be displaced between input and output. In the 3rd person and 1du/pl forms, however, some differences emerge between *de*-classifier and Ø-classifier verbs, as shown in (95).

(95) Unexpected pitch accent retraction in 1du/pl forms of **de*-classifier verbs

	----------Word Level----------		
Input	/qa#(déth)(de.ze)/	/qa#(qe.déth)(de.ze)/	/qa#(dé.thí)(de.ze)/
Foot Construction	(qa.déth)(de.ze)	qa(qe.déth)(de.ze)	(qa.dé)(thí.de)ze
Pitch Acc. Retr.	**-----**	**-----**	**(qá.de)(thí.de)(ze)**
Output	(qa.déth)(de.ze)	qa(qe.déth)(de.ze)	(qá.de)(thí.de)(ze)

In (95), we see that, unexpectedly, the analysis predicts that pitch accent retraction will also occur in the 1st person dual/plural forms of **de/le*-classifier verbs. Thus, in (95) the output form is **qádethídeze*, while the actual attested form in Slave is *xadéthídze* 'we ate up'. The Slave pattern is also true in Dogrib and Dëne Sųłıné: in none of the daughter languages does pitch accent retraction occur in 1st person dual/plural forms, in either *d/l*- or Ø/*ł*-classifier verbs. Does this mean that the analysis in (95) is incorrect? Note that the reason why pitch accent retraction occurs in this form is ultimately the presence of the *de*-classifier: the *de*-classifier adds an extra syllable between *thí* and the stem. Because there is no stress clash, *thí* (<*the-íd*) maintians underlying, lexically pre-specified stress, tone, and foot structure. This, then, creates the environment in which the Pitch Accent Retraction rule will apply. On the other hand, if the *de*-classifier were not syllabic, i.e. just *d*, then *thí* would be de-stressed to avoid stress clash with the stem, and pitch accent retraction would not apply.

This situation is roughly parallel to what we saw in §4.3.3, where the analysis predicted the form **gheneejɻ* in PNED, even though the actual forms in Dogrib and Slave are *ɣjɻ* and *yɻjɻ*, respectively—clearly not reflexes of **gheneejɻ*. In that case, the actual attested forms are the result of a later re-structuring, after the *d*- and *l*-classifiers ceased to be syllabic. Similarly here, the unexpected form **qádethídeze* indicates merely that the Pitch Accent Retraction rule continued to apply productively in NE Dene languages, even after the **de > d* and **le > l*. As soon as **de* ceased to be a syllable, the tone in **qádethídeze* would have returned to its underlying position: **qadéthídze*.

So far, I have explained the application, or non-application, or the Pitch Accent Retraction rule based on particular stress patterns which I assumed for the input to the Word Level, in the derivations in (92)-(95). In all of the forms we have examined, stressed and unstressed syllables remained in the same position, both in the input and output to the Word

Level; foot construction merely served to re-group syllables in some cases, i.e. weak(strong-weak) → (weak-strong)weak. Now, working backwards, we turn to the question of how those stresses got to be in the position where they are. Specifically, we will focus on a class of cases that may seem to contradict the earlier analysis of Outer Stem Level footing presented in §5.2. Recall that, at the Outer Stem Level, there is a rule of High tone deletion, whereby an iambic foot such as (qé.theł) → (qe.theł). However, in (92)-(95), we often saw inputs to the Word Level containing iambic feet such as (dé.thes), with a High tone on the first syllable. The question is, how are such inputs even possible? Why were these High tones not deleted at the Outer Stem Level, by the High tone deletion rule? This is illustrated in (96).

(96) Underapplication of the High Tone Deletion rule at the Outer Stem Level, PNED

	Before High tone deletion rule	**After High tone deletion rule**	**Expected**
Outer conjunct prefix, pre-associated to weak position of iambic foot (*qe, ts'e, ʔe*)	(qé.theł)	(qe.theł)	[same]
Other outer conjunct prefix (*se, ne*, etc.)	(sé.theł)	(sé.theł)	[same]
Inner conjunct, thematic prefix (*de, ne*)	(dé.thes)	(dé.thes)	*(de.thes)

In §5.2.1, we saw how, at the Outer Stem Level, High tone attracts stress, so that normally, with object agreement prefixes such as *se*, if the prefix bears High tone, it will head its own trochaic foot. This does not happen with *qe*, *ts'e*, and *ʔe*, because these prefixes come lexically pre-associated to the weak position of an iambic foot. Therefore, *qe*, *ts'e*, and *ʔe* undergo the High tone deletion rule, while the other prefixes do not. Puzzling, however, is the case of thematic prefixes such as *de* and *ne*, which are inner conjunct prefixes. We know that the pair of syllables (dé.thes) must be an iamb and not a trochee, i.e. stress must fall on *thes*, based on the data from pitch accent retraction we have seen in this section. Why, then, do forms such as these fail to undergo High tone deletion at the Outer Stem Level? I believe this can be explained by the Strict Cycle Condition (Kiparsky 1982). That is, conjugation High tone was already mapped onto *dé* at the Inner Stem level. Since no new prefixes are added to this form at the Outer Stem Level, it maintains its input prosody, both footing and tone. Thus, in this form, High tone deletion is blocked by the SCC. In the other forms, H was a floating tone that mapped onto a new prefix at the Outer Stem Level, and so the tone on these prefixes was "derived". In OT terms, we could say, informally, that the High tone on *dé* in (96) is an "old" tone, whereas the High tones on qé and *sé* are "new" tones, which could be referred to by different constraints on old and new iambic feet (McCarthy 2003). This analysis is formalized in (97) using the reconstructed forms **séthełq'é* 'he shot me' (PERF), **qethełq'é* 'they shot' (PERF), and **qádethesdeze* 'they ate up (pl. objects)' (PERF).

(97) Complete derivation of **séthełq'é, *qethełq'é,* and **qádethesdeze*

	----------Inner Stem Level----------		
	H | * (σ σ)	H | * (σ σ)	H | * (σ σ)
Input	/ the-(łq'é)/	/ the-(łq'é)/	/de-the-s-(de.ze)/
Tone Mapping	-----	-----	(dé.thes)(de.ze)
Foot Construction	(theł.q'é)	(theł.q'é)	(dé.thes)(de.ze)
Output	H(theł.q'é)	H(theł.q'é)	(dé.thes)(de.ze)
	----------Outer Stem Level----------		
		* (σ σ)	
Input	/se% H(the.łq'é)/	/qe% H(the.łq'é)/	/(dé.thes)(de.ze)/
Tone Mapping	sé(theł.q'é)	qé(theł.q'é)	-----
Foot Construction	(sé.theł)(q'é)	(qé.theł)(q'é)	**[blocked by SCC]**
High tone deletion	-----	(qe.theł)(q'é)	**[blocked by SCC]**
Output	(sé.theł)(q'é)	(qe.theł)(q'é)	(dé.thes)(de.ze)
	----------Word Level----------		
Input	/(sé.theł)(q'é)/	/(qe.theł)(q'é)/	/qa#(dé.thes)(de.ze)/
Foot Construction	-----	-----	(qa.dé)(thes)(de.ze)
Pitch Acc. Retr.	-----	-----	(qá.de)(thes)(de.ze)
Output	(sé.theł)(q'é)	(qe.theł)(q'é)	(qá.de)(thes)(de.ze)

What we see in (97) is that the reason that the High tone on the thematic conjunct prefix *dé* is not deleted at the Outer Stem Level is that, in this form, both Foot Construction and the High tone deletion rule are blocked at the Outer Stem Level by the Strict Cycle Condition. That is, the iambic foot (dé.thes) occurs in a non-derived environment, because no new prefixes are added to this form at the Outer Stem Level. On the other hand, the other two forms, *séthełq'é* 'he shot me' (PERF) and *qethełq'é* 'they shot' (PERF) do add new prefixes at the Outer Stem Level, *se* and *qe*, respectively, and so the derivation of these forms proceeds normally, as described in §5.2.1.

One final thing to note about the derivation in (97) is that, at the Inner Stem Level, in the foot (dé.thes), the High tone on *dé* does not attract stress: this form is still an iamb, not a trochee, and the syllable *thes* is stressed, as we can see from its effect on pitch accent retraction at the Word Level. Indeed, if one examines other forms in the reconstructed paradigms in (88) and (89), it is clear that the extra syllable *dé*, which in all forms in these paradigms bore High tone at the Inner Stem Level, has no effect whatsoever on the morphophonemics of *the* at the Inner Stem Level—for example, on whether or not /the-ne/ coalesce to *thę*. It seems, in fact, that the relationship between High tone and stress in Proto Northeast Dene is different at each stratum of the phonology. This relationship is summarized in (98).

(98) High tone – stress relationship in PNED, at different phonological levels

·Inner Stem Level: High tone has no effect on stress, e.g. (dé.thes)

·Outer Stem Level: High tone attracts stress, e.g. (sé.theł)

·Word Level: Stress attracts High tone, e.g. (qa.dé) → (qá.de)

At both the Outer Stem Level and Word Level, there is a connection between stress and High tone, but the direction of the relationship is different. At the Outer Stem Level, stress is shifted to align with High tone, whereas at the Word Level, High tone moves to align with stress. But apart from this difference, the existence of any High tone – stress connection at all is evidence that PNED was a tonal, High-marked language, since we would not expect a similar connection between stress and the feature [constricted glottis], under the Constriction Hypothesis. Perhaps most interesting in this regard, then, is the phonology of the Inner Stem Level in PNED, where tone has no effect on stress. Earlier, I suggested that the lexical representation of *the*, which involves a prominence mis-match between the stress and tone tiers, must have originated before tonogenesis, i.e. when *the* was in the strong position of a (constricted-plain) iamb, rather than a (High-Low) iamb. Since constriction has no special stress properties, the former representation was unproblematic. It is only when constriction was re-interpreted as High tone that a prominence mis-match arose, giving rise to the complex morphophonemics of *the* we have seen in this paper. In this context, the fact that tone has no effect on stress at the Inner Stem Level in PNED is interesting, since this may represent a layer of the phonology that was already fossilized in PNED, a relic of an earlier time before there was tone in the language.

Finally, what is missing from the summary in (98) is reference to the Postlexical Level, which we have so far not examined in this paper. Based on later developments in the daughter languages, it appears that, at the Postlexical Level, it is High tone once again that attracts stress, and it is to these processes that we now turn in the last section.

6.2.2 Later developments: intervocalic fricative voicing and deletion

If we compare the reconstructed PNED verb paradigms in (88)-(89) with the Slave paradigms in (80)-(81) on which they were based, the most striking difference is that, in Slave, the actual segmental content of the prefix *the* is completely gone in most forms: *th* is preserved only in the 1st person dual/plural (e.g. *dadéthítł'ų* 'we tied up') and as syllable-final *h* in the 3rd person and impersonal forms of *d/l*-classifier verbs (e.g. *xakedéhdze* 'they ate up pl. objects'). This is also true in Dogrib and Dëne Sųłıné: the reflex of *th* is deleted in most environments following a conjunct prefix. In PNED, on the other hand, I have assumed that *the* constituted a full syllable in all forms (except the 3rd person forms of *de/le*-classifier verbs), because the presence of this extra syllable is necessary in order to derive the correct stress pattern and, in turn, pitch accent retraction. That being the case, what remains to be explained is the exact process by which *the* was deleted in the daughter languages. In general, there was an intervocalic voicing process which applied in some environments, whereby *th* > *dh*. Subsequently, the voiced alternant, *dh*, was deleted, while the voiceless alternant, *th*, was preserved (Sharon Hargus, p.c.). However, the process by which intervocalic fricative voicing and deletion occurred was not a simple one. Consider the following paradigm from Li (1946), repeated from (85).

(99) Perfective of *netéıh* 'lie down' (based on Li 1946: 413), Ø-classifier

nııtı̨	{ne-the-ı-tı̨}	'I lay down'
nı̨tı̨	{ne-the-ne-tı̨}	'you (sg) lay down'
nédhtı̨	{ne-the-tı̨}	'he/she lay down'
néthíítez	{ne-the-íd-tez}	'we lay down'
nuhtez	{ne-the-uh-tez}	'you (pl) lay down'
he**nédh**tez	{he%ne-the-tez}	'they lay down'

Note that, while in most forms (except the 1st person dual/plural) *the* is deleted entirely, in Ø-classifier verbs, it is maintained as a *voiced* segment *dh*, syllable-finally. That is, in these data, collected in 1928, we observe a state of the Dëne Sųłıné language in which there was a voicing contrast in fricatives, syllable-finally (Li 1946). Also, it is not a coincidence that the forms in which this voiced segment *dh* appears are also those forms in which, historically, pitch accent retraction did not apply: they are immediately preceded by a High tone. In fact, a connection between the presence of conjugation High (or Low) tone and deletion of the conjugation marker itself has been suggested elsewhere in the literature.

> "Further checking is required on the *wh* perfectives, especially the third plural and first personal plural/indefinite forms. **The low tone which results from deletion of the perfective prefix at a conjunct boundary** does not always appear. Also, where more than one prefix precedes the perfective marker, low tone or stress sometimes appears on the second syllable to the left of the mode in non-third person forms" (Ackroyd 1982: 116, emphasis added [A.J.]).

> "Therefore, **the vowel of *the-* in these forms is deleted by another rule, which imparts a high tone**, e.g. *ná#de-the-dlógh* → *ná#dé-th-dlógh*.…In short, the conjunct form of *the-* is either zero as in the forms with a local subject or *H(h)-*, as in the forms with a non-local subject, where *h-* (which derives from *the-*) is subject to deletion by another constraint, i.e. *CCC (prohibition of a tri-consonantal sequence)" (Cook 2004: 159, emphasis added [A. J.].

In the above passages, it is assumed that vowel deletion causes High tone to appear (or Low tone, in Dogrib), and that this is a synchronic phonological process. While I disagree that deletion of a vowel can create a tone—the direction of causation is in fact the reverse—these passages do point to a complex relationship between tone and vowel deletion, a relationship which, once again, could only exist if the tone in question was High, rather than Low, at the time these processes applied.

My proposal for the process by which *the* was deleted intervocalically in NE Dene languages involves a total of 5 stages. These are summarized in (100).

(100) 5 stages in the deletion of *the*-conjugation in NE Dene languages

Stage 1: Proto Northeast Dene, as described so far in this paper.

Stage 2: *the* undergoes intervocalic voicing, following a conjunct prefix: *dethe* > *dedhe*

Stage 3: The vowel of *dhe* deletes following a High tone: *dédhe* > *dédh*

Stage 4: *dh* deletes intervocalically: *dedhe* > *dee* > *de*

Stage 5: *dh* deletes in syllable coda position: *dédh* > *dé*

Stage 4, in which *dh* is deleted intervocalically, but preserved syllable-finally, characterizes the conservative Dëne Sųłıné dialect described by Li (1946), as shown in (99) above; Stage 5 describes all other NE Dene dialects that have been described to date. Because these 5 stages seem to be shared by all of the present-day NE Dene languages, it is reasonable to ask whether these represent merely later stages of the PNED language itself, before it broke up into the various daughter languages, or whether these sound changes occurred independently but in parallel in the Dogrib, Slave, and Dëne Sųłıné, perhaps by diffusion of sound change across language boundaries. To answer this question properly, it would be necessary to reconstruct each stage as a whole system, and see which other sound changes (for example, reduction of **de* and **le* classifiers to *d* and *l*) are compatible with each stage, as part of the same phonological system. Such a task is beyond the scope of this paper. Rather, I will reconstruct each stage using Slave data as provided by Rice (1989), as this represents the most complete data set currently available for any NE Dene language, with data on *the*-conjugation for verbs of all classifiers, in word-initial, disjunct, and conjunct position.

6.2.2.1 Stage 2: the *is voiced intervocalically following a conjunct prefix:* dethe > dedhe

The goal of this section is to establish that, in the immediate descendants of PNED, intervocalic voicing of *th* to *dh* occurred only following an inner conjunct prefix, but not following an outer conjunct prefix, disjunct prefix, or word-initially. I will illustrate this with data from Slave (Rice 1989). In Slave, either *th* is retained as voiceless *th* (or *f, wh,* or *w*, depending on the dialect), or deleted; a voiced allophone *dh* does not occur. Thus, wherever *th* has disappeared intervocalically in Slave, we may infer that intervocalic voicing happened historically.

(101) *th* retained word-initially (Rice 1989: 537)

thıt'a	'I cut around'
thenet'a	'you (sg) cut around'
thet'a	'he/she cut around'
thít'a	'we cut around'
that'a	'you (pl) cut around'
get'a	'they cut around'
ts'et'a	'one cut around'

(102) *th* retained following disjunct prefix (Rice 1989: 530)

ná**th**ehtí	'I had trouble'
ná**th**ıtí	'you (sg) had trouble'
ná**h**tí	'he/she had trouble'
ná**th**ítí	'we had trouble'
ná**th**ahtí	'you (pl) had trouble'
náge**h**tí	'they had trouble'
náts'e**h**tí	'one had trouble'

(103) *th* retained following outer conjunct prefix (Rice 1989: 540)

né**wh**ıhk'é	'I shot you (sg)'
sé**wh**enehk'é	'you (sg) shot me'
séhk'é	'he/she shot me'
né**wh**ík'é	'we shot you (sg)'
sé**wh**ahk'é	'you (pl) shot me'
sekehk'é	'they shot me'

(104) *th* deleted following inner conjunct prefix (Rice 1989: 523-533)

ʔénehdzı̨	'I got sick'
ʔénę̨dzı̨	'you (sg) got sick'
ʔenéhdzı̨	'he/she got sick'
ʔené**th**ídzı̨	'we got sick'
ʔénahdzı̨	'you (pl) got sick'
ʔegenéhdzı̨	'they got sick'
ʔets'enéhdzı̨	'one got sick'

This pattern may be described in Lexical Phonology by saying that, at Stage 2, a rule was added to the Inner Stem Level phonology which voiced fricatives intervocalically. Because this rule is an Inner Stem Level rule, it does not apply to fricatives added at later levels—for example, object agreement and disjunct prefixes. Although this proposal goes against previous claims that new phonological rules always originate at the Postlexical Level, and gradually become restricted to earlier levels (Kiparsky 2013, Bermudez-Otero 2013), formally such an analysis poses no problems. Empirically, however, the generalization that fricatives were voiced (and later deleted) following inner conjunct prefixes is subject to exceptions in both directions—that is, there are cases where this rule both over- and under-applies.

A widespread case of underapplication of this rule involves 1st person dual/plural forms. In these forms, intervocalic *th, f,* or *wh* is preserved in the daughter languages, even though it follows a conjunct prefix. Consider the Slave forms *néwhíjǫ* 'we grew', *ʔeréwít'ı̨* 'we stole', *dadéthítł'ų* 'we tied up', *xadéwhíts'e* 'we drank up', and *ʔǫ́déthít'ah* 'we threw away' (Rice 1989: 541-542). In all of these forms, *th/f/wh* is preserved intact, even though it immediately follows a thematic conjunct prefix. Similar forms are also found in Dogrib and Dëne Sųłıné. In Dogrib we find forms such s *dèwìzè* 'we (2) started to hunt', *dèwìt'e* 'we (2) started out by boat' and *xàrèwìtǫ* 'we (2) taught' (Ackroyd 1982). Finally, in Dëne Sųłıné we find forms such as *néthíítez* 'we lay down' and *tunéthíídą* 'we drowned' (Li 1946). It should be noted, however, that Li also cites the form *hílzé* 'we started to hunt', cognate with Dogrib *dèwìzè*, which does exhibit deletion of *th* intervocalically. There is no obvious phonological reason why *th* should fail to delete in the above forms: we have established, based on evidence from pitch accent retraction, that, *thí* is unstressed in this environment, and thus we cannot appeal to positional faithfulness of stressed syllables (Trubetzkoy 1957: 255-258, Beckman 1998). It is interesting that Li marks many of his forms with long vowels, *nethíítez* and *tunéthíídą*, so that it might be argued that *th* is preserved before long vowels, but this would not work for Slave or Dogrib. Finally, it is of course possible that *th* is preserved before High tone, although this would be the

only instance in which High tone affects the preceding consonant in this way (and I am not aware of any other such examples cross-linguistically). What I would like to suggest, therefore, is that Dëne Sųłné forms such as *hílzé* 'we started to hunt' in fact represent the regular phonological reflex of PNED **tethílezé*, and, in the remaining forms, *th* (or *f, wh,* or *w*) has been restored by analogy in the 1st person dual/plural. We will see other examples of analogical changes in the remaining subsections—that is, where the actual attested forms in the daughter languages are different from what a regular phonological development from PNED would predict.

There are also cases of *over*-application of intervocalic fricative voicing, that is, cases where *th* is deleted in the modern languages, even though the prefix which precedes it is not an inner conjunct prefix. The prefixes involved are *qe* (position 7), *ts'e* (position 7), and *ye* (position 6), all outer conjunct, or Level 3 prefixes. Thus, in Slave we have the forms *get'a* 'they cut around' and *ts'et'a* 'one cut around', while in Dëne Sųłné we have the form *yéłtsı* 'he made it' (Li 1946). If intervocalic fricative voicing applied *only* after inner conjunct prefixes, we would expect the modern forms **gethet'a*, **ts'ethet'a*, and *yéthełtsı*, respectively. Again there is no obvious reason why intervocalic voicing would apply with these outer conjunct prefixes, but not with other outer conjunct prefixes, as in *néwhıhk'é* 'I shot you' and *séwhenehk'é* 'you (sg) shot me'. One interpretation is simply that level ordering is subject to variation: prefixes such as *qe, ts'e,* and *ye* behave sometimes as inner conjunct, and sometimes as outer conjunct prefixes. Another possible interpretation involes frequency: the prefixes *qe, ts'e,* and *ye* are much more frequent in the language than, for example, the object agreement prefixes *se* and *ne*. Thus it is possible that, following more standard Lexical Phonology assumptions, at one time the rule of intervocalic fricative voicing applied more widely in the language, and was only later restricted to the Inner Stem Level. Under such a scenario, the word-initial, voiceless form *the* was restored by analogy following all disjunct and most outer conjunct prefixes; however, the voiced form was preserved following *qe, ts'e,* and *ye,* because these forms are high-frequency and therefore "entrenched" (Bybee 1985). For the present purposes, I will simply assume that *th* voices to *dh* exceptionally, following *qe, tse,* and *ye,* though I will remain agnostic with regards to why.

Below, I reconstruct the same two paradigms of the verbs 'eat up pl. objects' and 'tie up bundle' shown in (88)-(89), as they would have been at Stage 2, with intervocalic fricative voicing. Since all forms contain a thematic conjunct prefix *de*, voicing occurs in all forms.

(105) Perfective of **qádedezé* 'eat up pl. objects', *de*-classifier (Stage 2, reconstructed)

	singular	dual	plural
1st person	(qá.de)(**dh**es)(de.ze)	(qá.de)(**dh**í.de)(ze)	(qá.de)(**dh**í.de)(ze)
2nd person	(qá.de)(**dh**ı.de)(ze)	(qá.de)(**dh**ax^{w})(de.ze)	(qá.de)(**dh**ax^{w})(de.ze)
3rd person	(qa.déth)(de.ze)	qa(qe.déth)(de.ze)	qa(qe.déth)(de.ze)
impersonal	qa(ts'e.déth)(de.ze)		

(106) Perfective of **dadetł'ų* 'tie up bundle', Ø-classifier (Stage 2, reconstructed)

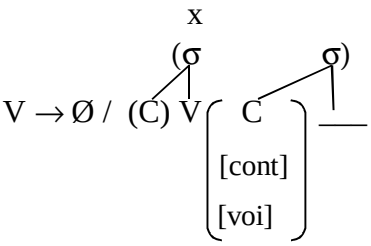
	singular	dual	plural
1st person	(dá.de)(dhes)(tł'ų)	(da.dé)(dhí.tł'ų)	(da.dé)(dhí.tł'ų)
2nd person	(dá.de)(dhe.ne)(tł'ų)	(dá.de)(dhax^{w})(tł'ų)	(dá.de)(dhax^{w})(tł'ų)
3rd person	da(dé.dhe)(tł'ų)	(da.qe)(dé.dhe)(tł'ų)	(da.qe)(dé.dhe)(tł'ų)
impersonal	(da.ts'e)(dé.dhe)(tł'ų)		

Note that, in the reconstructed 1st person dual/plural form in (105), pitch accent retraction occurs: **qádedhídeze*. Recall that this is because *de* adds an extra syllable between *thí* and the root *ze*, which causes thí to retain its stress, on account of which the High tone on dé moves one syllable leftwards to avoid stress clash. This differs from the modern Slave form *xadéwídze*, as in (80). The analysis of pitch accent retraction developed in §6.2.1 predicts that, if the *de*-classifier is restructured as *d* at a time when the pitch accent retraction rule is still productive, the tone on this form will return to its underlying position, i.e. **qadédhídze*. On the other hand, reducing the *de*-classifier to *d*, while pitch accent retraction was still active, would predict the wrong result in other forms, such as the 2nd person singular, i.e. **qadédhįdze* instead of **qádedhįdze*. Therefore, I prefer an analysis in which the High tone on *dé* in the modern form *xadéwídze* was restored to its current position by analogy. There are several other such apparent cases of analogy, as will be illustrated below.

6.2.2.2 Stage 3: Trochaic syncope following High tone: dédhe > dédh

In this section, I will focus on the effects of a rule I call *trochaic syncope*, that is, a rule that deletes an unstressed vowel in the weak position of a trochaic foot. This is the rule that is responsible for the syllable-final voiced consonant *dh* in forms such as *nédhtį* 'he lay down', *henédhtez* 'they lay down' (Li 1946: 413) and *hehédhdel* 'they have started off' (Li 1946: 400), which was still pronounced in the early 20th century, in a conservative dialect of Dëne Sųłiné. This rule is formalized in (107).

(107) Trochaic Syncope



"A vowel is deleted in weak position of a trochaic foot, if preceded by a voiced continuant."

Note that the domain of this rule is restricted only to vowels which follow voiced continuants (fricatives and sonorants). This requires some comment. I assume, following other work (Marinakis 2004) that, in PNED, the only allowable coda consonants were sonorants and fricatives (i.e. continuants)—stop codas were not allowed. Thus, it makes sense for a syncope rule to be restricted in such a way that it would not create unallowable stop codas, e.g. (da.de) →

**dad*. That such a rule should be restricted to *voiced* continuants, however, is somewhat more puzzling. Empirically, such a restriction is needed, in order to prevent this rule from applying in Slave forms such as *néwhıhk'é* 'I shot you' and *séwhenehk'é* 'you shot me'—if the syncope rule applied here, we would expect **néhk'é* and **sénehk'é*, respectively. However, it does seem somewhat odd that a prosodic rule should be subject to segmental conditioning in this way. I suggest, however, that this restriction based on voicing may be related to syllable weight. Li in fact makes a very interesting comment in this regard:

> "A light syllable is either an open syllable or ends in a voiceless consonant and a heavy syllable always ends in a voiced consonant. The alternation between a heavy and a light syllable plays a great part in the morphology of the language, particularly in the verbs" (Li 1946: 399).

The moraicity of coda consonants in NE Dene languages is a complicated question, most likely subject to a number of factors. However it is possible that in this case, at the stage of the language under discussion, only those CVC syllables closed by a voiced continuant counted as heavy. Voicing is itself a kind of sonority, and it is known that more sonorous segments are more likely to be mora-bearing (Zec 1995). Therefore, if the purpose of a rule of the form CV.CV → CVC is to make the first syllable heavy (Jaker 2012: 164), then it makes sense that such a rule would apply if the second consonant is voiced.

Finally, there is the question of where in the grammar the trochaic syncope rule is located. Since this rule only seems to involve inner conjunct prefixes, it could be located anywhere, even the Inner Stem Level. However, in the analysis of pitch accent retraction in §6.2.1, we saw that it is very important that *the* (or *dhe*) always constitute a full syllable at the point when this rule applies, in order to derive the correct syllable count. If trochaic syncope applied before pitch accent retraction, it would alter the syllable count of 3rd person and impersonal forms, so that all of these would undergo pitch accent retraction as well, i.e. *dadédhetł'ų* → *dadédhtł'ų* → **dádedhtł'ų*. One could say that trochaic syncope "feeds" pitch accent retraction, since the former creates an environment in which the latter would apply. In order to prevent this from happening, the two rules must be put in "counterfeeding" order. Therefore, since pitch accent retraction is a Word Level process, I will assign trochaic syncope to the postlexical level. A sample derivation is given in (108), of the forms *dadédhtł'ų* 'he/she tied it up' (PERF), *dádedhax^{w}tł'ų* 'you (pl) tied it up' (PERF), and *séthełq'é* 'he/she shot me' (PERF).

(108) Derivation of **dadédhtł'ų*, **dádedhax^{w}tł'ų*, and **séthełq'é* (reconstructed, Stage 3).

----------Inner Stem Level----------

	H * (σ σ)	H * (σ σ)	H * (σ σ)
Input	/de-the-(tł'ų)/	/de-the-ax^{w}-(tł'ų)/	/ the-(łq'é)/
Tone Mapping	dé.the(tł'ų)	dé.thax^{w}(tł'ų)	-----
Foot Construction	(dé.the)(tł'ų)	(dé.thax^{w})(tł'ų)	(theł.q'é)
Intervoc. Voicing	(dé.dhe)(tł'ų)	(dé.dhax^{w})(tł'ų)	-----
Output	(dé.dhe)(tł'ų)	(dé.dhax^{w})(tł'ų)	H(theł.q'é)

	----------Outer Stem Level----------		
Input	/(dé.dhe)(tɬ'ɥ)/	/(dé.dhax^{w})(tɬ'ɥ)/	/se% H(theɬ.q'é)/
Tone Mapping	-----	-----	sé(theɬ.q'é)
Foot Construction	-----	-----	(sé.theɬ)(q'é)
High tone deletion	-----	-----	-----
Output	(dé.dhe)(tɬ'ɥ)	(dé.dhax^{w})(tɬ'ɥ)	(sé.theɬ)(q'é)
	----------Word Level----------		
Input	/da#(dé.dhe)(tɬ'ɥ)/	/da#(dé.dhax^{w})(tɬ'ɥ)/	/(sé.theɬ)(q'é)/
Foot Construction	-----	(da.dé)(dhax^{w})(tɬ'ɥ)	-----
Pitch Acc. Retr.	-----	(dá.de)(dhax^{w})(tɬ'ɥ)	-----
Output	da(dé.dhe)(tɬ'ɥ)	(dá.de)(dhax^{w})(tɬ'ɥ)	(sé.theɬ)(q'é)
	----------Postlexical Level----------		
Input	da(dé.dhe)(tɬ'ɥ)	(dá.de)(dhaxw)(tɬ'ɥ)	(sé.theɬ)(q'é)
Trochaic Syncope	**da(dédh)(tɬ'ɥ)**	**-----**	**-----**
Output	da(dédh)(tɬ'ɥ)	(dá.de)(dhaxw)(tɬ'ɥ)	(sé.theɬ)(q'é)

As we can see in (108), the trochaic syncope rule applies only to a vowel preceded by a voiced fricative. If a vowel is preceded either by a stop of a voiceless fricative, the rule is blocked.

The stage of the language illustrated by the derivation in (108) is probably the last stage in which the rule of pitch accent retraction may be regarded as a synchronically productive rule. The next sound changes involve the deletion of *dh* intervocalically, which will change the syllable count in most forms. Although it is possible for these rules to be ordered after pitch accent retraction, they would create more opacity than would be allowed in current versions of Lexical Phonology (Kiparsky 2000). Therefore, I will assume that the next stage, which I call Stage 4, is the stage at which major re-analysis of the system begins to take place.

6.2.2.3 Stage 4: dh *deletes intervocalically:* dedhe > dee > de

The stage of NE Dene languages described here represents the stage described for Dëne Sųłıné by Li (1946), that is, the stage in which *dh* is deleted intervocalically, but preserved syllable-finally in forms such as *nédhtɥ* 'he lay down', *henédhtez* 'they lay down' (Li 1946: 413) and *hehédhdel* 'they have started off' (Li 1946: 400). I assume that the other two languages, Dogrib and Slave, also went through such a stage in the course of their development. This stage is characterized by the deletion of *dh* intervocalically. As mentioned above, this deletion of *dh* renders the pitch accent retraction rule opaque, such that it is likely no longer part of the synchronic grammar. Indeed, the entire synchronic analysis becomes uncertain at this point, as it is likely that a great deal of morphological restructuring also began to take place at this stage. One major area of morphological restructuring concerns the status of the **de* and **le* classifiers, whose underlying forms were re-structured to /d/ and /l/, respectively.

In this section as well as §6.2.2.4, I will simply apply *dh*-deletion as a regular sound change, without morphological restructuring, with the exception of the **de*- and **le*-classifiers, which I will show as restructured to *d* and *l*. I will also apply some other regular sound changes

that occurred in Slave dialects, for example, **q* > *k*, *g*. In doing this, as sort of intellectual exercise, we will see that the end result turns out different from the actual attested forms in Slave which we saw in (80)-(81). It is precisely in such cases, then, that we have evidence that morphological restructuring has occurred. The hypothetical paradigms at Stage 4 are given in (109)-(110).

(109) Perfective of **kádedze* 'eat up pl. objects', *d*-classifier (Stage 4, reconstructed)

	singular	dual	plural
1st person	kádeesdze	kádıídze	kádıídze
2nd person	kádu̧dze	kádaahdze	kádaahdze
3rd person	kadéedze	kakedéthdze	kakedéthdze
impersonal	kats'edéthdze		

(110) Perfective of *dadetł'u̧* 'tie up bundle', Ø-classifier (Stage 4, reconstructed)

	singular	dual	plural
1st person	dádeestł'u̧	dadíítł'u̧	dadíítł'u̧
2nd person	dádeenetł'u̧	dádaahtł'u̧	dádaahtł'u̧
3rd person	dadédhtł'u̧	dagedédhtł'u̧	dagedédhtł'u̧
impersonal	dats'edédhtł'u̧		

Above I have assumed that deletion of intervocalic *dh* left behind long vowels, which will be shortened in Stage 5, the final stage.

6.2.2.4 Stage 5: dh *deletes in syllable coda position:* dédh > de

The modern Slave reflexes of the verbs 'eat up pl. objects' and 'tie up bundle', as predicted by the analysis in this section, are given in (111)-(112). Note that these differ in a number of ways from those actually predicted. Those forms in (111)-(112) which differ from the actual attested forms in Slave are marked with an asterisk (*); for comparison, the attested forms are repeated in (113)-(114).

(111) Perfective of *xádedze* 'eat up pl. objects', *d*-classifier (Stage 5—predicted)

	singular	dual	plural
1st person	xádesdze	*xádídze	*xádídze
2nd person	xádu̧dze	xádahdze	xádahdze
3rd person	xádéhdze	xakedéhdze	xakedéhdze
impersonal	xats'edéhdze		

(112) Perfective of *dadetł'ų* 'tie up bundle', Ø-classifier (Stage 5—predicted)

	singular	dual	plural
1st person	*dádehtł'ų	*dadítł'ų	*dadítł'ų
2nd person	dádętł'ų	*dádahtł'ų	*dádahtł'ų
3rd person	dadétł'ų	dagedétł'ų	dagedétł'ų
impersonal	dats'edétł'ų		

(113) Perfective of *xadedzéeh* 'eat up pl. object', *d*-classifier (Rice 1989: 532).

	singular	dual	plural
1st person	xádehdze	xadéwídze	xadéwídze
2nd person	xádędze	xádahdze	xádahdze
3rd person	xadéhdze	xakedéhdze	xakedéhdze
impersonal	xats'edéhdze		

(114) Perfective of *dadetł'ų* 'tie up bundle', Ø-classifier (Rice 1989: 541).

	singular	dual	plural
1st person	dádetł'ų	dadéthítł'ų	dadéthítł'ų
2nd person	dádętł'ų	dádatł'ų	dádatł'ų
3rd person	dadétł'ų	dagedétł'ų	dagedétł'ų
impersonal	dats'edétł'ų		

In (111) and (112), I have also applied a number of other regular sound changes, such as *k* > *x*, *th* > *h*, and vowel shortening, that are independently motivated in Slave dialects. In these paradigms, all of the instances in which the operation of regular sound changes, as described in the present proposal, predict the wrong result are preceded by an asterisk (*). One class of exceptions concerns the syllable-final *h*'s in the 1st person singular and 2nd person dual/plural forms of Ø-classifier verbs. By regular sound change, these *h*'s should be retained, as shown in (112), even though they are deleted in the actual forms in (114). It is necessary that these *h*'s have been present historically, in PNED, in order to derive the correct syllable weight and stress pattern for pitch accent retraction to apply. It seems that deletion of syllable-final *h* in these forms is by analogy with the Ø-classifier perfectives of *n*- and *gh*-conjugation verbs in Slave, which also delete *h*. Deletion of *h* in these forms, however, must also involve the re-structuring of underlying representations—it cannot be done by a postlexical phonological rule, that applies after pitch accent retraction. Therefore, the absence of *h* in these forms is sufficient reason to conclude that pitch accent retraction has been morphologized, and is no longer a synchronic phonological process in the Slave dialects described by Rice (1989).

The other class of exceptions concerns the 1st person dual/plural forms. In both the Ø/*h*-classifier and *d*/*l*-classifier verbs, by regular sound change, we predict that *th*/*f*/*wh* should be deleted following a conjunct prefix, even though it is in fact preserved in Slave, in the forms *xadéwídze* in (113) and *dadéthítł'ų* in (114). As I have suggested earlier, I believe that, in these instances, *th* has been analogically restored in the 1st person dual/plural. Finally, note that in (111), regular sound change also predicts the wrong tone placement, i.e. **xádídze*, with a High tone on *xá*, rather than the actual form *xadéwídze*. Here, again, I believe that analogy is at work. After the pitch accent rule was morphologized, the pattern of Ø/*ɬ*-classifier verbs, in which pitch

accent retraction applies only in the 1sg, 2sg, and 2du/pl forms, but not in 1du/pl forms, was extended to *d/l*-classifier verbs as well. The fact that, in 1du/pl forms pitch accent retraction applied only in **de/le*-classifier verbs, but not Ø/*ɬ*-classifier verbs, was originally due to the extra syllable contributed by the **de* and **le* classifiers. It makes sense that, once these classifiers were restructured to /d/ and /l/ underlyingly, and pitch accent retraction ceased to be a synchronic phonological rule, this classifier-based distinction would be analogically levelled.

Thus there are a number of cases where the forms I have reconstructed for PNED, if fed into a series of regular and independently motivated sound changes, predict the wrong reflex in modern NE Dene languages. However, I take this as evidence not that the proposed sound changes are incorrect, nor even that the reconstructed PNED system is incorrect, but rather that there has been morphological re-analysis and analogical levelling in the daughter languages. In some sense, the theory of Lexical Phonology actually predicts that some form of morphological re-analysis ought to have taken place, because, after the deletion of voiced fricatives intervocalically, the old PNED phonological system would have become extremely opaque, and probably unacquirable by language learners (Kiparsky 2000).

7.0 Conclusion

In this paper, we have seen that all three NE Dene languages show evidence of two phonological processes that were characteristic of the Proto Northeast Dene language: deletion of High tone in unstressed syllables (§5.0) and pitch accent retraction, in a stress clash environment (§6.0). Under normal assumptions of phonetic naturalness, these processes could not have existed in a Low-marked system: there is no reason why a Low tone would be deleted in an unstressed environment, and no reason why a Low tone would move one syllable left to avoid stress clash—indeed, Low tone would be *preferred* in these environments, since they would make the adjacent stressed/High toned syllable even more prominent, relatively speaking. Could these phenomena have been associated with vowel constriction, rather than High tone, as suggested by the Constriction Hypothesis? This seems to me unlikely. Deletion of High tone in an unstressed syllable, as we saw in §5.0, is essentially a type of neutralization process. Thus, it is possible, in principle, that a phonation contrast could be neutralized in unstressed syllables, in the same way as, for example, vowel height, nasality, or any other feature could be neutralized in an unstressed environment (Trubetzkoy 1957). However, High tone has a special affinity with stress, whereas phonation does not, so this process is more likely to have occurred in a High pitch accent language, as I claim PNED was, rather than a language with constriction. Furthermore, the process of high pitch accent retraction would be completely inexplicable in a constriction based system. I am not aware of any previously reported cases of mobile phonation or "phonation feet"; on the other hand, the idea that stress alternates, and High tone is attracted to stress, is well-established and indeed taken often taken for granted in the literature. I thus see no way to escape the conclusion that Proto Northeast Dene was both tonal and High-marked, i.e. a high pitch accent language. It follows, therefore, that Dogrib has undergone tone reversal.

This conclusion raises the question, however, how far back does tonogenesis go? This question also depends in part on what classification system of Dene languages one adopts (see Hargus & Tuttle 2004: 72-74). According to the Rice-Goddard-Mithun classification system (Mithun 1999), the NW Canada subgroup includes—in addition to Dogrib, Slave, and Dëne Sųłıné—also Tagish, Tahltan, Kaska, Sekani, and Beaver. Sekani and Beaver are interesting because they represent a case similar to the NE Dene languages, in which closely related

languages—indeed, in the case of Beaver, mutually intelligible dialects of the same language—show opposite tones (Krauss 2005). These languages also provide a potentially promising area, to look for evidence of tone reversal—that is, the idea that some common ancestor of Sekani and Beaver was both tonal and High-marked. Here, however, the evidence is less strong, because pitch accent retraction does not seem to occur in these languages. In both Beaver (Randoja 1990) and Sekani (Hargus 1988), the prefix /`s/ places a Low tone on the vowel to its immediate left. Although this tone mapping is subject to a number of complications, when the tone does appear, it is always on the vowel immediately preceding the conjugation marker (Hargus 1988: 158-161; Randoja 1990: 82-93). As we have seen, Sekani also does, according to Hargus, delete Low tone on *ghə*, *ts'ə*, and *ɂə*, which, in my analysis, would be regarded as historically unstressed syllables. This is the sort of pattern which we would expect to have developed in a High-marked language, but, at present, this pattern provides the only evidence that might suggest tone reversal in Sekani. If more evidence can be found of historical High-marking in Beaver and Sekani, this would suggest that tonogenesis may be even older, i.e. extending to the "Proto NW Canada" node in the Rice-Goddard-Mithun family tree model. However such evidence is not available at present.

Finally, I would like to end on two methodological points. The first concerns the time depth of historical reconstruction. There has been a tendency in Dene linguistics to focus on fairly remote linguistic reconstructions: Proto-Athabaskan, Proto Eyak-Athabaskan, Proto Athabaskan-Eyak-Tlingit, or even more remote relationships (e.g. Vajda 2010). However, the phenomena discussed in this paper—High tone deletion, empty morph insertion, and pitch accent retraction—are phenomena which, on the one hand, are not really part of the synchronic phonology of any of the daughter languages, as they are highly opaque and irregular, but on the other hand do not go back to Proto-Dene, and are not shared with most other members of the Dene language family. The explanation for these phenomena is thus historical, but at a more shallow time depth. Thus I believe that the Proto Northeast Dene language is a useful language to attempt to reconstruct, to better understand the modern NE Dene languages and dialects.

The second point concerns the type of data used for reconstruction. What we have seen is that earlier stages of the NE Dene languages have left traces, which show up as irregular morphophonology in the modern languages. To discover such earlier stages, it is important to carefully examine the morphophonemics of verbs, not just in simple pairs of cognate nouns, such as *setà* and *setá*. While cognate noun pairs provide a clear and easy way to identify the present stage of a language as High-marked or Low-marked, they tell us very little about the *process* by which the language arrived at that stage. While, on the surface, the complex and opaque morphophonological rules of Dene languages may seem to muddy the historical picture, it is in fact the very complexity and opacity of these rules that give us fine-grained insights into thelanguages' prehistory. I therefore hope that my proposal, though only a sketch, may inspire additional work on the intersection of prosody, morphology, and sound change in Dene languages.

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