DEGEMINATION AND PROSODY IN LABRADOR INUTTUT: AN ACOUSTIC STUDY

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by

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ABSTRACT

In this thesis, I investigate the acoustic expression of Schneider's Law (SL), a consonant degemination rule observed in three dialects of Inuktitut (Labrador Inuttut, Quebec Inuttitut, and Northwest Territories Siglitun), the characterization of which has so far been based largely on aural-impressionistic data transcriptions. Given the expression of this rule, which conditions alternations between syllables that end with consonants versus vowels, thereby affecting rhythmic qualities of the language, I set out to perform instrumental measurements of spontaneous and elicited speech recorded in Labrador, Canada. My observations of SL from various acoustic viewpoints confirm its characterization in the scientific literature as a virtually exceptionless rule, and one that is consistent with dissimilation processes found in other languages — in particular, length contrasts attested in Latin, Japanese and Finnish. SL is further shown to operate independently from any system of recurring metrical stress. Labrador Inuttut itself seems to be devoid of any type of metrical conditioning in any of the standardly-assumed phonetic correlates of stress (intensity, duration or pitch). The acoustic results do, however, show a systematic pattern of phrase-final syllable lengthening, optionally co-varying with F0 boundary tones. The observed phenomena are consistent with descriptions of related dialects, except that the rule in Labrador Inuttut is shown to also include aspiration of phrase-final stop consonants, something not mentioned in the Eskimo-Aleut literature, but described in other languages (e.g., right-edge fortition in Blackfoot).

Master of Arts Thesis

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Nakummik to thank. v. Nakumminiakkat. Make sure you thank her/him. NakutlakKutit. Thank you very much.

The above is a lexical entry in UKauset katitsutauppaliningit (literally, 'a collection of words') compiled in 1976 from a weekend gathering of Inuit Elders in Nain, Labrador on Canada's northeast coast. It is the single most important text in the writing of this thesis and sparked my interest in the dialect of Inuktitut spoken in Labrador. A tattered copy became my virtual appendage from 1999 when my family decided to exclusively speak in Inuktitut to our newborn daughter Anika Eta Nochasak-Pigott. The simple format, 3,000 lexical entries with definitions, examples and miniature hand-drawn illustrations, was a superb introduction to the frighteningly difficult written appearance of this polysynthetic language. The genius of the 'word collection' is the defined examples, extracted and edited by Rose Jeddore (Pamak) from the spontaneous speech of Inuit Elders who got together to talk about their language. My first thanks is to them, nakutlakKutit.

The next thanks goes to my best supporters and academic supervisors Dr. Doug Wharram and Dr. Yvan Rose. Without their knowledge and steadfast encouragement this important research could not have been realized. Thanks as well to Dr. Carrie Dyck for daring me to "crack Schneider's Law," to Dr. Paul De Decker for advice on phonetics, to Dr. Phil Branigan for taking me up the faraway tree of syntax, to Dr. Julie Brittain for her elegant insights into morphology and to Dr. Marguerite MacKenzie for all manner of support, both academic and personal. To the patient wisdom of Ruby Bishop in particular, and all the staff and students in the Linguistics Department at Memorial in general, I am forever indebted. Thanks specifically to Linguistics students Karen Hunter, Kelly Burkinshaw and Victoria Allen for their transcription work. Thanks as well to Derek Norman at Memorial's Media Centre for use of professional recording equipment, Dr. Yvan Rose at Memorial's Speech Sciences and Language Acquisition Laboratory for use of the studio, and to the OKâlaKatiget Society, the Inuttut broadcaster in Nain, for loans of their studio space, video equipment and reporter Josh Pamak.

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1 Introduction

1.1 Preliminaries

This thesis is about a degemination phenomenon described in Eskimo-Aleut literature as Schneider's Law (henceforth, SL). Through instrumental measurement of Labrador Inuttut spontaneous speech, I will show that SL applies exceptionlessly throughout hundreds of spoken utterances. Following an insight from Dresher & Johns (1995)[1], who state that SL cannot be related to metrical stress, I show that SL does not co-vary with any measurable phonetic correlate of stress. Indeed, I show that SL is unrelated to any rhythmic or intonational characteristic of the system. For example, I show that lengthened phrase-final syllables co-vary with interrogative/declarative boundary tones, without regard to the application or non-application of SL. The results are thus consistent with acoustic studies of related dialects (e.g., in West Greenlandic), which also find no evidence of a metrical system of alternating stress in the language and (e.g., in Quebec Inuttitut) exceptionless degemination of underlying geminate consonants in syllable-adjacent positions moving from left-to-right. Finally, SL is typologically consistent with dissimilation processes in other languages. Bye (2011:3) describes fifteen types of dissimilation; relevant here are the languages that use the suprasegmental property of length as the medium for syllable-adjacent contrasts including Finnish (Keyser & Kiparsky 1984), Gidabal (Geytenbeek & Geytenbeek 1971), Japanese (Iwai 1989, Wade 1996, Ito & Mester 1998), Latin (Leumann 1977, Sihler 1995 and Ito & Mester 1998),

1 'The law of double consonants in Inuktitut' was first presented at the 35th annual meeting of the Canadian Linguistics Association, in Victoria, B.C. May 27-29, 1990.

Oromo (Gragg 1976, Lloret 1988, Alderete 1997) and Slovak (Kenstowicz & Kisseberth 1977, 1979 and Rubach 1993) .

1.2 Thesis objectives

In this study I attempt to document the SL phenomenon in current speech samples from Labrador Inuttut language consultants. The goal is to verify proposals found in the previous scientific literature on SL, especially Dresher & Johns (1995), who argue that the rule is virtually exceptionless, refers exclusively to underlying geminates in adjacent syllables and operates independently from duration, intensity, and pitch prominence. To confirm the latter, a secondary aim of this study is to show the nature of intonation in current Labrador Inuttut speech with the expectation that the data studied here will be consistent with the accounts of intonation in West Greenlandic (Mase 1973, Rischel 1974 and Nagano-Madsen 1990, 1993, 1994) and Quebec Inuttitut (Massenet 1980). The final goal of this thesis is to say something about the nature of rhythm in Labrador Inuttut, an issue that remains unresolved in the scientific literature on the Inuit languages.

1.3 The Eskimo-Aleut Language Family

The Eskimo-Aleut Language Family is a continuum of related grammars and vocabularies which includes six languages spoken on the Aleutian Islands, a dialect grouping spoken on the Chukotka Peninsula and in Southern Alaska, and a group of mutually intelligible dialects spoken across the North American Arctic from the Bering Strait in Alaska to the East coast of Greenland and Southern Labrador (Dorais 1990b).

The intermediate group comprises the various dialects of Yupik, which Hayes (1995:239) describes as stress-timed with persistent left-to-right iambs, and with the context-dependent assignment of either one or two moras to CVC. The latter group is the 'Eskimo' branch of the family and includes Inupiaq in Alaska and the Northwest Territories, Inuktun and Inuktitut in Canada as well as several dialects in Greenland. Dorais (1990b:2) calls the Eskimo branch the 'Inuit language' and that is how this group of related dialects will be referred to here. Dorais claims that speakers from as far away as the Bering Strait and Labrador can, with some difficulty, understand each other. Across the Inuit languages, Creider (1981) observes a continuum of Regressive Assimilation, showing that from the perspective of phonology, each dialect is slightly different in the way it deals with heterogeneous consonant clusters. Following the schematic generalization in Dorais (1990:41), the most conservative form is Western Alaskan Inupiaq in which there are eleven attested underlying environments for consonant clusters at the surface level: [mr, nr, χC, UVULARC, kC, VELARC, pC, BILABIALC, tC, ALVEOLARC, jFRICATIVE]. In the dialects of Inupiaq spoken in the North Slope region of Alaska and Northwest Territories, the number of environments drops to eight with the [χC, kC, pC, tC] distinctions assimilating into surface geminates. Inuktun has seven underlying environments for consonant cluster formation and the Western Canadian Arctic dialects of Inuktitut have five. The Baffin Island and Arctic Greenland dialects of Inuktitut have four, the same number as the remaining two dialects in Greenland. The dialect of Inuktitut in Quebec has only two environments, [rŋ, UVULARC], illustrated for example by the fact that speakers call their language, phonetically, [inuttitut]. Dresher & Johns (1995:83) show that the process of RA is complete in Labrador Inuttut, an Eastern Canadian dialect of Inuktitut where consonant clusters assimilate for manner, primary place and secondary place. The primary data collected for this thesis come from 31 Labrador Inuttut speaking language consultants. It is of primary interest as one of only three dialects in Eskimo-Aleut shown by Smith (1975:105) to have exceptionless degemination so that, moving left-to-right, the second in a pair of syllable-adjacent geminates is always reduced: CV(V)**CC**V(V)**CC**V→ CV(V)**CC**V(V)**C**V. The phenomenon was first documented by Father Lucien Schneider, a Catholic missionary who lived with Inuit in Quebec from the late 1930's until his return to France in 1974. Schneider (1966) describes the pattern for Quebec Inuttitut while Dorais & Lowe (1982) show a more restricted form of SL in the Inuktun dialect of Northwest Territories Siglitun.[2]

1.3.1 Background literature on the phonology of Labrador Inuttut

The compiled works on Labrador Inuttut phonology make up a slender volume in the Inuit languages literature, a body of linguistic inquiry that begins in Greenland with a phrase book by Hans Egede (1721) and the dictionary of his son Poul Egede (1760:6-7). The latter shows that vowel length is phonemic with a series of minimal pairs. Rischel (1974:26) compares phonemic pairs from current West Greenlandic with their counterparts in Egede (1760), showing how vowel length is phonemic:

2 In Northwest Territories Siglitun the schema $CV(V)\mathbf{C_iC_i}V(V)\mathbf{C_iC_i}V(V) \rightarrow CV(V)\mathbf{C_iC_i}V(V)\mathbf{C_i}V(V)$ properly describes the behaviour of SL. However unlike Quebec Inuttut, where SL also targets underlying consonant clusters, in Northwest Territories Siglitun the rule applies exclusively to underlying geminates. As a result the following schema is attested in that dialect: $CV(V)\mathbf{C_iC_i}V(V)\mathbf{C_iC_j}V(V) \rightarrow CV(V)\mathbf{C_iC_i}V(V)\mathbf{C_iC_j}V(V)$.

(1) West Greenlandic (Egede 1760) West Greenlandic (Richel 1974)

a. aulārpok[3]/aúlarpok [a:la:rpuq]/[a:larpuq]
'moves' 'leaves'

b. mânna/mánna [ma:nna]/[manna]
'now' 'that one'

The opaque orthography used by Egede in (1) makes it difficult to interpret the accent marks used to show vowel length, but Rischel's comparison shows that they must relate to phonemic vowel contrasts. Rischel (1974) makes another comparison from Egede (1760) to current West Greenlandic, showing that phonemic contrast can also be based on consonant duration:

(2) West Greenlandic (Egede 1760) West Greenlandic (Richel 1974)

a. írsilerpa/irsilérpa [issilirpa:]/[isilirpa:]
'begins to freeze' 'begins to look at him/her'

b. aggiúta/aggiutá [aɣɣiʲuta:]/[aɣiʲuta:]
'day of arrival' 'his/her file'

Rischel (1974:91) writes that the "terminology [used by Egede] reflects a transfer from Latin grammar and metrics rather than a real analysis of the Eskimo pattern, but it happened to be the crucial distinction in Eskimo as well." These phonemic contrasts are one hallmark of the Inuit languages; acoustic results shown in §5.1.1 document this phenomenon in current Labrador Inuttut speech. The literature also describes most of the Eskimo-Aleut languages in Alaska and Siberia as stress-timed and iambic. Only a handful

3 Egede's use of the mid tone marker in this example and the hat marker in (1b) seems to indicate in both examples that the vowel is long.

of phonological studies have been done in the Central and Eastern Arctic, with published acoustic results only for West Greenlandic and Quebec Inuttitut. Kleinschmidt (1851) contains an aural-impressionistic account of West Greenlandic phonology. Instrumental measurement for this dialect comes from Mase & Rischel (1971), Mase (1973), Rischel (1974), Nagano-Madsen (1990, 1993, 1994), and Jacobsen (2000). The latter concludes that stress is not a relevant category, based on her measurement of words produced in carrier sentences by two language consultants. Massenet (1980) derives a similar conclusion from his acoustic analysis of Quebec Inuttitut. As there are no acoustic studies of Labrador Inuttut to follow, these accounts of West Greenlandic and Quebec Inuttitut inform the analysis of the data considered here. This thesis will not rely on Erdmann (1864) or Bourquin (1891). Both adopt Kleinschmidt's orthography and phonological account of West Greenlandic, impacting the written form of Labrador Inuttut and confusing the phonological picture of the dialect until Dresher & John's (1995) account, a work which forms the basis of the phonetic and phonological description of Labrador Inuttut in Chapter Two.

1.3.2 Thesis roadmap

In the remainder of this chapter I present the theoretical framework for this thesis. Chapter Two begins with a phonetic and phonological sketch of Labrador Inuttut, followed by a brief description and schematic representation of SL as observed in the Inuit dialects. I conclude Chapter Two with a discussion of my preliminary results, which show no evidence of syllabic trochees, moraic trochees or iambs as described in Metrical

Stress Theory (MST hereafter) by Hayes (1995). In Chapter Three, I discuss in detail the background literature on SL in the Inuit languages, syllable prominence in West Greenlandic and intonation in West Greenlandic and Quebec Inuttitut. Chapter Four contains a discussion of the methodology used to design the linguistic interviews, implement the fieldwork, and analyze the results. The end of that chapter includes a detailed description of four types of data and the manner in which they were analyzed to produce the results introduced in Chapter Five. That chapter summarizes results which show that SL is virtually exceptionless, unrelated to metrical conditioning, and independent of intonation. I conclude in Chapter Six with a brief summary of the most central arguments of this thesis as well as some of their contributions for the field and related areas.

1.4 Theoretical framework

This thesis follows the model of multilinear generative phonology, assuming segments are made up of distinctive features. These largely coincide with the feature bundles proposed in Chomsky & Halle's (1968) *Sound Pattern of English*, but that linear approach is rejected here for a model where the various units comprised within phonological systems can be divided into independent components with potentially multiple associations between them. Goldsmith's (1976) autosegmental approach recognizes that features can spread across segmental or prosodic boundaries, grouping this sharing of segmental material into a geometry of interdependent features, the relations between them forming the locus of phonological patterning. This thesis adopts the skeletal tier to represent segmental duration. For syllabification, consider Kahn's (1976) *Maximum Onset Principle* (MOP), stated as follows:

(3) *Maximum Onset Principle* (MOP) (Kahn, 1976)
First make the onset as long as it legitimately can be; then form a legitimate coda.

This thesis follows Kahn's view that the context of phonological rules can often be captured by referencing duration to syllable-based generalizations. The rhythmic model accepted here is Selkirk's (1980) hierarchically organized prosodic domains, including the prosodic word, foot, syllable and mora. For the latter, this thesis follows Prince (1984) in representing intervocalic geminates as doubly-linking consonantal material to both a coda and the onset position following it across the syllable boundary. While none of the data produced by the current research contradicts the generalizations stated within MST as proposed by Hayes (1995), this thesis shows that Labrador Inuttut is not a "stress-timed" language, and therefore lies outside the MST framework. This thesis follows, instead, the syllable timing alternative proposed by Kager (1993, 1995) and "syllable-timed" theory as proposed in Abercrombie (1967), Ladefoged (1975), Roach (1982), Ramus, Nespor & Mehler (1999) and Mehler, Nespor, & Shukla (2011). Each of the above will now be considered in more detail.

1.4.1 Autosegmental phonology

A multilinear approach to features allows a better description of assimilatory processes. As mentioned in §1.3, in the Eastern Canadian dialects of the Inuit languages, consonant clusters undergo Regressive Assimilation, so that [inuktitut] 'like the Inuit' becomes [inuttitut] in Quebec Inuttitut: dorsal-coronal clusters become coronal-coronal /kt/→ /tt/. Under *SPE,* general rules would result in an inelegant description that depends on a self-contained list of place features. In an autosegmentalized representation, segmental features are organized under nodes for manner (voice, nasal and continuant) and place, with assimilation spreading featural material from one node (the trigger) to the next (the target). Dresher & Johns (1995) use feature geometry (see §3.3.2) to account for the natural classes of sounds that participate in these assimilation processes.

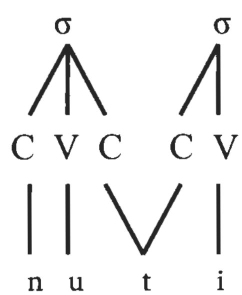
1.4.2 CV tier: representing duration

From the articulatory characteristics of segments, we turn next to the representation of their length. The skeletal tier organizes segments into an abstract sequence of time units or slots which can then have the added specification of [± syllabic], with vowels (V) being [+syllabic] and consonants [–syllabic]. I adopt the CV-Tier model argued for by Clements & Keyser (1983), so that the examples [inuktitut, inuttitut] can both be represented as VCVCCVCVC or, if we treat geminates as taking up a single slot, [inuttitut] = VCVCVCVC. The question of geminate representation is a key issue in the study of Labrador Inuttut where all geminates are underlyingly clusters of consonants and thus both the target and trigger of SL. CV-Tier theory can be of assistance in explaining geminate structure because it allows for slots with no segmental material or with segments not associated with a single syllable node. In this study, I will consider syllable-based generalizations that might help us to represent SL in Labrador Inuttut. The dichotomy between /kt/ and /tt/ as CC is thus represented in (4), where the geminate in (4b) straddles two syllables and is not limited to one syllable node:

(4) CV-Tier representation in Inuktitut.

a.

b.



Syllabification in Inuttut follows the Maximum Onset Principle, stated in (3), above. The fact that /kt/ and /tt/ are not legitimate onsets supports syllabification as V.CVC.CV.CVC, with two timing slots for geminates. Further support comes from the feature geometry posited by Dresher & Johns (1995:88), where pharyngeal geminates in

Quebec Inuttitut are shown to have two root nodes. The implications for Labrador Inuttut and the data considered here are the subject of the next chapter.

2 Phonological sketch of Labrador Inuttut

2.1 Accounts of the phonemic inventory and phonological processes

The first mention of Labrador Inuttut phonology in the literature comes from published letters between Kleinschmidt & Bourquin (1881). Their discussion centres on the orthographic representation of Labrador Inuttut versus the dialects in Greenland. Kleinschmidt's system was adopted in Labrador by Moravian Missionaries, resulting in a written form that did not match the phonetic reality of the spoken language. This led to a religious form of the dialect heard today only in church, "Moravian Inuttut," which will not be considered in this thesis. The data under investigation come from linguistic interviews, including directed oral tasks, reading, descriptions of images and spontaneous conversations with language consultants in informal settings. The first generative phonological description of Labrador Inuttut comes from Smith's (1975:101) "autonomous phonemic inventory," adapted in Smith (1977a), Dorais (1990b, 2003) and Dresher & Johns (1995), as follows:

(1) Labrador Inuttut consonant inventory (adapted from Dresher & Johns 1995:82)

	Labial	Coronal	Palatal	Velar	Uvular	Glottal
voiceless stops	p	t		k	q*	
voiceless fricatives		s		x	χ	h
voiced fricatives	v/β			ɣ		
lateral approximants		ɬ, l				
nasals	m	n		ŋ	ɴ	
glides			j			

* /q/ varies with the velar /k/

This inventory is consistent with the consonants observed in the data considered here, though [β], [ɴ] and [h] are virtually absent. Also, in the context of phrase/utterance-final lengthening and pitch effects detailed in §5.2, the stops [p], [t], [k] and [q] are in complementary distribution with [pʰ], [tʰ], [kʰ] and [qʰ]. These aspirated variants arise in the rightmost segment position of a phrase or utterance, while the unaspirated stops [p], [t], [k] and [q] arise elsewhere.

All of the stops and most of the fricatives from the inventory in (1) are shown by Smith (1975) as having a phonemically long, meaning-changing, variant:

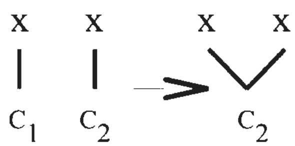
(2) Labrador Inuttut surface geminate inventory (adapted from Smith 1975:102)

pp	tt, tɬ		kk	qq
	ss		kx	qχ
ff, pv			χχ, xx	
	ɬɬ , ll			
mm	nn		ŋŋ, ɴɴ*	
		dʒ		

* /ŋŋ/ varies with the uvular /ɴɴ/

Smith's (1975) representation of the mixed clusters [kx], [qχ], [ts], [tɬ] and [dʒ] as phonemes is not entirely correct. Dresher & Johns (1995) show that each of these clusters is in fact the phonetic realization of geminates at the phonemic level. Part of Smith's treatment of clusters is due to the misleading orthography.[1] For example, the consonant cluster Smith writes as -kq- is, phonetically, [kx] or [qχ]. These consonant clusters arise at the surface level in the data considered here and the crucial insight from Dresher & Johns (1995) is that [kx] and [qχ] derive through affrication from the underlying phonemes /xx/ and /χχ/, respectively, and that [ts], [tɬ], and [dʒ] derive from the underlying phonemes /ss/, /ɬɬ/ and /jj/, respectively. Dresher & Johns's (1995) further show that each of these underlying phonemes is the result of Regressive Assimilation:

(3) Regressive Assimilation in Labrador Inuttut (Dresher & Johns 1995:82)



According to Dresher & Johns's (1995) analysis, if a voiceless stop [p], [t], [k] or [q] arises in the C_2 position of (3), it assimilates C_1 resulting in the phonemes [pp], [tt], [kk] or [qq]. A voiceless fricative [s], [χ] or [ɬ] in the C_2 position also assimilates the place of articulation of C_1 but the process results in affricates [ts], [qχ] or [tɬ] at the surface level under the rule (1995:82): "voiceless spirant geminates are affricated." The nasals are straightforward, with Regressive Assimilation resulting in the surface forms [mm], [nn],

1 Prior to the adoption of a standardized orthography by Labrador Inuit in 1980.

[ŋŋ] and [ɴɴ]. The voiced fricatives [v] and [ɣ] assimilate C_1 and then devoice, realized as [ff] and [χχ/xx] under the rule (1995:83): "voiced obstruent geminates devoice." The lateral approximant [l] is optionally voiceless. As a cluster it assimilates C_1 to form the underlying geminate /ll/, which then affricates to [tɬ], following the above affrication rule. Finally, the glide [j] assimilates C_1 to form the underlying geminate /jj/, which then affricates to [dʒ], following the above affrication rule. Dresher & Johns (1995) thus show that Regressive Assimilation applies to all underlying clusters in Labrador Inuttut. They also show that Regressive Assimilation must be followed by Affrication and Devoicing in the following rule ordering:

(4) Labrador Inuttut phonological processes (adapted from Dresher & Johns1995:83)

Underlying	/Cp/	/Cv/	/Cs/	/Cɣ/	/Cχ/	/Cj/
Regressive Assimilation	pp	vv	ss	ɣɣ	χχ	jj
(Palatal) Affrication			ts		qχ	dʒ
Devoicing		ff		χχ		
Surface	[pp]	[ff]	[ts]	[χχ]	[qχ]	[dʒ]

Dresher & Johns (1995) also refine Smith's (1977b) generalization, based on the following data, that SL simplifies geminates and heterogeneous consonant clusters:

(5) SL and 'mixed clusters'(Smith 1977b, from Dresher & Johns 1995:83)

a.	pisu(k) + kqaa + vuk	→	pisukqaavuk	's/he walks'
b.	ikqa + kqaa + vuk	→	ikqaqaavuk	's/he remembers'
c.	inu(k) + atsuk	→	inuatsuk	'loveable inuk'
d.	inni(k) + atsuk	→	inniasuk	'loveable son'

As already mentioned, the 'mixed cluster' that Smith writes as -kq- is phonetically [kx] or [qχ], derived from the underlying phoneme /χχ/. Smith's -ts- is derived from the underlying phoneme /ss/. Given those assumptions, Dresher & Johns (1995) show that in Labrador Inuttut SL applies only to phonological geminates and also must follow Regressive Assimilation. The following derivations yield the proper surface forms:

(6) SL and 'mixed clusters': sample derivations (from Dresher & Johns 1995:84)

Underlying	/iχχa + χχa: + vuk/	/inni(k) + assuk/
Truncation[2]	—	inniassuk
SL	iχχaχa:vuk	inniassuk
Affrication	iqχaχa:vuk	—
Surface	[iqχaχa:vuk]	[inniassuk]
Smith	*ikqaqaavuk*	*inniasuk*
	's/he remembers first'	'loveable inuk'

The data collected for this thesis are consistent with Dresher & Johns's (1995) analysis of rule ordering in (6). Consider the following two examples, extracted from spontaneous speech:

2 According to Smith (1977b:8), Labrador Inuttut has two classes of suffixes. For 'deleting suffixes', the final consonant of a base-stem is elided as in: /inuk/ 'person'+ /ŋa/ '3poss' → [inuŋa]. For 'adjoining suffixes' the final consonant of a base-stem is preserved as in: /inuk/ 'person'+ /mut/ 'from the...' → /inukmut/ Regressive Assimilation→ [inummut] (see §3.2.4).

(7) SL in current Labrador Inuttut data

Underlying	/iɣlu(k) + kkut/	/aχiɣɣi(k) + pvi + ssia + pvak/
Truncation	iɣlukkut	aχiɣɣipvissiapvak
Regressive Assimilation	illukkut	aχiɣɣivvissiavvak
SL	illukut	aχiɣɣivissiavak
Affrication	—	aχiɣɣivitsiavak
Devoicing	—	aχixxivitsiavak
Surface	[illukut]	[aχixxivitsiavak]
	'through the house'	'big, pretty willow ptarmigan'

Vowels do not play a significant role in this thesis, except in §5.1.3 where I show that vowel length does not co-vary with intensity prominence, pitch prominence or SL. Consider the vowel inventory in Smith (1977a:2):

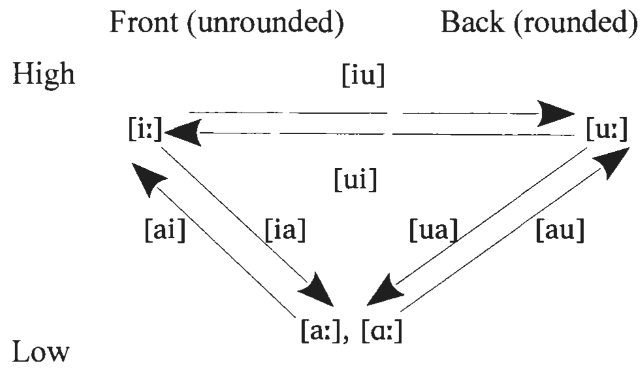
(8) Labrador Inuttut vowel inventory

	Front (unrounded)		Back (rounded)
High	[i]		[u]
Low		[a, ɑ]	

Smith's inventory is basically consistent with the short syllable peaks observed in the data considered in this thesis.[3] While I will not investigate the phonetic realizations of the allophones [a] and [ɑ], I will show that there is no evidence of widespread or systematic vowel reduction. Smith (1977a:3) describes the long vowels as follows:

3 The segment [ɑ] is virtually absent from the data considered here.

(9) Labrador Inuttut long vowel inventory



The data considered in this thesis are also consistent with this inventory. As we will see in §5.2.2, a further attestation is that of overlong vowels [a::], [i:u] etc., which occur in environments where a vowel that is already long is lengthened at the right edge of a phrase/utterance.

2.2 Schneider's Law: A basic description

SL was first categorized in the literature as a weight rule that deletes the rightmost coda consonant in adjacent CVC syllables. SL effects are reported for only three Inuit dialects: Labrador Inuttut, Quebec Inuttitut and Northwest Territories Siglitun (Schneider 1966, Collis 1970, Rischel 1974, Smith 1975, Dorais 1976, Dorais & Lowe 1982, Fortescue 1983, Lowe 1984, Massenet 1980, 1986, Dresher & Johns 1995, 1996 and Jacobsen 2000). A straightforward demonstration of the rule comes from the following data:

(10) SL in Quebec Inuttitut (adapted from Dorais 1990b:124)

a. $\mathbf{C_iC_i}\mathrm{V}\mathbf{C_jC_j}\mathrm{V} \rightarrow \mathbf{C_iC_i}\mathrm{V}\mathbf{C_j}\mathrm{V}$
illu + kkut
house.vialis
*illukkut
illukut 'through the house'

b. $\mathrm{C_iV}\mathbf{C_jC_j}\mathrm{V} \rightarrow \mathrm{C_iV}\mathbf{C_jC_j}\mathrm{V}$
nuna + kkut
land.vialis
*nunakut
nunakkut 'through the land'

The early literature on SL describes the environment for this rule in (10a) as a clash of two adjacent closed syllables. In (10b) then SL applies vacuously. The implication of this position is that CVC syllables are heavy. However, Dresher & Johns (1995) show that the presence of another kind of heavy syllable, CV:, has no impact on the operation of SL. For example, [illu:kut] 'through two houses' and [nuna:kkut] 'through two lands' are also grammatical. First of all, "(:)" must be added to the schematic representation of SL in (10a) $C_iC_iV(:)C_jC_jV \rightarrow C_iC_iV(:)C_jV$. And since syllable weight cannot be a factor in the rule, SL must be redefined in Labrador Inuttut, where Regressive Assimilation applies to all heterogeneous consonant clusters, as a ban on syllable-adjacent geminates.[4]

Based on his analysis of Labrador Inuttut, Smith (1977b) argues that SL applies to the first segment in C_jC_j sequences. His evidence is based on the 'mixed cluster' he writes as -kq-, which arises as -q- when it is the target of SL. A problem with this description arises from Dresher & John's (1995) rule ordering, which posits -kq- as the phonological geminate /χχ/ at the point in the derivation where SL applies. The geminate /χχ/

4 And syllable-adjacent underlying geminates in Quebec Inuttitut.

therefore says nothing about which segment in a C_jC_j sequence gets deleted. Smith's insight is probably correct however given the facts in Quebec Inuttitut. In that dialect, assimilation extends only as far as primary place of articulation (Dresher & Johns 1995:84) so that heterogeneous consonant clusters involving a uvular such as [qp] are possible at the point in the derivation where SL applies. SL targets these clusters, just as it targets geminates in (10), and in those cases the first member of the cluster is deleted, e.g. [qp]→[p]. Our schematic representation in (10a) must therefore be revised again to include this possibility in Quebec Inuttitut: $C_iC_iV(:)C_jC_kV \rightarrow C_iC_iV(:)C_kV$. In Northwest Territories Siglitun, the rule operates somewhere in between the two Eastern dialects. It is like Labrador Inuttut, in that geminate consonants are targeted by SL but unlike Quebec Inuttitut because heterogeneous consonant clusters cannot be the target of simplification (Lowe 1984): $C_iC_jV(:)C_kC_kV \rightarrow C_i\ C_jV(:)C_kV$ but $C_iC_jV(:)C_kC_lV \rightarrow C_i\ C_jV(:)C_kC_lV$.

2.3 Preliminary results

The data considered in this thesis are consistent with the phonemic inventories and phonological rules outlined in the previous sections. In addition to spontaneous speech, language consultants participated in an oral task, designed to produce two types of example words: one with syllable-adjacent underlying geminates in all word-medial consonant positions and another with syllable-adjacent underlying geminates in all word-medial consonant positions except the base-stem (for a full description of the methodology, see Chapter Four). The full phonetic results will be presented in Chapter Five, but first a brief discussion of the preliminary results.

2.3.1 SL is exceptionless

First consider the basic description of SL above and the iterative left-to-right pattern of degemination in the following two examples:

(11) SL in Labrador Inuttut data

a.	Underlying	/tuttu(k) + u: + ŋŋua + χχau + ŋŋik + tuk/
	Truncation	tuttu:ŋŋuaχχauŋŋiktuk
	Regressive Assimilation	tuttu:ŋŋuaχχauŋŋittuk
	SL	tuttu:ŋuaχχauŋittuk
	Affrication	tuttu:ŋuaqχauŋittuk
	Surface	[tuttu:ŋuaqχauŋittuk]
b.	Underlying	/tutu(k) + u: + ŋŋua + χχau + ŋŋik + tuk/
	Truncation	tutu:ŋŋuaχχauŋŋiktuk
	Regressive Assimilation	tutu:ŋŋuaχχauŋŋittuk
	SL	tutu:ŋŋuaχauŋŋituk
	Affrication	—
	Surface	[tutu:ŋŋuaχauŋŋituk]

SL degeminates underlying C_jC_j without exception in (11). This is representative of the results in Chapter Five for 32 examples like the ones in (11). These examples show that SL is fully productive in the language and that it behaves just as it is described in the Eskimo-Aleut literature. Typologically, SL is similar to a class of dissimilation rules (Bye 2011:1285) that refer to length. Consider the Lex Mamilla rule in Latin, shown in the following data from Ito & Mester (1998:22, 70):

(12) Lex Mamilla rule in Latin

a.	mamma	→	mami**ll**a	*ma**mm**i**ll**a
	'breast'		(diminutive)	
	offa	→	ofe**ll**a	*o**ff**e**ll**a
	'morsel'		(diminutive)	
	saccus	→	sace**ll**us	*sa**cc**e**ll**us
	'sack'		(diminutive)	
	ob-	→	o-mi**tt**ō	*o**mm**i**tt**ō
	'aside'		'lay aside'	
b.	canna	→	canālis	*ca**nn**ālis
	'reed'		'channel'	
	farr-	→	farīna	*fa**rr**īna
	'spelt'		'meal, flour'	
	currus	→	curūlis	*cu**rr**ūlis
	'chariot'		'relate to c.'	
	pollen	→	polenta	*po**ll**enta

In terms of banning syllable adjacent geminates, the rule as shown in (12a) looks just like SL, except the output is regressive while SL applies progressively. Lex Mamilla is unlike SL in that, as well as banning syllable adjacent geminates, a geminate in Latin also cannot arise before a heavy syllable (CV:, CVC) as shown by (12b). As will be shown in §5.1.3, SL is a rule that targets only underlying geminates: vowel length or the metrical weight of an adjacent syllable have no impact on its application.

2.3.2 Syllable prominence is not based on loudness, or loudness and duration

Initial analysis of lexical word examples from spontaneous speech shows that intensity peaks do not pattern systematically. The observed range of intra-word intensity variation is never more than 10 decibels (dB), this value being an extreme one, as variation in loudness between syllables is typically very small. A stringent approach to this data compilation results in the somewhat arbitrary cut-off of 1 dB as the minimum difference between syllables that contrast for intensity. On that basis, consider the following:

(13) a.	áχìxxik	‘ptarmigan’	AB
b.	aχìxxík		AE
c.	àχixxík		AE
d.	áχixxìk		BK
e.	aχìɣɣík		HW
f.	áχixxìk		PJ
g.	áχiɣɣì:k		HP

Under this description of syllable prominence, peak intensity falls on either the initial or final syllable. Secondary prominence can fall on any syllable. Also, peak intensity and durational prominence do no co-vary. In a slightly longer word example peak intensity can fall on the penultimate syllable, and every other syllable except the initial:

(14) a.	aχixxìlík	‘spruce ptarmigan’	BK
b.	aχixxílìk		BK
c.	aχixxílìk		JI
d.	aχìxxílik		JM
e.	aχíxxìlik		SI
f.	aχixxílìk		SI

The prominent syllable in terms of intensity is most often the penultimate, a generalization that gains support from another lexical word with the same number of syllables:

(15) a.	áχixxìvik	'willow ptarmigan'	BH
b.	aχìxxivík		BK
c.	àχixxívik		EF
d.	aχiɣɣìvík		HW
e.	áχiɣɣìvi:k	'is it a willow ptarmigan?'	HP
f.	àχiɣɣívik		HP
g.	àχixxívik		JI
h.	aχìxxívik		JM
i.	aχìxxívik		LI
j.	àχixxívi:k		LI
k.	aχìxxívik		PJ
l.	àχixxívi:k		SI

As we see in (14-15), the penultimate syllable is most prominent in 12 of the 18 examples. The question is how to explain initial prominence in (15a, e), antepenultimate prominence in (14e) and final prominence in (14a) and (15b, d). Prosodic factors such as syllable shape do not resolve these apparent exceptions. The data in (13-15) come from ethnographic interviews (see full description in §4.2.2) during which language consultants were shown unlabelled photographs of Labrador flora and fauna species. In (15), for example, the photographic plate showed a willow ptarmigan in winter and summer plumage. The spontaneous response was most often a single word answer, as in (15a-c, g, h, k). These examples words have initial, penultimate and final prominence, clear evidence that peak intensity does not pattern systematically at the prosodic level of the word. The remaining example words are embedded in phrases and utterances, but peak intensity does not pattern consistently in these either. Observe penultimate prominence in (15f) where the example word arises phrase-initially and in (15j, l) where the example words are phrase-final. The initial syllable is the most prominent in (15e) where the example word arises at the end of an interrogative phrase and utterance, further evidence that peak intensity does not pattern systematically at the level of the phrase/utterance.

Another initial finding is that the long vowels in (15) do not systematically attract peak intensity. Most accounts of Labrador Inuttut, including that of Dresher & Johns (1995:89), argue that long vowels attract the most "stress." In (15e), the opposite can be true, with the short vowels in the initial and penultimate syllables attracting intensity peaks of 72 dB and 71 dB respectively. By comparison, the long vowel in the final syllable has a peak intensity of only 68 dB. These contrasts are small enough to be considered insignificant. What truly matters is that the location of peak intensity is variable. These initial results in (13-15) lead to the conclusion that intensity is not a relevant correlate of syllable prominence in Labrador Inuttut (see §5.3).

2.3.3 Syllable prominence is not based on duration alone

Each vowel in Labrador Inuttut's phonemic inventory [a, i, u] has a meaning changing phonemic long form. From spontaneous speech in the data, observe the following minimal pairs:

(16) a.	anak	'faeces'	a:nak	'paternal grandmother'
b.	innik	'son'	i:nnik	'starfish'
c.	inuk	'person'	inu:k	'two people'

Within the word domains in (16), phonemic short vowels always have less duration than phonemic long vowels. There is no durational overlap between long and short, consistent with Jacobsen's (2000:54) acoustic study based on a reading task in West Greenlandic. As well, there is no rhythmic constraint on long vowels, which can arise in all syllable types and positions within the word. It follows from this that phonemic vowel duration alone is not relevant to any notion of stress in Labrador Inuttut.

2.3.4 Syllable prominence is not based on pitch

The Inuit dialects and all languages in the Eskimo-Aleut Family are non-tonal. This is similar to languages like English, in which tonal contrasts are not phonemically relevant, and like Japanese, where pitch is relevant at the level of the phrase and where boundary melodies are timed with the rightmost mora of an intonational phrase (Nagano-Madsen 1994). I discuss pitch effects in Chapter Five, §5.4, where I show that SL is unaffected by a pattern of pitch effects at phrase-final/utterance-final boundaries. Neither can these effects be associated with metrical stress. In non-boundary environments, pitch is slightly falling from left-to-right. Pitch alone is therefore not a relevant correlate of stress.

2.3.5 Syllable prominence is not based on articulatory quality

None of the Eskimo-Aleut languages display a systematic pattern of vowel reduction. The Aleut and Yupik languages have a schwa segment in their phonemic vowel inventories. Dialects like Siberian Yupik, for example, have [ə], where the segment is unlike its [a i u] vowel counterparts in that it does not have a long form (Reuse 1994:18). Schwa is merged with [i] in all but one of the Inuit dialects.[5] I observe no schwa segments and no vowel reduction in the data considered in more detail in the next chapters.

2.3.6 Syllable prominence is not based on pitch and duration

The only pattern of pitch effects in my data involves phrase-final/utterance-final boundaries, a phenomenon that can include syllable rhyme lengthening, as shown in Chapter Five in §5.4. Because this covariance of pitch and duration occurs only in boundary environments, it cannot be a correlate of a metrical system of alternating stress.

2.4 Summary

Labrador Inuttut is an Inuit language where Regressive Assimilation applies to all consonants clusters, making all underlying coda consonants part of a geminate in surface forms. Initial analysis of the acoustic results from the data considered here shows that SL behaves just as it is described in the literature, especially Dresher & Johns (1995). SL is exceptionless and independent of any metrical conditioning. No recurring pattern of prominence based on the three correlates of stress can be found. With these observations in mind, I address, in the next chapter, the previous literature on the SL phenomenon.

5 At the geographic language border with Yupik, the Inuit dialect of Inupiaq on Little Diomede Island in Alaska retains schwa.

3 Background Literature on SL, “stress” and pitch

3.1 Introduction

This chapter reviews the previous descriptions and analyses of SL, keeping the preliminary results in mind and trying to establish a theoretical baseline for a fuller examination of the results in Chapter Five. One of the goals in this thesis is to provide further empirical evidence documenting the SL phenomenon. Since no acoustic studies of Labrador Inuttut are available in the previous literature, the theoretical basis for the interpretation of “stress” and pitch in this dialect primarily comes from acoustic studies of the related Inuit languages in Greenland and Quebec.

3.2 SL descriptions

Building on the basic description of SL in §2.1.2, I present in this section a chronological summary of SL descriptions in the literature. Nothing resembling the phenomenon is mentioned in the earliest literature on Labrador Inuttut. A diachronic study on the origins SL is beyond the aims of this study. However the rule, on first glance, appears to be absent from 19th century lexicography and grammar books on Labrador Inuttut. Compare, for example, the following lexical entries from Erdmann (1864) and Bourquin (1891) to the same word in a more recent dictionary by Anderson, Kalleo & Watts (2006):

(1)		19th century orthography	Contemporary Labrador	IPA
	a.	aksalloak ‘wheel’	atsa**l**uak	[atsaluak]
	b.	Ketterdlermik ‘jewelry ring’	Kititli**m**ik	[χititɬimik]

The examples in (1) suggest that SL did not apply previously, but more study is needed on the phonological assumptions of Erdmann and Bourquin, which are not described. It appears unlikely however that Bourquin would have overlooked SL if it was present in historic Labrador Inuttut, given his careful documentation of this dialect's polysynthetic morphology. One possibility is that they were influenced by the orthographic conventions of West Greenlandic, where SL is not a factor. The issue will not be resolved here.

3.2.1 SL in Quebec Inuttitut

SL gets its name from a French priest, Lucien Schneider, who spent most of his career working in the Inuit communities of Northern Quebec. Schneider (1966) wrote a series of grammar books where *la Loi des double consonnes* (the law of double consonants) is first described. There is no analysis of the rule, but its output is consistent with the spelling in his 1970 dictionary, one of the most comprehensive lexicographies of any Inuit language. It provides the data for the first formal description of SL as a phonological rule. Collis (1970:276-77) dubs the phenomenon "*Loi Schneider d'allitération*" (Schneider's Law of alliteration), shown in the following examples:

(2) SL description in Collis (1970): /aik + pa + ʃʃi + aq/ 'fiance'

West Greenlandic	Quebec Inuttitut
[a:ppaʃʃiaq]	[aippasaq]

According to Collis, SL is found in all the Canadian Inuit dialects east of Hudson's Bay, including Quebec Inuttitut (which includes sub-dialects on the Belcher Islands

(Qikirtamiut), the eastern shore of Hudson's Bay (Itivimiut) as well as around Ungava Bay (Tarramiutut)) and Labrador Inuttut (which includes sub-dialects spoken on the North Coast of Labrador and in Rigolet). Collis argues that SL was operative in 19th century Labrador, based on letters between Bourquin in Labrador and Kleinschmidt in Greenland. He writes (1970:277): "*cette règle existait déjà au siècle dernier, ce qui explique pourquoi T. Bourquin n'a pu suivre les conseils orthographiques que S. Kleinschmidt lui prodiguait dans ses lettres d'août 1865 et de juin 1871*" (this rule existed in the last century, which is why T. Bourquin could not follow the orthographic advice that S. Kleinschmidt gave to him in his letters of August 1865 and June 1871). This assessment is not quite correct, as Bourquin did follow Kleinschmidt's orthographic advice in most areas, but this issue lies beyond the purposes of this thesis.

Following Collis, Rischel (1974:86) is the first to refer to SL as a rule governing the sequencing of syllables: "some Canadian dialects do not, according to the law, tolerate successions of closed syllables and hence a sequence VCCVCCV is simplified to VCCVCV."

Massenet (1986:131) shows that stating the rule in this way is too restrictive because simplification does not occur when a word's final syllable is CVC, "*si l'on adopte cette interprétation, il faudra restreindre la règle aux syllabes internes de mot, puisque à la finale on peut avoir deux syllabes fermées successives:* /sinippuq/ *'il dort'* /ipp'it/ *'toi'*" (if one adopts this interpretation, it [must] restrict the rule to word internal syllables, since at the end of a word there can be two successive closed syllables: /sinippuq/ 's/he sleeps' /ippit/ 'you'). Massenet takes instead a rule-based, generative approach in his SL description. He also makes a convincing argument that in Quebec Inuttitut the phenomenon operates iteratively, from left to right. Consider the underlying consonant clusters in the following data:

(3) SL description in Massenet (1986:125)

a.	/tussiaq-puq/	→	[tutsiapuq] 's/he prays'
b.	/tussiaq-vik-mut-lu/	→	[tutsiavimmulu] 'and to church'

In (3a), the uvular is deleted while the labial is preserved at the surface level. The same happens in (3b), where, going from left to right, the final alveolar consonant of the base is deleted while the final alveolar consonant of the next affix is preserved. For Massenet this is evidence that SL works from the left, targeting the first member of a heterogeneous consonant cluster. As support for this hypothesis, Massenet refers to a similar phenomenon in Labrador Inuttut described by Smith (1977) (see earlier in §2.1.2) and in Willis (1971:81), who argues the phenomenon is iterative and exceptionless: "in the Ungava dialect there cannot be a sequence of two consonant clusters (or two tense consonants). When this occurs, through affixation mainly, the first consonant of the second (fourth, sixth, etc.) cluster is deleted."

Massenet (1986) contributes to the description of SL by showing where the rule occurs relative to other phonological rules in Quebec Inuttitut, especially in relation to a phenomenon that deletes the final consonant of base-stems. He calls this phenomenon *effacement de la consonne finale du radical* (called Truncation here, following Dresher &

Johns (1995)). First, Massenet demonstrates an environment where SL applies exclusively:

(4) SL alone (Massenet 1986:127)

	$C_1C_2V(:)C_3C_4$
Underlying	/illu + rru:ja:q + tuq/
Truncation	—
SL	illuru:ja:qtuq
Surface	[illuru:ja:tˤtuq]
	maison-ressembler.à-3s
	'it looks like a house'

Massenet argues that in the case of a base-stem that ends in a vowel, the environment for Truncation is not met, leaving SL to operate as in (4) where it targets C_3 for deletion. Massenet next illustrates environments where neither rule applies, then another where SL applies and Truncation does not, and finally two examples where Truncation applies and SL does not. Consider the following:

(5) SL and Truncation (Massenet 1986:127)

a. $C_1V(:)C_2C_3$

Underlying	/niuviq + vik/
Truncation	—
SL	—
Surface	[niuvip^{r}p^{l}ik]
	faire.du.commerce-endroit
	'store'

b. $C_1C_2V(:)C_3C_4$

Underlying	/tussiaq + vik/
Truncation	—
SL	tutsiavik
Surface	[tutsiavik]
	prier-endroit
	'church'

c. $C_1C_2V(:)C_3C_4$

Underlying	/niuvip^{r}p^{l}ik + liaq + puq/
Truncation	niuvip^{r}p^{l}iliap^{r}puq
SL	—
Surface	[niuvip^{r}p^{l}iliap^{r}puq]
	faire.du.commerce-endroit-aller-3s
	's/he goes to the store'

d. $C_1C_2V(:)C_3C_4$

Underlying	/qalluna:q + liaq + puq/
Truncation	qallunaliap^{r}puq
SL	—
Surface	[qalluna:liap^{r}puq]
	blanc-aller
	's/he goes to the white person'

For Massenet, the crucial distinction is between (5b), in which the suffix /-vik/ is [-Truncation] and SL applies to the underlying heterogeneous consonant cluster, and (5c), in which the suffix /-liaq-/ is [+Truncation] so that Truncation applies and SL is vacuous.

In his final case, Massenet shows environments where both rules apply, showing that Truncation must apply first:

(6) SL and truncation (Massenet 1986:128)

a.		$C_1V(:)\ C_2C_3C_4$
	Underlying	tusaq-qqaujuq
	Truncation	tusaqqaujuq
	SL	—
		[tusaqqaujuq]
		'entendre-il-vient.de/just hear it'
b.		$C_1C_2\ V(:)\ C_3C_4C_5$
	Underlying	tussiaq-qqaujuq
	Truncation	tussiaqqaujuq
	SL	tussiaqaujuq
	Surface	[tutsiaqaujuq]
		'prier-il-vient.de/s/he is just praying'
c.		$C_1V(:)C_2C_3$
	Underlying	ipa-ttauq
	Truncation	—
	SL	—
	Surface	[ipattauq]
		'veine.d'arbre-aussi/also a tree vein'
d.		$C_1C_2\ V(:)\ C_3\text{-}C_4C_5$
	Underlying	ippaq-ttauq
	Truncation	ippattauq
	SL	ippatauq
	Surface	[ippatauq]
		'restes.de.nourriture-aussi/also leftover food'

Massenet's system of ordered rules is then expanded to include Regressive Assimilation. Because Regressive Assimilation is crucial to his analysis of SL, discussion of that topic will resume in §3.3, which describes SL analyses in the scientific literature.

3.2.2 SL in the Inuit languages

Dorais (1976) calls "Schneider's Law of alliteration" a morphophonological characteristic of Quebec Inuttitut and Labrador Inuttut, describing it as an exceptionless law of elision. He shows that SL does not apply in the Inuit languages west and north of Hudson's Bay by comparing lexical words there to the same words used by Inuit in Quebec and Labrador:

(7) SL application, non-application in other Canadian Inuit languages (Dorais 1976:391)

	SE Baffin, Kinngaqmiut, Iglulingmiut		Quebec Inuttitut/Labrador Inuttut
a.	autlaqpuq	's/he goes away'	autlapuq
b.	akɣakka	'my hands'	akɣaka
c.	ijukkaqtit	's/he makes him fall'	ijukkatit
d.	utnukkut	'during the evening'	utnukut

Dorais says SL affects surface forms in Quebec and Labrador so that in (7a) the second cluster /qp/ must be simplified because it follows /tl/. Dorais differs with Collis in his diachronic assessment of SL. He argues that old Labrador texts and the memory of elderly Quebec Inuttitut language consultants show that SL is a recent innovation, coming into use sometime in the early 20th century. His main contribution relevant to the key aims of this thesis is his description of a dialectal continuum based on four variations: the voiced velar lateral approximant phoneme /L/, cluster assimilation, glottal stopping and SL. His findings are summarized in the following table:

(8) Phonological processes in four Inuktitut dialects (Dorais 1976:391)

	Iglulingmiut	SE Baffin	Kinngaqmiut	Qubec Inuttitut		Inuttut
				Itivimiut	Taqramiut	
Presence of assimilation (→)	L	→t	→s	→s	→s	L
Degree of cluster neutralization[1]	0	1	1	2	2	3
Presence (+) or absence (-) of glottal stop	-	-	-	+	-	-
Presence (+) or absence (-) of SL	-	-	-	+	+	+

Only Dorais' descriptions of the phoneme /L/ in Labrador Inuttut is problematic: it is not supported by the data here or by the subsequent literature, including Dorais (1990b). The table is otherwise useful, showing how dialects with SL are at the extreme end of heterogeneous consonant cluster assimilation.

Finally, Dorais describes what he calls a 'limited form' of SL in Northwest Territories Siglitun (1986:46): "the first consonant of a cluster is elided in the same circumstances as described above, but only when the two elements of the group have the same position of articulation." Dorais provides the following examples:

1 The degree of neutralization varies from 0 in Iglulingmiut (where all four types of clusters are fully used) to 3 in Labrador (where there is only one principal type).

(9) SL in Siglitun (Dorais & Lowe 1982:131)

	Siglitun	Copper Inuit
a.	iɣluka 'my two houses'	iɣlukka
b.	tikillijuŋ 'may he/she arrive at it!'	tikillidɟuŋ
c.	iɣlutka 'my (many) houses'	iɣlutka

Dorais argues that SL applies in (9a-b) because the clusters /kk/ and /dɟ/[2] have the same place of articulation, while SL has no impact on a coronal-velar cluster like /tk/ in (9c). The primary goal here is to instantiate SL empirically. Lacking Northwest Territories Siglitun primary source data to analyze, evidence from this Inuit language will play no further role in this thesis.

3.2.3 SL in Labrador Inuttut

Smith (1975:105) writes that, in Labrador Inuttut, "two consonant clusters may not occur with only a vowel or vowel cluster between them, but must also have an intervening intervocalic simple consonant. There are no sequences of the form ...CCV(:)CC." No analysis is given, but Smith (1975:100) "questions the confirmability" of the hypothesis in Collis (1970:276-7) that SL existed in 19th century Labrador Inuttut, pointing to the "unreliability of the orthography" and numerous counter-examples in Bourquin. Smith discounts for Labrador Inuttut the position of Rischel (1974) that SL is a rule governing the sequencing of syllables (see §3.2.1), showing that adjacent CVC syllables are possible in /imappik/ 'sea' and /χaittuk/ 'band of land'.

2 Dorais describes /ɟ/ as a voiced glide in Copper Inuit, the apical fricative /r/ in other Inuit dialects.

A more comprehensive description of SL is in Smith (1977b), where he shows the behaviour of /-kkut/, the affix used in §2.1.2 to demonstrate SL in Quebec Inuttitut. Smith finds the same pattern in Labrador:

(10) SL application in Labrador Inuttut (1977b:6)

a. /nuna + kkut/ → [nunakkut]
land.vialis

b. /tuttu(k) + kkut/ → [tuttukut]
caribou.vialis

Smith (1977b) also shows more complex constructions as evidence that SL applies iteratively from left-to-right:

(11) SL application over longer sequences

a. /nanu + ŋŋua(k) + χχa: + lluni/ → [nanuŋŋuaχa:lluni]
bear.toy.do first.by

b. /tuttu(k) + ŋŋua(k) + χχa: + lluni/ → [tuttuŋuaqχa:luni]
caribou.toy.do first.by

The affixation in both examples results in three adjacent underlying geminates, but the surface output in each case is different. The source of this variation must be a contrast in the base-stems. In (11a), the base-stem has only short consonants, but in (11b) the base-stem contains an underlying geminate in the suffix-adjacent position. Smith (1977b) therefore shows that SL must apply left-to-right, since only that direction can yield the correct results in (11). The same pattern will be instantiated in the analysis here of the phonemic pair /tutuk/ versus /tuttuk/ (see methodology in §4.4.1, results in §5.1).

Smith (1977a) shows that, consistent with the results in Chapter Five, an open syllable interrupts the iterative pattern of SL, as we can see from the rule's non-application in the following example:

(12) SL blocked by the insertion of a CV syllable (1977a:82)

Underlying	/χimmi(k) + χa + ŋŋik + tuk/
	dog-have-3.s.neg
Surface	[χimmiχaŋŋituk]

Smith argues that in (12) the underlying geminate /ŋŋ/ does not degeminate because of the intervening open syllable /χa/. This position is consistent with the preliminary results and will be further substantiated by the acoustic results in §5.1.

3.2.4 Deleting versus adjoining affixes in Labrador Inuttut

One of the issues not fully explained thus far is a variation first described by Smith (1977a:8) involving two types of affixes differentiated by the way in which they adjoin base-stems with final coda consonants. One class, which he calls 'deleting affixes', is exemplified by /χa/ 'have' in (12). In that example the final stop in the base-stem /χimmi(k)/ is deleted, not because of SL, but because /χa/ is a deleting affix. The other class of affixes preserve the final coda consonant of a base-stem they adjoin, which Smith calls 'adjoining affixes' (Massenet (1986) describes the same phenomenon in Quebec Inuttitut as [±Truncation]). Both classes are shown in the following data:

(13) Deleting versus adjoining affixes in Labrador Inuttut Smith (1977a:8)

a.	/inuk + ŋa/	→	[inuŋa]		
	person.3poss				
b.	/inuk + mit/	→	inukmit	→	[inummit]
	person.from				

The deleting class is exemplified by /ŋa/ in (13a), while /mit/ is an example of an adjoining affix (note the preservation of the final stop is here made opaque at the surface level by the application of Regressive Assimilation to the underlying heterogeneous consonant cluster /km/). Smith acknowledges that this alternation is not the same for all language consultants:

> ... the Labrador dialect has been in a state of rapid change for at least the last century. The adjoining/deleting classes are presently quite variable from idiolect to idiolect.
>
> (Smith 1978:116)

Smith's dictionary of affixes (1978) is the basis for most of the glosses used in this thesis, but he admits that for some cases, "insufficient or contradictory data was obtained. Individual speakers may in certain cases exhibit the class which is not given" (p. 116). These observations of variability in Labrador Inuttut are consistent with the findings in §5.1.4 where SL is shown to be exceptionless. At the same time, the perfect alternating pattern shown in (11), where SL applies to all syllables, is not always the case in the data considered here which show some variability at the right edge of words for the affix [ŋŋituk], [ŋittuk], or the previously unattested [ŋituk]. Crucially these variations never cause an SL violation.

3.3 SL analyses

Only two studies of SL attempt a principled explanation and theoretical solution to the phenomenon. Massenet (1986) argues for an articulatory motivation related to "tense" geminates. Dresher & Johns (1995) offer Government Theory as a plausible framework of analysis.

3.3.1 SL is not "geminate tension" in Quebec Inuttitut

Massenet (1986) shows that in Quebec Inuttitut Regressive Assimilation is not total, allowing a class of clusters that begin with a uvular [q χ ʁ N] such as /qp/ and /ʁt/. From these uvular clusters, Massenet finds phonological processes that result in pharyngealized geminates which he calls r-clusters [$p^{r}p$], [$p^{r}p'$], [$t^{r}t$], [$t^{r}s$], [$t^{r}s'$], [$l^{r}l$], [$m^{r}m$], [$n^{r}n$] and a third class of consonant clusters he calls glottalized geminates [pp'], [ts'], [kk'] and [qq']. All other consonant clusters are surface geminates with SL degeminating each as follows: [vv →v], [pp →p], [ts'→ j], [ll →l], [tt→t], [kk→k], [kk'→ɣ], [qq→q] and [qq'→ʁ]. He argues that in Quebec Inuttitut both geminates and uvular clusters are tense as compared to the unassimilated clusters in other Inuit languages. According to Massenet (1986:130), the idea that geminate tension is the force behind SL follows Schneider's (1970:XIV) insight that geminates are "*tendues*," a term that Massenet interprets to mean articulatory tension. He argues for Tension (TEN) within the list of ordered rules already mentioned:

Truncation, Regressive Assimilation, SL, Affrication and Devoicing. Dresher & Johns (1995:85) describe Massenet's argument as articulatory, with the production of consonant clusters causing an "explosive release of air" or consonant tension. To avoid a 'tension clash' in adjacent syllables, Massenet (1986:105) proposes the following rule:

(14) SL: Law of double consonants (*La Loi des double consonnes*)
RULE: Delete a word-internal coda consonant in a syllable with a tense onset

Massenet argues for the ordering of his phonological rules as (Regressive Assimilation → Tension → SL) applied in derivational cycles, to yield the correct surface forms as follows:

(15) Rule ordering in Quebec Inuttitut (Massenet 1986:131-2)

a. /niuviq + vik + mut/ 'to the store'

1er cycle:		niuviq
		— (*aucune règle ne s'applique*)
2ème cycle:		niuviqvik
	R. Assimilation	niuviv^{r}vik
	Tension	niuvip^{r}p$^{'}$ik
	SL	niuvip^{r}p$^{'}$i
3ème cycle:		niuvip^{r}p$^{'}$imut
		—
		[niuvip^{r}p$^{'}$imut]

b. /anaʁ + ʁaj + jaŋ + ŋit + tuq/ 's/he didn't return'

1er cycle:		anaʁ
		—
2ème cycle:		anaʁʁaj
	R. Assimilation	—
	Tension	anaqq'aj
	SL	anaqq'a
3ème cycle:		anaqq'aja
		—
4ème cycle:		anaqq'ajaŋŋit
	R. Assimilation	—
	Tension	anaqq'ajaŋit
	SL	anaqq'ajaŋi
5ème cycle:		anaqq'ajaŋŋituq
		—
		[anaqq'ajaŋŋituq]

Tension occurs in the second cycle of (15a) where its output is a glottalized geminate, Massenet's SL trigger environment. In the second cycle of (15b), Massenet observes the same process for the uvular stop. What he does not explain is the fourth cycle where Tension appears to delete the /ŋ/ segment. This is either a printing error or Massenet envisaged an unstated definition for tense onset in (14) that includes the nasal geminate /ŋŋ/. His stated definition of *tense consonant* is a 'delayed burst', which cannot apply to non-plosives. While agreeing with Massenet's account of Regressive Assimilation, I find no motivation for Tension as an articulatory phenomenon, the basis of which also makes the wrong predictions with respect to the observed facts of SL in Northwest Territories Siglitun[3].

3.3.2 SL is not a metrical phenomenon

Dresher & Johns (1995) is perhaps the most ambitious study of SL in the literature. The authors first use feature geometry to explain the degree of assimilation in the three dialects of Inuktitut where SL is attested, then they show how this phenomenon cannot be metrical or related to a compensatory phenomenon observed in some Inuit languages, and conclude with an overall theoretical solution based on Government Phonology. They propose:

---

3 As discussed in §1.1, SL is reminiscent of other dissimilation processes, especially those that impact length. The rule in Northwest Territories Siglitun also looks like a dissimilation process involving the nasal feature in Gooniyandi. McGregor (1990:98) shows the progressive dissimilation of NC clusters, saying that the rule "deletes the nasal in a homorganic nasal-stop cluster when it immediately follows any nasal-stop cluster." Consider the behaviour of the ergative postposition /-ŋga/ which loses its initial nasal when the preceding syllable boundary is also a nasal-stop cluster, as seen in the following examples:

/go: ɳbo:-ŋga/	→	[go: ɳbo:ga]
'by the woman'		
/gongo:do: ɳbo:-ŋga/	→	[gongo:do: ɳbo:ŋga]
'by the snot'		

McGregor further shows that the Gooniyandi dissimilation rule avoids "homorganic nasal-stop clusters [which] follow one another in successive syllables [... and] sequences of non-homorganic nasal-stops followed in the next syllable by homorganic nasal-stop clusters." By comparison, an SL trigger in Northwest Territories Siglitun can be a cluster (but also a geminate) and the rule only simplifies geminates: clusters cannot be SL targets, as shown in §2.2. The crucial difference is that SL is not morphologically conditioned; Suzuki(1998:155) shows that the NC cluster dissimilation in Gooniyandi operates within the morphological domain. See further discussion of dissimilation processes in §5.1.4.

(16) SL Description: $VCCV(:)C_1C_2V \rightarrow VCCV(:)\ C_2V$

SL Rule:	Delete the left root node of a place geminate when it follows a consonant cluster

As discussed in §1.3, Creider (1981) observes a typological difference in Regressive Assimilation across the Inuit languages. Dresher & Johns (1995:86) describe the situation in terms of feature geometry. In Northwest Territories Siglitun, place is not assimilated, but voicing, nasality and continuancy are. They propose Manner as one feature node and split the Place node based on the facts of all three dialects:

(17) Continuum of Regressive Assimilation (Dresher & Johns 1995:86)

Siglitun:	Manner		
Quebec Inuttitut:	Manner	Primary Place	
Labrador Inuttut:	Manner	Primary Place	Secondary Place

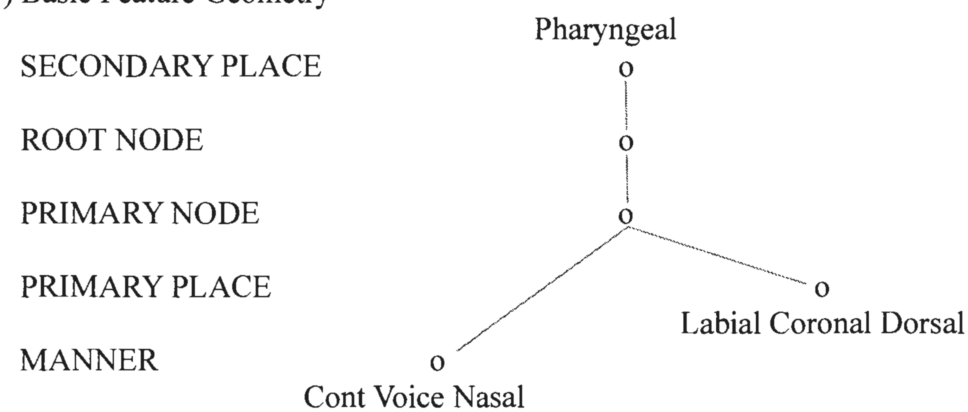
Dresher & Johns (1995) focus on the exception to place assimilation in Quebec Inuttitut, described above as 'r-clusters.' Massenet (1986) shows that these pharyngealized coronal or labial geminates [p^{r}p], [p^{r}p^l], [t^{r}t], [t^{r}s], [t^{r}s^l], [l^{r}l], [m^{r}m] and [n^{r}n] lose their pharyngealization when targeted by SL, shown by the following data:

(18) SL and 'R-clusters' in Quebec Inuttitut (Dresher & Johns 1995:87)

Underlying	/aullar + tuŋa/
SL	aullatuŋa
Surface	[aullatuŋa] (*aulla^{r}tuŋa)

Since Regressive Assimilation does not “wipe out the pharyngeal element contributed by /r/,” Dresher & Johns (1995:87) argue that the data in (18) means that all the other features must spread together. They give pharyngealization an independent status, consistent with the fact that it is a secondary articulation:

(19) Basic Feature Geometry



From (19), Dresher & Johns (1995) can say that Regressive Assimilation in Northwest Territories Siglitun spreads the manner node, while in Quebec Inuttitut it spreads the primary node. Consistent with this architecture is the fact that, unlike other features, pharyngealization also spreads to vowels. Finally, in Labrador Inuttut, which lacks pharyngealization, Regressive Assimilation spreads to all nodes. This is consistent with the preliminary results and the results in Chapter Five which show that Regressive Assimilation in Labrador Inuttut is total.[4]

4 One exception are those examples from the Rigolet sub-dialect, in which heterogeneous consonant clusters not heard in other parts of Labrador are valid. Initial results from HP, the Rigolet Inuktut consultant, show that the phenomenon affects the coronal place of articulation: [ɣl], [βl], [χt], etcetera (see also Dorais (1977b), Dresher & Johns (1995), and Bobaljik (1996) for related discussion, especially the Dresher & Johns (1995:93) discussion of the two environments where SL remains

One of the outcomes of this thesis is that SL is not a metrical rule, in line with Dresher & Johns (1995). They consider three plausible metrical solutions and then show how each one fails to explain SL. The first proposal supposes a system of strong and weak syllables from left to right, with SL applying to syllables in the weak position as follows:

(20) Metrical Theory One: S W syllables left-to-right, W undergo SL

a.

bear. toy. do-first.by 'by first killing the toy bear'

1 2 3 4 1 2 3 4

/**nanu** + **ŋŋuak** + **kχa:** + **lluni**/ → [**nanuŋŋuaχa:lluni**]

S W S* W S W

b.

caribou. toy. do-first.by 'by first killing the toy caribou'

1 2 3 4 1 2 3 4

/**tuttu** + **ŋŋuak** + **kχa:** + lluni/ → [**tuttuŋuaqχa:**luni]

S W S W S W

This analysis accounts for the pattern in (20b); however SL is sensitive only to the preceding syllable. As a result, in (20a), SL simplifies the underlying geminate in consonant position three, therefore weakening a syllable that is supposed to be strong.

---

inactive: in words with only CV sequences and in words with a string of mixed clusters dissimilar in their place of articulation. Dresher & Johns note that later environment could potentially occur in Rigolet Inuktut, as it does in Northwest Territories Siglitun. In their footnote on page 93, Dresher & Johns mention a forthcoming paper, but state that their "results, so far are inconclusive." Results from the Rigolet Inuktut consultant are the same: while numerous examples of mixed place of articulation clusters do arise, in only one case from several hours of recordings is there an example of syllable adjacent mixed clusters and this is a marginal case at best. Further analysis is not possible in this thesis. Results from the Rigolet Inuktut consultant do confirm that Regressive Assimilation does not spread to coronal node, suggesting a different feature geometry for the Rigolet dialect is needed. This as well is a topic for future study.

Dresher & Johns (1995) also show that reversing the strong weak pattern does not resolve the problem:

(21) Metrical Theory Two: W S syllables left-to-right, W undergo SL

a.

bear. toy. do-first.by 'by first killing the toy bear'

1 2 3 4 1 2 3 4

/**nanu** + **ŋŋuak** + **kχa:** + **lluni**/ → [na**nuŋŋua**χa:**lluni**]

W S W S W S

b.

caribou. toy. do-first.by 'by first killing the toy caribou'

1 2 3 4 1 2 3 4

/**tuttu** + **ŋŋuak** + **kχa:** + **lluni**/ → [**tuttuŋ**uaqχa:luni]

W S W S* W S

This account describes (21a). But in (21b), Dresher & Johns (1995) observe that SL degeminates the underlying geminate at consonant position four, thus simplifying what is supposed to be a strong syllable. They further note that any system of strong and weak syllables that one could imagine fails each time an open syllable is inserted in the relevant string. Dresher & Johns (1995:89) conclude that a metrical explanation "requires that the metrical system locates heavy syllables wherever they are." They next consider SL as a stress-governed rule, assuming that closed syllables are stressed and that adjacent stressed syllables clash. SL would thus resolve the clash by deleting the coda of the rightmost closed syllable. The proposal is schematized in the following rhythmic grid:

(22) Metrical Theory Three: Assign stress to every closed syllable, SL context is adjacent heavy syllables

```
 *     *     *     *              *           *
 *     *     *     *             (*     *)   (*      *)
 μ μ   μ μ   μ μ   μ μ            μ μ   μ    μ μ    μ
CVC  CVC  CVC  CVC   →         CVC   CV   CVC   CV
```

Under this system coda consonants add one mora to the overall weight of any syllable. This works as long as the vowel adds only one mora to the grid. But consider the same system for the examples in (20-21) where some syllable peaks are bimoraic:

(23) Metrical Theory Three does not work for long vowels

a.

```
       *           *
(*    *)  (*      *)  (*   *)
 μ   μμ   μμ    μμμ   μ   μ
CV  CVC  CVV  CVVC  CV  CV
na  nuŋ  ŋua  χa:l  lu  ni
```

b.

```
 *        *
(*     *) (*       *)  (*  *)
 μμ   μ   μμμ     μμ   μ   μ
CVC  CV  CVVC   CVV  CV  CV
tut  tu  ŋuak   χa:  lu  ni
```

The problem, in Dresher & Johns's (1995) view, is that long and/or complex vowels cannot be metrically weak, the situation for the third syllable, [ŋua], in (23a) and the antepenultimate syllable [χa:] in (23b). Finding no metrical solution to the problem, Dresher & Johns (1995:90) next consider a diachronic proposal from Ulving (1953). He argues that "Inuit has, or once had, a rule of consonant gradation" so that an original /k/

is weakened to /ɣ/ when it precedes main stress, as in the word [pùtuɣúq] 'big toe'. Ulving (1953) argues that /k/ is preserved and geminated when it follows main stress as in the following examples where stress shifts back a syllable in the singular versus dual forms:

(24) Consonant Gradation (Ulving 1953, adapted from Dresher & Johns 1995:90)

a.	nùkáq 'younger sibling'	→	núkkat 'younger siblings (2)'
b.	pu:q (< *puɣuq) 'bag'	→	púɣɣut 'bags (2)'

Rischel (1974) agrees that consonant gradation may previously have been a factor but he rejects a stress-based solution for modern day Inuit languages, especially West Greenlandic where he argues that 'stress' or intensity prominence is undefined. According to Rischel, phenomena like those found in (24) are related to compensatory lengthening in West Greenlandic. The rule is like SL in that it also involves geminates alternating with non-geminates but is otherwise unlike SL, being morphologically conditioned, sensitive to vowel length and non-iterative. Synchronic evidence that SL and compensatory lengthening are unrelated comes from Northwest Territories Siglitun where both rules operate independently, as shown in Dresher & Johns (1995:92):

(25) Gemination and SL in Northwest Territories Siglitun (adapted from Lowe 1985)

	a.	b.	c.
Singular	iɣaliq	quaq	upkuaq
Dual Formation	iɣallak	qujjak	upkuajjak
SL			upkujak
Affrication		qudʒak	
	iɣallak	qudʒak	upkujak
Gloss = dual of:	'window'	'frozen meat'	'door'

	d.	e.	f.
Singular	iqidjralik	itiɣaq	sulukpauɣaq
Dual Formation	iqidjrallak	itikkaq	sulukpaukkaq
SL	iqidjralak		sulukpaukaq
Affrication			
	iqidjralak	itikkaq	sulukpaukaq
Gloss = dual of:	'square'	'foot'	'grayling'

Dresher & Johns (1995) argue that since SL operates on the output of gradation (or compensatory lengthening) as in (25c, d, f), the rule must be independent from any gradation phenomenon.

Dresher & Johns (1995) finally consider consonant gradation in Inupiaq, spoken on the Seward Peninsula of Alaska. This Inuit language is characterized by Kaplan (1985) as having a pattern of gemination/degemination that regulates an alternating pattern of strong and weak syllables. According to Dresher & Johns (1995:92) the pattern is set in motion by the first syllable of the base-stem: "if it is closed or has a long vowel the pattern begins with a strong syllable; if it is open with a short vowel the pattern starts with a weak syllable." Consider the following data:

(26) Seward Peninsula Consonant Gradation (Kaplan 1985)

a. /tuttuttuq/ → [tuttutuq]
caribou.kill.3s

b. /katittuq/ → [katittuq]
marry.3s

Dresher & Johns (1995) acknowledge that the rule is iterative like SL, outputting C-CC or CC-C sequences. The similarities, however, end there. Consonant Gradation is sensitive to vowel length and functions as a rhythm rule, maintaining iambic stress. Dresher & Johns (1995:93) argue that SL cannot have a rhythmic function since it remains inactive in CVCV and $C_iC_jV(:)C_iC_jV(:)$ sequences: "it is only when a cluster is followed by a geminate that SL is brought into play." This singular generalization is fully consistent with the durational pattern observed in the primary data considered in this thesis.

Dresher & Johns (1995) conclude with a proposal whereby the source of SL lies in a government relationship between coda consonants and the following onsets (PN = place node):

(27) SL and Syllable Government

	S1				S2				S3			S4	
O		R		O		R		O		R	O		R
		N			N		C		N		C		N
C1	V		V	C2 V		V	C3	C4	V		C5 C6		V
PN1				PN2			PN3	PN4			PN5		

The first syllable has no coda and thus no relationship with the following syllable. But in the second syllable, Dresher & Johns (1995) argue that the coda is governed by the onset that follows it. Since a governing syllable cannot itself be governed, the motivation for SL is to eliminate that possibility by deleting C5 and thus any trans-syllable relationship between S3 and S4. While the proposal accounts for the data, the nature of government, or of the factors that ultimately drive government relations, remains undefined (Rose, Pigott & Wharram 2012).

3.4 Accounts of "stress"

The nature of syllable prominence in the Inuit languages is unclear in the literature.[5] The issue is discussed in some detail in a recent acoustic study (Jacobsen 2000), which concludes that West Greenlandic is a not a stress language. The results presented in Chapter Five suggest that this is also the case for Labrador Inuttut.

5 Except for Seward Peninsula Inupiaq which, according to Kaplan (1985), has iambic stress.

3.4.1 Early accounts of "stress" in West Greenlandic

In his orthography of West Greenlandic Egede (1760) uses long and short accents to represent phonemic length, but he leaves the nature of stress undefined. Nowhere in the Inuit languages literature is there a convincing description of the correlates of prominence. Rischel (1974:91) writes that "the category of stress has no well defined status in West Greenlandic phonology." Unlike intonation, he says, it is difficult to make generalizations about stress patterns, though the tendency is to perceive stress on the final syllable and/or the antepenultimate. Kleinschmidt's (1851:8) acoustic impression of West Greenlandic is that stress generally falls on the penultimate syllable, with stress called "*ton*" (accent) and defined as a "*hebung der stimme,*" which Jacobsen (2000:41) translates as a "raising of the voice." However the acoustic manifestation of stress is left undefined. Kleinschmidt later presents an account of stress based on syllable weight: a coda consonant counts 1, a short vowel 2, and a long vowel 4. This configuration supposedly yields the correct word stress in the following phrase:

(28) Kleinschmidt: stress based on syllable weight

2 2	2 2 3	2 3 5 3	2 3 3 4
nanu	ilumut	qilammiituq	itsi^{r}ssa^{r}ppaa

Kleinschmidt argues that syllable with the highest count in (28) get the most stress, with lesser amounts of stress going to each syllable with lower counts. According to his account, each word has one main accent and one subsidiary accent falling on the initial or ultimate syllable, while long words may have several subsidiary accents. The distribution is as follows: heavy syllables always attract accent; two adjacent syllables cannot both have main accent; there cannot be more than two syllables in a row without accent; and main accent falls heaviest on the last three syllables unless they are equal in which case stress falls on the third syllable from the end. Despite the elaborate system described in Kleinschmidt, Jacobsen's (2000) study of stress correlates in modern West Greenlandic reading data shows that stress has no reliable acoustic basis. This finding is consistent with the data considered here. Despite these acoustic realities, the Inuit languages are often described in the literature as having a system of stress that is sensitive to syllable weight.

Rischel (1974:78-80) contends that the undefined 'accent' in Kleinschmidt may be pitch. His book on West Greenlandic phonology includes a chapter on phenomena related to syllabification. Addressing the representation of long segments, he shows a prominence pattern for the stress correlate of pitch: "for example the phrase final neutral intonation contour high-low-high" (p. 78). Rischel explains the timing of this HLH boundary melody in terms of morae: each short vowel in West Greenlandic can carry one tone. In other words, it has one mora; each long vowel has two morae and can thus host two tones and so on. Consider the following data:

(29) Rischel: vowel morae explain the timing of boundary melodies in West Greenlandic

```
a.      H L H              H LH                 HLH
        | | |              | ||                 |||
        akivara            aavaa                ataasiq
        'I answer him/her' 's/he fetched it'    'one'

b.      H L H              H L H                H LH
        | | |              | | |                | ||
        uvaŋa              uvaŋalu              uvaŋattaaq
        'I'                'and I'              'I, too'

c.      H LH                    HLH                        HLH
        | | |                   | ||                       || |
        akivat                  akivaa                     akivaatit
        'you answered him/her'  's/he answered him/her'    's/he answered you'

d.      HLH                HLH                  HLH
        |||                | ||                 |||
        ataasiiq           tiguʷaa              tiguʷaaa
        'one?'             's/he takes that'    'does s/he take that?'

e.      HLH                HLH
        |||                |||
        apirai             apiraai
        's/he asked them'  'did s/he ask them?'
```

The data in (29) indicate that the HLH boundary melody is timed with the three rightmost morae in any phrase. Those data also indicate that the interrogative can involve a lengthening of the final syllable, which then causes the HLH boundary to shift relative to the base-stem, as in (29a) [atâ:síq] versus the question form in (29d) [atá:sĭ:q]. This lengthening can also result in homogeneous overlong vowels as in (29d) and heterogeneous overlong vowels as in (29e). This thesis will not deal with the complex question of how to syllabify these sequences, but Rischel's insights on intonation will be touched upon again in §3.4.3. In this section about "stress," Rischel's contribution is to show that this prosodic phenomenon of intonational phrasing may have been incorrectly perceived by Kleinschmidt and others as word stress.

One consistency with Kleinschmidt's account throughout the literature is the position that heavy syllables always attract stress in West Greenlandic. Dresher & Johns (1995:89) write that while "the facts of stress in Inuktitut tend to be elusive, on most accounts syllables with long vowels or vowel clusters have some degree of stress: typically they have the most stress." The preliminary results here show that this is sometimes the case. But the full results in Chapter Five show that short vowels can also attract peak intensity and host pitch effects. These findings are also contrary to another system of stress proposed by Smith (1975:103-4) for Labrador Inuttut. While he acknowledges that his account is "aural impressionistic and not based on spectrographic analysis," Smith nevertheless proposes the "gross features of stress assignment at the word level" as adhering to a ternary system where the strongest [1] stress falls on syllables with a long vowel, the next strongest [2] on precluster syllables and the least stress [3] on open syllables. Consider the following data:

(30) Three degrees of stress in Inuttut (Smith 1975:103)

    2 3 3 1 3 1   3 3
    nukχakasa:ligi:kχuŋa
    'I am already almost finished'

Like Kleinschmidt (1851), Smith does not define stress and offers no acoustic evidence of the correlates he may be referring to. As we will see in Chapter Five, however, no one correlate or any combination of correlates could be found to match the pattern in (30). Intensity, for example appears to be entirely at the discretion of the speaker. Minimally, Smith (1975:103) contends that "subtler factors such as emphasis and emotion can be superimposed" onto his proposed system for word stress.

3.4.2 A recent account of "stress" in West Greenlandic

Jacobsen attempts to resolve the outstanding question of stress in West Greenlandic in her (2000) study of durational and pitch values for a series of words in carrier sentences read seven times by two West Greenlandic language consultants. Her focus on just two possible correlates of stress comes from Rischel (1974:96):

> ... two prosodic parameters must be studied thoroughly before it is advisable to speak of stress. One is intonation in relation to vowel morae. The other is Kleinschmidt's concept of syllable weight. Since the latter parameter is entirely deducible from the segmental structure of word forms it is no problem to represent it consistently, and hence it should be entirely possible to test empirically to what extent the subjective category of stress can be explained as a complex function of syllabification, syllable weight, and intonation. If there is a residue of unexplained rhythmicization (which there is, without doubt), we may begin to search for a significant parameter of stress'.

As mentioned above, Jacobsen (2000) finds no empirical basis for Kleinschmidt's system of stress based on syllable weight. Her working hypothesis is that, minimally, stress must include more than one acoustic parameter. Therefore the relevant parameters in her view, duration and pitch, "must covary in a systematic and consistent way." She finds no evidence of this covariance in her data and concludes that stress is not a "relevant category in the description of West Greenlandic word prosody." This finding is consistent with the detailed results presented in Chapter Five.

3.5 Accounts of pitch in the Inuit languages

The most studied phonological pattern in the Inuit languages involves intonation, introduced already for West Greenlandic in §3.4.1 as being moraically timed. I conclude this chapter with a review of the scientific literature on intonational phrases in West Greenlandic and Quebec Inuttitut, which serve as background to the analysis of pitch patterns in Chapter Five.

3.5.1 Accounts of pitch in West Greenlandic

Mase & Rischel (1971:235), Mase (1973), and Rischel (1974) examine pitch in West Greenlandic. Each concludes that the syllable is a functional category. Further, they argue that since "intonation is clearly based on a mora-counting principle, we have two units of measure in West Greenlandic: VOWEL MORA and SYLLABLE" (p. 97). Rischel also describes five terminal contours (that will not be addressed in detail here), an important one being the phrase-final boundary melody HLH. Exhaustive F0 studies of reading task data by Nagano-Madsen (1988, 1990, 1993, 1994) and Nagano-Madsen & Bredvad-Jensen (1995) reveal empirical evidence of these phenomena. Gussenhoven (2000:133) summarizes their findings, using examples from Rischel (1974), including (29d-e), which highlight the contrasting tonal patterns in declarative and interrogative phrases with the addition of a vowel mora to the final syllables of the examples in (29e). Consider the following data:

(31) Intonation in West Greenlandic: declarative versus interrogative

a.	takúʷìʲúk 'you saw him/her'	takuʷíʲŭ:k 'did you see him?'
b.	tsigúʷă: 's/he takes that'	tsiguʷă:: 'did s/he take that?'
c.	apíràí 's/he asked them'	apirâ:í 'did s/he ask them?'

First from a segmental perspective, Gussenhoven observes that final short vowels in declaratives are lengthened in the interrogative form, as shown in (31a). Final long vowels in declaratives become overlong in the interrogative form, as shown in (31b). Similarly, final diphthongs in declaratives also become overlong, with the first element of the diphthong being lengthened, as shown in (31c). Thus, from a mora count perspective, the final syllable in (31a) is monomoraic in the declarative and bimoraic in the interrogative, while the final syllables in (31b, c) are bimoraic in the declarative and trimoraic in the interrogative. Nagano-Madsen (1993) adds one more detail to Rischel's (1974) account of the terminal HLH contour, decomposing that boundary melody into a word-final boundary melody of HL and a phrase or utterance-final H boundary tone. Her argument is thus that all words have an HL boundary melody, which is generally consistent with the current results, and that the H boundary tone is phrasal, falling on the final mora of a phrase or utterance and causing the HL boundary melody to shift leftwards by one mora. Finally, based on the results from two language consultants reading six paragraphs of West Greenlandic text, Nagano-Madsen & Bredvad-Jensen (1995) treat the HL previously described as a word domain boundary melody as an F0 reset or, "a pitch accent which appears in relation to a word boundary, while the phrase-final H tone can be referred to as phrase accent" (p. 152). Support for this analysis comes from the fact that in the phrase-final position they observe that with the reset of L, it "is nearly 100% predictable that it will be followed by a phrase-final H tone which is manifested as a F0 rise." (Nagano-Madsen & Bredvad-Jensen 1995:137).

I assume, as a starting point, that the body of work on West Greenlandic is directly applicable to the related language of Labrador Inuttut studied here. It therefore stands as the theoretical model for intonation used in my analysis of F0 results in Chapter Five, where I show that boundary melodies in Labrador Inuttut also consistently pattern with various dialogue contexts.

3.5.2 A recent account of tonal and durational patterns in West Greenlandic

Building on her analysis of the prosody of West Greenlandic, Jacobsen makes three further conclusions, summarized as follows:

(1) The prosodic characteristics of words can be explained in either tonal or durational terms.
(2) The four different syllable types (of different 'weight') are distinguished in durational terms; further, there appears to be only a tripartite system of short, long and overlong [segments].
(3) There are intra-syllabic as well as inter-syllabic rhythmical adjustments. It is concluded that Greenlandic prosody does not include an autonomous stress category, either tonal or durational parameters alone will do. And although Greenlandic has distinctive quantity, there is room for considerable durational variation of segments.

(Jacobsen 2000:40)

The first point is consistent with the results of the current investigation, where, as we will see, intensity is unsystematic. The second point is also consistent with the results detailed in Chapter Five, which generally reveal four classes of syllable length and three classes of syllable peak length (no overlong consonants). Like Jacobsen's work, this thesis presents empirical evidence of distinctive quantity and also shows a limit to durational variation: phonemic long and phonemic short segments never overlap.[6] Jacobsen's (2000) study

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6 This study was not designed to test for the "intra-syllabic as well as inter-syllabic rhythmical adjustments" that Jacobsen finds in her data. She describes these, respectively, as (a) shortening of long segments adjacent to other long segments, and (b) shortening of either the first or second syllable from adjacent heavy syllables, a so-called 'weight clash'. Dealing with the segmental adjustment first, Jacobsen observes:

> [...] the difference (both relative and absolute) between phonologically long /kk/ after the long vowel in atu:kkasura: and the phonologically short /k/ after the long vowel in piku:kulavuɣut happens to be smaller than the difference between the phonologically long /kk/ after the long vowel in atu:kkasura:) and phonologically long /kk/ after short vowel (in kukukkumavara).
>
> Jacobsen (2000:58)

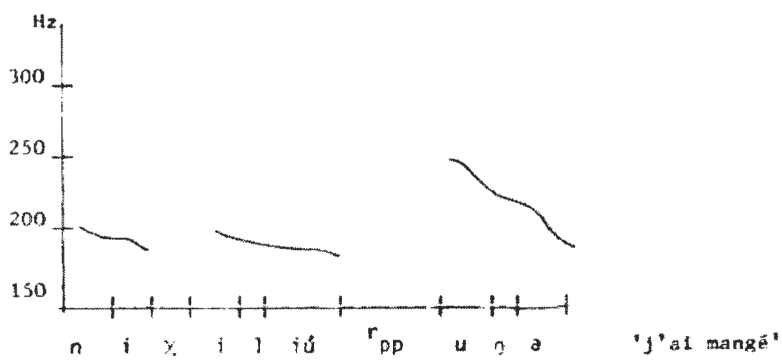
Jacobsen argues that her West Greenlandic language consultant uses this durational variation as a form of rhythmicization, with the limitation that short vowel duration must not exceed the duration of its long vowel counterpart. This phenomenon will not be explored in this thesis. The second durational phenomenon Jacobsen (2000) argues for is that adjacent super heavy syllables CV:C create a weight clash that her language consultants resolve by shortening consonants in either the first or second syllable. The environment arises in the test word [ta:ma:lla:llia:si:t], where she observes that one of her language consultants reads the first CV:C more quickly than the second CV:C, while the other language consultant does the opposite. The preliminary results here show no evidence of this phenomenon and it will not be pursued in this thesis. However, these detailed analyses of segmental duration do inform the establishment of the acoustic criteria for geminate status, crucial in Chapter Five to the instantiation of SL in the data considered here.

presents empirical evidence, consistent with the findings of Nagano-Madsen (1992:62), that geminates in West Greenlandic are twice as long as their short counterparts.

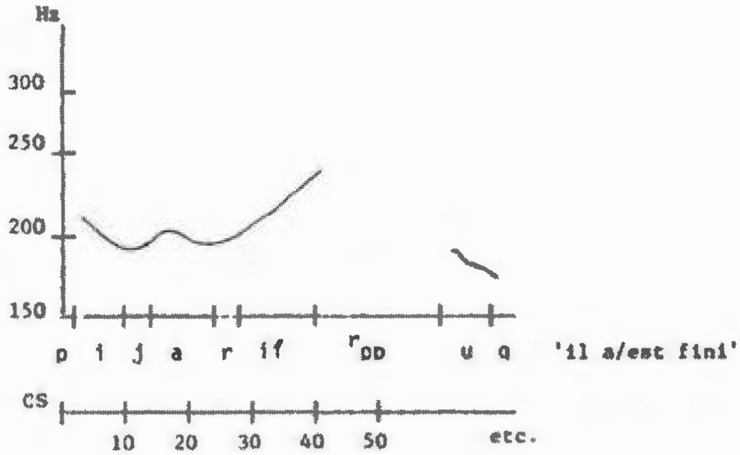
3.5.3 Pitch patterns observed in Quebec Inuttitut

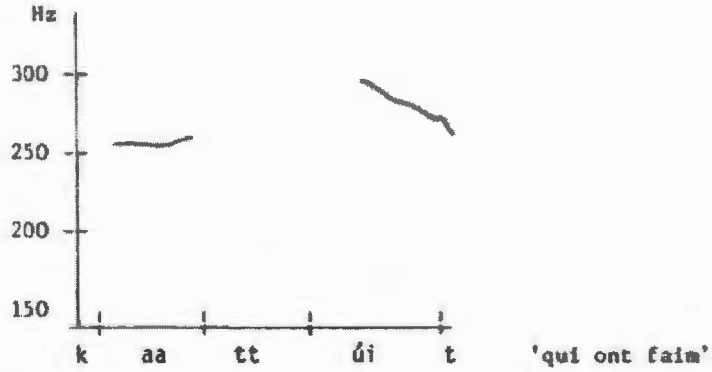
Finally the pitch effects observed in the current data are consistent with Massenet's (1980) findings in his acoustic study of spontaneous speech recorded from Inuit language consultants originally from Quebec, Canada.[7] His analysis of F0 for these Quebec Inuttitut speakers shows patterns for declarative, interrogative and imperative phrases. As regards final declarative intonation, Massenet observes high tone on the penultimate vowel, as shown in the following examples:

(32) Massenet: declarative intonational melody (1980:197-8)



7 Massenet interviewed speakers living for more than 20 years in Resolute Bay, Nunavut (now called Qausuittuq), but originally from Port Harrison, now called Inukjuak, in Quebec.

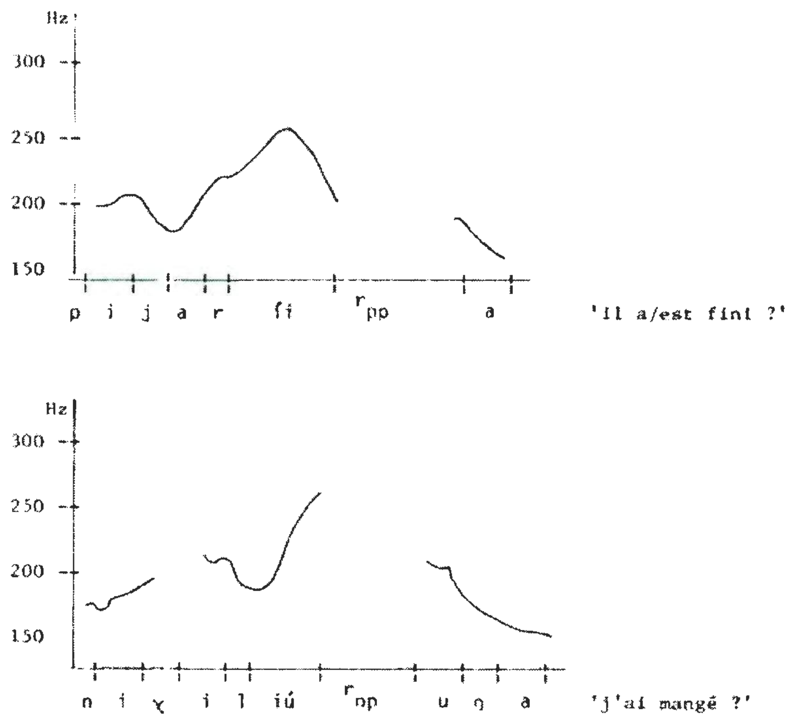




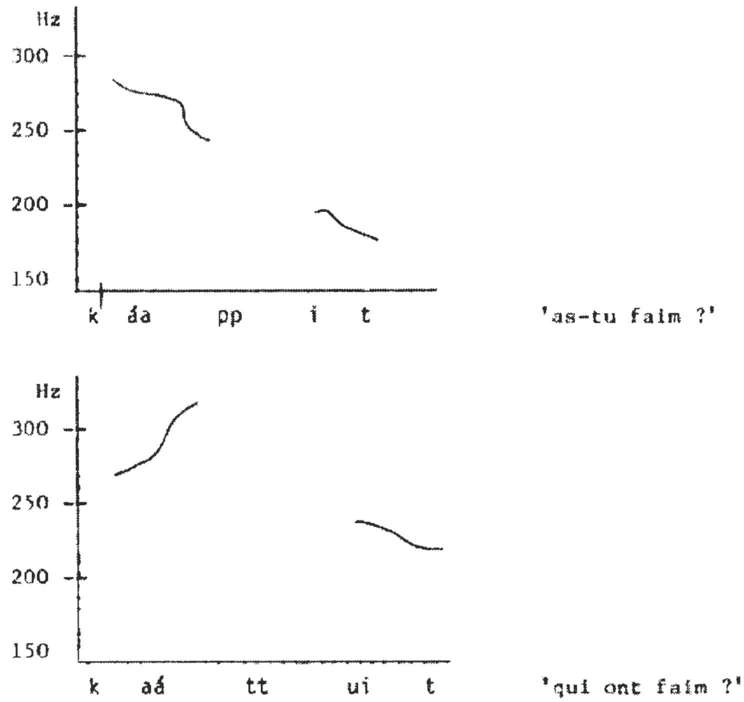
In the left and medial syllables of the first example in (32), pitch is flat or slightly falling from left-to-right across each syllable, a pattern shown in the Chapter Five results to be the unmarked pitch pattern. By contrast, at the right edge of the declarative phrases in (32), Massenet's data show high pitch on the penult consistently contrasting with low pitch on the phrase-ultimate syllable. This finding is consistent with the declarative phrase data shown in Chapter Five. Massenet's description is also consistent with arguments for an HL boundary melody associated with the final two morae of phrases in West Greenlandic, as described in Gussenhoven (2000)[8].

Massenet (1980:204) next describes interrogative phrases where "*l'accent musical se place sur l'anté-pénultième*" (boundary melody is placed on the antepenult). Massenet describes three different interrogative types. First, for questions where the answer is known or visible, Massenet finds no lengthening of the phrase-final syllable, as shown in the following results:

(33) Interrogative intonational melody, no lengthening (Massenet, 1980:199-200)



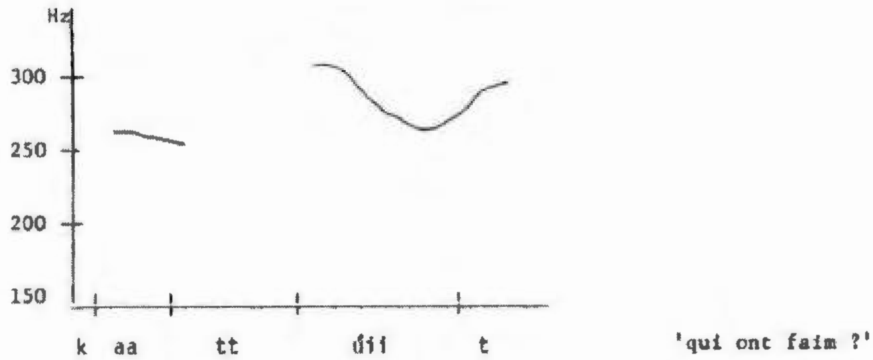
8 Nagano-Madsen & Bredvad-Jensen (1995) put forward an alternative analysis to the position that West Greenlandic words end with an HL boundary tone, arguing instead that the observed phenomenon may in fact be an F0 reset.

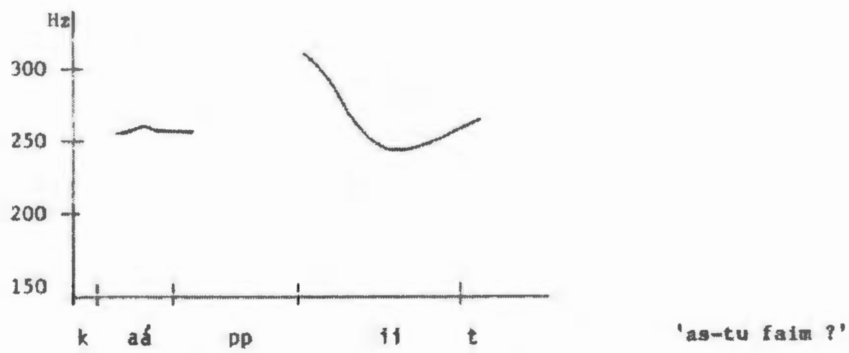


Massenet observes that "*l'accent musical est placé sur la troisième voyelle la fin de la phrase*" (the boundary melody is placed on the third vowel from the end of the sentence), as shown in (33) where the H tone begins on the ante-penultimate syllable for each example.

In the second type of question, the answer is not known. Massenet (1980:200) describes lengthening for this type of interrogative phrase in a phenomenon called "*redoublement*" (reduplication) of the phrase-final vowel. In these cases the high tone is again placed on the ante-penultimate syllable, as shown by the following data:

(34) Interrogative intonational melody, with reduplication (Massenet, 1980:200-201)

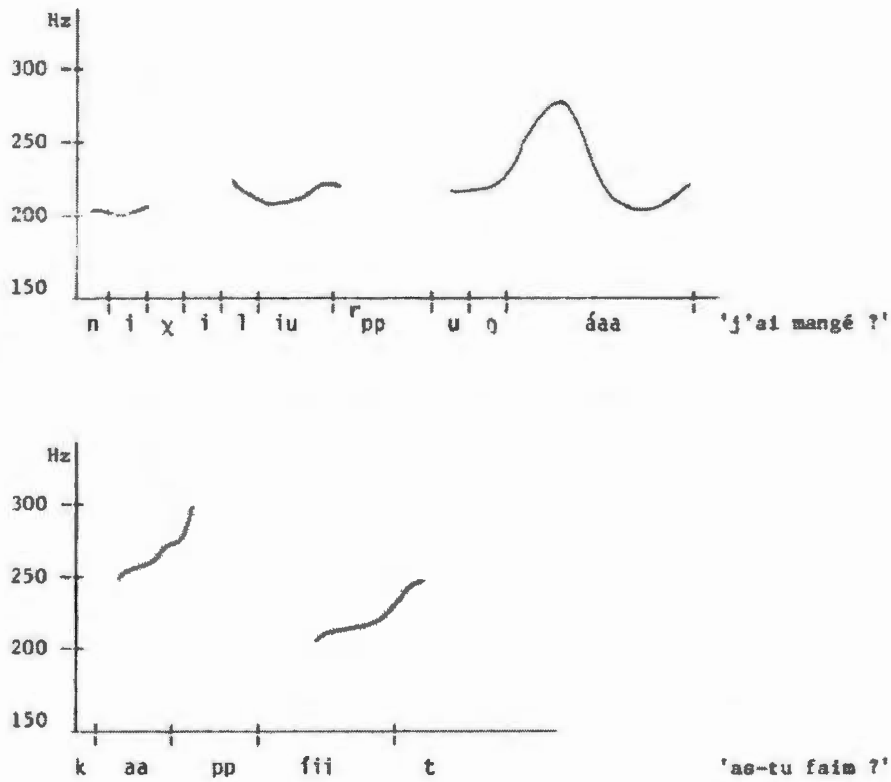




Massenet argues for a different pitch pattern in these types of questions, since, following the H tone on the antepenultimate syllable, he observes that "*après la retombée sur la voyelle suivante, on assiste à un (légère) remontée sur la dernière*" (after the decline of the following vowel, there is a (slight) rise on the last). The data in (34) are thus consistent with the descriptions of an HLH boundary melody in West Greenlandic, and with the pitch results in the data considered here.

The third type of question echoes a statement, where the questioner is looking for confirmation as a result of misunderstanding or surprise. Massenet (1980) observes "*surallongement*" (overlong) in these cases, shown by the following examples:

(35) Interrogative intonational melody, with reduplication (Massenet, 1980:200-201)



Massenet argues for the same pitch pattern as (34), except that in (35) the HLH melody falls entirely on the overlong final vowel. This description is consistent with the accounts of West Greenlandic, and, further, the same pattern is observed in the results for pitch discussed in Chapter Five.

3.6 Summary

SL is a phenomenon in which the second of two syllable adjacent geminates is degeminated. The rule is described in the literature for Quebec Inuttitut, Labrador Inuttut and Northwest Territories Siglitun, where it is shown to exclusively target underlying geminates. It is indifferent to vowel length, and works on the output of other rules like Truncation, Regressive Assimilation and Consonant Gradation. SL is not related to any metrical pattern. In regard to rhythm, studies on the Inuit languages show no evidence of metrical stress in any dialect apart from Inupiaq on the Seward Peninsula in Alaska, which Kaplan (1985) describes as iambic. Studies of the remaining dialects show that intensity prominence is unsystematic, consistent with the data considered here. Finally, SL operates independently from intonation. Among the Inuit languages, the most studied tonal system is that of West Greenlandic, where SL is not operative. In that dialect, interrogative phases are marked with boundary melodies and final syllable lengthening. Massenet (1980) describes a similar system of intonation for Quebec Inuttitut, where SL *is* operative. The rule is not affected by these tonal patterns, consistent with the results discussed here in Chapter Five.

4 Methodology

4.1 Preliminaries

The primary source data for this thesis come from field work performed in 2009 and 2010. After gaining ethical approval from Memorial University and a research permit from the Nunatsiavut Government, I conducted 19 days of field work on the North Coast of Labrador in April of 2009. This included radio interviews with the OKâlaKatiget Society to publicize the research, canvassing of potential Labrador Inuttut speaking language consultants, ethnographic interviews and continuing the preparation of my linguistic research program. Field work resumed in April of 2010 for 21 days of linguistic interviews with language consultants and travel on the land with cultural experts in and around the communities of Nain, Hopedale, Makkovik and Rigolet. In each town, local authorities were consulted and information sessions were held at community halls (attendance: Nain 17; Hopedale 15; and Rigolet 12). Information sessions were also held at three local schools, involving more than 60 students.

4.2 Participants

More than thirty people were directly involved in this study, including translators and language consultants, in addition to their spouses and other family members. For the linguistic and ethnographic interviews, examples from 22 language consultants were transcribed and segmented into a corpus organized by the software program *Phon*. From this corpus, examples were then measured with the speech analysis software program

Praat. Nine language consultants were women (AE, BH, DF, FW, JD, KT, MH, VI and SI) and 13 were men (AZ, BK, EF, HP, HW, JI, JM, LI, MK, MN, PA, PJ and TK). Language consultants ranged in age from 41 to 81 years old. Based on their answers to questions about their parents and grandparents, the language consultants were categorized as being from speech communities roughly divided as follows: Inuttut ((Hebron 9), (Okak 3), (Nain 6), (Hopedale 3)) and Inuktut (Rigolet sub-dialect 1).

4.3 Audio environment and equipment

Transportation was an issue for some of language consultants, so quiet areas were established in their homes with appropriate mixing and microphone placement to capture high-quality recordings. Alternately, interviews were done in a quiet area set up at the Atsanik Lodge, a hotel in Nain. Two interviews were done at the OKâlaKatiget Society's Broadcast Centre in Nain. Language consultants from Makkovik were interviewed in their homes. In Hopedale and Rigolet, language consultants were interviewed either in their homes or in a quiet room set up in two local hotels. All interviews were documented with the following professional equipment: Sony DV camcorder, M-Audio Microtrack 24/96 audio flash recorder and an HHL professional MD recorder. Main source audio came from a boomed Electro-voice RE-50 microphone.

4.4 Goals and methodology

The primary goal of the field work was to gather examples of SL in the speech of Labrador Inuttut speaking language consultants living in Nunatsiavut, the Inuit-governed part of Labrador. My hypothesis was that the durational pattern of SL as described in the literature would emerge from such data. Secondarily, I wanted to investigate the possibility of an iambic metrical pattern, or remnant thereof, since one of the key examples of iambic footing in MST comes from the related but more conservative Eskimo-Aleut languages of the Yupik (Hayes 1995). The ultimate goal was to compare the metrical system in Labrador Inuttut data with the occurrence of SL, with the working hypothesis that they would operate independently, as suggested by Dresher & Johns (1995).

4.4.1 Design and implementation of the linguistic interview

With help from my academic supervisors, I designed a linguistic interview to elicit the required data. A trial of that linguistic interview was done at Memorial's Speech Sciences and Language Acquisition Laboratory with a language consultant who preferred to remain anonymous. Analysis of that data offered the basis for the final revisions of my linguistic interview materials, provided in Appendix A. Each interview began with a conversational exchange intended to establish background personal information. The results for Section A of the interview process provided a series of words used by all language consultants. An important example word used in this study is [ana:naɣa] 'my mother' which arises in multiple conjugations and phrasal positions (described in §4.4.4), making it an appropriate token for acoustic testing on the possible correlates of stress, presented in §5.3.

Sections B and C of the interview involved reading tasks. Language consultants were first asked to read from the top of the seventh page of *Labradorimi Ulinnaisigutet*, which is the introduction of a dictionary published by the Labrador Inuit Association in 2006. Next, language consultants read from a series of words, minimal pairs and lexical items with SL alternations, each embedded in carrier sentences. Since the durational pattern of SL is represented in the Labrador Standardized Spelling System (LSSS)[1], these reading tasks did not constitute a neutral test for the application of SL. None of the results for Sections B and C were thus considered in this thesis in the context of SL.

Section D is the /tutuk/ 'messy hair' versus /tuttuk/'caribou' oral task. Language consultants were asked to make up four sentences, each with a different example word based on either [tutuk] or [tuttuk]. These words were given to the language consultants orally. They were also not allowed to see the written form given to the translator. Instead the translator was instructed to explain the meaning of the word without actually using the construction. In the case of bilingual language consultants, the meaning of the word was explained entirely in English. For example, with [tuttuːŋuaqχauŋittuk], language consultants were asked to imagine a situation in which they would use a word that means: "she wasn't pretending to be a caribou earlier today." Despite the somewhat artificial nature of the task, without exception language consultants produced all four alternations without the aid of the written form shown in Section D. The results from this task

1 Adopted in 1980 by a conference of Elders held in Nain. LSSS is almost phonemic, except the long vowels [aː iː uː] are written as 'â', 'e' and 'o', respectively, while the consonants [χ] and [ɣ] are written with a small upper-case letter 'ĸ' and the lower-case letter 'g', respectively.

(described in §4.4.1) are crucial to the demonstration of the exceptionless nature of SL, in §5.1.

In Section E, consultants were asked topical questions about life in Northern Labrador. The results varied, with some language consultants giving long and detailed answers while others gave only short responses. Within these results, several words were repeated, but none specifically appropriate to a study of SL and syllable prominence. Of interest from this data set are the parts where the language consultants became emotionally engaged in what they are describing, something that occurs in particular for questions one and four. The difficulty is that the lexical items used in these responses are too varied to form tables of intra-speaker examples. As a result, there only a handful of example words from Section E in this thesis,[2] however these results do provide examples of utterances and speech samples important to the discussion of Labrador Inuttut prosody in §5.4.

4.4.2 Ethnographic interviews: purpose and methodology

I first took an interest in Labrador Inuttut in part because of the surprising realization that, even though the dialect has been 'documented' in terms of having a proper dictionary and grammar, many forms describing the natural environment, travel and hunting have not been written down. The existence of these forms is threatened because Labrador Inuttut is the mother tongue of so few Inuit under 40 years old. It is one outcome of colonization,

2 Numerous examples of the token, /χattaχ/ 'repeatedly' from EF were extracted for this thesis, with the results discussed in §5.2.

first by German-speaking missionaries in the 18th century to Labrador, then by English-speaking immigrants. In the 1950's the provincial government of Newfoundland started to enforce an education strategy that saw the relocation of Labrador Inuttut speaking children away from their parents for long periods to English-only boarding schools. Nunatsiavut, the Inuit government in Northern Labrador, is now trying to revitalize their language. Following their example of holding story telling gatherings and land-based language camps, I endeavoured to include elements of the same in my linguistic study. The first field trip to Labrador in 2009 was in part reconnaissance for the linguistic interviews and an opportunity to do ethnographic research which in the end provided data crucial to this study. Background work was first done for two ethnographic studies: first I compiled a list from the Labrador Inuttut dictionaries of all the words related to sea ice; and I then compiled a second list of all the species of flora and fauna named in the biology literature. The latter was correlated to a folder of photographs printed from Google Images for each species. To obtain photographs of sea ice conditions, trips were taken on snowmobile over the frozen sea around the communities. From Nain, a trip was undertaken with three Inuit guides to an [iŋiɣɣanik] 'polynya' 30 kilometres away. From Rigolet there was a trip with two Inuit guides to two open water polynyas: one on a river and a second on the sea. Finally, from Makkovik, an Inuk father and son took me by snowmobile to the [sina:] 'sea ice edge', 15 kilometres off shore. Hundreds of sea ice features were photographed and correlated to words in the Labrador Inuttut lexicon. One feature, for example, an [allu] 'seal's breathing hole', was found near Makkovik. The resulting discussion in Labrador Inuttut about the signs left in the snow and ice by a seal was recorded. During the ethnographic interviews, these videos and photographs[3] were presented systematically to each language consultant. The resulting spontaneous discussions included explanations, descriptions and stories about the sea ice, plants and animals. The results are important to this phonological study because they contain intra-speaker sequences of /-ixxi-/ from the base-stem, /aχixxik/ 'ptarmigan'.[4] These 52 tokens are directly relevant to this study, as each contains an intervocalic geminate. My hypothesis was that if the morphology supplies an underlying geminate in the next adjacent sequence to /-ixxi-/, SL must apply. Where SL applies vacuously, any prominence pattern related to syllable weight should be visible, the subject of §5.3, in the following chapter.

4.5 Software and settings

Measurement of the relevant sequences was done with the phonetic analysis software suite *Praat,* version 5.1.19. For the analysis of pitch, the following settings were used: time step 0.1, pitch floor of 75 Hz to pitch ceiling 300 Hz for male language consultants, pitch floor of 100 Hz to pitch ceiling 500 Hz for female language consultants. Formant settings were as follows: Maximum Formant Hz 5500, Number of Formants 5, Dynamic range dB 30. Intensity settings, View Range dB 50-100, Mean Energy averaging method. Finally, the spectrogram setting was a dynamic range of dB 75.

3 As well as photographs of sea ice conditions in the Bering Strait (Krupnik & Weyapuk 2010).

4 Produced variably by speakers as /-iɣɣi-/, /-ixxi-/ or /-ikki-/ the result of the optional phonetic implementation rules: devoicing or continuancy.

4.5.1 Acoustic analysis

As mentioned above, one of the primary goals of this field work was to find some pattern of syllable prominence, possibly related to the iambic pattern shown for Yupik. Word examples were thus extracted from /tutuk/ versus /tuttuk/ and three sequences in the ethnographic interviews from the base stems /ana:na-/ and /aχixxi-/ and the suffix /-χattaχ-/. The tokens were first transcribed into the *Phon* software program, designed at Memorial University to facilitate the phonological analysis of data. Each example was then exported to *Praat* for measurement. Using both auditory and visual cues from the spectrogram, the three correlates of stress were considered: duration, fundamental frequency and peak syllable intensity (Fry 1958, Liberman & Prince 1977, Hayes 1995, inter alia). Values for each were then entered back into *Phon* for each segment under tiers for loudness, duration and pitch. This was then exported into the tables which appear in Appendices C-F. A graphic representation of the three stress correlates for some of the examples was created with *Praat* as a visual aid in the description of results in Chapter Five.

4.5.2 The phonemic pair /tutuk/ 'messy hair' versus /tuttuk/ 'caribou'

The data set in Appendix C was designed to test for SL in spontaneous speech. It resulted in 32 usable examples, some discussed already in the preliminary results (see §2.2.1). There were eight language consultants involved of various ages: five women (AE-69, JD-53, BH-56, MH-41 and FW-63) and three men (PA-46, MK- 43 and TK-51). Most of these example words arise in phrase-medial positions, but a few occur phrase-finally. There is systematic lengthening of the final-syllable rhyme, a phenomenon that will be explored in §5.4 using a different data set. For the analysis of /tutuk/ versus /tuttuk/ in §5.1, which focuses on the SL durational phenomenon, this lengthening phenomenon is left aside: the duration of final-syllable coda consonants is not included in the results. This approach received support from the consideration of word edge effects in the literature on West Greenlandic. Nagano-Madsen (1992:118) observes that the /t/ in the ultimate syllable of /ata:ta/ and /ata:ta:/ is longer than /t/ in the penultimate syllable of /ata:ta:ta/ and /ata:tatta/. She atrributes this length to a pattern of 'prepausal lengthening'; in §5.4, using data from the ethnographic interviews, I will show that a similar lengthening phenomenon covaries in the data considered here with pitch effects, specifically boundary melodies.

4.5.3 The morpheme /χattaχ/ 'often, intermittently'

The data set in Appendix D is also discussed in Chapter Five. It involves a single language consultant (EF, 69 years old, male), combining 18 example words from both the linguistic and ethnographic interviews. This data set was compiled with the hypothesis that a prominence pattern might emerge from the way one speaker uses the morpheme /χattaχ/ 'often, intermittently', a derivational affix often found in the spontaneous data considered here. The sequence is crucial to this study because, unlike the /tutuk/ versus /tuttuk/ example, the intervocalic geminate arises between the short vowel [a], left-adjacent to both the SL trigger and target. Intensity for this data set patterns unsystematically, providing additional evidence in §5.2 for the hypothesis that SL is not governed by syllable prominence.

4.5.4 The sequence [χixxi]

The data set in Appendix E includes 52 example words extracted from the ethnographic interviews with 15 language consultants of various ages: five women (AE-69, BH-56, SI-79, VI-74 and KT-53) and ten men (EF-69, JI-73, LI-70, PJ-49, BK-53, JM-63, MN-61, HP-81, HW-72 and AZ-46). The sequence occurs within five lexical items describing related bird species, generally called 'partridge' in Labrador English. Part of the exercise was to try to better understand the Labrador Inuttut names for all flora and fauna, a subject of some confusion in the published dictionaries. Each language consultant was thus shown a photograph of the species, and, without using any assumed names, invited to make comments. Responses varied from a simple statement of the species name as they knew it, to long and detailed descriptions. As a result, word examples arise in isolation, in phrase-medial positions or in phrase-final positions. The impact this has on the observed values for all three stress correlates of the intervocalic geminate, adjacent vowels and overall word examples is the subject of §5.3.

4.5.5 The sequence [na:na]

The final data set, in Appendix F, is based on nine word examples extracted from a question in the linguistic interview where the responses included spontaneous phrases with the example word [ana:naɣa] 'my mother'. The resulting data table includes nine example words from seven language consultants of various ages: three women (JD-53, DF-61 and BH-56) and four men (PA-46, MK- 43, TK-51 and MN-61). The isometric nature of the CV:CV sequence makes it an ideal test for any recurring syllable prominence pattern. As with all the data discussed in Chapter Five, these example words pattern unsystematically for all three stress correlates.

5 Project data: results and analysis

5.1 SL: acoustic manifestation

In this chapter I present the results of my 2009-2010 fieldwork in four Labrador Inuit communities. As we will see, SL is exceptionless in the spontaneous speech of my consultants, consistent with other descriptions in the literature. This generalization is supported by the measurement of consonant duration in 32 example words where the base-stems /tutuk/ and /tuttuk/ are morphologically concatenated with morphemes which, together, yield underlying sequences of geminates adjacent to one another across a single syllable nucleus. Nowhere in these data do syllable-adjacent geminates arise at the surface level. Instead, phonetically realized geminates can be adjoined maximally by a short consonant. These results also show inter-speaker variation in constructions involving the morphemes /-ŋŋit-/ 'negative' and /-tuk/ '3s'. Despite these unexpected results, none of the variations violate SL.

5.1.1 Fieldwork data consistent with previous descriptions of SL

In this section I discuss findings from the /tutuk/ and /tuttuk/ alternation task, described in §4.5.2 as a way to test for the prevalence of SL in spontaneous speech. Recall from Smith's (1975:105) aural-impressionistic description, SL occurs in all cases: "there are no sequences of the form ...CC(V)VCC...". This generalization holds for all 32 example words with the base-stem /tutuk/ or /tuttuk/. Before discussing SL's acoustic manifestation in the data, consider first the criteria used in the representation of segments as geminate. Since the /tutuk/ and /tuttuk/ alternation task involves the phonemic pair /tutuk/ 'messy hair' and /tuttuk/ 'caribou', one way to investigate geminate duration is the systematic comparison of the [t] and [tt] segments. Consider the following four examples (see Appendix C for all of the relevant data):[1]

(1) a. [tutu:ŋŋuaχauŋŋituk]
messy.hair-be-pretend-NEARPAST-NEG-3s
's/he did not pretend to be messy hair'

t	u	t	u:	ŋŋ	'ua	χ	au	ŋŋ	i	t	u	k	
28	61	67	111	108	124	91	98	121	78	81	95	76ms	BH

b. [tuttu:ŋuaχauŋituk]
caribou-be-pretend-NEARPAST-NEG-3s
's/he did not pretend to be a caribou'

t	u	tt	u	ŋ	'ua	χ	au	ŋ	i:	t	u	k^h	
19	88	205	87	78	227	63	127	88	129	21	91	140	BH

c. [tutu:ŋŋuaniaŋŋituk]
messy.hair-be-pretend-NEARFUTURE-NEG-3s
's/he will not pretend to be messy hair'

t	u	t	u:	ŋŋ	'ua	n	ia	ŋŋ	i:	t	u	k^h	
29	75	52	120	114	101	63	126	111	99	58	97	125	BH

d. [tuttu:ŋuaniaŋŋituk]
caribou-be-pretend-NEARFUTURE-NEG-3s
's/he will not pretend to be a caribou'

t	u	tt	u:	ŋ	ua	n	'ia	ŋŋ	i	t	u	k	
52	67	180	146	59	128	73	128	124	99	56	43	103	BH

1 The use of apostrophes in this table and all those that follow, as in (1a) ['ua], denotes the syllable with peak word intensity. The initials at the far right denote the language consultant.

In (1a), the singleton [t] has a duration of 67 milliseconds (ms hereafter) while in (1b) the geminate [tt] is 205ms. The geminate is thus 3.1 times longer than its singleton counterpart. In (1c, d) the geminate is 3.5 times longer. On average [tt] (198ms; *n*=27) is 3 times longer than [t] (66ms; *n*=66) for the examples in Appendix C. This is consistent with all the data considered here as well as with comparable data from acoustic studies of West Greenlandic. Mase & Rischel (1971:235) and Nagano-Madsen (1992:61) argue that long consonants are "two times" longer than short consonants. Jacobsen (2000) also finds a systematic durational difference; she argues that a long segment (where 'segment' stands for either a consonant or a vowel) is shorter when preceded by another long segment (as described in §3.5.2). Jacobsen (200:60) compares [kk] (248ms; *n*=2) in [kuk.u**kk**.umavara] with the singleton [k] (136ms; *n*=2) in [kuk.u**k**.ulava:t]. On average then for Jacobsen's two West Greenlandic language consultants, the geminate is 1.8 times longer than its singleton counterpart, consistent with the data considered here. These examples support the representation of geminate consonants in the following discussion of SL.

Recall that the objective set in §4.5.2 for the /tutuk/ and /tuttuk/ alternation task was to observe the behaviour of morphemes in opposite environments: following a syllable with an SL trigger versus following a syllable where SL is not a factor. Smith (1977a, 1978) describes the morphemes selected for the current investigation as /-ŋŋua-/ 'to pretend, play x', /-χχau-/ 'near past' and /-ŋŋituk/ 'negative.3s'. According to Smith, these morphemes alternate under the influence of SL with the degeminated surface forms, [ŋua], [χau] and [ŋittuk]. Beginning with the morpheme /-ŋŋua-/, the degeminated form arises in all cases for the base-stem /tuttuk/ and never for /tutuk/, as shown in the following examples, with segments represented as geminate (SL triggers) shaded in light grey and segments represented as degeminated (SL targets) shaded in dark grey. The durational ratio between the trigger and target, here called the geminate shortening ratio (GSR), is shown for each instance of SL in the following examples:

(2) a. [tutu:**ŋŋ**ua**χ**au**ŋ**i**tt**uk]
messy.hair-be-pretend-NEARPAST-NEG-3s

t	u	t	u:	ŋŋ	ˈua		au	ŋ	i	tt	u	t^h	
44	128	61	160	150	166		178	57	82	117	60	263ms	FW

GSR: 1.2

b. [tu**tt**u:**ŋ**ua**qχ**au**ŋ**ituk]
caribou-be-pretend-NEARPAST-NEG-3s

t	u	tt	ˈu:		ua	qχ	au		i	t	u	k^h	
64	50	258	190		158	210	174		103	88	34	380	FW

GSR: 2.7 GSR: 3.9

c. [tutu:**ŋŋ**uania**ŋ**i**tt**uk]
messy.hair-be-pretend-NEARFUTURE-NEG-3s

t	u	t	ˈu	ŋŋ	ua	n	ia	ŋ	i	tt	u:	$χ^h$	
68	97	39	13	164	182	90	111	86	70	120	250	553	MK

d. [tu**tt**u:**ŋ**uania**ŋŋ**ituk]
caribou-be-pretend-NEARFUTURE-NEG-3s

t	u	tt	ˈu:		ua	n	ia	ŋŋ	i		u	k	
57	45	255	161		176	67	140	117	60		48	96	FW

GSR: 2.9 GSR: 1.4

In (2b, d), [ŋua] arises following the SL trigger [tt]. As we can see in (1) this pattern is, again here, exceptionless. Observe further that, on average in Appendix C, [ŋŋ] (145ms; n=24) is 1.6 times longer than [ŋ] (89ms; n=39) consistent with the representative results in (2). Crucially, in spite of considerable inter-speaker and intra-speaker variation in the duration of phonemically long versus phonemically short segments, their respective values never overlap.[2] This is consistent with Jacobsen's (2000:42) account of West Greenlandic. In the remainder of this thesis I, will refer to the above calculation as the 'geminate shortening ratio' (GSR), which expresses how many times longer the SL trigger is, when compared to its target.

With the /-χχau-/ morpheme, the degeminated form [χau] arises in (2a) where it follows the SL trigger [ŋŋ]. By contrast, in (2b), where SL is not a factor, the surface form is [qχau]. This pattern holds for all the examples (listed in Appendix C), which provides further evidence that SL is exceptionless. Also, the fact that SL applies twice in the examples in (2b, d) is consistent with the claim that SL is an iterative rule. In (2b) the rule applies in consecutive adjacent syllables. In (2d), however, the pattern fails to apply as the relevant context contains a morpheme that lacks an SL trigger, the underlying /-nia(χ)-/ 'near future' (Smith 1978:77). That allows the [ŋŋituk] form to arise in the adjoining

2 At its lowest, the geminate shortening ratio is 1.2, as in (2a) (see also Appendix C, (1b). If we consider speaking speed, notice that one of these two examples, (2a), is the second fastest sequence for the paradigm /tutu:ŋŋuaχauŋŋitu/ at 1.07s, while the other comes from a slower speaking speed example, (1b) in Appendix C at 1.33s. It thus cannot be said that lower geminate shortening ratios associate exclusively with faster speech rates, though this is more often than not the case in the 32 Appendix C examples. All of the instances of GSR 1.3 in Appendix C occur in the fastest, second and third fastest speech rate examples for their paradigm: (1a) at 0.97s, (2b) at 1.05s, and (3c) at 1.12s.

position.[3] As a result, the underlying form of (2d), prior to application of SL, is /ŋɲittuk/. Observe that the iterative pattern of SL resumes, despite the intervening non-SL trigger syllable. This finding is consistent with the position in the literature that SL is an exclusively syllable adjacent phenomenon. Finally, in (2c) the /-ŋɲit-/ and /-tuk/ morphemes do not follow the pattern in (2d), the case for a number of examples in Appendix C. This morphological variation will be discussed further in the next section. For our purposes here, observe that none of the variations involving these morphemes result in an SL violation, the unattested surface form *[ŋɲittuk].

In sum, SL truly is exceptionless: there are no SL violations in these 32 examples of semi-directed spontaneous speech.

5.1.2 SL holds despite variations of the 3s negative morpheme

Smith (1978) describes the morpheme /-ŋɲit-/ as a deleting suffix (see §3.2.3), in other words causing the deletion of a base-stem final consonant if there is one. He describes /-tuk/ is an adjoining affix, in other words adjoining a base-stem final consonant if there is one. In a footnote he describes widespread inter-speaker variability in the application of deleting versus adjoining rules. The language consultants interviewed for this thesis were asked about the [ŋɲituk]/[ɲittuk] alternation and several described confusion about the proper usage. The results also show intra-speaker variation. Consider the following:

3 This alternation is more complex than Smith's description, as it involves two morphemes: /-ŋɲit-/ 'negative' and /-tuk/ '3s' (Douglas Wharram, p.c., October 2010).

(3) a. /tutu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
messy.hair-be-pretend-NEARPAST-NEG-3s

t	u	t	u	ŋŋ	ua	[redacted]	ˈau	ŋ	i	t	u	k	
62	69	80	22	200	172		93	124	45	128	23	108ms	MK

b. /tuttu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
caribou-be-pretend-NEARPAST-NEG-3s

t	u	tt	u	[redacted]	ua	χ	ˈau	ŋŋ	i	[redacted]	u	t	
36	93	139	49		237	103	85	143	44		31	60	MK

c. /tutu(k) + u + ŋŋua + nia(χ) + ŋŋi(t) + tuk/
messy.hair-be-pretend-NEARFUTURE-NEG-3s

t	u	t	ˈu	ŋŋ	ua	n	ia	ŋ	i	tt	u:	χ^h	
68	97	39	13	164	182	90	111	86	70	120	250	553	MK

d. /tuttu(k) + u + ŋŋua + nia(χ) + ŋŋi(t) + tuk/
caribou-be-pretend-NEARFUTURE-NEG-3s

t	u	tt	u	[redacted]	ua	n	ˈia	ŋ	i	t	u	k^h	
96	39	184	68		191	70	131	111	62	129	29	818	MK

The examples in (3a, d) show a surface form not described in the literature: [ŋituk]. In (3b) the expected form arises, while [ŋittuk] is the surface form in (3c). As with (2c) above, it is not clear why in (3c) the underlying morpheme /-ŋŋit-/ is degeminated in the surface form. It may be that diachronic changes addressed by Smith (1978:116) are ongoing. As for the forms in (3a, d), these are two of the fastest performances of this particular word form, which suggests some 'flattening' of geminates in faster speech. These speculations however lie beyond the scope of my study. Lacking the data to fully understand the cause of the variation within the phonetics of this context, the important point for the current study is that none of the unexpected variations of this affix involves a violation of SL.

5.1.3 SL operates independently from vowel length

In this section, I show that, consistent with the literature, the length of the vowels adjacent to the consonants modified by SL is irrelevant to the operation of the rule. From the 32 example words in Appendix C, we can see 38 instances of degemination. In 27 of those cases, the segment in the intervening rhyme is either a long vowel [u:, i:] or a vowel sequence [ua, au]. In the other 11 cases, the segment in the intervening rhyme is a short vowel [u, i]. There is thus no evidence from these examples that vowel length makes a difference to SL, consistent with Dresher & John's (1995:81) observation that long vowels are "no impediment to the operation of SL." As discussed in §3.3.2, Dresher & Johns (1995:89) take this argument further, concluding that "just as vowels do not affect SL, they are never affected by it either. Thus there is no vowel shortening in the context of SL." Evidence in support of this position comes from the following examples. Consider the second syllable in each which, following Smith (1978), is underlyingly /tuttu + u/ 'be a caribou' or /tutu + u/ 'be messy hair':

(4) a. /tuttu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
caribou-be-pretend-NEARPAST-NEG-3s

t	u	tt	u:	[redacted]	ˈua	χχ	au	[redacted]	i	tt	u	k	
21	38	125	166	[redacted]	243	119	117	[redacted]	70	125	27	56	MH

b. /tuttu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
caribou-be-pretend-NEARPAST-NEG-3s

t	u	tt	u	[redacted]	ˈua	qχ	au	[redacted]	i	tt	u	k^h	
47	101	140	101	[redacted]	180	120	98	[redacted]	74	191	100	153	PA

c. /tutu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
messy.hair-be-pretend-NEARPAST-NEG-3s

t	u	t	u	ŋŋ	ua	[redacted]	ˈau	ŋ	i	t	u	k	
62	69	80	22	200	172	[redacted]	93	124	45	128	23	108	MK

d. /tutu(k) + u + ŋŋua + χχau + ŋŋi(t) + tuk/
messy.hair-be-pretend-NEARPAST-NEG-3s

t	u	t	u:	ŋŋ	ˈua	[redacted]	au	ŋ	i	t	u	k^h	
26	37	126	120	180	186	[redacted]	124	127	34	121	28	302	MH

Observe that in (4b, c) the second syllable peak is a short vowel. This is the case for 10 of the 32 examples in Appendix C, a morphological variation that may be attributable to the spontaneous nature of the oral task. For some reason, a few language consultants dropped the *-u-* 'to be' morpheme.[4] The motivation for this will not be explored here. Again, the important point is that the different vowel lengths of the second syllable in (4a, b) have no impact on the application of SL, since the underlying geminate /ŋŋ/ is degeminated in both cases. Note as well that SL has no systematic impact on the length of a syllable peak it straddles; as discussed above, the difference in vowel length in (4a, b) is morphological.

4 The results are still grammatical words, though somewhat artificial in meaning.

In (4c, d), observe that a short vowel versus a long vowel in the syllable peak preceding a SL trigger has no impact on the degemination of an SL target, in this case /χχ/. These general patterns described for (4) hold without exception for all the data considered here.

5.1.4 Summary of durational results for /tutuk/ versus /tuttuk/

The encompassing conclusion is thus that SL is exceptionless in environments where the morphology supplies syllable-adjacent underlying geminates. Generally from the data in (1-4) and the 32 examples in Appendix C, phonemically long consonants, [tt] (198ms; *n*=27) and [ŋŋ] (145ms; *n*=24), are 2.2 times longer than their phonemically short counterparts, [t] (66ms; *n*=66) and [ŋ] (89ms; *n*=39). In the context of SL, geminates are at the very minimum 1.2 times longer than the underlying geminates they reduce. On average for the data in Appendix C, sequences that trigger the rule, [ŋŋ] (151ms; *n*=20), [tt] (209ms; *n*=16) and [qχ] (167ms; *n*=6) are 2.1 times longer than the underlying geminates they target, [ŋ] (70ms; *n*=26), [t] (77ms; *n*=8) and [χ] (102ms; *n*=8). Some morphological variation was observed for the data in Appendix C involving 'negative.3s' and 'to be', but these never yielded SL violations. It can therefore be said of SL that morphology is only a relevant factor insofar as it provides syllable-adjacent underlying geminates. Finally, the presence or absence of SL has no systematic impact on vowel duration and a long vowel cannot block an SL trigger. The acoustic data in Appendix C thus fully demonstrates the productivity of the phonological rule, which also fully supports the descriptions found in the literature. As a dissimilation process, SL is typologically distinctive in that it is blind to syllable length and targets underlying geminates. For example the Lex Mamilla rule in Latin, discussed in §2.3.1, is like SL in the targeting geminates, except the rule operates regressively. But Lex Mamilla also refers to vowel length and syllable weight. We have seen that vowel length is irrelevant to SL. In §5.2 syllable weight is shown to have no effect on SL either. So SL is crucially different from a rule like Lex Mamilla. Another language that might provide an analogous length dissimilation process comes from two studies of loanwords in Japanese (Iwai 1989, Wade 1996). They describe the diachronic rule as follows: loanwords with lax vowels are followed by geminate plosives (e.g. 'zipper' becomes [jippa], 'lucky' [rakki:], 'platform' [purattohoomu]). The rule is not followed in cases where the loan word has a lax vowel and a geminate, as the following data from Itô & Mester (1998:23) show:

(5) Exceptions to the consonant length rule in Japanese loanwords

čike**tt**o	*či**kk**etto	'ticket'
kečappu	*ke**čča**ppu	'ketchup'
mape**tt**o	*ma**pp**e**tt**o	'Muppet'
ootomači**kk**u	*ootoma**čč**i**kk**u	'automatic'
maikurosukopi**kk**u	*maikurosuko**pp**i**kk**u	'microscope'

Consider the unattested forms in the middle column: the banned environment involves syllable adjacent geminates, the same environment banned by SL. The examples in (5) also show that the exception applies to geminate consonants for all places of articulation,[5] the same as the Labrador Inuttut data studied here. The only difference from SL is that, as with Lex Mamilla, the rule applies regressively. This study therefore contributes to

5 Itô & Mester (1998:23) show the exception *kk...kk also applies but their example, [piknikku] 'picnic', the hypothetical form [*pi**kk**uni**kk**u] appears to breach syllable adjacency. Further investigation of this apparent counter-example is beyond the scope of this thesis.

previous typological surveys of dissimilation (Suzuki 1998 and Bye 2011) by showing another type of language with length dissimilation. In the case of the Inuktitut dialects with SL, the rule can be characterized as follows: /CC...CC/ → [CC...C] when the trigger and target are syllable adjacent within the domain of the phonological word. Crucially this last condition makes Labrador Inuttut unlike the other length dissimilation examples in Suzuki(1998:157) since the domain of dissimilation in Finnish, Gidabal, Japanese, Latin (Lex Mamilla), Oromo and Slovak (Rhythmic Law) is the phonological foot. As will be shown in my discussion of prominence in §5.3, there is no acoustic evidence in the corpus of data compiled for the current study suggesting a foot structure is operative in Labrador Inuttut.

5.2 SL: No metrical motivation

The durational results discussed thus far are unsurprising given the description of SL in the literature. Another key point comes from Dresher & Johns (1995). They convincingly argue that SL is unrelated to any system of metrical stress, though admitting that the precise nature of the rhythmic system of the language is, at best, only partially defined (see §3.3.2). Previous research discussed in §3.5 shows that fundamental frequency, which plays a role in the intonational system of the language, has no metrical foundation. Similarly, recent research discussed in §3.4 shows that intensity prominence has no metrical basis in West Greenlandic, consistent with my preliminary results §2.2.2. In this section, I show evidence that, consistent with Dresher & John's (1995) observations (and related analysis), SL does not co-vary with a system of metrical stress based on intensity or pitch prominence.

5.2.1 SL: unrelated to syllable intensity

In addition to the references above, evidence that intensity is unsystematic (§2.2.2) and unrelated to SL comes from ethnographic and linguistic interviews with one language consultant (see §4.5.3). The following results for duration, representative of 18 word examples in Appendix D, first show that SL is active and exceptionless:

(6) a. /kattu(k) + χχi + vallia + tuinna + χatta + tu(k)/
come.together-instance.of-increasing-only-repeatedly-3s

k	a	tt	u	[redacted]	i	v	a	ll	ia	[redacted]	ui	nn	a	χ	a	tt	a	[redacted]	u
142	99	174	70		84	60	51	179	138		101	131	71	37	33	172	64		61ms

b. /χaiŋŋu(k) + u + ni(χ) + ɣa + ttau + tu(k)/
polynya-be-unnoticed-HABITUAL-PASS-3s

χ	ai	ŋŋ	uː	n	i	ɣ	a	tt	au	χ	a	tt	a	[redacted]	uːʰ
132	122	187	127	63	45	52	123	211	148	20	22	209	78		206

c. /χua(k) + ɣunna + niuma + χatta + tut/
freeze-be.able.to-be.expected.to-repeatedly-3p

χ	ua	ɣ	u	nn	a	ŋ	iu	m	a	χ	a	tt	a	[redacted]	u	tʰ
186	204	41	59	180	68	93	140	93	47	53	38	210	73		43	147

d. /pi + χatta + tut/
do-repeatedly-3p

p	i	χ	a	tt	a	[redacted]	u	t
35	60	22	65	223	67		88	39

Limiting the analysis to the [χ**attatu**] sequence at right edge of each word example, note first that SL occurs, unsurprisingly, in every case. The underlying morphemes are /χattaχ/ 'often, intermittently' and /tuk/ '3s' or /tut/ '3p' (Smith, 1978:88,108). SL thus applies to the second geminate /tt/ in /χatta**χ** + **tuk**/→/χatta**χtuk**/→/χ**attattuk**/ (through Regressive Assimilation) → **[χattatuk]** (through SL).

The general pattern is thus a weakening of the second consonant in the context of two adjacent CVC syllables. If SL and intensity prominence were to co-vary, one would expect that the first CVC syllable in the [χ**attatu**] sequence would attract loudness in a systematic way. The fact that this does not occur is clear from the following intensity results for the word examples in (6):

(7) a. [kattuχivalliatuinnaχattatu]
'it is often just more and more (sea ice) coming together'

k	a	tt	u	[redacted]	i	v	a	ll	ia	[redacted]	ui	nn	a	χ	a	tt	a	[redacted]	u
60.9	70.7	63.8	73.4	65.5	72.3	67.8	71.5	68.5	73.4	61.7	70.2	68.7	69.2	65.9	63	58	68.6	64.1	65.4dB

b. [χaiŋŋu:niɣattauχattatu:]
'polynyas are often unnoticed'

χ	ai	ŋŋ	u:	n	i	ɣ	a	tt	au	χ	a	tt	a	[redacted]	u:
65.4	73.6	71.2	72.8	70.8	71.6	68.8	73.6	64.5	70.4	67.9	64.9	62	69.3	59.6	66.8

c. [χuaɣunnaŋiumaχattatut]
'they are often expected to be able to freeze'

χ	ua	ɣ	u	nn	a	ŋ	iu	m	a	χ	a	tt	a	[redacted]	u	t^h
63.8	80.8	68.9	71.5	71.8	75.1	71.7	72.4	69.5	71.5	64	63.6	60.3	67.8	62	64.4	52.8

d. [piχattatut]
'they do (something) often, repeatedly'

p	i	χ	a	tt	a	[redacted]	u	t
68.2	78.3	73.9	73.8	71.5	71.4	66.9	70.4	61.4

Peak intensity falls on the second syllable in [χattatu] sequence in three of the four examples in (7a-c). Only in (7d) is it possible to argue that the syllable which retains a coda after the application of SL, the [χat] in [χattatu], co-occurs with peak intensity in the sequence. However, the contrast between the 'strong' and 'weak' syllables is low, at less than 3dB. Further, peak word intensity in (7d) falls on the initial syllable. The best explanation for the data in (7) is that SL does not co-vary with intensity. The same can be said for all 18 words in Appendix D where peak word intensity is unsystematic and merely suggested by mostly weak intensity differences between syllables; these data also (weakly) contradict Dresher & John's (1995:89) claim "that on most accounts syllables with long vowels or vowel clusters have some degree of stress, typically they have the most stress" (see §3.3.2).[6] Finally, words like (7d) show that syllables with short vowels (and no coda) can also attract peak word intensity.

5.2.2 SL: unrelated to intonation

The intonational systems for West Greenlandic and Quebec Inuttitut are described in §3.5. Similar patterns emerge from the data considered here. Acoustic results for the base-stem /aχixxik/ 'partridge (generic, ptarmigan) or rock ptarmigan (*Lagopus mutus*)' show that syllables made prominent by intensity pattern unsystematically and that fundamental frequency exhibits boundary melodies at the right edge of phrases or utterances. This last phenomenon co-occurs with lengthening of the final syllable rhyme, as described for Quebec Inuttitut (§see 3.5.2), and, in the data considered here, with final stop aspiration. Consider the following results, representative of the 52 examples in Appendix E:

6 Presumably, this claim is related to the impressionistic relationship that exists between vowel duration and relative prominence.

(8) a. [aχixxik]
'ptarmigan'

59 52 53 56 58 51 dB

a χ i x x i k˺ $]_{\omega}$ PJ

99 74 79 97 97 56 38 ms

b. [aχiɣɣi::k^h]
'is it really a ptarmigan (in the photograph)?'

73 72 69 64 69 52

a χ i ɣ ɣ î:í k^h $]_{IP}]_{U}$ HP

187 49 96 76 76 254 292

c. [aχixxi::]
'is it really a ptarmigan?'

57 57 66 60 70

a χ i x x î:í $]_{IP}]_{U}$ JM

91 79 75 109 109 489

d. [aχixxivi::n]
'are you(1) a ptarmigan?'

66 63 69 65 70 69 63 60

a χ i x x i v í:ĭ n $]_{IP}]_{U}$ VI

87 74 65 81 81 89 120 512 153

e. [aχixxivitsiavak]
'a big, pretty brooker (willow ptarmigan, *Lagopus lagopus*)'

70 64 67 65 71 66 71 71 73 67 69 57

a χ i x x i v i t s ia v â: k^h $]_{DP}]_{U}$ SI

75 70 94 81 81 87 39 174 93 93 295 82 141 307

In (8a), the word arises in the middle of a declarative sentence. Generally, in consideration of the data in Appendix E, it can be said that in phrase-medial environments, F0 is slightly falling from left to right. Consider the following acoustic results for (8a) and a pitch drawing of the highlighted area (the language consultant is male; accordingly, the pitch range setting was 75-300Hz; see also §4.5):

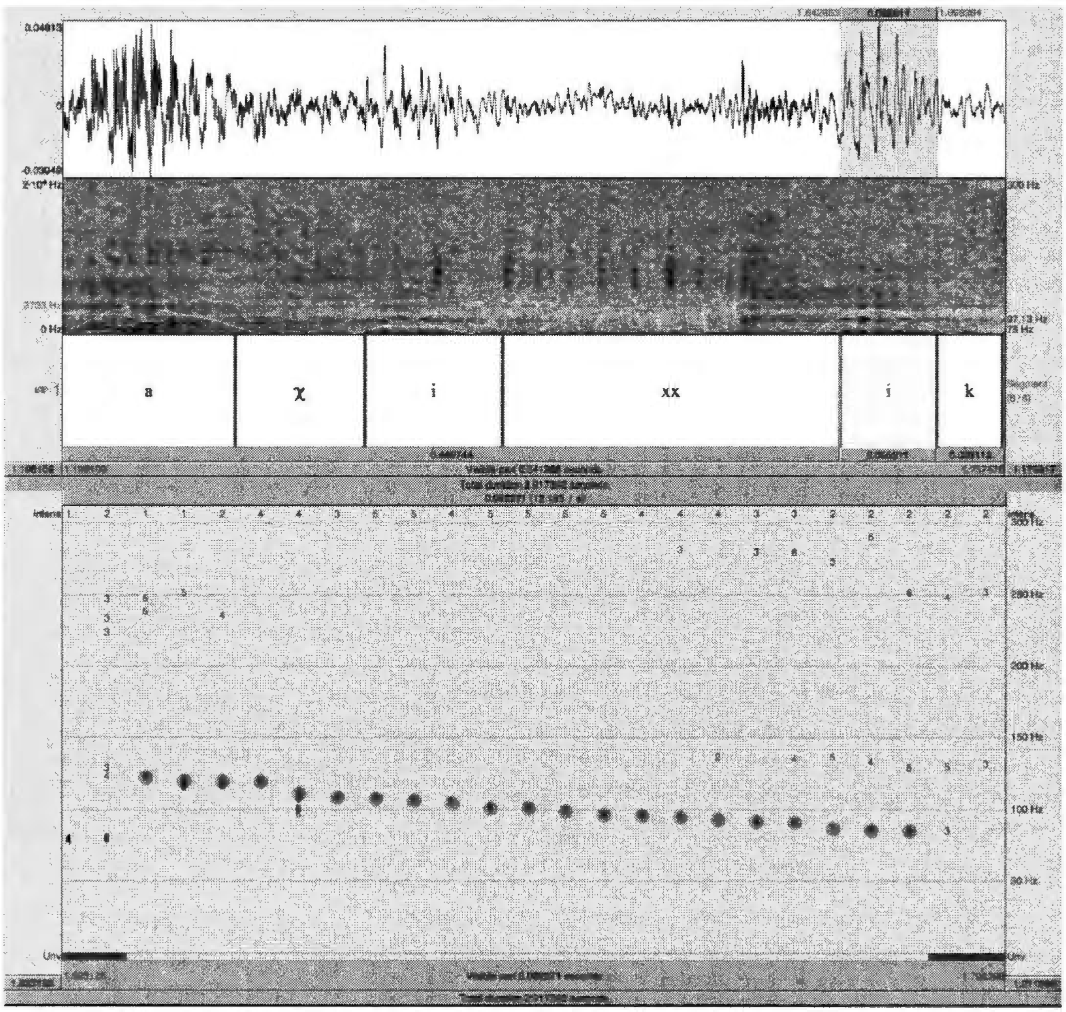


Figure 1: slightly falling tone

Observe the slightly falling tone from left to right in Figure 1. This illustrates the F0 pattern observed for phrase-medial environments throughout the recorded data. By contrast, consider (8b), where the word is located at the right edge of an interrogative phrase and utterance. The male consultant was directed to look at a photograph of the animal species in question and responds by asking: “is it really a ptarmigan?”[7] In (7b) the phrase-final syllable undergoes a strengthening phenomenon: the syllable rhyme is tripled in length and the coda stop is aspirated. The latter result is crucial because it shows that the SL trigger, the geminate [ɣɣ], does not apply to the final consonant [k^h] or in any way limit the lengthening caused by aspiration. This is evidence that the strengthening rule, henceforth called Final-syllable Strengthening, applies after SL. Finally in (8b), and all the example words in the data considered here that arise phrase finally, observe the exceptionless covariance of Final-syllable Strengthening and F0 boundary melody:

7 It is therefore analogous to Massenet’s (1980) description of a boundary melody and “surallongement” in environments where the questioner wants clarification of a possible misunderstanding (see §3.5.3).

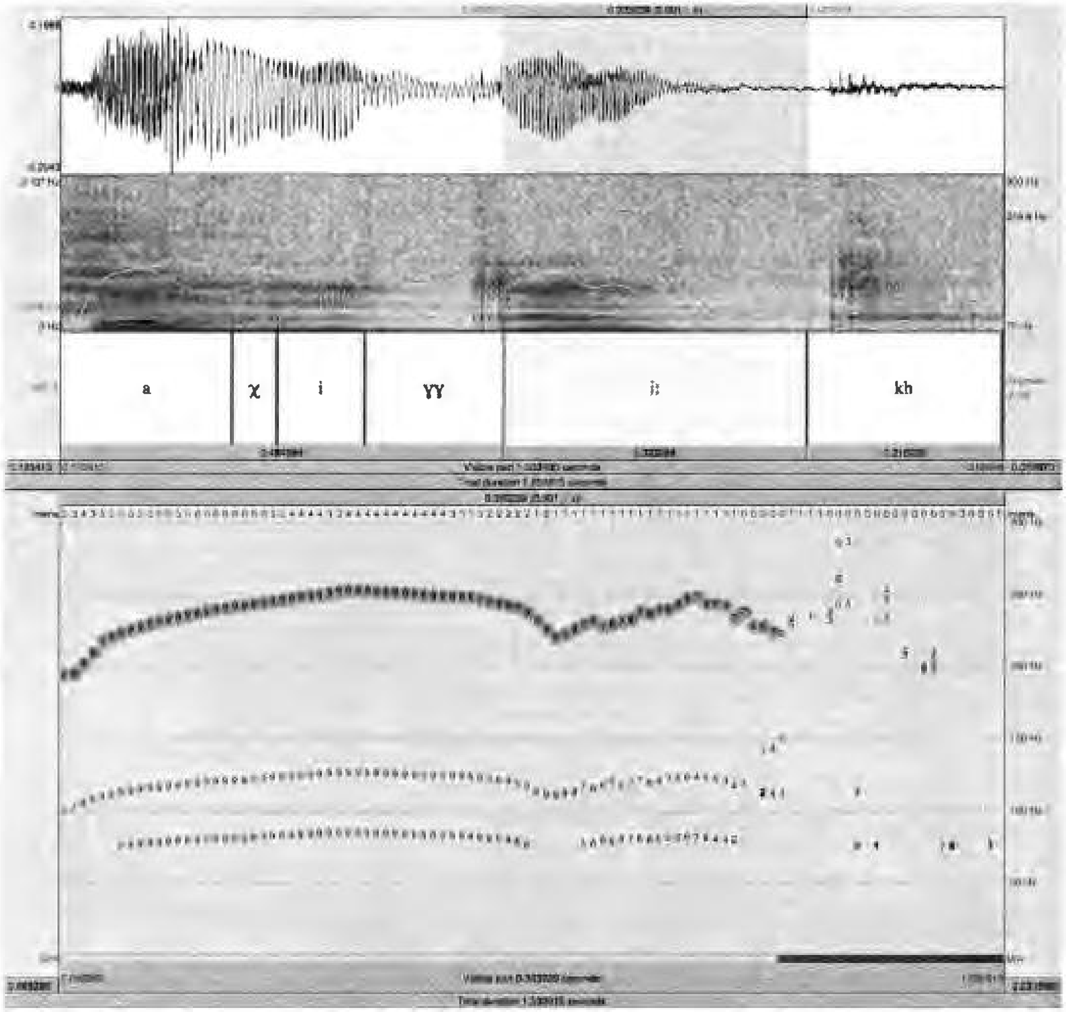


Figure 2: HLH boundary melody

The movement of F0 in Figure 2 is evidence of a HLH boundary melody, the same phenomenon described for Quebec Inuttitut by Massenet (1980:200) and West Greenlandic by Rischel (1974:97), Nagano-Madsen (1993:152) and Gussenhoven (2000:133). In (7c) the male consultant is again asking a clarification-type question. The acoustic results below show F0 movement familiar from Figure 2 and again co-varying with the Final-syllable Strengthening effect of syllable rhyme lengthening (since the word in (8c) lacks a coda consonant, final stop aspiration is not a factor):

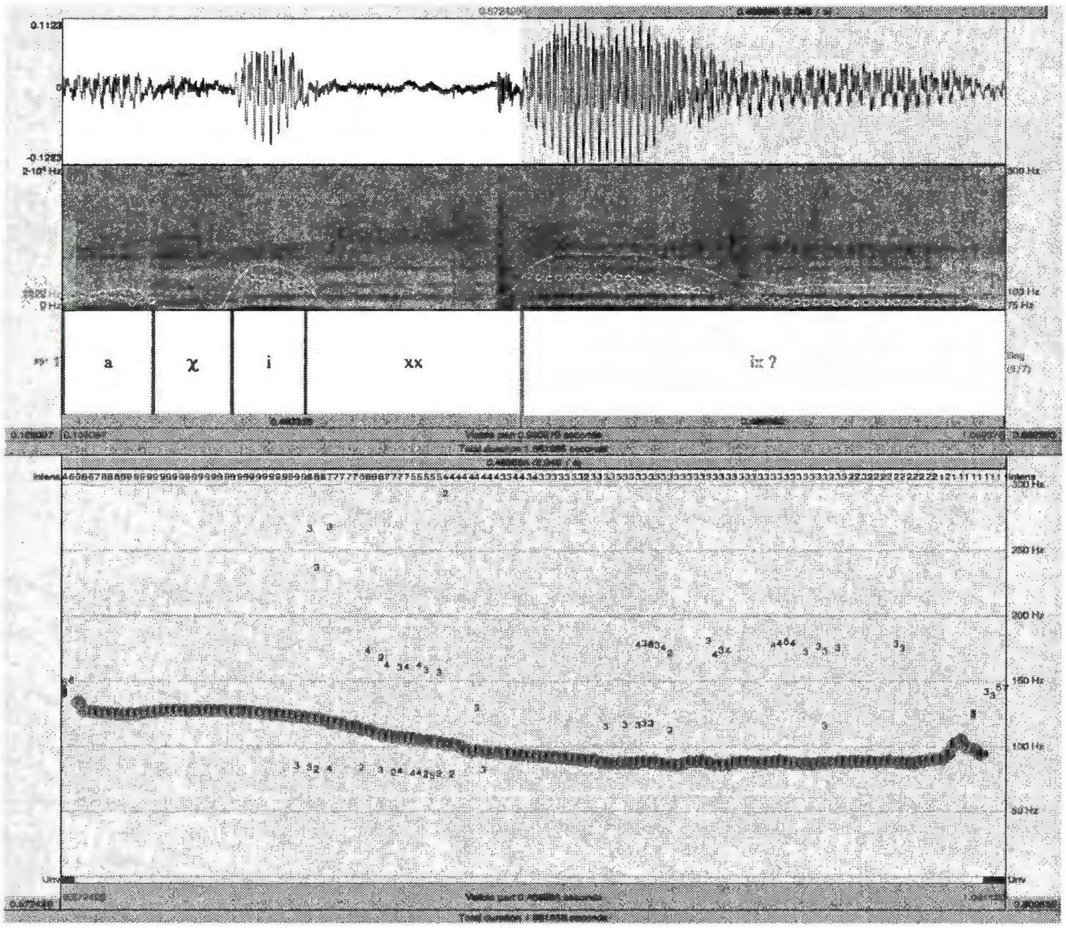


Figure 3: marginal HLH boundary melody

The F0 movement suggests an HLH boundary tone, though not as clearly implemented as the one shown in Figure 2. The pattern predicted in the literature is thus not always perfectly represented in the data, although it generally holds. Consider another interrogative example, (8d). The word was extracted from an animated conversation: one language consultant is imitating a bird's call and the speaker asks playfully if he is a ptarmigan [aχixxivi::n]. Smith (1977a:45) describes the suffix [vi:n] 'do/are you(1)?', so the syllable peak in this morpheme is underlyingly long. Realized in Figure 4 at 512ms, the final syllable peak in (7d) is one of the longest segments observed in the data considered here; it is one of the clearest examples of lengthening. Unlike (8b) and like (8c), the strengthening rule is this case is not accompanied by aspiration, because in this case the final syllable coda [n] is [+voiced]. In (8d), a female language consultant (pitch range setting is 100-500Hz, as described in §4.5), observe an HLH boundary melody:

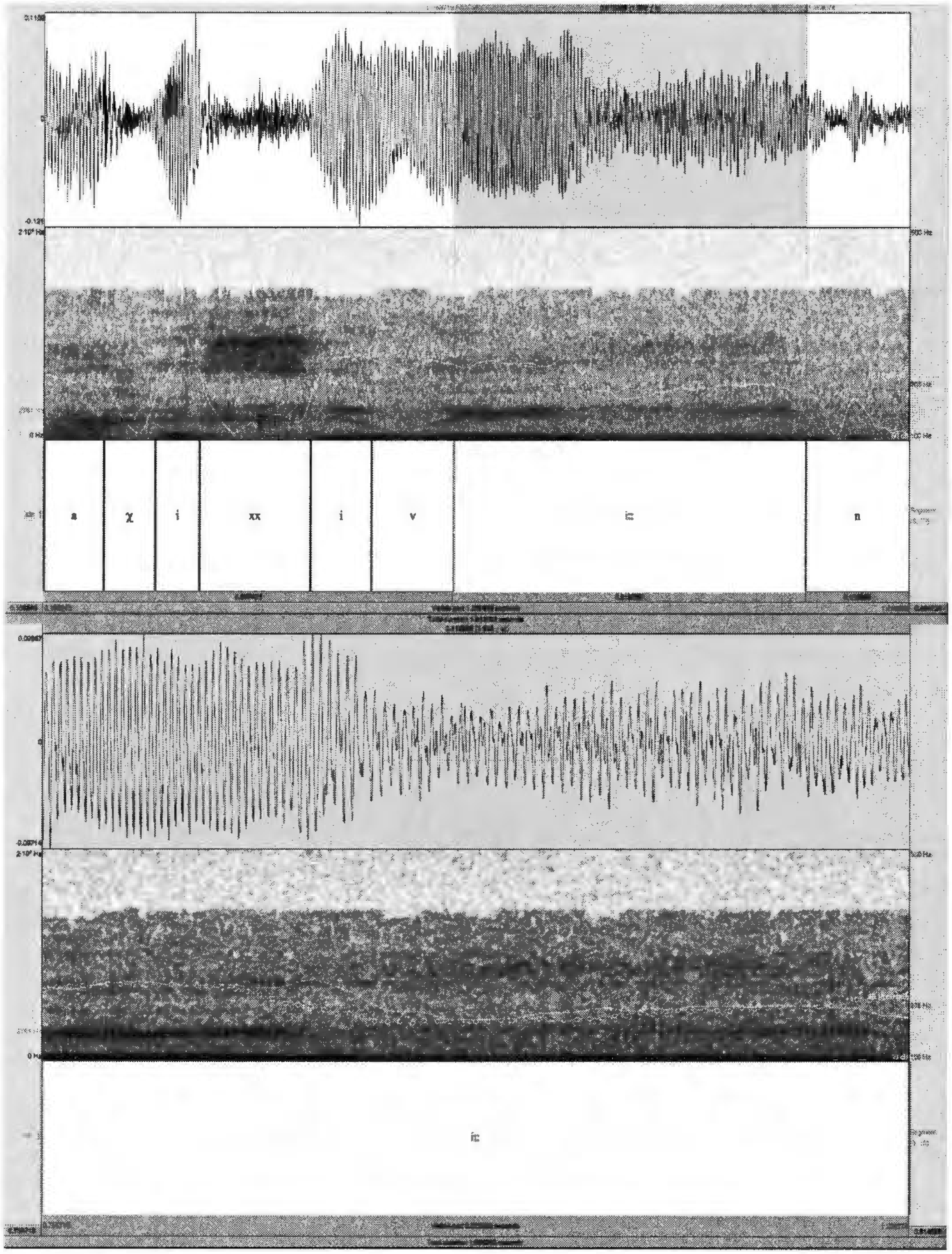


Figure 4: HLH boundary melody

The F0 movement is consistent with (8b), except with a more elongated HLH boundary melody because of lengthening. The final example, (8e), also comes from a female language consultant. In this conversation, she is making animated comments to her husband about a photograph of the ptarmigan species in question. She expresses delight at the sight of this type of ptarmigan by stating how much she wants one. The utterance and declarative phrase ends with the word [aχixxivitsiava:kʰ], based on the underlying /aχixxivik/ 'brooker' and the suffixes described in Smith (1978:103) as /-tsia-/ 'fine, well, good, properly *x*' and in Smith (1978:113) as /-vvak/ 'big'. The resulting derivation is realized with Final-syllable Strengthening effects: at 149ms, the final vowel is doubled and the final coda stop is aspirated. Observe as well the following pitch pattern:

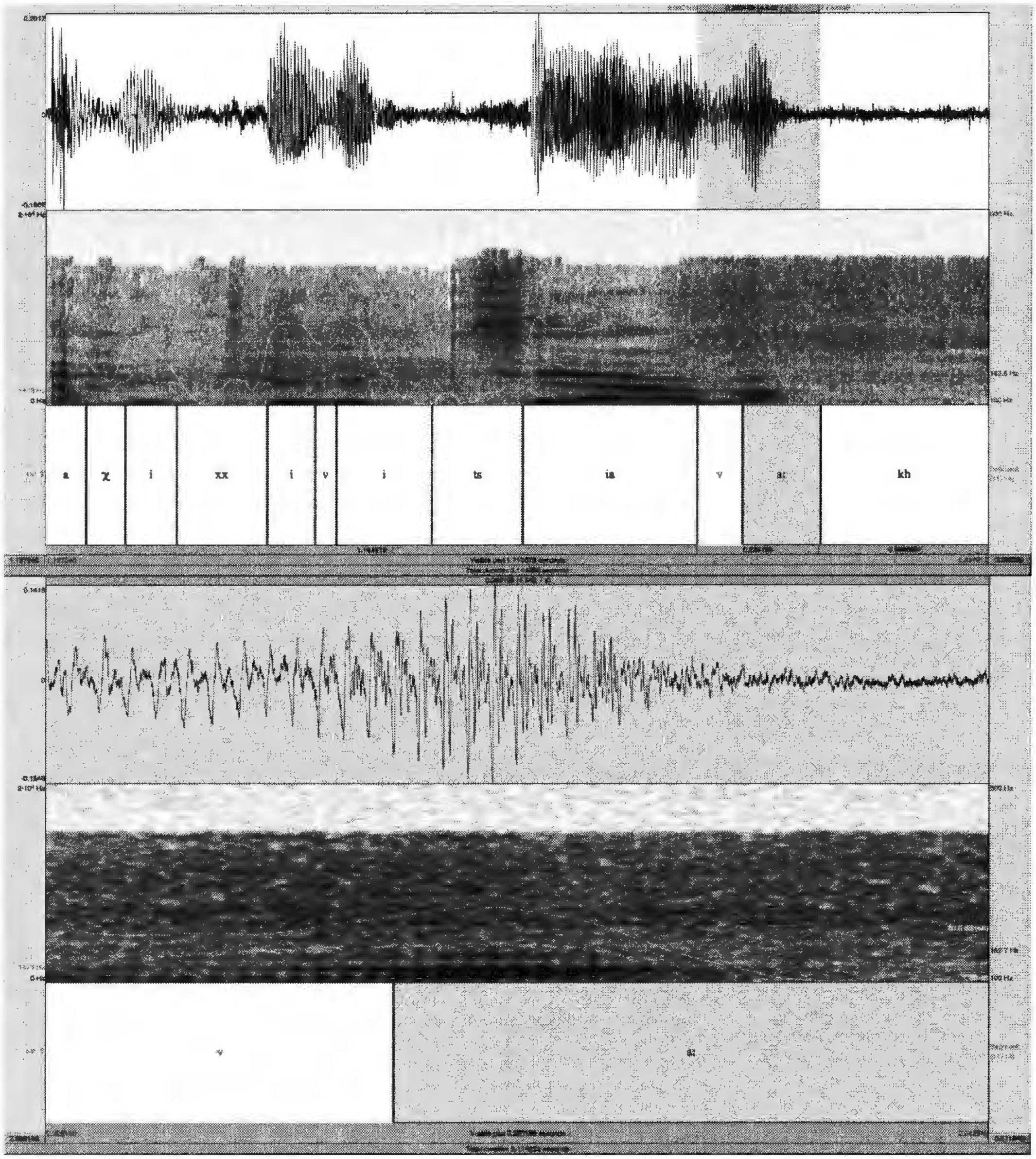


Figure 5: HL boundary melody

In this case the F0 movement suggests an HL boundary melody pattern, shown at the centre-right of the pitch drawing in Figure 5, co-occurring with the lengthened final vowel. The L tone is not fully implemented, possibly because it is followed by a stop coda. The pattern is nevertheless consistent with the description of declarative phrase intonation in West Greenlandic (Rischel 1974, Nagano-Madsen 1993, Gussenhoven 2000). The difference from those studies is the optional nature of boundary melodies, that lengthening is shown at the right edge of declarative phrases (described only for interrogative phrases in the literature on West Greenlandic and Quebec Inuttitut) and that stop consonants at the right edge of phonological phrases are aspirated, a phenomenon which, to my knowledge, is not discussed in the literature. Aspiration at the right edge of phonological phrases is found in many languages. Windsor & Cobler (2013:1) describe a similar process in Blackfoot[8], while AnderBois (2009:2) shows that aspiration refers to word boundaries as in Yucatek Maya[9] and Nespor & Vogel (1986:90-91) show that metrical prominence regulates aspiration in English.[10]

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8 For example: apiit 'sit down' /api:$\underline{t}$/ → [api:$\underline{t^h}$] ϕ. Windsor & Cobler's data on Blackfoot is unlike the Labrador Inuttut data here in that the phenomenon in Blackfoot also impacts phrase-final vowels: mistapoota 'go away' /mistapo:t$\underline{a}$/ → [mistapo:t$\underline{Ø}$] ϕ

9 The environment for aspiration in Yucatek Maya is the right-edge of the phonological word. Voiceless stop codas in this position are aspirated, as the following data from AnderBois shows: [si:ni$\underline{k^h}$] 'ant' (*si:nik, *si:nik')

10 In English aspiration refers to footing, a level of metrical structure not observed in the data considered here. Obstruents arising in the most prominent syllable of the phonological foot are aspirated, as shown in the following data from Nespor &Vogels (foot structure labelled with Σ):

sweet tooth	→	sweet [tʰ]ooth	$[\text{sweet}]_\Sigma\ [\text{tooth}]_\Sigma$
hospital	→	*hospi[tʰ]al	$[\text{hospital}]_\Sigma$
night owl	→	*nigh[tʰ] owl	$[\text{night}]_\Sigma\ [\text{owl}]_\Sigma$

Iverson & Salmons (1995:378) show that aspiration in English, and more generally the laryngeal feature [spread glottis], encompasses a ternary system of contrasts, as shown in the following grid (with metrical prominence of a syllable ranked (0, 1, 2) according to how many asterisks it is accorded in the grid):

2 (word)	*			*		*	*	
1 (foot)	*		*	*	*	*	*	*
0 (syllable)	*	*	*	*	*	*	*	*
	[tʰ]u	na_Σ	[t]e_Σ	rrain_Σ	en_Σ	$\text{[t}^h\text{]ire}_\Sigma$	sa_Σ	[t]ire_Σ

The degree of aspiration is greatest in [tʰ]una because the obstruent arises in the most prominent syllable within the foot and word. Iverson & Salmons (1995) argue for a secondary form of aspiration in the case of an an obstruent arising in a metrically weak position, like the onset /t/ in [t]errain. This contrast is also shown in word-medial positions where the onset /t/ in en[tʰ]ire is more aspirated than the onset /t/ in sa[t]ire because it is in a metrically strong position. Finally, aspiration is absent outside the syllable

Overall, the evidence in (8) points to a rule in Labrador Inuttut that strengthens the final syllable of a phrase or utterance. The relevance of that finding to this thesis is the fact that Final-syllable Strengthening can be shown to occur independently from SL. For example, the underlying geminate /vv/ in (8e) is degeminated by SL /vv/→/[v] despite being adjacent to strengthening in the adjacent final syllable.

5.3 No evidence of metrical stress in the data

So far in this chapter, I have shown that SL is exceptionless in the examples and does not co-vary with syllables made prominent by any of the three stress correlates. I have not yet discussed the nature of syllable prominence in Labrador Inuttut, however. In this section, I will show that there is no recurring or systematic pattern of metrical prominence in the data considered here.

5.3.1 Intensity prominence does not depend on duration

The word examples considered thus far have included different vowels, coda consonants and/or Final-syllable Strengthening. To eliminate the possibility that these factors are somehow clouding the picture of syllable prominence, we must consider the results for a set of example words with no codas (and thus no SL) and only the low vowels, [a] and [a:]. Nine examples of the relevant word, [ana:naɣa] 'my mother' were extracted from the spontaneous speech sections of the linguistic interviews as they were uttered by seven

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onset, like the coda /t/ in nigh[t˺] owl or in the onset of a syllable with the lowest degree of metrical prominence, like the /t/ in hospi[t]al.

different language consultants (see §4.5.5). Underlyingly, the words come from the base-stem /ana:nak/ 'mother' and the deleting suffix described in Smith (1977a:31) as /-ɣa/ '1s.poss'. Consistent with the durational patterns described for West Greenlandic by Jacobsen (2000), on average the long vowel in the CV:CV sequence is 1.7 times longer than the following short vowel (see Appendix E for an exhaustive description of the relevant examples). Consider the following representative sample of results for duration and peak syllable intensity (with the relevant prosody, utterance, declarative phrase or word shown in brackets: ${}_{U}[{}_{DP}[{}_{\omega}[\,]_{\omega}]_{DP}]_{U}$):

(9) a. $_{U}$[tuχuma $_{\omega}$**[ana:naɣa]**$_{\omega}$ asaina aŋutita:lauttuk Joshua Obed nainimiumit]$_{U}$

‘At the time of her death my mother, her husband was Joshua Obed from Nain.’

70 70 73 68 69 67 69 db

a n a: n a ɣ a BH

81 71 93 54 78 48 78 ms

b. $_{U}$[$_{\omega}$**[ana:naɣa]**$_{\omega}$ ma:nimiu Nainimiuk -um- …ata:taɣa: United States-imiuk]$_{U}$

‘My mother is from here, from Nain, um, my father is American.’

70 72 77 72 79 75 81

a n a: n a ɣ a JD

70 56 141 53 63 34 84

c. $_{U}$[$_{DP}$[ata:tai ma:nimiuŋujuk ma:nimiuŋuqχauju:k^{h}]$_{DP}$ $_{DP}$[$_{\omega}$**[ana:naɣa:]**$_{\omega}$]$_{DP}$… $_{DP}$[nainmi -uh-]$_{DP}$ $_{DP}$[nainimi: tauni nainimi -uh-]$_{DP}$ $_{IP}$ [χanu:ŋ]$_{IP}$]$_{U}$

‘Father is from here, was from here... my mother.... in Nain, uh, in Nain down in Nain. How?’

63 65 69 67 69 70 75

a n a: n a ɣ a:: PA

35 77 138 59 68 27 259

d. $_{U}$[$_{DP}$[ata:taɣalautaɣa:]$_{DP}$ $_{DP}$[nuta:miuɣulauttu:]$_{DP}$ $_{DP}$[$_{\omega}$**[ana:naɣa:]**$_{\omega}$]$_{DP}$ $_{DP}$[ku:jjuamivuk panaitiluɣu:]$_{DP}$]$_{U}$

‘My father was from Nutak, my mother she’s Kuujjuaq and up there (in Northern Quebec)’

70 71 71 68 69 66 61

a n a: n a ɣ a: MK

90 63 154 82 72 61 124

The antepenultimate syllable in [ana:naɣa] co-varies with peak intensity in (9a, d) and is an underlying long vowel. It could be wrongly argued from these facts that peak duration and intensity co-vary. That cannot be, indeed, since in (9b, c) peak intensity co-varies with the final syllable, a short vowel underlyingly. Furthermore, the degree of contrast between all the intensity peaks in (9) is rather minimal, as it never exceeds 4dB. If intensity does mark syllables as prominent, this occurs not as a systematic metrical function, but instead as a way to emphasize specific points, consistent with observations previously made by Smith (1975:104). Consider for example the acoustic results in (9b), from a female language consultant:

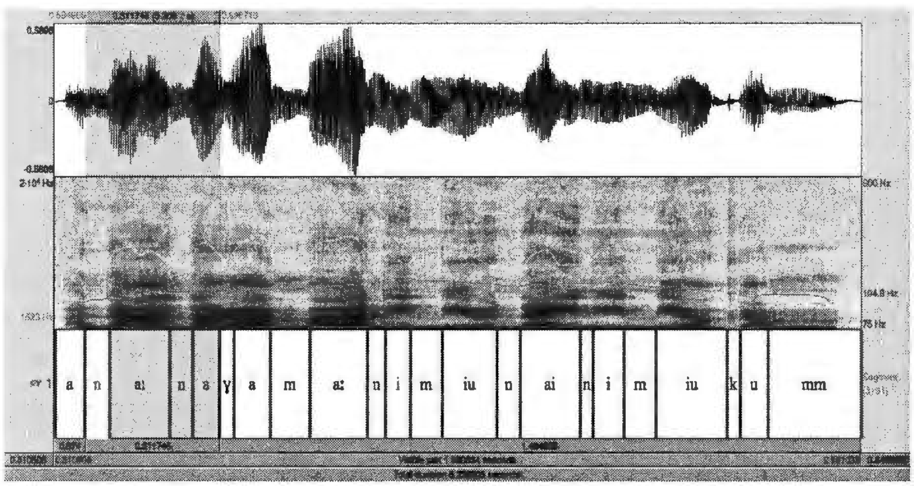

Figure 6: Intensity prominence is discretionary

In addition to attracting peak word intensity, the morpheme [ɣa] is also the loudest syllable in the utterance. If this contrast is in fact significant, it is that it functions to emphasize that the language consultant is talking about *her own* mother. No plausible arguments can be made for a system of recurring metrical prominence involving duration or intensity from the data in Figure 6. We can further observe that the intensity peaks in this representative example range between 70 and 81dB with no alternating pattern of prominence. Instead each syllable attracts roughly the same prominence. Based on these observations, intensity assignment must: (a) refer to the syllable (as opposed to larger constituents like the foot or the word), giving each syllable in an utterance similar peak intensity, and (b) be agnostic to vowel duration (consistent with other observations about SL in §5.1). The pattern in Figure 6 is therefore incompatible with Hayes' (1995) definition of a stress-timed language, which should be characterized by systematic intensity alternations between strong and weak syllables based on intensity prominence. The evidence in (9b) supports the claim by Rose, Pigott & Wharram (2012) that Labrador Inuttut shares characteristics with syllable-timed languages (see §5.4, and see also Rischel 1974, Nagano-Madsen 1993, and Jacobsen 2000).

5.3.2 Intensity prominence does not depend on prosodic factors

More generally, prosodic conditioning fails to offer explanations for the distribution of intensity peaks observed in (9). The example in (9a) is utterance medial, while the example in (9b) is utterance initial. There is no evidence in any of the examples considered here that position within an utterance systematically impacts the distribution of intensity peaks. In (9c, d) the words are located at the right edge of declarative phrases, where their final syllables both display Final-syllable Strengthening (as shown in §5.2). For example, we observe lengthening of the phrase-final syllable in [anaːnaɣ**aː**]. In this example, we also observe a boundary melody of a type not discussed yet. Recall the description of HL boundary melodies phrase finally in West Greenlandic in §3.5.2. Rischel (1974) and Nagano-Madsen (1993) present acoustic evidence of high-to-low boundary melodies at the right edge of declaratives. In light of their description, consider now the following acoustic results for the utterance in (9d), from a male language consultant:

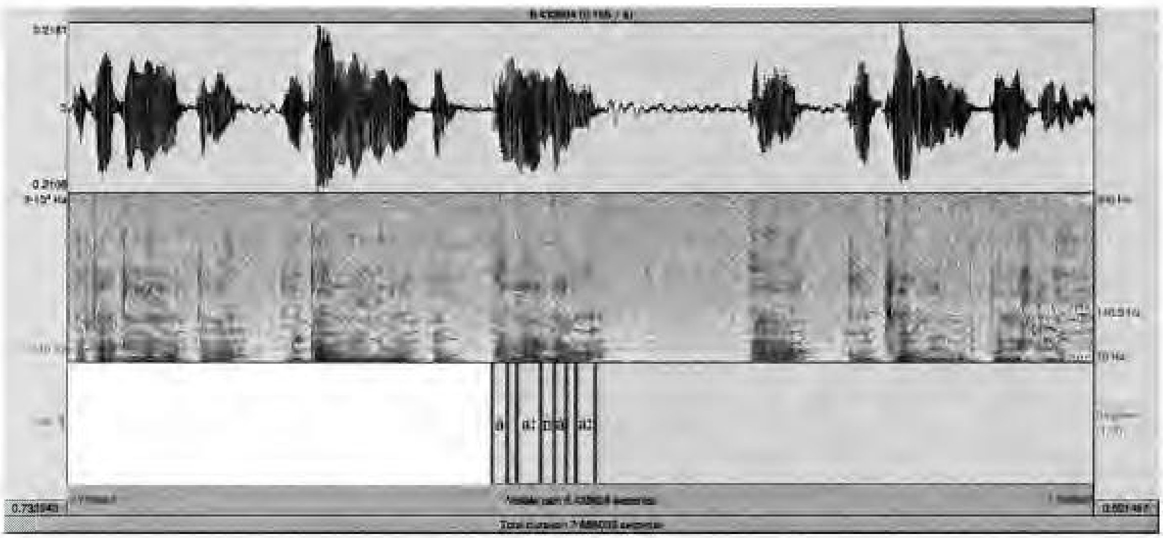

Figure 7: Evidence of a declarative phrase

The final syllable is characterized by lengthening as well as by a sharp downward movement of F0 at the right edge, consistent with the pattern seen thus far for the declarative phrase in Figure 5. A closer look at the acoustics of this example word shows the F0 movement more clearly:

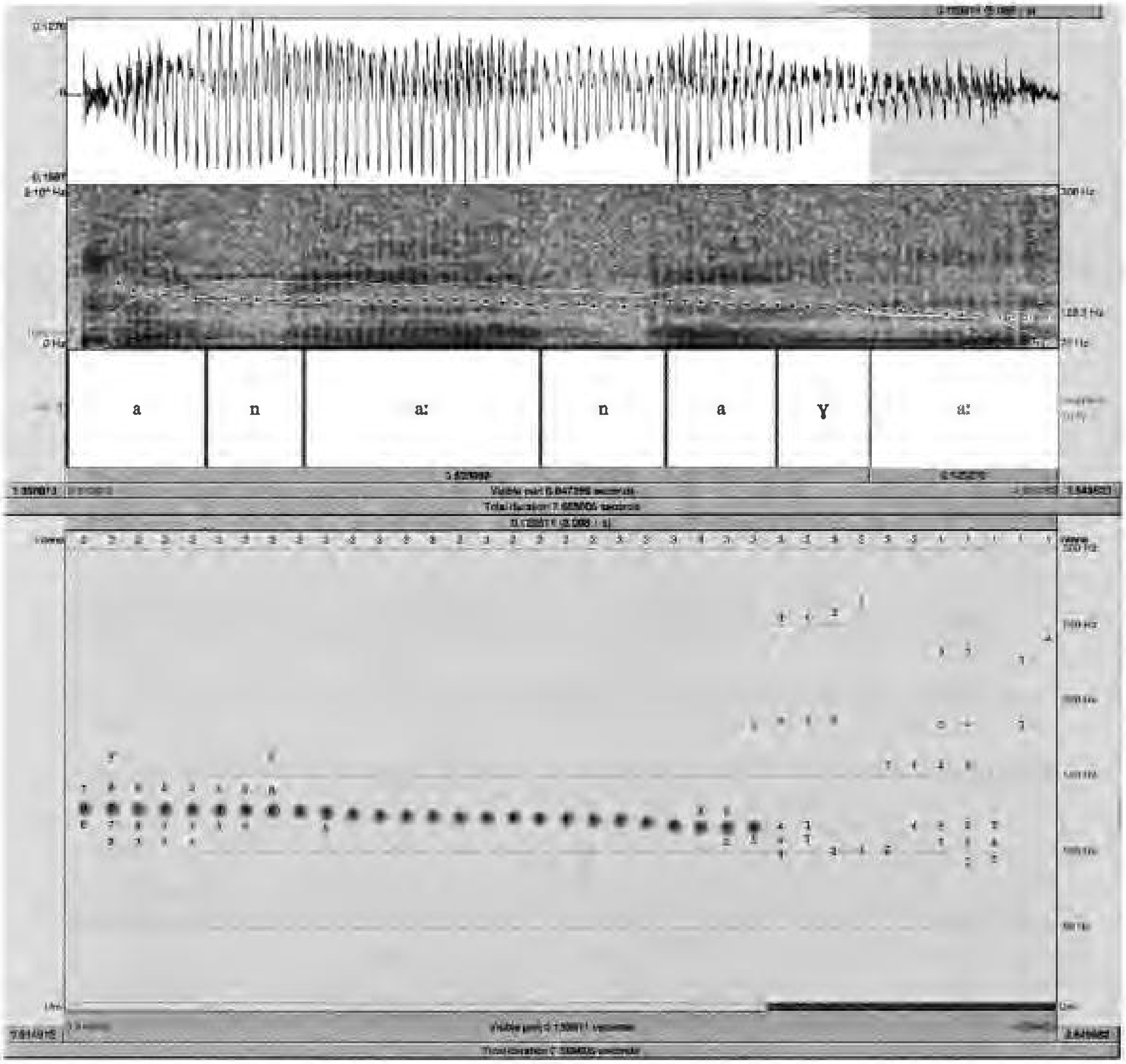

Figure 8: marginal HL boundary tone

The expected HL tonal pattern, as in Figure 5, is not implemented. This suggests that lengthening alone can signal the end of declarative phrase and suggests that the HL predicted by the literature in this environment is optional in the data considered here. The HL pattern may not be best instantiated by Figure 8 however, given the fact that in (9d) the boundary after [ana:naɣa:] appears to be a pause, while the language consultant recollects information about his mother. Better evidence of a HL boundary melody comes from the final word in the preceding declarative phrase about the language consultant's father, as shown in the following spectrogram:

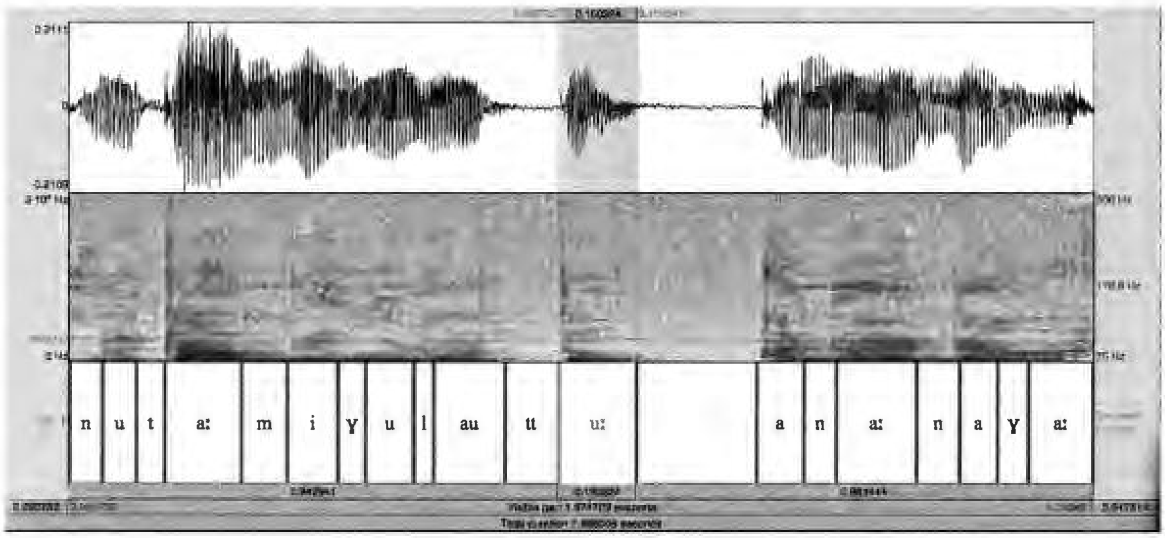

Figure 9: HL boundary tone

In line with the description of pitch in this environment from the literature, the most plausible interpretation for the falling movement of F0 at the centre of the pitch drawing in Figure 9 is that it instantiates a declarative phrase-final HL boundary. When this boundary melody co-occurs with vowel lengthening as in (8c, d) it acts as a cue to the end of a declarative phrase (and possibly stop aspiration as shown for example words at the right edge of interrogative phrases in §5.2). Peak intensity therefore does not systematically co-vary with Final-syllable Strengthening in both word examples, since in (9c) peak intensity falls on the final syllable while in (9d) it is antepenultimate. Overall, the data in (9) shows that intensity and pitch operate independently and that pitch effects minimally occur in syllables at the right edge of a prosodic category (word, phrase or utterance).

5.4 Evidence for syllable timing

The evidence presented thus far supports the position that the data considered here are typologically consistent with syllable-timed languages, in line with the findings of Rischel (1974), Nagano-Madsen (1993), Jacobsen (2000) and Rose, Pigott & Wharram (2012). Three durational patterns have been demonstrated: phonemic contrast and SL, both discussed in §5.1, and Final-syllable Strengthening (involving vowel lengthening, aspiration of stop codas and optionally, boundary melodies), discussed in §5.2. Aside from phrase-level intonational contours, the overarching generalization about these phenomena is that they all involve the length adjustment of a syllable rhyme. Phonemic contrasts involve a lexical difference in the length of syllable peaks, as in [anak] 'faeces' versus [a:nak] 'paternal grandmother', or a lexical difference in the length of consonants as in [anak] versus [annak] 'woman'. SL deletes coda consonants in alternating syllables. Final-syllable Strengthening lengthens the syllable peak and aspirates the syllable coda if it is an oral stop. Recall from §3.4.2 that Jacobsen (2000:64) finds syllable rhyme length adjustments in example words read in carrier sentences by two West Greenlandic language consultants. Following Rischel (1974), Nagano-Madsen (1993:66) concludes that the "syllable is the relevant articulatory unit [in West Greenlandic]." These acoustic studies demonstrate that, like the data considered here, other Inuit dialects have phonological rules that regulate syllable rhyme duration, especially when the syllables in question become extra-long because of the presence of long segments. From this perspective, SL regulates syllable rhyme duration. Final-syllable Strengthening on the other hand regulates syllable rhyme duration at the phrase level, in that case making the rightmost syllable durationally prominent relative to the other syllable rhymes in an utterance, or aspirated, or lengthened and aspirated. In the next two sections, I will show acoustic evidence that in environments where SL and Final-syllable Strengthening are not factors, syllables fall into just two length categories, short and long.

5.4.1 Syllables in example words are similar in length

The evidence in this section comes from the spontaneous speech data discussed already as the /na:na/ sequence in §4.5.5. Consider the syllable rhyme durations in the following examples:

(10) a.	${}_{\omega}$[a	n	a:	n	a	ɣ	a]${}_{\omega}$	425 ms	
	34		98		81		58ms		TK
b.	${}_{\omega}$[a	n	a:	n	a	ɣ	i]${}_{\omega}$	459	
	83		107		86		49		BH
c.	${}_{\omega}$[a	n	a:	n	a	ɣ	a]${}_{\omega}$	501	
	70		141		63		84		JD
d.	${}_{\omega}$[a	n	a:	n	a	ɣ	a]${}_{\omega}$	503	
	81		93		78		78		BH
e.	${}_{\omega}$[a	n	a:	n	a	ɣ	a]${}_{\omega}$	512	
	77		134		63		58		DF
f.	${}_{\omega}$[a	n	a:	n	a	ɣ	a]${}_{\omega}$	624	
	95		163		69		109		MN
g.	${}_{\omega}$[a	n	a:	n	a	ɣ	a:]${}_{\omega}$]${}_{DP}$	646	
	90		154		72		124		MK
h.	${}_{\omega}$[a	n	a:	n	a	ɣ	a::]${}_{\omega}$]${}_{DP}$	663	
	35		138		68		259		PA
i.	${}_{\omega}$[a	n	a:	n	a	ɣ	a::]${}_{\omega}$]${}_{DP}$	722	
	98		120		97		224		BH

Based on the physical durations in (10), three classes of syllable rhyme emerge: short, long and overlong (shown in white, light grey and dark grey respectively). *Short* includes nine [a] syllables, with an average duration of 73 ms, nine [na] syllables, with an average duration of 75ms, and six [ɣa] syllables, with an average duration of 73ms. *Long* includes nine [na:] syllables, with an average duration of 128ms, and one [ɣa:] syllable at 124ms. *Overlong* includes two [ɣa::] syllables, with an average duration of 242ms. These results are consistent with Massenet's (1980) analysis of short, long and overlong syllables in Quebec Inuttitut (see §3.5.3), especially since the overlong syllable rhymes in (10h, i) co-vary with interrogative phrase boundaries and Final-syllable Strengthening. Consider (10a-f), where Final-syllable Strengthening is not a factor in the word examples. Only syllable rhymes from the short and long classes remain. The long syllable rhymes all come from the lexicon as the linguistically contrastive, long form of [a]. The remaining short syllable rhymes in (10) arise in different word positions (initial, medial and final) and with different segments ([a] versus [na] versus [ɣa]), yet each is about the same length with average durations of 73, 75 and 73ms respectively. At the word level then, if phonemic contrast and Final-syllable Strengthening are not factors, each syllable rhyme is assigned short duration. The phonetic realization of *short* is shown in (10) to be between 34 and 98ms. The next section I will show evidence of short, long and overlong durational classes in phrases and utterances, as well as briefly considering the syllable rhyme duration for CVC.

5.4.2 Syllables in phrases are similar in length

First consider the syllable rhyme durations in the following response from the linguistic interviews where the language consultant was asked where his parents are from:

(11) $_{U}$[$_{DP}$[ata:taɣalautaɣa:]$_{DP}$ $_{DP}$[nuta:miuɣulauttu:]$_{DP}$ $_{DP}$[ana:naɣa:]$_{DP}$
'My father was from Nutak, my mother...'
$_{DP}$[ku:jjuamivuk panaitiluɣu:]$_{DP}$]$_{U}$
'...also from up there in Kuujjuak (Quebec).' MK

a. $_{DP}$[ata:taɣalautaɣa:]$_{DP}$

a	t	a:	t	a	ɣ	a	l	au	t	a	ɣ	a:
99	47	143	26	83	55	59	54	134	98	83	22	123

b. $_{DP}$[nuta:miuɣulauttu:]$_{DP}$

n	u	t	a:	m	iu	ɣ	u	l	au	t	u:
101	69	48	124	114	127	35	69	32	139	118	134

c. $_{DP}$[ana:naɣa:]$_{DP}$

a	n	a:	n	a	ɣ	a:
90	64	154	82	72	60	124

d. $_{DP}$[ku:dʒuamivuk...

k	u:	dʒ	ua	m	i	v	u	k
49	109	139	137	75	70	93	69	38

e. ... panaitiluɣu:]$_{DP}$

p	a	n	ai	t	i	l	u	ɣ	u::
19	47	70	108	81	47	60	46	37	213

The utterance must be divided into four declarative phrases based on Final-syllable Strengthening effects observed in all cases except (11d). At the right edge of that word example, there is no syllable rhyme lengthening and the final stop is unreleased. This word must therefore form a declarative phrase with the example word in (11e). The duration of syllable rhymes not affected by Final-syllable Strengthening correspond with two classes of length. *Short* includes seven syllables where [a] is at the peak ([a], [ta], [ɣa], and [pa]) with an average duration of 76 ms, two syllables where [i] is at the peak ([mi], and [ti]) with an average duration of 59ms and four syllables where [u] is at the peak ([nu], [ɣu], [lu], and [vuk]) with an average duration of 73ms. *Long* includes five syllables where [a:] is at the peak ([ta:], [ɣa:], and [na:]) with an average duration of 134ms, two syllables where [u:] is at the peak ([ku:d] and [tu:]) with an average duration of 137ms[11] and four syllables with a complex vowel cluster at the peak ([lau], [miu], [jua], and [nai]) with an average duration of 129ms. The other length class, *overlong*, occurs only in Final-syllable Strengthening environments where the final syllable [ɣu::] has a duration of 213ms.

Overall, the data in (11) suggest that each syllable class roughly corresponds to a durational range. For example short syllable rhymes, including V, CV and CVC, are all between 47ms and 107ms in (11). Long syllable rhymes meanwhile, including V:, CV: and CV:C are between 108 and 179ms.[12] Thus the durational ranges for short and long syllable rhymes in (11) do not overlap, a pattern that holds for most of the data considered here. Generally, then, it can be said then that in phrases, short syllables are realized within a similar durational range with no overlap into the durational range of long syllable rhymes.

11 Assuming that the duration of the affricate in (10d) is divided equally between coda and onset.

12 Again on the assumption that the duration of the affricate in (10d) is divided equally between coda and onset.

The final evidence for a system of short, long and overlong syllable rhymes comes from a spontaneous speech section of the linguistic interviews.[13] One language consultant was asked to recall her memories of a tragic hunting accident in Northern Labrador in the 1970's. Consider the durational pattern in the following response:

(12) $_{U}$[$_{DP}$[tuttuniaɣiasimatɬuti auŋa namukkiak]$_{DP}$ -uh-
'While they were trying to hunt caribou going south, uh, '
$_{DP}$[pittualummu:::]$_{DP}$ -uh- $_{DP}$[alla: piŋasut piŋasuiχu:k]$_{DP}$ $_{DP}$[ajulisimajut^{h}]$_{DP}$
'... through deeply drifted snow, uh, so three, three of them, they died.'
$_{DP}$[nuti atautsi ilanna:ɣa matn sillit^{h}]$_{DP}$ $_{DP}$[aijai:::]$_{DP}$
'And one my friend Martin Sillit. Oh my!'
$_{DP}$[ilu:natta:]$_{DP}$ $_{DP}$[inuit]$_{DP}$ $_{DP}$[ilu:nattik la:badr taχχanimiu attutaulauttut]$_{DP}$
'All the people, all of us northerner Labradorians, we were all touched,'
$_{DP}$[asiujiɣatta piŋasuni:k^{h}]$_{DP}$ $_{DP}$[inu:χatittinik^{h}]$_{DP}$]$_{U}$
'as a group by the loss of those three.' FW

a. $_{DP}$[tuttuniaɣiasimatɬuti...

t u tt u n ia ɣ ia s i m a tɬ u t i

42 236 67 188 187 56 31 152 43 68

b. ... auŋa namukkiak]$_{DP}$

au ŋ a n a m u kk ia k^{h}

215 31 42 38 210 162 431

c. $_{DP}$[pittualummu:::]$_{DP}$

p i tt ua l u mm u:::

45 245 225 78 168 623

d. $_{DP}$[alla: piŋasut piŋasuiχu:k]$_{DP}$

a ll a: p i ŋ a s u t p i ŋ a s ui χ u: k^{h}

80 182 232 56 96 109 51 85 59 135 220 172

e. $_{DP}$[ajulisimajut^{h}]$_{DP}$

a: j u l i s i m a j u t^{h}

153 77 67 70 84 75 359

13 See Appendix A, Section E: Storytelling.

f. $_{DP}$[nuti atautsi ilanna:ɣa...

n u t i a t au ts i i l a nn a: ɣ a

57 72 86 130 185 56 71 70 180 188 111

g. ... matn sillit^h]$_{DP}$

m a t n s i ll i t^h

69 45 68 148 77 441

h. $_{DP}$[aijai:::]$_{DP}$ $_{DP}$[ilu:natta:]$_{DP}$ $_{DP}$[inuit]$_{DP}$

ai j ai::: i l u: n a tt a: i n ui t^h

184 806 96 134 57 111 208 117 201 286

i. $_{DP}$[ilu:nattik la:badr taχχanimiu...

i l u: n a t i k l a: b a d r t a χχ a: n i m iu

80 108 55 62 52 140 43 109 48 156 111 96 236

j. ...attutaulauttut]$_{DP}$

a tt u t au l au tt u t^h

64 192 44 190 160 175 47 232

k. $_{DP}$[asiujiɣatta piŋasuni:k^h]$_{DP}$

a s iu j i ɣ a tt a p i ŋ a s u n i: k^h

87 164 96 54 221 98 45 75 43 135 162

l. $_{DP}$[inu:χatittinik^h]$_{DP}$

i n u χ a t i tt i n i k^h

36 100 40 39 202 78 61 388

The speech sample in (12) involves 12 declarative phrases as we can see from the pattern of Final-syllable Strengthening effects. Observe for example that the first DP, shown in (12a, b), ends with an aspirated stop. The next DP in (12c) exhibits syllable rhyme lengthening at the right edge, a pattern also shown for the first DP in (12h). Observe

Final-syllable Strengthening as well in (12d), the second DP in (12h) and (12k). The remaining DPs end with aspirated stops. Given these assumptions about the prosody in (12), consider the duration for each class of syllable rhyme.

Short includes 20 syllables where [a] is at the peak ([mat], [ɣa], [na], [a], [ma], [lan], and [pa]) with an average duration of 78ms, 20 syllables where [i] is at the peak ([si], [ti], [pi], [li], [i], [sil], [tik], [ni], [ji] and [tit]) with an average duration of 76ms and 11 syllables where [u] is at the peak ([tut], [tu], [ɬu], [muk], [lu], [sut], [ju], [nu], and [su]) with an average duration of 88ms. Overall the durational range for *short* in this example is between 31 and 160ms.

Long includes five syllables where [a:] is at the rhyme ([la:], [a:], [na:], [ta:] and [χa:]) with an average duration of 172ms, two syllables where [u:] is at the peak ([lu:]) with an average duration of 121ms and 10 syllables with a complex vowel cluster at the peak ([ɣia], [au], [tua], [sui], [tau], [ai], [lau] and [siu]) with an average duration of 183ms. Overall the durational range for long syllable rhymes is between 111 and 236ms.

Overlong occurs exclusively environments where the Final-syllable Strengthening effect of syllable rhyme lengthening is a factor. The two overlong syllable peaks [u:::] and [ai:::] in (12c, h) have an average duration of 713ms. The remaining environments not discussed so far for (12) are those cases where Final-syllable Strengthening includes only an aspirated stop: [kiak^h], [χu:k^h], [jut^h], [lit^h], [nuit^h], [tut^h] and [nik^h]. In terms of duration the syllable peaks in all cases pattern either with short or long, but measurement of the syllable rhyme for each overlong example results in an average duration of 441ms. What remains unclear is whether or not the duration of an aspirated stop should be included in the measurement of syllable rhyme length, a question that will not be answered in this thesis. It is clear that aspiration plays an important prosodic role in marking phrase boundaries. As discussed in §5.2.2, this is consistent with right-edge fortition in other languages like Blackfoot.

In sum, the picture that emerges from the data in (12) is that, except in environments where Final-syllable Strengthening is a factor, syllable rhymes are realized phonetically as either short or long and that these classes have similar durational ranges, though some overlapping of these ranges was observed in (12), especially for the duration of closed syllables. It may be that the phonetic reality of performing a coda consonant pushes a given syllable rhyme to the limit of its durational class. The importance here in an acoustic investigation of SL is the fact that these results show Labrador Inuttut to be unlike the stress-timed languages described in MST by Hayes (1987, 1995) because syllables are not organized into alternating strong and weak patterns. Suzuki (1998) proposes a Rhythmic Dissimilation Hypothesis, arguing that vowel/length dissimilation is inherently rhythmic and "driven by rhythmic principles governing foot structure (Hayes 1987, 1995)." In support of his hypothesis, Suzuki observes that alternating dissimilation patterns in Gidabal parallel the patterns of alternating stress, and that:

> vowel/length dissimilation cases can be viewed as equivalent to the quantitative effects driven by the principle of foot optimization found in a number of languages.
>
> Suzuki (1998:206)

In Gidabal long vowels are shortened after long vowels as shown in the following data from Kenstowicz & Kisseberth (1997:321), adapted from the original study by Geytenbeek & Geytenbeek (1971):

(13) Vowel dissimilation: an alternating pattern in Gidabal

a.

[njule-da:ŋ]	[nu:n-daŋ]
'he (emphatic)'	'too hot'
[bala-ya:]	[gila:-ya]
'is under'	'that (locative)'

b. [djalum-ba:-daŋ-be:]
'is certainly right on the fish'
/djalum-ba:-da:ŋ-be:/
djalum-ba:-da:ŋ-be: → Not applicable: preceding vowel is short
^
djalum-ba:-da:ŋ-be: → Applies: vowel preceded by long vowel
^
djalum-ba:-daŋ-be: → Not applicable: preceding vowel is short
^
[djalum-ba:-daŋ-be:]

In (13a) we can see a ban on long vowels in successive syllables, consistent with the way SL targets underlying geminates. In (13b) we see the resulting iterative pattern, which looks similar to SL, with one crucial difference: Gidabal is a metrically conditioned language, so the pattern in (13) does not depend on the trigger and target being syllable adjacent, like SL, the alternation depends on foot structure. From the data considered in §5.3 there is no evidence of foot structure in Labrador Inuttut. Intensity is unsystematic and syllable rhymes are roughly equal in terms of duration: either short or long, except phrase finally, where they can be overlong. These facts are reminiscent of syllable-timed languages described in Abercrombie (1967), Ladefoged (1975), Roach (1982), Kager (1993, 1995), Ramus, Nespor & Mehler. (1999) and Mehler, Nespor & Shukla (2011).

This current study therefore contributes some insight into the possibility that Labrador Inuttut is syllable-timed. I recognize however that the exact nature of syllable-timing remains an unresolved question in the literature and suggest that a specific study of rhythm in Labrador Inuttut is required before any final conclusions can be made.

5.5 Summary

Overall, the results show that SL is both phonetically and phonologically exceptionless in Labrador Inuttut spontaneous speech and that on average underlying geminates, the segmental units at the centre of this phenomenon, are 2.1 times longer than the segments they degeminate. The rule is not affected by phonemic vowel length contrasts nor does it co-vary with any regular pattern involving syllable duration, intensity or pitch. The data considered here further show that MST does not describe the metrical system in Labrador Inuttut which must, therefore, be a non-stress language — and possibly syllable-timed. This position is consistent with the acoustic evidence accumulated by this study which shows remarkable similarities in the duration assigned to short and long syllables, while a third category, overlong, is needed to describe the phonetic realizations of the syllable preceding a prosodic boundary.

6 Conclusion

The current work highlights the virtually exceptionless nature of Schneider's Law, based on primary corpus data from Labrador Inuttut language consultants. Linguistic interviews were conducted with more than thirty speakers across four Inuit communities. Analysis of the resulting data shows Schneider's Law to be exceptionless in hundreds of examples. Even the unexpected inter-speaker variations described in §5.1.2 for the '3s' and 'to be' morphemes never result in a violation of this process. It can therefore be said of Schneider's Law that morphology is only relevant insofar as it provides syllable-adjacent underlying geminates, the structural manifestation that triggers application of the rule.

Schneider's Law is indeed of typological interest as a rule that applies exclusively to coda consonants, irrespective of the length of the vowels preceding these consonants: the operation behaves exactly the same in syllables with short or long vowels. The fact that the output of Schneider's Law affects only coda consonants led to its first description in the literature (Schneider 1966) as a syllable sequencing rule involving CVC, a view disputed by Dresher & Johns (1995). This thesis contributes to the debate by showing acoustic evidence from current Labrador Inuttut speech samples where syllable weight is not only independent from Schneider's Law, but also plays no systematic role in the assignment of intensity or pitch. The assignment of duration, meanwhile, is blind to the segmental makeup of the syllable since V, CV and CVC are short while V:, CV: and CV:C are long. This contrasts typologically with a language like Latin, where Hayes (1995:51) shows that long-vowelled and closed syllables count as heavy. Labrador Inuttut is consistent with the other class of languages under Metrical Stress Theory, exemplified by St. Lawrence Island Yupik, where Hayes (1995:51) shows that the division between heavy and light is based on long-vowelled versus short-voweled syllables.

However, unlike St. Lawrence Island Yupik, the data considered in this thesis clearly suggest that Labrador Inuttut is not a stress-timed language. Intensity prominence does not pattern with vowel length and is predominantly non-contrastive or unsystematic.[1] At the same time, pitch is shown to function as a cue to prosodic boundaries. In terms of duration, this thesis shows that phonemically long consonants are generally more than twice as long as their phonemically short counterparts. Simultaneously, the output of Schneider's Law causes geminate shortening, with geminates shown in the data considered here to be at very minimum 1.2 times longer than their degeminated counterparts. We can also see in this thesis that this phonological operation is independent from the other durational pattern observed in Labrador Inuttut: Final-syllable Strengthening. This rule applies exclusively to the final syllable of a phrase or utterance. It is observed here to output HL or HLH boundary melodies which can covary with either short syllables or lengthened long or overlong syllables.[2] As well, there is evidence that, without exception for dozens of examples, plosive consonants arising in the coda position of phrase-final syllables are aspirated, a phenomenon not previously mentioned in the literature on Labrador Inuttut. The fact that CV:C syllables are preserved in the context of Final-syllable Strengthening, even when preceded by a CVC

1 While allowing for the possibility that intensity prominence may be used by some speakers for emphasis.

2 With overlong syllables denoting an interrogative form where the information is not known to the speaker.

or CV:C syllable, in other words a Schneider's Law trigger, is further evidence that this process is not sensitive to syllable weight. Emphatically, Schneider's Law effectively eliminates syllable-adjacent underlying geminates, and nothing more.

For each phonetic correlate of stress examined, prominence is either clearly irrelevant or, at best, unsystematic. Labrador Inuttut prosodic phonology differs from that described for St. Lawrence Yupik. More generally, the unsystematic nature of the correlates of syllable prominence reported in the previous chapters makes this system incompatible with any of the stress-timed languages predicted within Metrical Stress Theory. It seems, then, that the language must be syllable-timed, implying an evolution of Labrador Inuttut to its current free or unsystematic stress system from the bounded, rhythmic stress systems found in the more conservative Yupik languages of the Eskimo-Aleut language family. Recent diachronic research suggests that Schneider's Law, found in just three of the Inuit languages, is in fact the remnant of a lost metrical system (see Rose, Pigott & Wharram 201~~1~~2).

From a formal perspective, this work provides systematic acoustic evidence in support of Schneider's Law as it is described in the literature on theoretical phonology by Schneider (1966), Collis (1970), Rischel (1974), Smith (1975, 1977a, 1977b, 1978), Dorais (1976, 1990b), Dorais & Lowe (1982), Fortescue (1983), Lowe (1984), Massenet (1986), Dresher & Johns (1995, 1996) and Jacobsen (2000). More generally, this thesis offers a contribution to the understanding of non-stress-timed languages. Among other matters, the overwhelming acoustic evidence accumulated by this study points to non-trivial similarities in the durational range of short and long syllables. In turn, these findings highlight the relative gradation in the duration of each syllable type, as well as contextual patterns — for example, the overlong duration of syllables observed at phrase and utterance boundaries. Such characteristics are also consistent with the description of syllable-timed languages in Abercrombie (1967), Ladefoged (1975), Roach (1982), Kager (1993, 1995), Ramus, Nespor & Mehler (1999) and Mehler, Nespor, Shukla & (2011). Overall, this thesis offers a stepping stone for further investigation of the prosodic typologies of languages like Labrador Inuttut which, despite showing distinctions at the level of vowel or consonant length (lexical contrasts) and having a prohibition on the occurrence of underlying geminates in adjacent syllables, fails to show any conditioning at the metrical level.

In sum, this thesis bridges phonetic and phonological lines of investigation and offers a number of benchmarks for future investigations of the syllable and higher levels of prosodic organization across languages both within the Eskimo-Aleut language family and beyond.

Bibliography and references

Abercrombie, David. 1967. *Elements of general phonetics*. Edinburgh: Edinburgh University Press.

Alderete, John. 1997. Dissimilation as local conjunction. *Proceedings of the 27th annual meeting of the North East Linguistic Society.* 17–32. Amherst, MA: GLSA Publications.

AnderBois, Scott. 20089. Strong positions and laryngeal features in Yucatek Maya. *Proceedings of the 39th annual meeting of the North East Linguistic Society*. Amherst, MA: GLSA Publications.

Andersen, August, William Kalleo & Beatrice Watts. 2007. *Labradorimi ulinnaisigutet: An Inuktitut-English dictionary of the northern Labrador dialect*. Nain, NL: Torngâsok Cultural Centre.

Berinstein, Ava. 1979. A cross-linguistic study on the perception and production of stress. *UCLA working papers in phonetics* 47. 1-59.

Bjørnum, Stig. 2003. *Grønlandsk grammatik*. Nuuk: Forlaget Atuagkat.

Bobaljik, Jonathan David. 1996. Assimilation in the Inuit languages and the place of the uvular nasal. *International journal of American linguistics* 62(4). 323-350.

Bourquin, Theodor. 1891. *Grammatik der Eskimo-sprache*. London: Moravian mission agency.

Bye, Patrik. 2011. Dissimilation. In Oostendrop, M. van, C. Ewen, E. Hume & K. Rice (eds.), *The Blackwell Companion to Phonology Vol.* 2. 1285-1308. Oxford: Wiley-Blackwell.

Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English.* Cambridge, MA: MIT Press.

Clements, George N. & Samuel Keyser. 1983. *CV phonology: A generative theory of the syllable.* Cambridge, MA: MIT Press.

Collis, Dirmid. 1970. Études philologiques et linguistiques des languages Esquimaux. *Inter nord Vol.* 11. 263-282.

Creider, Chet. 1981. Place of articulation assimilation and the Inuktitut dialect continuum. *Études/Inuit/Studies* 5(supplement). 91-100.

Dorais, Louis-Jacques. 1976. Some phonological characteristics of eastern Canadian Inuit. *Anthropological linguistics* 18(8). 387-92.

Dorais, Louis-Jacques. 1977a. Les dialectes Inuit de l'arctique oriental Canadien: Une comparison phonologique. *Études/Inuit/studies* 1(2). 47-56.

Dorais, Louis-Jacques. 1977b. Les parler Inuit de Rigolet (Labrador). *Études/Inuit/studies* 1(2). 113-117.

Dorais, Louis-Jacques. 1990a. *Inuit uqausingit 1,000 mots Inuit.* Kuujjuak, QC: Association Inuuksiutiit Katimajiit.

Dorais, Louis-Jacques. 1990b. *Inuit uqausiqatigiit: Inuit languages and dialects.* Kuujjuak, QC: Association Inuuksiutiit Katimajiit.

Dorais, Louis-Jacques. 2003. *Inuit Uqausiqatigiit: Inuit languages and dialects, 2nd edition.* Iqaluit, NU: Nunavut Arctic College.

Dorais, Louis-Jacques & Ronald Lowe. 1982. Les dialectes de l'arctique de l'ouest. *Études/Inuit/studies* 6(2). 127-33.

Dresher, Elan & Alana Johns 1990. The law of double consonants in Inuktitut. Paper presented at the 35th annual meeting of the Canadian Linguistics Association, Victoria, B.C.

Dresher, Elan & Alana Johns. 1995. The law of double consonants in Inuktitut. *Linguistica Atlantica Vol.* 17. 79-95.

Dresher, Elan & Alana Johns. 1996. Rigolet and phonological change in Labrador. *Études/Inuit/studies* 20(1). 113-121.

Egede, Hans. 1925. Relationer fra Grønland 1721-36 & Det gamle Grølands ny perlustration 1741. In Bobé, L. (ed.), *Meddelelser om Grønland* 54. 1-304 & 305-404. Copenhagen: Bianco Luno.

Egede, Poul. 1760. *Dictionarium Grønlandica Danico-Latinum*. Havniæ.

Erdmann, Friedrich. 1864. *Eskimoisches wörterbuch gesammelt von missionaren in Labrador*. Bautzen: Ernst Moritz Monse.

Fortescue, Michael. 1983. A comparative manual of affixes for the Inuit dialects of Greenland, Canada and Alaska. *Meddelelser om Grønland* 229. Copenhagen: Nyt Nordisk Forlag.

Fry, Dennis B. 1958. Experiments in the perception of stress. *Language and speech* 1(2). 126-152.

Geytenbeek, Brian B. & Helen Geytenbeek. 1971. *Gidabal grammar and dictionary*. Canberra, ACT: Australian Institute of Aboriginal Studies.

Gragg, Gene. 1976. Oromo of Wellegga. In Bender, M. L. (ed.), *The non-Semitic languages of Ethiopia.* 166-195. East Lansing, MI: Michigan State University Press.

Gussenhoven, Carlos. 2000. The boundary tones are coming: On the non-peripheral realization of boundary tones. In Broe, M. & J. Pierrehumbert (eds.), *Papers in laboratory phonology acquisition and the lexicon*. 132-152. Cambridge: Cambridge University Press.

Goldsmith, John. 1975. Tone melodies and the autosegment. In Herbert, R. (ed.), *Conference on African Linguistics.* 135-147. Columbus, OH: Ohio State University.

Goldsmith, John. 1976. *Autosegmental phonology*. Cambridge, MA: MIT doctoral dissertation.

Hagerup, Asger. 2011. *A phonological analysis of vowel allophony in West Greenlandic*. Bergen, Norway: Norwegian University of Science and Technology MA thesis.

Harris, John. 1994. *English sound structure*. Cambridge, MA: Blackwell.

Hayes, Bruce. 1985. Iambic and trochaic rhythm in stress rules. *Proceedings of the 11th Annual Meeting of the Berkeley Linguistics Society.* 429-446. Berkeley, CA: La Revue de Sommaires.

Hayes, Bruce. 1987 A revised parametric metrical theory. *Proceedings of the 17th annual meeting of the North East Linguistic Society*. 274-289. Amherst, MA: GLSA Publications.

Hayes, Bruce. 1989. Compensatory lengthening in moraic phonology. *Linguistic inquiry* 20(2). 253-306.

Hayes, Bruce. 1995. *Metrical stress theory: Principles and case studies*. Chicago, IL: UCP.

Iverson, Gregory, & Joseph C. Salmons. 1995. Aspiration and laryngeal representation in Germanic. *Phonology* 12(3). 369-96.

Itô, Junko. 1989. A prosodic theory of epenthesis. *Natural language & linguistic theory* 7(2). 217-259.

Itô, Junko & Armin Mester. 1998. *Markedness and word structure: OCP effects in Japanese*. University of California manuscript.

Iwai, Melissa. 1989. *A Prosodic analysis of Japanese loanwords*. Santa Cruz, CA: University of California BA thesis.

Jacobsen, Birgitte. 2000. *The question of 'stress' in West Greenlandic: An acoustic investigation of rhythmicization, intonation, and syllable weight*. Basel: S. Karger AG.

Jeddore, Rose. 1976. *Labrador Inuit uKauset katitsutauppaliningit*. St. John's, NL: Labrador Inuit Committee on Literacy.

Kager, René. 1993. Alternatives to the iambic-trochaic law. *Natural language & linguistic theory* 11(3). 381-432.

Kager, René. 1995. Review of metrical stress theory: Principles and case studies. *Phonology* 12(3). 437-464.

Kahn, Daniel. 1976. *Syllable-based generalizations in English phonology*. Bloomington, IN: Indiana University Linguistics Club.

Kaplan, Lawrence. 1979. *Phonological issues in North Alaskan Inupiaq*. San Diego, CA: University of California San Diego doctoral dissertation.

Kaye, Johnathan. 1990. Coda licensing. *Phonology* 7. 301-330.

Kenstowicz, Michael J. & Charles Kisseberth. 1977. *Topics in phonological theory.* New York, NY: Academic Press.

Kenstowicz, Michael J. & Charles Kisseberth. 1979. *Generative phonology: Description and theory.* New York, NY: Academic Press.

Keyser, Samuel & Paul Kiparsky. 1984. Syllable structure in Finnish phonology. In Aronoff, M. & R. Oehrle (eds.), *Language sound structure*. 234-244. Cambridge, MA: MIT Press.

Kleinschmidt, Samuel. 1851. *Grammatik der Grönländischen sprache mit teilweisem einschluss des Labradordialekts*. Hildesheim: Olms.

Kleinschmidt, Samuel & Theodor Bourquin 1881. *The letters of Samuel P. Kleinschmidt to Theodor Bourquin, August 1865-May 1881*. In Schloss, B. (trans.) of Holtved, E. (ed.), *Kleischmidts briefe an Theodor Bourquin.* Copenhagen: C. A. Reitzels.

Krupnik, Igor & Winton Weyapuk, Jr. 2010. Qanuq ilitaavut, how we learned what we know: Wales Inupiaq sea ice dictionary. In Krupnik, I., C. Aporta, S. Gearheard, G. Laidler & L. Kielsen Holm (eds.), *SIKU: Documenting Inuit sea ice knowledge and use.* 321-354. Dordrecht: Springer.

Ladefoged, Peter. 1975. *A course in phonetics*. New York: Harcourt Brace Jovanovich.

Leumann, Manu. 1977. *Lateinische grammatik von Leumann-Hofmann-Szantyr Vol.* 1. Lateinische Laut- und Pormenlehre. Munich: Beck.

Lieberman, Mark & Alan Prince. 1977. On stress and linguistic rhythm. *Linguistic inquiry* 8(2). 249-336.

Lloret, Maria-Rosa. 1988. Gemination and vowel length in Oromo morphophonology. Indiana, IN: Indiana University doctoral dissertation.

Lowe, Ronald. 1984. *Basic Siglit Inuvialuit Eskimo dictionary*. Inuvik, QC: Association Inuksuit Katimajiit Inc.

Lowe, Ronald. 1985. *Basic Siglit Inuvialuit Eskimo grammar*. Inuvik, QC: Association Inuksuit Katimajiit Inc.

Mase, Hideo. & Jørgen Richel. 1971. A study of consonant quantity in West Greenlandic. *University of Copenhagen 5th annual report of the institute of phonetics*. 175-247.

Mase, Hideo. 1973. A study of the role of syllable and mora for the tonal manifestation in West Greenlandic. *University of Copenhagen 7th annual report of the institute of phonetics*. 1-98.

Massenet, Jean-Marie. 1980. Notes sur l'intonation finale en Inuktitut. *Cahiers de linguistique* 10. 195-214.

Massenet, Jean-Marie. 1986. *Études phonologiques d'un dialecte Inuit Canadien*. Inuvik, QC: Association Inuksuit Katimajiit Inc.

Mehler, Jaques, Marina Nespor and Mohinish Shukla. 2011. Stress-timed and syllable-timed languages. In Oostendorp, M. van, C. J. Ewen, E. Hume & K. Rice (eds.), *The Blackwell companion to phonology*. 1147-1159. Hoboken, NJ: Wiley-Blackwell.

McCarthy, John & Alan Prince. 1986. *Prosodic morphology*. University of Massachusetts and Brandeis University manuscript.

Nagano-Madsen, Yasuko. 1988. Phonetic reality of the mora in West Greenlandic Eskimo. *Lund University working papers* 34. 79-82.

Nagano-Madsen, Yasuko. 1990. Quantity manifestation and mora in West Greenlandic Eskimo: Preliminary analysis. *Lund University working papers* 36. 123-132.

Nagano-Madsen, Yasuko. 1993. Phrase-final intonation in West Greenlandic Eskimo. *Lund University working papers* 40. 145-155.

Nagano-Madsen, Yasuko. 1994. *Mora and prosodic coordination: A phonetic study of Japanese, Eskimo and Yoruba*. Lund: Lund University Press.

Nagano-Madsen, Yasuko & Anne-Christine Bredvad-Jensen. 1995. Analysis of intonational phrasing in West Greenlandic Eskimo reading text. *Lund University working papers* 44. 129-144.

Nespor, Marina & Irene Vogel. 1986. *Prosodic phonology*. Dordrecht: Foris.

Ramus, Franck, Marina Nespor & Jacques Mehler. 1999. Correlates of linguistic rhythm in the speech signal. *Cognition* 73(3). 265–292.

Rasmussen, Jens. 1979. *Anaptyxis, gemination and syncope in Eskimo, a diachronic study*. Copenhagen: The linguistic circle of Copenhagen.

Reuse, Willem de. 1994. *Siberian Yupik Eskimo: The language and its contacts with Chukchi*. Salt Lake City, UT: University of Utah Press.

Rischel, Jørgen. 1974. *Topics in West Greenlandic phonology*. Copenhagen: Akademisk Forlag.

Roach, Peter. 1982. On the distinction between 'stress-timed' and 'syllable-timed' languages. In Crystal, D. (ed.), *Linguistic controversies.* 73-79. London: Edward Arnold.

Piggott, Glyne. 1998. Foot form and the parsing of weightless syllables. In Gruber, M., D. Higgins, K. Olson & T. Wysocki, (eds.). *Papers from the 34th regional meeting of the Chicago Linguistic Society.* 315-332. Chicago, IL: Chicago Linguistics Society.

Prince, Alan. 1984. Phonology with tiers. In Aronoff, M. & R. Oehrle (eds.), *Language sound structure.* 234-244. Cambridge, MA: MIT Press.

Pyle, Charles. 1970. West Greenlandic Eskimo and the representation of vowel length. *Papers in Linguistics* 3(1). 115-146.

Rose, Yvan, Paul Pigott, & Douglas Wharram. 2012. Schneider's Law revisited: The syllable-level remnant of an older metrical rule. In McKillen, A. & J. Loughran (eds.), *Proceedings from phonology in the 21st Century: In honour of Glyne Piggott.* Montréal, QC: McGill working papers in linguistics 22(1), Winter 2012. 12 pages.

Rubach, Jerzy. 1993. *The lexical phonology of Slovak*. Oxford: Clarendon Press.

Schneider, Lucien. 1966. *Grammarian Esquimaude du sous-dialecte de l'Ungava.* Quebec, QC: Ministère des Richesses Naturelles.

Schneider, Lucien. 1972. *Inuktituorutit: Grammaire purement Esquimaude.* Quebec, QC: Ministère des Richesses Naturelles.

Schneider, Lucien. 1985 *Ulirnaisigutiit/An Inuktitut-English dictionary of northern Quebec, Labrador and eastern Arctic Dialects*. Quebec, QC: Presses de l'Université Laval. (Originally published in French in 1970).

Selkirk, Elizabeth. 1980. On prosodic structure and its relation to syntactic structure. Bloomington, IN: Indiana University Linguistics Club.

Sihler, Andrew L. 1995. *New comparative grammar of Greek and Latin*. Oxford: Oxford University Press.

Smith, Lawrence. 1975. Labrador Inuttut surface phonology. *International journal of American linguistics* 41(2). 97-105.

Smith, Lawrence. 1977a. Some morphophonemic processes of Labrador Inuktitut affixation. *International journal of American linguistics* 43(2). 77-84.

Smith, Lawrence. 1977b. *Some grammatical aspects of Labrador Inuttut (Eskimo): A survey of the inflectional paradigms of nouns and verbs*. Ottawa, ON: National Museum of Man mercury series.

Smith, Lawrence. 1978. *A survey of derivational post bases of Labrador Inuttut (Eskimo)*. Ottawa, ON: National Museum of Man mercury series.

Smith, Lawrence. 1979. Some recent phonological and orthographic changes in Labrador Inuttut. In Basse, B. & K. Jensen (eds.), *Symposium on majority language influence on Eskimo minority languages.* 108-111. Aarhus: Aarhus University.

Suzuki, Keiichiro. 1998. A typological investigation of dissimilation. Tuscon, AZ: University of Arizona doctoral dissertation.

Tranel, Bernard. 1991. CVC light syllables, geminates and moraic theory. *Phonology* 8(2). 291-302.

Ulving, Tor. 1953. Consonant gradation in Eskimo. *International journal of American linguistics* 19(1). 45-52.

Wade, Juliette. 1996. *An examination of word borrowings into Japanese*. Santa Cruz, CA: University of California MAf thesis.

Willis, Anne-Marie. 1971. *Some phonological problems of an Eskimo dialect of the Ungava region*. Ottawa, ON: University of Ottawa MA thesis.

Windsor, Joseph & Cobler, Jessi. 2013. A unified analysis of three phrase-final phenomena in Blackfoot. *Poster presentation at the 58th Annual meeting of the Canadian Linguistics Association*, Victoria, B.C.

Woodrow, Herbert. 1951. Time perception. In Stevens, S. S. (ed.), *Handbook of experimental psychology*. 1224-1236. New York: Wiley.

APPENDIX A: Linguistic interview

A: Introductory questions

1. kinauven? / What is your name?
2. Katsinik jariKaven? / How old are you?
3. Nanemiunguven? / Where are you from?
4. Anânait, atâtaitilu, nanemiunguvâng? / Where are you mother and father from?
5. Nane angiKait mânna? Piujong? / Where are you living now? Is is good?
6. sunauna nigikKauven ullumi? / What have you eaten today?
7. PinasualautsimalaukKen puijet? / Have you ever hunted seals before?
8. UKâlautiKalaulaget Kanong tuKilaukKân puijet sivullipâk. / Tell the story about how you killed your first seal.

B: Introductory reading task

Have the language consultant read Beatrice Watt's Inuttut introduction to the 2006 dictionary.

C: Phonemic pair reading task

1. Tânna aggak piujuk
2. Angutik ipiunnguangittuk ullumi
3. Angutik tutonnguangittuk ullumi
4. Maggonik anâk piujok
5. Angutik ikittonguanngituk ullumi
6. Angutik taKaunnguangittuk ullumi
7. Angutik pisiunnguangittuk ullumi
8. Angutik niliunnguangittuk ullumi
9. Tânna itivinik piujuk
10. Angutik inngitiunnguangittuk ullumi
11. Angutik tingijonnguanianngituk ullumi
12. Tânna anak piujuk
13. Angutik aggaunguajuk ullumi

14. Angutik ikketujonnguangittuk ullumi
15. Angutik aggaunguangituk ullumi
16. Angutik kiviniunnguangittuk ullumi 1
7. Angutik iginaunnguangittuk ullumi
18. Angutik imennguangittuk ullumi
19. Angutik tingijonnguangittuk ullumi
20. Angutik ijiunnguangittuk ullumi
21. Angutik alaunnguangittuk ullumi
22. Angutik ippiunguanngituk ullumi
23. Angutik tuttonguanngituk ullumi
24. Angutik KakKanguanngituk ullumi
25. Angutik pitsiunguanngituk ullumi
26. Angutik nilliunguanngituk ullumi
27. Angutik annaunguanngituk ullumi
28. Angutik mipviunguanngituk ullumi
29. Angutik aKiggiunguanngituk ullumi
30. Angutik Kimmiunguanngituk ullumi
31. Angutik itjiliunnguangittuk ullumi
32. Angutik atlaunguanngituk ullumi
33. Angutik anânnguangittuk ullumi
34. Angutik ânânnguangittuk ullumi
35. Angutik innenguanngituk ullumi
36. Angutik itennguangittuk ullumi
37. Angutik ullonguanngituk ullumi
38. Angutik ojonnguangittuk ullumi
39. Maggonik ânâk piujok
40. Tânna enniuvinik piujuk
41. Angutik anaunnguajuk ullumi
42. Angutik ojonnguanianngituk ullumi
43. Angutik anaunguanngituk ullumi

44. Tânna innik piujuk
45. Angutik aggaunguanianngituk ullumi
46. Angutik ullonguanianngituk ullumi
47. Tânna ikketujovinik piujuk
48. Angutik ujugonnguajuk ullumi
49. Angutik inniunguajuk ullumi
50. Angutik inniunguanngituk ullumi
51. Angutik anaunnguanianngituk ullumi
52. Tânna ikik piujuk
53. Angutik ullonguajuk ullumi
54. Angutik aggânguanngituk ullumi
55. Maggonik innek piujok
56. Angutik iginaunnguajuk ullumi
57. Tânna ulluk piujuk
58. Angutik ikkiunguanngituk ullumi
59. Tânna ujuguk piujuk
60. Angutik ullonguanngituk ullumi
61. Tânna aggâk piujuk
62. Angutik inniunguanianngituk ullumi
63. Angutik ikkiunguanianngituk ullumi
64. Angutik ullonguanianngituk ullumi
65. Angutik ujugonnguanianngituk ullumi
66. Angutik aggânguanianngituk ullumi
67. Tânna ânak piujuk
68. Angutik enniunguanianngituk ullumi
69. Angutik ikketujonnguanianngituk ullumi
70. Angutik ullonguanianngituk ullumi
71. Angutik ojunnguanianngituk ullumi
72. Tânna ennik piujuk
73. Angutik imiunnguanianngituk ullumi

74. Angutik ijiunnguanianngituk ullumi
75. Angutik alaunnguanianngituk ullumi
76. Angutik ippiunguanianngituk ullumi
77. Taitsumani tutunnguaKâlluni Nainimelauttuk
78. Angutik tuttonguanianngituk ullumi
79. Angutik KakKaunguanianngituk ullumi
80. Angutik pitsiunguanianngituk ullumi
81. Tânna ikketujok piujuk
82. Tânna ullok piujuk
83. Angutik ikkinguajuk ullumi
84. Tânna ojuk piujuk 85.Tânna itik piujuk
86. Angutik aggânguajuk ullumi
87. Tânna ipik piujuk 88. Tânna ikittut piujuk
89. Angutik ujugunnguangittuk ullumi
90. Angutik enniunguanngituk ullumi
91. Tânna tutuk piujuk
92. Angutik ullonguanngituk ullumi
93. Angutik ojonnguangittuk ullumi
94. Tânna taKak piujuk
95. Angutik ikketujonnguajuk ullumi
96. Tânna pisik piujuk
97. Angutik nilliunguanianngituk ullumi
98. Angutik annaunguanianngituk ullumi
99. Angutik mipviunguanianngituk ullumi
100. Angutik aKiggiunguanianngituk ullumi
101. Angutik Kimmiunguanianngituk ullumi
102. Angutik inngitinnguanianngituk ullumi
103. Angutik itjiliunnguanianngituk ullumi
104. Angutik atlaunguanianngituk ullumi
105. Taitsumani ikketujonnguaKâlluni Nainimelauttuk

106. Angutik anânnguanianngituk ullumi
107. Angutik ânânnguanianngituk ullumi
108. Angutik innenguanianngituk ullumi
109. Angutik itennguanianngituk ullumi
110. Tânna nilik piujuk
111. Angutik enniunguajuk ullumi
112. Tânna kivinik piujuk
113. Angutik ullonguajuk ullumi
114. Tânna iginak piujuk
115. Angutik ojunnguajuk ullumi
116. Tânna imik piujuk
117. Angutik ipiunnguanianngituk ullumi
118. Angutik tutonnguanianngituk ullumi
119. Angutik ikittonguanianngituk ullumi
120. Angutik ippiunguajuk ullumi
121. Maggonik itek piujok
122. Angutik taKaunnguanianngituk ullumi
123. Angutik pisiunnguanianngituk ullumi
124. Angutik niliunnguanianngituk ullumi
125. Angutik kiviniunnguanianngituk ullumi
126. Angutik iginaunnguanianngituk ullumi
127. Tânna tingijok piujuk
128. Angutik mipviunguajuk ullumi
129. Tânna ijik piujuk
130. Angutik annaunguajuk ullumi
131. Tânna alak piujuk
132. Angutik nillinguajuk ullumi
133. Angutik aggaunguakKaungittuk ullumi
134. Angutik ananngua Kaunngituk ullumi
135. Angutik inninguakKaungittuk ullumi

136. Angutik ikkinguakKaungittuk ullumi
137. Angutik ullunguakKaungittuk ullumi
138. Angutik ujugonnguaKaunngituk ullumi
139. Angutik aggânguakKaungittuk ullumi
140. Angutik enniunguakKaungittuk
141. Angutik ikketujonnguaKaunngituk ullumi
142. Taitsumani annanguakKâluni Nainimelauttuk
143. Angutik ullonguakKaungittuk ullumi
144. Angutik ojonnguaKaunngituk ullumi
145. Angutik ipiunnguaKaunngituk ullumi
146. Angutik tutonnguaKaunngituk ullumi
147. Angutik ikittonguakKaungittuk ullumi
148. Angutik taKaunnguaKaunngituk ullumi
149. Angutik pisiunnguaKaunngituk ullumi
150. Angutik niliunnguaKaunngituk ullumi
151. Taitsumani nanunnguaKâlluni Nainimelauttuk
152. Angutik kiviniunnguaKaunngituk ullumi
153. Angutik iginaunnguaKaunngituk ullumi
154. Angutik imiunnguaKaunngituk ullumi
155. Angutik tingijonnguaKaunngituk ullumi
156. Taitsumani enninguakKâluni Nainimelauttuk
157. Angutik ijiunnguaKaunngituk ullumi
158. Angutik alaunnguaKaunngituk ullumi
159. Angutik ippiunguakKaungittuk ullumi
160. Angutik tuttonguakKaungittuk ullumi
161. Angutik KakKaunguakKaungittuk ullumi
162. Angutik pitsiunguakKaungittuk ullumi
163. Angutik nilliunguakKaungittuk ullumi
164. Angutik annaunguaKaunngituk ullumi
165. Angutik mipviunguakKaungittuk ullumi

166. Angutik aKiggiunguakKaungittuk ullumi
167. Taitsumani nillinguakKâluni Nainimelauttuk
168. Angutik KimmiunguakKaungittuk ullumi
169. Angutik inngitiunnguaKaunngituk ullumi
170. Angutik itjiliunnguaKaunngituk ullumi
171. Angutik atlaunguakKaungittuk ullumi
172. Angutik anânnguaKaunngituk ullumi
173. Angutik ânânnguaKaunngituk ullumi
174. Angutik innenguakKaungittuk ullumi
175. Angutik itennguaKaunngituk ullumi
176. Angutik ullonguakKaungittuk ullumi
177. Angutik ojonnguaKaunngituk ullumi
178. Tânna ippik piujuk
179. Angutik aKiggiunguajuk ullumi
180. Angutik inngitinnguajuk ullumi
181. Tânna tuttuk piujuk
182. Angutik alaunnguajuk ullumi
183. Tânna ikkik piujuk
184. Angutik tuttonguajuk ullumi
185. Angutik ijiunnguajuk ullumi
186. Maggonik ullok piujok
187. Angutik KakKaunguajuk ullumi
188. Angutik tingijonnguajuk ullumi
189. Tânna KakKak piujuk
190. Angutik ipiunnguajuk ullumi
191. Tânna pitsik piujuk
192. Angutik tutonnguajuk ullumi
193. Tânna nillik piujuk
194. Angutik imiunnguajuk ullumi
195. Tânna annak piujuk

196. Angutik ullonguajok ullumi
197. Tânna mipvik piujuk
198. Angutik ikittonguajuk ullumi
199. Tânna aKiggik piujuk
200. Angutik taKaunnguajuk ullumi
201. Tânna Kimmik piujuk
202. Angutik pisiunnguajuk ullumi
203. Tânna inngitit piujuk
204. Angutik pitsiunguajuk ullumi
205. Maggonik ojok piujok
206. Angutik Kimmiunguajuk ullumi
207. Tânna itjilik piujuk
208. Angutik niliunnguajuk ullumi
209. Angutik itennguajuk ullumi
210. Tânna atlak piujuk
211. Angutik kiviniunnguajuk ullumi
212. Tânna ojuvinik piujuk
213. Angutik itjiliunnguajuk ullumi
214. Tânna tuttuvinik piujuk
215. Angutik atlaunguajuk ullumi
216. Tânna nillivinik piujuk
217. Angutik anânnguajuk ullumi
218. Tânna aKiggivinik piujuk
219. Angutik ânânnguajuk ullumi
220. Tânna Kimmivinik piujuk
221. Angutik innenguajuk ullumi
222. Tânna atlavinik piujuk
223. Angutik ojonnguajuk ullumi

D: tutuk/tuttuk alternation task. Through translator, ask the language consultant to use these words in a conversational sentence, without showing them the words or using the following constructions:

224. Tuttonguanianngituk

225. Tutonnguanianngituk

226. TuttonguakKaungittuk

227. TutonnguaKaunngituk

E: Story telling. Ask the following questions through translator:

1. What do you remember about the time Gus Bennett, Martin Sillit and Paul Semigak died caribou hunting in that blizzard of 1979 and what do you think happened?

2. What changes have you notice in the weather since the 1979, and what about since you were young?

3. What is different about the ice conditions? What changes have you seen?

4. What are some of the words your Grandparents used that you don't hear often today?

APPENDIX B: Ethical Approval

Certification of Informed Consent (as approved by ICEHR) July 28, 2009

ICEHR No. 2008/09-072-AR

Mr. Paul Pigott

Department of Linguistics

Memorial University of Newfoundland

Dear Mr. Pigott:

Thank you for your correspondence of April 14, 2009, addressing the issues raised by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) concerning your research proposal "Inuttut ice topology".

We are happy to confirm our earlier approval of your proposal. If you intend to make changes during the course of the project which may give rise to ethical concerns, please forward a description of these changes to the ICEHR Co-ordinator, Mrs. Eleanor Butler, at ebutler@mun.ca for the Committee's consideration.

The Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (TCPS) requires that you submit an annual status report on your project to ICEHR, should the research carry on beyond March 2010. Also, to comply with the TCPS, please notify us when research on this project concludes.

We wish you success with your research.

Yours sincerely,

Lawrence F. Felt, PhD

Chair, Interdisciplinary Committee on Ethics in Human Research

LF/bl

APPENDIX C: The phonemic pair /tutuk/ 'messy hair' versus /tuttuk/ 'caribou'

Derivational ordering (see Dresher & Johns 1995:83)

Truncation = stem-final consonants are deleted before suffixation

RPA = regressive place assimilation

SL = applies after Truncation and Assimilation cycles

Affrication = voiceless spirant geminates are affricated /χχ/ → [qχ], /ss/ → [ts], /ll/ → [tl], /jj/ → [dž]

Light grey = analyzed as an underlying geminate, or SL trigger

Dark grey = analyzed as an underlying geminate targeted by SL

ms = segmental duration values averaged to the nearest 0.001 second

0.97s = measurement of the sequence /tutu:ŋŋuaχauŋŋitu-/ = peak ω intensity

^{h} = phrase/utterance-final aspiration

(1)		(2)
/tutu(k) + u + ŋŋua + χχau + ŋŋi(k) + tuk/	UR	/tuttu(k) + u + ŋŋua + χχau + ŋŋi(k) + tuk/
messy hair.to be.pretend.near past.negative.3s	Gloss	caribou.to be.pretend.near past.negative.3s
tutu:ŋŋuaχχauŋŋiktuk	Truncation	tuttu:ŋŋuaχχauŋŋiktuk
tutu:ŋŋuaχχauŋŋittuk	RPA	tuttu:ŋŋuaχχauŋŋittuk
tutu:ŋŋuaχauŋŋituk	SL	tuttu:ŋuaχχauŋittuk
—	Affrication	tuttu:ŋuaqχauŋittuk
[tutu:ŋŋuaχauŋŋituk]	SR	[tuttu:ŋuaqχauŋittuk]

Position / Surface

	Key:							Sequence Segment					Final seg
	SL trigger					SL target		Segment duration					Duration
						Geminate shortening ratio							Seq dur
a.	t	u	t	uː	ŋŋ	ua	χ	ˈau	ŋ	i	tt	u	kʰ
	43	18	91	126	107	126	83	109	88	42	109	43	301ms TK
						1.3							0.97s
b.	t	u	t	uː	ŋŋ	ˈua	χ	au	ŋŋ	i	t	u	k
	28	61	67	111	108	124	91	98	121	78	81	95	76ms BH
						1.2		SL		1.5			1.07s
c.	t	u	t	u	ŋŋ	ua	χ	ˈau	ŋ	i	tt	u	k
	62	69	80	22	200	172	137	93	124	45	128	23	108ms MK
						1.5							1.16s
d.	t	u	t	uː	ŋŋ	ˈua	χ	au	ŋ	i	tt	u	kʰ
	26	37	126	120	180	186	90	124	127	34	121	28	302ms MH
						2							1.20s
e.	t	u	t	uː	ŋŋ	ˈua	χ	au	ŋ	i	tt	u	kʰ
	29	49	122	163	149	191	99	137	111	31	130	32	165ms MH
						1.5							1.27s
f.	t	u	t	uː	ŋŋ	ˈua	χ	au	ŋ	i	tt	u	tʰ
	44	128	61	153	150	166	124	184	57	82	117	60	263ms FW
						1.2							1.33s
g.	t	u	t	uː	ŋŋ	ua	χ	ˈau	ŋ	i	tt	u	kʰ
	37	147	47	149	165	240	72	148	87	46	249	137	50ms JD
						2.3							1.39s
h.	t	u	t	uː	ŋŋ	ˈua	χ	au	ŋ	i	tt	u	k
	54	122	59	138	173	168	118	153	91	52	240	88	111ms PA
						1.5							1.45s
Averages													
Segment	40		82		**154**		102		90		**147**		
Sequence													1.23 s
Ratios													
Gem Short						1.6				1.5			
C vs. CC	[t] avg = 82				[t]: [tt] = 1.9								
	[tt] avg = 156												

a.	t	u	tt	uː	ŋ	ua	qχ	ˈau	ŋ	i	tt	u	kʰ
	20	28	169	121	43	136	158	83	45	41	114	28	489ms
				3.9				3.5					0.96
b.	t	u	tt	u	ŋ	ua	χ	ˈau	ŋŋ	i	t	u	t
	36	93	139	49	65	237	103	85	143	44	109	31	60ms
				2.1						1.3			1.05
c.	t	u	tt	uː	ŋ	ˈua	χχ	au	ŋ	i	tt	u	k
	21	38	125	166	92	243	119	117	94	70	125	27	56ms
				1.4				1.3					1.19
d.	t	u	tt	u	ŋ	ˈua	χ	au	ŋ	iː	t	u	kʰ
	19	88	205	87	78	227	63	127	88	129	21	91	140ms
				2.6									1.22
e.	t	u	tt	u	ŋ	ˈua	qχ	au	ŋ	i	tt	u	kʰ
	47	101	140	101	88	180	120	98	45	74	191	100	153ms
				1.6				2.7					1.29
f.	t	u	tt	ˈuː	ŋ	ua	qχ	au	ŋ	i	t	u	kʰ
	64	50	258	190	96	158	210	174	54	103	88	34	380ms
				2.7				3.9					1.44
g.	t	u	tt	uː	ŋ	ˈua	qχ	au	ŋ	i	t	u	kʰ
	89	109	244	199	67	222	124	154	50	108	58	100	234ms
				3.6				2.5					1.53
h.	t	u	tt	ˈuː	ŋ	ua	qχ	au	ŋ	i	tt	u	
	17	76	415	205	151	251	270	246	115	98	366	61	205
				2.7				2.3					2.27
Segment	42		**212**		85		**146**		71		**134**		
Sequence													1.37
Gem Short				2.6				2.7			1.3		
C vs. CC			[t] avg = 69						[t]: [tt] = 3				
			[tt] avg = 208										
			[ŋ] avg = 77						[ŋ] : [ŋŋ]= 1.9				
			[ŋŋ]= 143										

(3)		(4)
/tutu(k) + u + ŋŋua + nia(χ) + ŋŋi(k) + tuk/	UR	/tuttu(k) + u + ŋŋua + nia(χ) + ŋŋi(k) + tuk/
messy hair.to be.pretend.near future.negative.3s	Gloss	caribou.to be.pretend.near future.negative.3s
tutu:ŋŋuaniaŋŋiktuk	Truncation	tuttu:ŋŋuaniaŋŋiktuk
tutu:ŋŋuaniaŋŋittuk	RPA	tuttu:ŋŋuaniaŋŋittuk
tutu:ŋŋuaniaŋŋituk	SL	tuttu:ŋuaniaŋŋituk
—	Affrication	—
[tutu:ŋŋuaniaŋŋituk]	SR	[tuttu:ŋuaniaŋŋituk]

(3) Surface

a.	t	u	t	ˈu:	ŋŋ	ua	n	ia	ŋ	i	t	u	k
	24	39	104	113	119	120	65	93	102	31	111	46	30ms TK
													0.97s
b.	t	u	t	u:	ŋŋ	ˈua	n	ia	ŋŋ	i	t	u	kʰ
	29	75	52	120	114	101	63	126	111	99	58	97	125ms BH
										1.9			1.05s
c.	t	u	t	ˈu	ŋŋ	ua	n	ia	ŋŋ	i	t	u	k
	28	83	84	78	195	153	90	120	136	50	106	39	25ms MH
										1.3			1.12s
d.	t	u	t	u	ŋŋ	ˈua	n	ia	ŋ	i	t	u	k
	26	89	113	96	171	154	90	123	117	38	120	33	368ms MH
													1.14s
e.	t	u	t	u	ŋŋ	ˈua	n	ia	ŋ	i	t	u	kʰ
	72	60	46	67	154	187	53	170	87	97	65	114	146ms PA
													1.17s
f.	t	u	t	u	ŋŋ	ˈua	n	ia	ŋŋ	i:	t	u	kʰ
	67	80	73	34	160	178	105	149	109	136	36	52	706ms MK
										3			1.19s
g.	t	u	t	u:	ŋŋ	ˈua	n	ia	ŋ	i	t	u-	
	28	40	97	113	149	170	87	139	79	86	49	104	ms JD
													1.28s
h.	t	u	t	ˈu	ŋŋ	ua	n	ia	ŋ	i	tt	u:	χʰ
	68	97	39	13	164	182	90	111	86	70	120	250	553ms MK
													1.31s
Averages													
Segment Sequence	43		76		153		80		76		83		1.16s
Ratios SL										2.1			
C vs. CC	[ŋ]: [ŋŋ] = 1.6												

(4) Surface

a.	t	u	tt	u:	ŋ	ˈua	n	ia	ŋ	i	t	u	kʰ
	39	20	164	104	85	117	68	79	96	47	95	45	365ms TK
				2									0.96s
b.	t	u	tt	u	ŋ	ua	n	ˈia	ŋ	i	t	u	kʰ
	96	39	184	68	47	183	70	131	111	62	129	29	818ms MK
				3.9									1.15s
c.	t	u	tt	u:	ŋ	ua	n	ˈia	ŋŋ	i	t	u	k
	52	67	180	146	59	128	73	128	124	99	56	43	103ms BH
				3						2.2			1.15s
d.	t	u	tt	u	ŋ	ˈua	n	ia	ŋ	i	t	u	x
	27	93	127	68	64	184	73	123	115	50	115	63	173ms PA
				2									1.15s
e.	t	u	tt	ˈu:	ŋ	ua	n	ia	ŋŋ	i	t	u	k
	57	45	255	161	87	176	67	140	117	60	83	48	96ms FW
				2.9						1.4			1.30s
f.	t	u	tt	u:	ŋ	ˈua	n	ia	ŋ	i	t	u	k
	34	117	173	138	115	183	87	147	84	61	83	56	154ms JD
				1.5									1.34s
g.	t	u	tt	u:	ŋ	ua	n	ˈia	ŋ	i	t	u	kʰ
	36	39	280	151	147	173	96	158	118	51	129	32	279ms MH
				1.9									1.41s
h.	t	u	tt	ˈu:	ŋ	ua	n	ia	ŋŋ	i	t	u	k
	68	70	291	198	122	199	73	158	179	39	84	51	93ms FW
				2.4						2.1			1.53 s
Averages													
Segment Sequence	51		105		91		76		86		97		1.25s
Ratios SL				2.5						1.9			
C vs. CC	[t]: [tt] = 2.1												

Appendix D: The morpheme /χattaχ/ 'often, intermittently'

(5)a.	k	a	tt	u	χ	i	v	a	ll	ia	t	ui	nn	a	χ	a	tt	a	[illegible]	u		
	142	99	174	70	84	84	60	51	179	138	95	101	131	71	37	33	172	64	[illegible]	61		
																	0.31s					
b.									s	i	v	u	ll	iu	χ	a	tt	a	[illegible]	a		
									87	66	77	49	182	149	65	30	171	63	[illegible]	37		
																	0.33s					
c.					χ	ai	ŋŋ	u:	n	i	ɣ	a	tt	au	χ	a	tt	a	[illegible]	u:ʰ		
					132	122	187	127	63	45	52	123	211	148	20	22	209	78	[illegible]	206		
																	0.33s					
d.								a	tj	i	ɣ	i	ts	ia	χ	a	tt	a	[illegible]	i	t	u:	k
								150	147	109	49	96	241	137	30	44	210	57	[illegible]	72	81	190	38
																	0.34s					
e.											s	a:	tt	au	χ	a	tt	a	[illegible]	u:		
											77	128	207	158	28	48	192	102	[illegible]	166		
																	0.37s					
f.											p	i	j	au	χ	a	tt	a	[illegible]	u:		
											47	68	101	132	49	40	206	84	[illegible]	154		
																	0.37s					
g.											s	i	k	ua	χ	a	tt	a	[illegible]	u:		
											166	52	153	174	42	54	190	83	[illegible]	276		
																	0.37s					
h.					χ	ua	ɣ	u	nn	a	ŋ	iu	m	a	χ	a	tt	a	[illegible]	u	tʰ	
					186	204	41	59	180	68	93	140	93	47	53	38	210	73	[illegible]	43	147	
																	0.37s					
i.													p	i	χ	a	tt	a	[illegible]	u	t	
													35	60	22	65	223	67	[illegible]	88	39	
																	0.38s					

For each example word the decibel value boxed in double lines attains peak word intensity. Decibel value boxed valued in a single line attains peak intensity for the [χatta] **sequence.**

j.					i	mm	au		i	l	ua	n	i	χ	a	tt	a	l	u:		
					113	152	187		57	91	158	70	136	66	53	181	79	71	295		
																0.38s					
k.	χ	a	nn	i	t	au	s	i	m	a	j	u:	j	a:	χ	a	tt	a	t	u:ʰ	
	177	73	206	94	97	162	84	49	95	80	67	209	53	155	43	52	206	90	70	704	
																0.39s					
l.					χ	i	n	ua	ŋ	u	n	i	ɣ	a:	χ	a	tt	a	t	a	v u t
					166	69	174	162	60	91	64	65	46	150	48	32	207	104	10[illegible]	68	70
																0.39s					
m.									χ	i	n	ua	l	i	χ	a	tt	a	m	a	
									220	88	102	240	55	74	60	67	217	55	91	105	
																0.40s					
n.												a	tj	i:	χ	a	tt	a	n	i	tt a ŋ a
												140	192	201	84	53	230	63	76	42	100 75 81 167
																0.43s					
o.														u	χ	a	tt	a	ŋ	a	
														140	77	86	226	75	107	33	
																0.46s					
p.											t	i	n	i	χ	a	tt	a	s	u	n i:
											86	79	85	72	75	58	227	110	74	64	172 201
																0.47s					
q.												u	l	i	χ	a	tt	a	tɬ	u	n
												183	109	67	102	62	210	102	74	97	172
																0.48s					
r.											χ	u	pp	a	χ	a	tt	a	[illegible]	u:	ɣ a l ua
											97	100	210	90	170	96	209	84	[illegible]	199	24 65 55 305
																0.56s					
															60	52	205	80	80		
																0.40s					

(6)a.

χ	a	nn	i	t	au	s	i	m	a	j	u:	j	a:	χ	a	tt	a	t	u:ʰ
62.6	$\boxed{72.3}$	67.3	68.5	63.9	71.1	60	64.1	63.8	66.9	64.5	69.4	66.6	71.1	63.9	62.2	59.5	$\boxed{63.9}$	57.8	63.5

58.8

b.

p	i	j	au	χ	a	tt	a	t	u:
58.8	66.1	68	$\boxed{68}$	63.7	63.1	60.5	$\boxed{64.8}$	54.6	60.9

59.5

c.

s	i	k	ua	χ	a	tt	a	t	u:
64.7	67.4	63.5	$\boxed{73.6}$	65.6	64	60.4	$\boxed{66}$	58.9	65

60.9

d.

χ	ua	ɣ	u	nn	a	ŋ	iu	m	a	χ	a	tt	a	t	u	tʰ
63.8	$\boxed{80.8}$	68.9	71.5	71.8	75.1	71.7	72.4	69.5	71.5	64	63.6	60.3	$\boxed{67.8}$	62	64.4	52.8

61.1

e.

t	i	n	i	χ	a	tt	a	s	u	n	i:
59.4	$\boxed{72}$	70.2	70.2	64.5	65.7	58.7	$\boxed{67.8}$	56.3	65.3	65.6	65.7

61.4

f.

u	χ	a	tt	a	ŋ	a
67.9	58.7	$\boxed{68.7}$	61.6	68.5	65.8	$\boxed{68.7}$

61.8

g.

i	mm	au	i	l	ua	n	i	χ	a	tt	a	t	u:
65.2	64.5	$\boxed{72}$	66.9	65.4	$\boxed{71.6}$	65.5	71.2	68.4	63.5	64.7	$\boxed{68.8}$	63.8	54.9

62.1

h.

k	a	tt	u	χ	i	v	a	ll	ia	t	ui	nn	a	χ	a	tt	a	t	u
60.9	70.7	63.8	$\boxed{73.4}$	65.5	72.3	67.8	71.5	68.5	73.4	61.7	70.2	68.7	69.2	65.9	63	58	$\boxed{68.6}$	64.1	65.4

62.7

i.

χ	ai	ŋŋ	u:	n	i	ɣ	a	tt	au	χ	a	tt	a	t	u:ʰ
65.4	$\boxed{73.6}$	71.2	72.8	70.8	71.6	68.8	73.6	64.5	70.4	67.9	64.9	62	$\boxed{69.3}$	59.6	66.8

63

j. s a: tt au χ a tt a l u:
61.3 71.5 63.7 71.9 64.8 62.6 64.3 70.9 58.1 67.2
63.1

k. u l i χ a tt a tɬ u n
76.1 70.1 71.6 63.5 68.1 60.5 69.6 63.1 65.6 64.2
63.2

l. χ i n ua l i χ a tt a m a
64.5 72.3 69.1 73.2 66.6 69.6 65.7 67.7 64.2 64.5 65.3 68.2
63.2

m. a tj i ɣ i ts ia χ a tt a ŋ i t u: k
71 57.9 73.2 67.5 71.1 67 72.2 63.8 63.5 60.2 70.8 70.9 71.4 61.7 70 71
63.4

n. a tj i: χ a tt a ŋ i tt a ŋ a
70 67.2 74.9 65.8 68.4 61.6 70.5 71.5 70.1 67.1 70.1 68.8 69
64.2

o. χ i n ua ŋ u n i ɣ a: χ a tt a l a v u t
67.6 73 73.4 77.8 73.1 73.8 71.8 72.8 70.4 76 70 68.1 63.9 70.2 66.6 73.4 69.5
64.7

p. χ u pp a χ a tt a t u: -ɣ a l ua
58.5 71.3 68 73.6 64.4 73.1 65.7 70.8 66.6 73.7 69.2 74.5 66.3 72.2
65.4

q. s i v u ll iu χ a tt a m a
59.9 69.5 65.5 70.1 69.5 74.7 68.7 67.7 61.9 72.1 69.6 71
65.9

r. p i χ a tt a t u t
68.2 78.3 73.9 73.8 71.5 71.4 66.9 70.4 61.4
68.6

Avg. 65.7 66.2 62.2 68.7 63.4

APPENDIX E: The sequence /χixxi/

For all the tables in the ptarmigan corpus, peak intensity is shown above each segment in decibels with the peak word intensity value boxed in double lines and secondary word intensity boxed in a single line. For duration, values are beneath each segment in milliseconds with peak word duration boxed in double lines and secondary durational prominence boxed in a single line. The examples are ordered from the shortest [χixxi] sequence in seconds.

The boundary tones H and L are marked with the unmarked case being a pitch line slightly falling from left to right. Prosodic boundaries are marked, as needed for my analysis.

$]_{\omega}$ = word boundary
$]_{IP}$ = interrogative phrase-final boundary
$]_{DP}$ = declarative phrase-final boundary
$]_{U}$ = utterance-final boundary

	$\boxed{71}$	61	63	56		65		dB	
7a.	a	χ	i	x	x	i		$]_{\omega}$	BH
	104	25	90	57	57	$\boxed{117}$		ms	
				0.35s					

	62	61	61	59		$\boxed{75}$			
b.	a	χ	i	x	x	i		$]_{\omega}$	BH
	72	14	56	91	91	$\boxed{116}$			
				0.36s					

	62	61	61	59		$\boxed{75}$			
c.	a	χ	i	ɣ	ɣ	i		$]_{\omega}$	BH
	14	5	37	116	116	$\boxed{99}$			
				0.37s					

	57	57	66	60		$\boxed{70}$			
d.	a	χ	i	x	x	î:í		$]_{IP}]_{U}$	JM
	91	79	75	109	109	$\boxed{489}$			
				0.86s					

	$\boxed{59}$	52	53	56		58	51		
e.	a	χ	i	x	x	i	k̚	$]_{\omega}$	PJ
	$\boxed{99}$	74	79	97	97	56	38		
				0.40s					

	56	58	63	60		$\boxed{64}$	56		
f.	a	χ	i	x	x	í:	kʰ	$]_{U}$	AE
	64	70	66	114	114	$\boxed{128}$	224		
				0.49s					

	67	62	66	62		$\boxed{71}$	57		
g.	a	χ	i:	x	x	í:	kʰ	$]_{U}$	AE
	96	112	$\boxed{140}$	63	63	124	423		
				0.50s					

	$\boxed{75}$	68	64	65		69	70		
h.	a	χ	í	ɣ	ɣ	ì:	kʰ	$]_{DP}$	HW
	111	81	93	61	61	$\boxed{214}$	118		
				0.51s					

	$\boxed{73}$	72	69	64		69	52		
i.	a	χ	i	ɣ	ɣ	î:í	kʰ	$]_{IP}]_{U}$	HP
	187	49	96	76	76	$\boxed{254}$	292		
				0.55s					

	$\boxed{54}$	46	48	44		43	36		
j.	a	χ	í	x	x	ì:	kʰ	$]_{DP}$	AZ
	83	36	67	91	91	$\boxed{260}$	342		
				0.55s					

	$\boxed{75}$	68	64	65		69	70		
k.	a	χ	í	x	x	ì:	kʰ	$]_{DP}$	BK
	75	120	58	96	96	$\boxed{224}$	343		
				0.59s					

	71	61	63	56		65		dB	
8a.	a	χ	i	x	x	i		$]_\omega$	BH
	104	25	90	57	57	117		ms	
	104	172			174				

	62	61	61	59		75			
b.	a	χ	i	x	x	i		$]_\omega$	BH
	72	14	56	91	91	116			
	72	161			207				

	62	61	61	59		75			
c.	a	χ	i	ɣ	ɣ	i		$]_\omega$	BH
	14	5	37	116	116	99			
	14	158			215				

	57	57	66	60		70			
d.	a	χ	i	x	x	î:í		$]_{IP}]_U$	JM
	91	79	75	109	109	489			
	91	263			598				

	59	52	53	56		58	51		
e.	a	χ	i	x	x	i	k˺	$]_\omega$	PJ
	99	74	79	97	97	56	38		
	99	250			191				

	56	58	63	60		64	56		
f.	a	χ	i	x	x	í:	k^h	$]_U$	AE
	64	70	66	114	114	128	224		
	64	250			466				

	67	62	66	62		71	57		
g.	a	χ	i	x	x	í:	k^h	$]_U$	AE
	96	112	140	63	63	124	423		
	96	315			610				

	75	68	64	65		69	70		
h.	a	χ	í	ɣ	ɣ	ì:	k^h	$]_{DP}$	HW
	111	81	93	61	61	214	118		
	111	235			393				

	73	72	69	64		69	52		
i.	á	χ	ì	ɣ	ɣ	î:í	k^h	$]_{IP}]_U$	HP
	187	49	96	76	76	254	292		
	187	221			622				

	54	46	48	44		43	36		
j.	a	χ	í	x	x	ì:	k^h	$]_{DP}$	AZ
	83	36	67	91	91	260	342		
	83	194			693				

	75	68	64	65		69	70		
k.	a	χ	í	x	x	ì:	k^h	$]_{DP}$	BK
	75	120	58	96	96	224	343		
	75	274			663				

	53	49	43	44		53	48	45	46	49	52		44	34	
9a.	a	χ	i	x	x	i	l	i	t	á	n	n	à:	kʰ	$]_{DP}$ AZ
	82	44	116	64	64	63	66	107	140	39	91	91	153	377	
	82		224		127		173			270			621		
			0.35s												

	71	63	64	62		71	69	71	54	
b.	a	χ	i	x	x	i	l	î:í	kʰ	$]_{IP}$ BK
	78	93	50	66	66	80	57	126	350	
	78		209		146			533		
			0.36s							

	69	68	70	69		75	71	74	72	79	74		74	67	
c.	a	χ	i	x	x	i	l	i	t	á	n	n	à:	kʰ	$]_{DP}$ EF
	195	86	73	67	67	81	39	60	120	86	108	108	125	458	
	195		226		148		99			314			691		
			0.37s												

	69	63	66	66		71	67	70	62	
d.	a	χ	i	x	x	i	l	i	k'	$]_{\omega}$ SI
	146	62	59	104	104	62	86	76	72	
	146		225		166			234		
			0.39s							

	73	71	73	66		75	71	74	62	
e.	a	χ	i	x	x	i	l	i	k'	$]_{\omega}$ BK
	76	100	73	95	95	53	61	69	59	
	76		268		148			189		
			0.41s							

f.	66	58	68	65		71	64	62	52	
	a	χ	i	x	x	i	l	î:	kʰ	$]_{DP}$ JM
	113	73	70	92	92	94	95	241	238	
	113		235		186			574		
			0.42s							

	59	52	54	54		65	61	62	59	
g.	a	χ	i	x	x	i	l	î:í	kʰ	$]_{DP}]_{U}$ JI
	73	103	47	100	100	96	59	297	254	
	73		250		196			610		
			0.45s							

	62	59	69	61		74	68	67	70	
h.	a	χ	i	x	x	i	l	i	m	$]_{\omega}$ JM
	85	92	74	103	103	97	104	31	244	
	85		269		200			379		
			0.47s							

	69	63	66	66		70	67	70	62	
i.	a	χ	i	x	x	i	l	i	k'	$]_{\omega}$ SI
	118	75	107	135	135	88	76	66	99	
	118		317		223			241		
			0.54s							

	69	68	68	64		72	68	68	62	dB
10a.	a	χ	i	ɣ	ɣ	i	v	i	kʾ	$]_{\omega}$ HP
	115	23	76	71	71	102	50	61	65	ms
	115		170			173		176		
				0.34s						

	71	68	70	66		75	64	68	65	
b.	a	χ	i	x	x	i	v	i	kʾ	$]_{\omega}$ LI
	176	32	85	69	69	104	60	63	77	
	176		186			173		200		
				0.36s						

	66	60	67	61		67.7	66	68.4	60	
c.	a	χ	i	ɣ	ɣ	i	v	i	kʾ	$]_{\omega}$ HW
	94	90	100	63	63	77	63	91	56	
	94		253			140		210		
				0.39s						

	71	63	63	65		73	66	67	54	
d.	a	χ	i	x	x	í	v	ĭ	kʰ	$]_{DP}]_{U}$ LI
	290	18	87	82	82	115	85	155	149	
	290		187			197		389		
				0.39s						

	66	57	59	56		68	65	62	61	
e.	a	χ	i	x	x	í	v	ì:	kʰ	$]_{DP}$ JI
	96	100	51	95	95	78	88	311	269	
			246			173		668		
				0.42s						

	72	71	68	64		71	68	68	46	
f.	a	χ	i	ɣ	ɣ	i	v	î:í	ɣʾ	$]_{IP}]_{U}$ HP
	157	47	91	90	90	116	50	171	143	
	157		228			206		364		
				0.44s						

	71	66	68	65		77	74	71	61	
g.	a	χ	i	x	x	í	v	ì:	kʰ	$]_{DP}$ EF
	135	41	64	99	99	140	66	247	313	
	135		204			239		626		
				0.45s						

	61	60	64	59		66	61	60	55	
h.	a	χ	i	x	x	í	v	ì:	kʰ	$]_{DP}$ PJ
	73	102	103	95	95	67	97	233	196	
	73		300			162		526		
				0.46s						

	60	61	67	58		72	66	65	54	
i.	a	χ	i	x	x	í	v	ĭ:	kʰ	$]_{DP}]_{U}$ JM
	118	86	96	92	92	109	106	223	536	
	118		274			201		865		
				0.47s						

j.	75.8	59	69	56		75.5	67	70	52	
	a	χ	i	x	x	í	v	ĭ:	kʰ	$]_{DP}]_{U}$ BH
	150	45	122	87	87	118	71	174	230	
	150		254			205		475		
				0.48s						

	72	65	72	64		73	66	69	66	
k.	a	χ	i	x	x	í	v	ĭ:	kʰ	$]_{DP}]_{U}$ SI
	87	86	57	122	122	101	55	260	311	
	87		265			223		626		
				0.49s						

	71	65	76	70		75	74	78	64	
l.	a	χ	i	x	x	í	v	ĭ:	kʰ	$]_{DP}]_{U}$ BK
	83	90	157	79	79	93	59	291	253	
	83		326			172		603		
				0.49s						

75 75 73 69 67 71 72 64 69 55 dB
11a. a | χ i x | x i | n iu | t ĩɪ́ kʰ]IP]U BH
72 | 44 78 62 | 62 39 | 97 194 | 27 360 141 ms
72 | 184 | 101 | 291 | 528
0.29s

65 56 63 60 64 63 62 56 58 54
b. a | χ i x | x i | n ɪ̂ù | t ɪ: kʰ]DP]U KT
155 | 60 68 62 | 62 55 | 93 131 | 77 187 270
155 | 190 | 117 | 224 | 534
0.31s

71.77 69 70 62 71 73 71.71 66 69 58
c. a | γ i x | x i | n iu | t ɪ̂:ɪ́ kʰ]DP]U EF
126 | 46 90 69 | 69 70 | 96 199 | 35 132 297
126 | 205 | 139 | 295 | 464
0.34s

59 56 65 62 70 70 75 65 67 63
d. a | χ i x | x i | n iu | t ɪ̂:ɪ́ kʰ]DP]U HW
81 | 67 78 67 | 67 74 | 91 152 | 69 175 156
81 | 212 | 141 | 243 | 400
0.35s

70 66 69.8 65 69 69 73 64 68 67 69.8 66 67
e. a | χ i x | x i | n iu | t i | k u | l u]ₐ SI
87 | 78 81 77 | 77 38 | 77 180 | 45 45 | 95 55 | 52 92
87 | 236 | 115 | 257 | 90 | 150 | 144
0.35s

65 60 64 60 68 68 69 63 61 65
f. a | χ i x | x i | n íu | t ɪ̂: kʰ]DP]U KT
115 | 47 86 77 | 77 65 | 89 188 | 65 135 412
115 | 210 | 142 | 277 | 612
0.35s

77 66 71 65 74 69 73 66 72
g. a | χ i x | x i | n iu | γ u]ₐ BH
100 | 82 76 68 | 68 84 | 42 122 | 14 84
100 | 226 | 152 | 164 | 98
0.38s

56 53 53 54 61 60 60 54 56 47
h. a | χ i x | x i | n iu | t ɪ̆: kʰ]U PJ
96 | 107 42 72 | 72 101 | 31 190 | 50 195 163
96 | 221 | 173 | 221 | 408
0.39s

61.9 56 62 58 61 60 61.8 57 58 56
i. a | χ i x | x i | n iu | t i k]ₐ JI
98 | 83 84 73 | 73 87 | 47 176 | 54 100 48
98 | 240 | 160 | 223 | 202
0.40s

71 67 68 72 72 69 75 69 71 73 74
j. a | χ i x | x i | n iu | t i | C[ŋ âɪ́]C]IP]U BH
101 | 57 67 109 | 109 83 | 54 171 | 50 59 | 78 516
101 | 233 | 137 | 225 | 109 | 594
0.43

70 56 68 67 71.7 71 72.2 60 68 64
k. a | χ i x | x i | n ɪ̂ũ | t ɪ:: kʰ]IP]U SI
143 | 95 95 159 | 159 89 | 126 403 | 110 463 539
143 | 349 | 248 | 529 | 1112
0.60s

12a.
70 66 67 58 $\boxed{72}$ 69 $\boxed{75}$ 70 71.8 49 dB
a χ i ɣ i t ui n a k˺]ω LI
156 100 87 70 128 51 109 145 96 64 ms
156 187 198 160 305
0.33s

b.
64 61 65 64 66 70 $\boxed{71}$ 65 $\boxed{67}$ 66 $\boxed{71.7}$ 68 $\boxed{71.8}$ 62
a χ i x x i n iu t i c[Y l u: n i: t˺]c]ω SI
115 54 83 61 61 67 45 142 80 40 93 93 146 82 126 108
115 198 128 187 213 239 316
0.33s

c.
$\boxed{68.3}$ 62 65 56 $\boxed{67.8}$ 60 67.5 59 $\boxed{68}$
a χ i x x i l i c[l u]c]ω BH
82 87 72 64 64 75 68 87 82 65
82 223 139 155 147
0.36s

d.
68 67 67 63 $\boxed{70.6}$ 68 $\boxed{71.2}$ 67 63 63 65 56 63 66 67 65
a χ i ɣ ɣ i l iu I I u ŋ i: t u ɣ I i ɣ˺]ω
139 50 81 79 79 74 74 146 86 86 42 57 118 53 57 83 83 88 98
139 210 153 306 128 175 193 269
0.36s

e.
66 63 69 65 $\boxed{70}$ 69 $\boxed{63}$ 60
a χ i x x i v í:I n]IP]U VI
87 74 65 81 81 89 120 512 153
87 $\boxed{220}$ 170 $\boxed{785}$
0.39s

f.
70 64 67 65 $\boxed{71}$ 66 71 71 $\boxed{73}$ 67 69 57
a χ i x x i v i t s íà ɣ á: kʰ]DP]U SI
75 70 94 81 81 87 39 174 93 93 295 82 141 307
75 245 168 306 $\boxed{388}$ $\boxed{530}$
0.41s

g.
68 57 69 64 68 71 $\boxed{72}$ 67 $\boxed{70}$
a χ i x x i ɣ u n a]ω SI
141 70 99 168 84 93 86 87 33 75
141 337 177 173 108
0.43s

h.
70 65 $\boxed{71}$ 67 70.8 68 $\boxed{73}$ 68 70.6
a: χ i x x i χ i v a]ω SI
147 92 98 77 77 104 55 116 35 95
147 267 181 171 130
0.45s

i.
71.5 68 71.7 60 71.4 69 $\boxed{72.6}$ 71.9 $\boxed{72.5}$ 70 71
a χ i x x i l i ŋ u n a]ω SI
108 84 116 100 100 97 87 64 107 96 102 91
108 300 197 151 203 193
0.50s

j.
71 66 72.4 62 $\boxed{72.5}$ 72 $\boxed{73}$ 71 70
a: χ i: x x i ŋ ú n n ă::]DP]U SI
162 160 144 124 124 121 145 78 116 116 663
162 428 245 $\boxed{339}$ $\boxed{779}$
0.67s

k.
69 70 $\boxed{71.77}$ 61 71 69 71.71 72 $\boxed{74}$ 57
a χ i x x i χ u: t i k]ω SI
153 137 147 161 161 116 137 195 107 116 143
153 445 277 332 366
0.72s

APPENDIX F: The sequence /naːna/

(13)a.

65	70	71.8	71	72.2	68	74	dB		
a	n	aː	n	a	ɣ	a	$]_\omega$	TK	
34	67	98	49	81	38	58	ms		

0.30s
0.43s

b.

75	75	77	75	76	69	72		
a	n	aː	n	a	ɣ	i	$]_\omega$	BH
83	57	107	47	86	30	49		

0.30s
0.46s

c.

70.2	70	73	68	69.7	67	69		
a	n	aː	n	a	ɣ	a	$]_\omega$	BH
81	71	93	54	78	48	78		

0.30s
0.56s

d.

70	72	77	72	79	75	81		
a	n	aː	n	a	ɣ	a	$]_\omega$	JD
70	56	141	53	63	34	84		

0.31s
0.50s

e.

66.7	68	66.6	63	64	64	66.8		
a	n	aː	n	a	ɣ	a	$]_\omega$	DF
77	81	134	61	63	38	58		

0.34s
0.51s

f.

63	65	69	67	69.1	70	75		
a	n	aː	n	a	ɣ	aː	$]_{DP}$	PA
35	77	138	59	68	27	259		

0.34s
0.66s

g.

73	75	77.1	76	76.4	73	73		
a	n	aː	n	a	ɣ	aː	$]_{stutter}$	BH
98	51	120	75	97	57	224		

0.34s
0.74s

h.

70	71	71	68	69	66	61		
a	n	aː	n	a	ɣ	aː	$]_{DP}$	MK
90	63	154	82	72	61	124		

0.37s
0.65s

i.

69.5	72	71	71	69.8	68	69.2		
a	n	aː	n	a	ɣ	a	$]_\omega$	MN
95	84	163	63	69	41	109		

0.38s
0.62s