Prosody and Wordhood in South Baffin Inuktitut*

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Abstract: This paper provides a first account of prosodic structure and the correspondence between prosodic and morphosyntactic constituents in South Baffin Inuktitut. Analyzing scripted dialogues between two speakers, we found that orthographic words were consistently marked by an f0 fall, while some prosodic variation occurred in utterance-final position. We propose that our intonational analysis shows evidence for two prosodic units: a smaller one corresponding to orthographic words, termed 'prosodic word' here, and a larger one delimited by pauses, identified as the intonational phrase. These two prosodic units exhibit remarkable regularity with respect to their tonal marking, with words regularly being marked by HL tones and intonational phrases mostly being demarcated by an additional L tone. This finding suggests that there is a robust prosodic correlate for the notion of "wordhood" in Inuktitut: orthographic words, whether or not they exhibit polysynthetic properties such as noun incorporation, behave uniformly with respect to their prosodic demarcation.

Keywords: prosody, intonation, word, wordhood, Inuit, Inuktitut

1 Introduction

Many languages of North America exhibit a high degree of polysynthesis, having words with a clause-like level of complexity, a high number of morphemes per word, noun incorporation, and rich agreement, among other phenomena.

For instance, the following polysynthetic words from Inuktitut appear in language lessons intended for beginners (Pirurvik Centre 2015):

(1)   Aatuvaa-mu-u-laaq-tunga
       Ottawa-ALL-go-DIST.FUT-DEC.1SG
       'I will be going to Ottawa.'

(2)   Katima-qati-gi-junna-qinnga?
       meet-partner-have.as-can-INTER.2SG.1SG
       'Can you meet with me?'

We can note that both of these examples exhibit noun incorporation and rich agreement, and that the latter also contains a modal.

Recent analyses of these words (and particularly in frameworks such as Distributed Morphology Halle 1993, 1994) posit that they are syntactically complex. But such complexity raises the following question: are orthographic polysynthetic words really words, in the usual sense?

Sadock (1980) argues that words in West Greenlandic (part of the Inuit dialect continuum) are words because they satisfy a number of commonly-assumed criteria for wordhood. His arguments include the observations that that affixes cannot occur in isolation, that phonological processes that are obligatory within words are either optional or do not apply between words, and that words may not be interrupted with pauses, parenthetical material, or error correction, all of which may only take place at word boundaries (p. 303). Additionally, Sadock's assessment takes into account more syntactically oriented arguments, such as the inability to conjoin constituents within words.

To account for the phenomenon of polysynthesis in Inuit, Compton and Pittman (2010) propose that Inuit words are DP and CP phases, and that DP and CP phases spell out as phonological words. Such an account offers an explanation as to why words are almost exclusively nominal (bearing case and number) or verbal (bearing mood, agreement, and tense). However, their evidence that these orthographic words are also phonological words is based primarily on Sadock's (1980) claims, leaving open the possibility that such words could perhaps be the result of widespread cliticisization or other phrasal phenomena like French liaison.

Prosodically, prosodic words (ω) are typically assumed to be the minimal prosodic domain derived from morphosyntactic structure (e.g. Nespor and Vogel 1986, Selkirk 1995, and many others). However, theories of prosodic phonology have been based primarily on analyses of Indo-European languages, rather than languages with polysynthetic properties like Inuit. As such, we can ask whether the same principles governing the mapping from morphosyntactic structure to prosodic constituency will hold in a language where words tend to show a higher degree of morphosyntactic complexity.
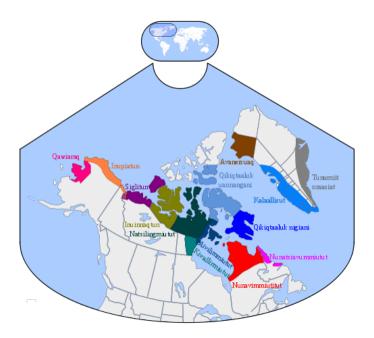
In this paper, we discuss prosodic evidence that orthographic words are prosodic domains in Inuit. Furthermore, because we find no evidence for prosodic domains smaller than the orthographic word, we propose that orthographic words correspond to minimal prosodic domains (ω).

Our line of reasoning is as follows. If orthographic words correspond to prosodic domains, we might expect to find prosodic or intonational cues demarcating these domains. On the other hand, evidence of prosodic domains within orthographic words might suggest that the syntactic complexity of orthographic words is also preserved in the prosodic structure, suggesting perhaps that orthographic words are simply epiphenomenal. Incorporated nominals, which are proposed to be XPs by Compton & Pittman (2010), are likely candidates for evidence of domains within words, given their syntactic complexity. In the following sections, we compare the prosody of Inuit words with and without nominal incorporation, and conclude that they follow the same prosodic pattern. In addition, we present

evidence of a prosodic domain larger than the orthographic word, which we take to be the intonational phrase.

2   Background

The Inuit language is a dialect continuum stretching across the North American Arctic, including Alaskan Inupiaq, Western Canadian Inuit, Eastern Canadian Inuit, and Greenlandic. It is part of the Eskimo-Aleut language family which also includes Yupik and Aleut.

Figure 1: Map of Inuit dialect continuum. Wikipedia creative commons copyright by Asybaris01, CC BY-SA 3.0

Inuit is a polysynthetic language, exhibiting noun incorporation, verb incorporation, word-internal modifiers, few phonologically free functional morphemes, rich agreement (for both subjects and objects), and radical pro-drop. It also has an ergative-absolutive alignment.

In terms of prosody, the Inuit variety that has received the most attention is West Greenlandic (Kalaallisut, see Arnhold 2014 for a recent overview), the official language of Greenland spoken by about 45,000 people (Fortescue 2004). The only dialect to have been the subject of several experimental acoustic studies, West Greenlandic does not show evidence of lexical tone, lexical pitch accents, or stress (Jacobsen 2000; Rischel 1974). Instead, words uttered in isolation invariably receive the same fall-rise tonal contour, a realization of three tonal targets

associated with the last three vowel moras:[1] a high (H) target, a low (L) target and another H target (Mase 1973; Nagano-Madsen 1993; Rischel 1974). In connected speech, four different word contours appear, which can be modelled as more or less complete realizations of the HLH contour, namely HLH, HL, LH and flat words without noticeable pitch changes (Arnhold 2014; Fortescue 1984; Nagano-Madsen 1993; Rischel 1974). While the vast majority of words appear with HLH or HL tones, variation is induced by speaker, speech rate, genre (spontaneous vs. read speech), word length, and information structure (Arnhold 2014). Phrase-finally, intonation is further influenced by sentence type: declaratives and wh-questions generally end with high f0, whereas yes/no-questions end with low f0 (Arnhold 2014; Fortescue 1984).

Similarly, Massenet (1980) finds a mora-based system without stress in the speech of two consultants originally from Inukjuak, Quebec, who had lived in Qausuittuq, Nunavut for about twenty years at the time of recording. In declaratives, he observes high f0 on the penultimate vowel mora, followed by a pitch fall, while in imperatives, the high appears on the last vowel mora. In questions, the ante-penultimate vowel mora shows high pitch and, in some cases, an additional following f0 rise accompanies the lengthening of the final vowel.

Pigott (2012) investigates f0, duration, intensity, and (lack of) vowel reduction in Labrador Inuttut, and finds no evidence for stress. Instead, he observes lengthening of the final syllable rhyme, as well as final stop aspiration, in phrase- and utterance-final position. Moreover, he reports phrase-final intonation consisting of either HL or HLH tones.

For other Inuit varieties, the only research we are aware of is Fortescue's (1983) overview of sentence-final intonation in twelve dialects (but see Krauss 1985; Mithun 2012 on the prosody of a related language, Yupik). Based on a qualitative auditory analysis of tape recordings of at least one speaker per dialect, he classifies statement intonation as showing a pitch fall in one of five locations: on the final syllable, on the final mora, on the penultimate syllable, on the penultimate mora, or on the antepenultimate mora (these falls are followed by a rise in some dialects, including West Greenlandic). He further observes that while yes/no-questions end in a pitch rise in most dialects, some show a fall on the final syllable, a fall on the final mora, or a fall on the penultimate mora accompanied by lengthening. For the South Baffin Island variety we investigate here, he found pitch falls on the final syllable for statements and final rises for yes/no-questions.

3 Methodology

Our data come from a series of audio-recorded, scripted dialogues between two speakers (one male and one female), made available on a website for learning Inuktitut (Pirurvik Centre 2015) which included orthographic transcription (us-

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[1] In addition to being the tone-bearing unit, the mora is also a timing unit (Jacobsen 2000; Mase and Rischel 1971; Nagano-Madsen 1988, 1992) and West Greenlandic, like other varieties of Inuit, is a quantity-sensitive language.

ing a Roman script), as well as English translation. Both speakers were from Kimmirut, Nunavut, and thus speakers of the South Baffin dialect. We analyzed the first twenty of the dialogues available on the website; this corpus yielded 5.5 minutes of speech, containing 151 orthographic sentences and 297 orthographic words. Among these words, 64 contained an incorporated noun.

Two research assistants (both undergraduates at UQAM) were tasked with annotating and aligning the words and segments in these recordings with the existing transcriptions of the dialogues, using the software Praat (Boersma and Weenink 2015). They additionally marked syllable boundaries and numbered the syllables in each word counting from the end of the word. Dialogues were also tagged for the gender of the speaker, marking the female speaker as BF and the male speaker as BM. We then added morpheme glosses and annotated the dialogues for the occurrence of phrase boundaries and realizations of high and low tonal targets.

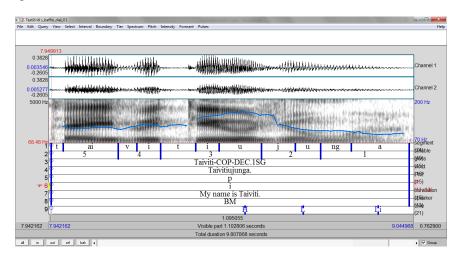Figure 2 shows an example annotation for an utterance produced by the male speaker.

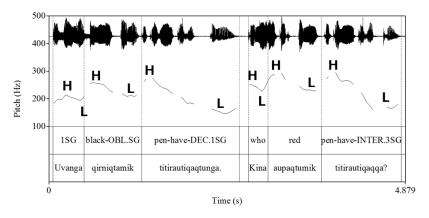
Figure 2: Example of an utterance annotated in Praat.

4 Results

Our data show evidence for the relevance of two prosodic units, a smaller and a larger one, which we here identify as the prosodic word (ω) and the intonational phrase (ι). In the annotation of the soundfiles, they were labelled as 'p' and 'i', respectively, as shown in Figure 2.

4.1 The prosodic word (ω) level

Almost all of the 297 orthographic words in our corpus carried an f0 fall, indicating a realization of an H and a following L target, as illustrated in Figure 3. There

was only one exception: in one utterance, the male speaker realized the word *ul-laaq* 'morning' with a rising f0 contour in *Ullaaq aanniavimmiiqqaugama* 'I went to the hospital this morning', but started the following word with low f0.

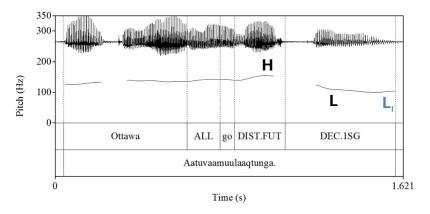**Figure 3:** Utterance 'I have a black pen. Who has a red pen?'.

Due to this very regular occurrence of f0 falls, we conclude that orthographic words in South Baffin Island Inuktitut correspond to a prosodic unit, which we term 'prosodic word' (ω). The data indicate that the prosodic word is marked by two tones, H and L. Whereas L is almost invariably realized on the word-final syllable, the alignment of the H tone is considerably more variable, with some H tones appearing on the penultimate syllable and some falls starting close to the beginning of the word. Further, regular marking with HL tones appeared for words of different lengths. Words in our corpus had between one and nine syllables, with the largest category being trisyllabic words (76 words, corresponding to 26% of the data).

The correspondence between prosodic and orthographic words consistently appeared in cases of noun incorporation. Words containing incorporated nouns showed the same prosodic realization as all other words, likewise carrying H and L tones. As an example, see the third and the last word in (3) and their prosodic realization in Figure 3.

(3)   Uvanga qirniqta-mik   titirauti-qaq-tunga. Kina aupaq-tu-mik
        1SG   black-OBL.SG pen-have-DEC.1SG who redDEC-OBL.SG
        titirauti-qaq-qa?
        pen-have-INTER.3SG
        'I have a black pen. Who has a red pen?' (= Figure 3)

Moreover, words with noun incorporation showed the same variation with respect to the location of H as did the other words. Note that the peaks appear early for both examples in Figure 3, indicating that H was aligned with the noun. Thus, the

f0 fall spans the whole word, uniting the incorporated noun and the verbal ending. As an example of late H alignment, consider Figure 4 showing the prosodic realization of (1). Here, the f0 fall starts close to the end of the word and the incorporated noun carries neither of the two tones.

Figure 4: Utterance with incorporated noun 'I will be going to Ottawa'.

4.2 The intonational phrase (ι) level

We identified 166 units of speech delimited by pauses in our data; these we have identified as intonational phrases (ι). Almost half of them (77) contained only one word, while a little more than a third (54) consisted of two words and a little over 20% were longer. In addition to being separated by pauses, most ι were additionally marked with final boundary tones. As an illustration, Figure 5 shows three utterances realized as one intonational phrase each, corresponding to the last three utterances in (4). Note that all words again show the regular marking with HL tones. Words that are followed by another word within the same intonational phrase have falling pitch until the end, i.e. the L tone is aligned to the end of the word. In contrast, words that are final within a ι show an earlier f0 fall, followed by a stretch of low pitch. We model this by assuming the presence of an additional L tone, which is associated with ι (this tonal unit is represented as L_ι in Figure 5).

(4)   BF: ('Do you speak Inuktitut?')
        BM: Ii,   miki-ju-mik.
              yes small-DEC-OBL.SG
              'Yes, a little bit.'
        BF: Riita-u-junga.   Kina-u-vit?
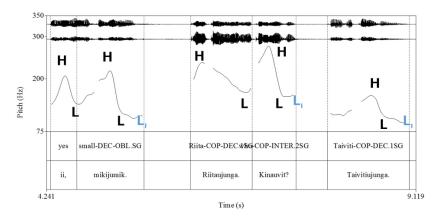   Riita-COP-DEC.1SG who-COP-INTER.2SG
              'I'm Riita. What's your name?'

BM: Taiviti-u-junga.
   Taiviti-COP-DEC.1SG
   'My name is Taiviti.' (= Figure 5)

Figure 5: Realization of three consecutive utterances 'Yes, a little bit.',
'I'm Riita. What's your name?', 'My name is Taiviti.' (= last three
utterances of (4)).

In all, 99 intonational phrases ended in a clear L_ι (60%), while for 55 of them, the fall continued more or less clearly until the end (33%). The remaining seven tokens (7%) showed a final rise that we analyze as indicating the presence of a high tone associated with the intonational phrase, i.e. H_ι instead of L_ι.

4.3 Discussion

Our results indicate that with remarkable regularity, orthographic words are marked with f0 falls in South Baffin Inuktitut. We analyze these falls as realizations of HL tones associated with a prosodic unit identified as the prosodic word (ω). This prosodic marking of orthographic words appeared consistently for all words in our corpus except one, irrespective of word length and internal complexity.

Interestingly, words with noun incorporation exhibited the same tonal patterns as less morphosyntactically complex words. We did not find evidence that the internal syntactic structure of these words was marked prosodically. We therefore conclude that indeed all orthographic words in our data correspond to units of the minimal prosodic domain (ω).

Compared to the almost one-to-one correspondence between orthographic and prosodic words, slightly more variation appeared at a higher prosodic level. For the present preliminary analysis we interpreted all stretches of speech separated by a pause as a prosodic unit identified as the intonational phrase (ι). The 151 orthographic sentences in our materials corresponded to 166 such ι. We iden-

tified three different ɩ-final tonal contours, with the most frequent one being a low plateau after the word-final fall.

Our findings thus only partially confirm Fortescue's (1983) characterization of phrase-final statement intonation in Baffin Island Inuktitut as showing f0 falls from the penultimate to the final syllable (in our terms, H tones realized on the second-to-last syllable and L tones realized on the last syllable). While this description is accurate for a fair amount of the ɩ-*internal* words in our corpus, the frequent final low plateaus indicate a different tonal distribution. Furthermore, the precise timing of H tones also showed some variation ɩ-internally. While 'final syllable falls' did occur, f0 frequently started falling earlier, sometimes even on the first syllable of a word (compare Figure 3 again).

Intriguingly, our analyses have so far not provided evidence for an intermediate prosodic level ranging between the word and the intonational phrase. This may be due to the limits of our data and the preliminary nature of the analysis, but note that this level was also not employed in Arnhold's (2014) analysis of West Greenlandic.

We intend to revise the present analysis by considering more controlled and systematically varied data and by performing more in-depth acoustic analyses. Overall, however, the present findings suggest that South Baffin Inuktitut prosody is characterized by the regular tonal marking of prosodic domains, similar to West Greenlandic, but differing strongly from English and many other well-studied Indo-European languages (see Arnhold 2014).

4.4   Conclusion

Based on recordings of read dialogues targeted at beginning language learners, we have presented a first prosodic analysis of South Baffin Inuktitut, employing two prosodic units: the prosodic word (ω) and the intonational phrase (ι). Our findings suggest that prosodic words regularly correspond to orthographic words, while intonational phrases frequently comprise orthographic sentences. Crucially, we maintain that the unit we identify as the prosodic word is indeed the minimal prosodic domain, as we found no evidence for prosodic marking of any internal structure, even for long and morphosyntactically complex words.

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