Magnusson, E. & K. Nauclér. in press. 'The development of linguistic awareness in language-disordered children'. To be published in *First Language*.

Olofsson, Å. 1985. *Phonemic awareness and learning to read: A longitudinal and quasi-experimental study*. Umeå universitet.

Søegård, A., S. Hesselholdt, S. Kreiner, J.C. Nielsen, A. Poulsen, & S. Spelling. 1983. *Ordstilleæsningsprøve OS 64*. Köpenhamn: Dansk Psykologisk Forlag.

Søegård, A., S. Hesselholdt, S. Kreiner, J.C. Nielsen, A. Poulsen, & S. Spelling. 1986. (experimentalutg.) *Sætningslæsningsprøverne SL 60 & SL 40. SL-Vejledning, SL-Håndbog*. Köpenhamn: Dansk Psykologisk Forlag.

Phrase-final Intonation in West Greenlandic Eskimo

Yasuko Nagano-Madsen

A previous description of Eskimo intonation was examined by studying text-reading material. Auditory and acoustic analyses have led to an alternative analysis of phrase-final intonation, where the proposed HLH contour is decomposed to HL plus H. HL is regarded as a word property whereas H is a phrasal component.

Introduction

Works on intonation in West Greenlandic Eskimo are not numerous. It has been described by Thalbitzer 1904, Petersen 1970, Collis 1970 and Rischel (in Mase 1973), among others. Thus far, Rischel presents the most comprehensive description of intonation by identifying five terminal contours. Their occurrence is supposed to be determined by both prosodic and grammatical categories. Of these five types, only the phrase-final high-low-high pattern has been subjected to acoustic analysis (Mase 1973, Nagano-Madsen 1988). Furthermore, the acoustic analyses presented in Mase and in Nagano-Madsen have both used words in isolation forms. Thus, we are still very far from obtaining a more thorough picture of intonation in West Greenlandic Eskimo. This work serves as a pilot study in examining the adequacy of Rischel's description of phrase-internal and phrase-final contours in text reading material, a considerably larger domain of intonation than those used in previous studies.

The present work is part of the project work called *Multilingual Prosodic Rules*, which seeks to ascertain the basic rules and parameters that are necessary in order to describe the typological differences between the three languages chosen for the project (Japanese, West Greenlandic Eskimo, and Yoruba). Earlier, it was hypothesized that in a quantity language like Eskimo, where duration is the primary acoustic cue for signalling single/geminate segments, duration contributes little to other functions such as grouping (Nagano-Madsen 1992). Instead, it is expected that F0 plays the major role for the purpose.

Previous descriptions of Eskimo prosody

There has been considerable confusion in the description of Greenlandic Eskimo as to the status of accent, stress, and intonation. What is now recognized as being an element of phrase-final intonation manifestation on the last three vowel morae (Rischel 1974) has earlier been interpreted as 'musical accent' (Thalbitzer 1904) or 'stress' (Pyle 1970). Both Rischel and Nagano-Madsen 1992 treat the language as having no lexical stress or accent and as being mora-counting.

Rischel (described in Mase 1973) analyses intonation as a terminal contour which is manifested on the last few vowel morae in a word. An important aspect of Rischel's analysis is his explicit claim that the terminal contour is manifested on a vowel mora basis and not on a syllable basis as described in Collis 1970. Five terminal tonal contours are proposed to characterize each phonological word. Using Rischel's terms, they are: (1) phrase-internal, (2) phrase-final, (3) yes-no question, (4) wh-question and (5) absolutely final contour. Since no question sentences were included in the material for the present study, (3) and (4) are not discussed in this paper.

According to Rischel's description, a phrase-internal contour is manifested on a word which is non-final in a phrase by high pitch on the last vowel mora, the penultimate one having in most cases slightly higher pitch than the neighbouring ones ('raised pitch'). The phrase-final contour is signalled by low pitch on the penultimate vowel mora whereas the antepenultimate and final ones have a high pitch (HLH). The absolutely final contour is manifested as the antepenultimate vowel mora having a high pitch while the last two segments have low-pitch (HLL). However, he mentions that the pattern of distribution of this type is not well known and is difficult to distinguish rigidly from phrase-final intonation.

Acoustic evidence for Rischel's analysis is presented in the extensive measurements by Mase 1973 as well as in the F0 contour by Nagano-Madsen 1988, using the phrase-final high-low-high contour. Figure 1 shows the F0 contour of the utterances [anáàná] 'mother', [atáàtá] 'father' and [ataátàá] 'his father' respectively. It is shown that the F0 contour is basically the same for all the three utterances when they are lined up at the end point. Different assignment arises depending on the mora composition of the carrier phrase.
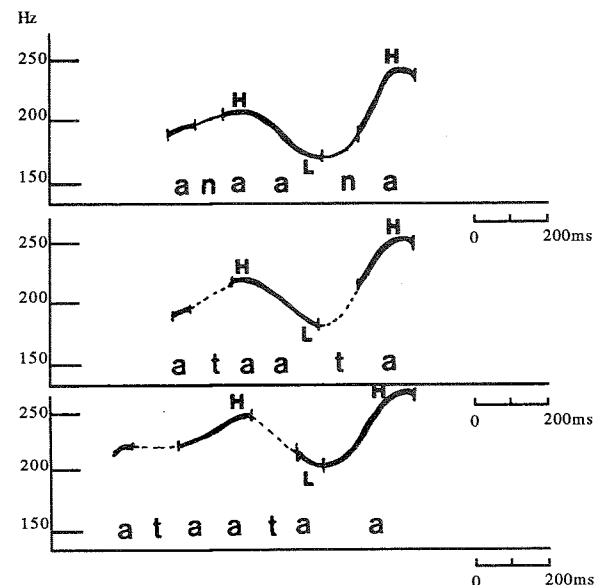
Figure 1. F0 contours for phrase-final intonation in Eskimo. Adopted from Nagano-Madsen 1988.

Material

One of the chapters from a current text book on Greenlandic which describes a Greenlandic town is used for analysis. A female native speaker read it at a comfortable speaking rate. The recording time was approximately 5 minutes. The material has been used previously for durational analysis (Nagano-Madsen 1992). The entire material was processed by the LUPP program installed on a Macintosh computer. One of the figures was processed using the PIP program.

Auditory analysis

The material was listened to carefully and a prosodic transcription was made by marking phrase-internal and phrase-final contours as well as short and long pauses (cf. Appendix). As already mentioned, there is no lexical category of stress or accent in West Greenlandic Eskimo. The perceived prominence was found to coincide with the high tone of the terminal contour, be that phrase-internal or phrase-final.

The text which was divided into 6 paragraphs included 148 phonological words and 29 sentences. Following the phrase-final intonation pattern described by Rischel, i.e. high-low-high or absolutely final high-low-low terminal contour, the text was divided into 64 phrases, which are described as intonation phrases in the present paper. There was considerable variation as to the size of intonation phrases. Some phrases consisted of only a single word, whereas in other cases it contained up to six phonological words. When a phrase contained only a single word, it was found to have some kind of focus, i.e. new as topic or semantic focus. In addition to intonation phrases, the auditory analysis has divided the text into 122 units based on the impressionistic pause. Longer pauses usually, but not always, coincided with sentence final positions.

The major disagreement between Rischel's description and the present transcription is the treatment of phrase-internal terminal contour, which appears towards the end of each phonological word that is not phrase-final. Rischel describes the phrase-internal terminal contour as high pitch on the last mora and raised pitch on the penultimate. However, the pitch of the last two morae was constantly perceived as high-low.

As for the phrase-final contour, the main problem was to determine whether it should be identified as high-low-high or high-low-low. The ambiguity arises from the treatment of the last tone since it was sometimes not clearly high or low but rather somewhere in between. Rischel says that a high-low-low pattern exists as absolute terminal contour, but he also mentions that the pattern of distribution of this type is not well known and it is difficult to distinguish it rigidly from phrase-final intonation.

In the present material, the high-low-high terminal contour was clearly perceived in 49 cases out of 64 instances whereas the rest of 14 cases were ambiguous regarding the status of the last tone. All the ambiguous ones, except for one case (no. 28), occurred in sentence final position. The clearly high-low-high ones occurred either in a single-word phrase or in multi-word phrases. In contrast, all the ambiguous ones except for one (no. 55), were preceded by one or more words belonging to the same phrase.

Acoustic analysis

The acoustic manifestation of each terminal contour, i.e. phrase-internal, phrase-final and absolutely final contours were examined with reference to the auditory analysis.
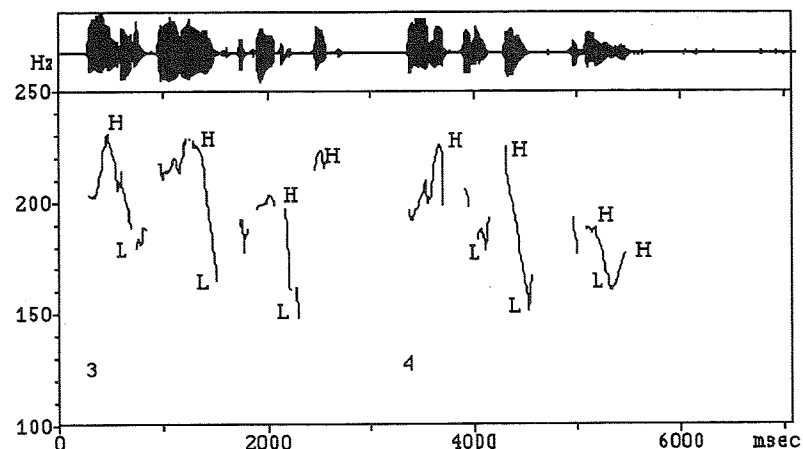

Figure 2. Manifestation of phrase-internal and phrase-final contours: (3) *kaáli aqqanilínnik ukióqàrpóq,* (4) *kaalállù arínèq sisámànik.*

As for the phrase-internal contour, there was a regular sharp drop in F0 value from the penultimate to the final vowel mora. The magnitude of F0 drop was found to be comparable to that of high-low in the phrase-final high-low-high contour. As for the phrase-final contour, there were considerable variations as to the F0 height of the last mora. In most cases, the F0 value of the last high was either higher than the previous high or nearly the same. However, there were some cases where the F0 value of the last mora was considerably lower than that of the previous high. In the former case, the terminal contour is clearly judged as high-low-high whereas the latter case exposes some ambiguities. In all the instances, however, there was a constant F0 rise no matter how small the gradient was.

Figure 2 shows a typical F0 contour of a single sentence consisting of two intonation phrases, each containing three words. In both intonation phrases, the first two words have a high-low terminal contour. The phrase-final high-low-high is clearly manifested on the first phrase while it is much reduced in the second phrase, where it is in sentence final position.

The exact height of F0 was found to differ considerably for the successive highs and lows since downdrift, i.e. the general downwards movement of F0, was observed in the majority of utterances. Downstepping, i.e. the successive lowering of highs and lows, was also very
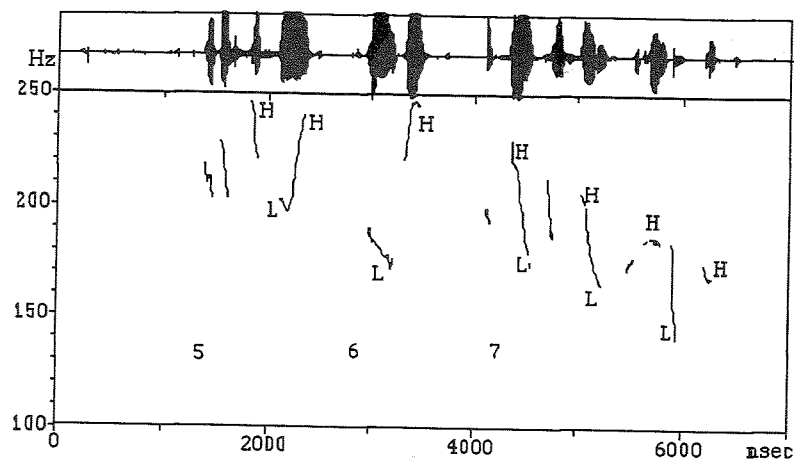
Figure 3. F0 contour of a single sentence consisting of three intonation phrases: (5) *Nukarleésàát,* (6) *Jaàkú,* (7) *arfínèq marlúnìk ukióqàrpóq.*

Figure 4. F0 contour of the two successive sentences: (34) *Taamaattúmìk aqqutaátàá,* (35) *ajorsisarnérà aámmà misigisárpàát,* (36) *Pisiníàrfìk,* (37) *iffiorfíllù immínnùt qánìppùt.*

commonly observed though there is a variation as to the exact nature of downstepping. The most common type of downstep was where both highs and lows are gradually lowered. In a considerable number of cases, only highs were downstepped. And in a few cases, only lows were downstepped.

Figure 3 shows the F0 contour of a single sentence composed of three intonation phrases. It appears that F0 is organized for the entire sentence making a single movement of downdrift. The word *Jaaku* (6) 'Jacob', which has the semantic focus in this sentence, is spoken as a single intonation phrase with expanded pitch range. Also, the first high of high-low-high seems to be missing in this phrase. After focus, there is a smooth downstepping of highs and lows towards the end of the sentence.

Although the majority of the data show that a sentence is the obvious domain for F0 to be organized, the existing literature suggest the possibility for F0 to be organized to an even larger unit such as successive sentences (Bruce 1982). Figure 5 below shows the F0 contour of two successive sentences (50 and 51, where 51 is also paragraph final) in overlapping manner, synchronized sentence initially.

Figure 4 shows the F0 contour of two successive sentences, each composed of two intonation phrases. The phrases 34 and 35 clearly form one unit of downdrift which coincides with a sentence. It is then followed
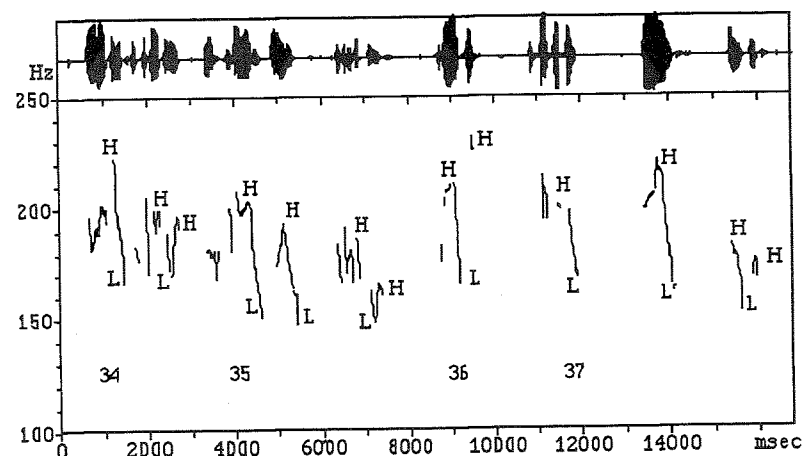
by another downdrift group consisting of phrases 36 and 37, which together form another sentence. Within the first sentence, the second phrase is distinguished by the lower values of highs and lows. Sentence final words are usually articulated weakly, which is indicated by the reduced amplitude of the waveform.

In Figure 5, the larger part of F0 is seen to coincide for the two sentences in F0 values whereas the F0 value of the sentence initial high as well as the sentence final high and low are higher in the first sentence (no. 50) than those in the second sentence (51). It may indicate that the actual F0 value is affected by the larger domain of prosody.

Alternative analyses

The auditory and acoustic analysis of the present text-reading material has led to an alternative analysis to that of Rischel's. The first is to change Rischel's raised-high of the phrase-internal contour to high-low. This analysis is more attractive in the sense that it becomes parallel to the descriptions of phrase-final contour which use only highs and lows. Auditorily, it was clearly perceived as high-low rather than raised-high and there was a sharp and regular F0 fall which supports the auditory analysis.
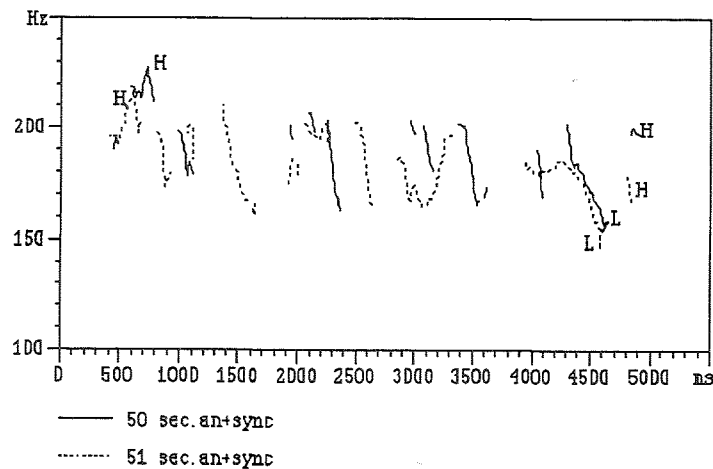
Figure 5. Two successive sentences shown in an overlapping manner: (50) *Oqalúffik pisóqàq illoqarfíùp qeqqaniîpóq,* (51) *Palásìp illúàloqaluffíùp qúlàátungaaniîpóq.*

The recognition of the phrase-internal contour as high-low leads to a further alternation regarding the phrase-final contour.

Next alternative is to split Rischel's phrase-final high-low-high contour into two constituents, namely high-low and high. (I owe this analysis of decomposition to Gösta Bruce.) Since high-low is now recognized on each word, only the last high is regarded as a phrasal property. The phrasal tone high is expected to appear on the last vowel mora in a phrase, shifting the word property high-low contour leftwards consequently. If a phrase has less than three vowel morae as in *mallit*, it will have a high-low pattern while leaving the first high unassociated. The tonal pattern in a word *anaata* is expected to shift as follows depending on whether it is phrase-internal or phrase-final.

1. Phrase-final
   A n á à n á. 'mother' (spoken in isolation)
      H L H

2. Phrase-internal.
   A n a á n à L e n é m ì k a t é q à r p ó q. 'Mother's name is Lene'.
     H L   H L   H L H

Following the above analyses, and following the distribution of the last tone which was perceived as being somewhat lower, Rischel's absolutely terminal contour high-low-low is accounted for by saying that the phrasal high is phonetically lowered when it coincides with the final position in a larger unit like sentence, provided that the word does not receive semantic focus. The loss of the first high in high-low-high in a few examples is interpreted as being where the phrasal component is dominant over the word component thereby weakening the F0 fall which is usually observed for a high-low-high sequence.

Thus, Eskimo intonation is characterized by a terminal contour which is associated with the hierarchical unit of word, phrase, and sentence. In addition, this pilot study has revealed the existence of downdrift and downstep in this language, which is likely to reflect syntactic and other parameters. However, the current material is very limited using data obtained from a single speaker. These alternative analyses, therefore, need to be confirmed with more speakers.

Acknowledgement

References
Bruce, G. 1982. 'Textual aspects of prosody in Swedish'. *Phonetica* 39, 247-287.

Collis, D.R.F. 1970. 'Études philologiques et linguistiques des langages esquimaux'. *Inter Nord, Revue Internationale d'Études Arctiques et Nordiques* 11, 263-282.

Mase, H. 1973. 'A study of the role of syllable and mora for the tonal manifestation in West Greenlandic'. *Annual Report of the Institute of Phonetics, University of Copenhagen* 7, 1-98.

Nagano-Madsen, Y. 1988. 'Phonetic reality of the mora in West Greenlandic Eskimo'. *Working Papers, Department of Linguistics and Phonetics, Lund University*, 34, 79-82.

Nagano-Madsen, Y. 1992. *Mora and prosodic coordination. A phonetic study of Japanese, Eskimo and Yoruba.* Lund: Lund University Press.

Petersen, R. 1970. 'On phonological length in the eastern Eskimo dialects'. *Folk* 11-12, 329-344.

Pyle, C. 1970. 'West Greenlandic Eskimo and the representation of vowel length'. *Papers in Linguistics* 3, 115-146.

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

Thalbitzer, W. 1904. 'A phonetical study of the Eskimo language, based on observations made on a journey in north Greenland'. *Meddelelser om Grønland* XXXI.

Appendix

Kaalikkut Kaalallu

1   Kaálì | Kaalállù | Kalaákkìt Nunaánnì illoqárfiít |
2   ilaánnì najugáqàrpóq.||
3   Kaálì aqqanilínnìk ukióqàrpóq |
4   Kaalállù arfínèq-|sisámànìk.|*
5   Nukarlérsàát |
6   Jaàkú |
7   arfínèq-marlúnìk ukióqàrpóq. ||*

8   Íllù || najugarísàát |
9   nutaájùvóq.||*
10   Illoqarfímmì | íllùt amerlánèrít |
11   assígàí.||
12   Illoqarfíùp | najugaátà aámmà illoqárfiít |
13   állàt | amerlanèrìt | assígàí. ||*
14   Íllùt | pisoqaanérìt | qattuninnguánì | inissisímàppút. |
15   Soórlù ílàát |
16   piaaralutìk | ámmùt | alakkártèrtút.||

17   Igalákkùt avámmùt | asikkivíat | pitsaáqàáq. ||
18   Silagissúmì aámmà silarluttúmì | avámmùt | isigalúnì | alutornártàrpóq. ||*
19   Silagissúmì | isígìsáq |
20   kusánàrtóq, |
21   silarluttúmì ilaánnì | màllìt |
22   amiilaárnàrtút! ||
23   Angallátùt | aggérsùt | tamármìk | érsittàrpút. ||
24   Umiasualívìk | tamármì | érsìppóq.||*
25   Ataátàp | pujortuleéràá |
26   aallarsimatinnánì | tasámà soórlù kisímì | takóqqùsóq.||

27   Ukiúkkùt | érmùp | qisússàllú |
28   majuunniarnéràt | pisariúsàrpóq |*
29   aqqútàá |
30   sivíngàsóq |
31   quasartàrmí.|*
32   kaálìp | Kaalállù | anaánàá|
33   ataatálu | pisassánìk | assigiinngitsúnìk | ikiortárpàát.|
34   Taamaattúmìk aqqutaátàá |
35   ajorsisarnérà | aámà | misigisárpààt. ||*

36   Pisiniàfík ||
37   iffiorfíllù | immínnùt | qánìppút.||*
38   Katersortárfìk | táaká. ||*
39   Tassánì filmértàrpút.||
40   Illúrsùft |
41   nioqqutíssàt ínàát |
42   aalisakkerívìllú |
43   ímmàp | killinganíìppút. |
44   Kæmnérìp | allàffiá |
45   tarrisímàvóq.||*
46   Utoqqáàt íllùát |
47   nuisalàârpóq.|
48   Kallérùp|-inniliorfíùp | pisorpálùá ||
49   illúmì | tusaasárpàát.||*
50   Oqalúffìk | pisóqàq | illoqarfíùp | qeqqaníìppóq. |
51   Palásìp illúá | oqaluffíùp qúlàá |
52   tungaaníìppoq.||

53   Íllùt | nutaaliáàsát|
54   qulerínnìk | inéqàrpút||
55   portunérìt | ínìt qulérìít |
56   sísàmát.||**
57   Sánnàvík,|
58   saffíòrfík |
59   amutivìllú ||
60   kangerliúmàrngúp |
61   qinnguaníìppút.||
62   Kaálìp kaalállù | atuarfíàt | illulíàt | nutaánèrít |
63   iágàát.||
64   Tássà illoqarfímmì | taasássàt | pingaánèrít.||

Note on transcription:
| and || represent short and long pauses respectively. This differs from the IPA transcription where . and .. are used for short and long pauses, leaving | and || for phrasing. It is to avoid confusion since in the present material, sentence final position is marked by a period (.). * represents the case where the pitch height of the last tone was not clearly high, whereas ** represents the case where the whole 'high-low-high' sequence was greatly reduced.