

# Phonetic reality of the mora in Eskimo

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## Introduction

Based on the results of a pilot study, this paper discusses to what extent such an abstract unit as "mora" is realized phonetically in West Greenlandic Eskimo (henceforth WGE). The mora is generally defined as a unit of timing that takes approximately the same length of time (e.g. Ladefoged 1975, p.224). Heavy syllables like CVV and CVC may be regarded as consisting of two moras, CV-V and CV-C, respectively.

## Pitch patterns of WGE words

The relevance of such a unit as the mora for the description of WGE has been most convincingly demonstrated in relation to pitch patterns. According to Rischel (1974, p.79), "phrase final neutral intonation contour high-low-high" is placed on the last three vowel moras rather than on the last three syllables.

## Examples

anaāna	ataāta	but	ataatāa
('mother')	('father')		('his father')

Examples of the pitch curves are shown in Fig. 1. Note that in all the words, pitch movements of the last three moras are very much alike when they are lined up at the end point. An important observation is that the pitch change takes place at mora boundaries and not at syllable boundaries. For example, in anaana, the most notable pitch change (rise) occurs in the last [na] starting from the onset of the consonant. Similar pitch movement is observable in the last [ta] for ataata though the earlier part is masked by the voiceless consonant. In the word ataataa, however, this pitch rise occurs only in the latter part of the last syllable [taa]. We assume that this portion that has the rise movement corresponds to the last mora [a]. Similar observations were made for the phrase internal intonation where the last mora, rather than syllable, has a pitch fall. The relevance of the point of pitch change for the perception of accent categories is discussed elsewhere in more general perspective (Nagano-Madsen and Eriksson forthcoming)

## Durational patterns of WGE words

It is then reasonable to assume that the mora also plays a role in determining the durational pattern of WGE words. Since the mora is defined as a constant time unit regardless of its segmental composition, we expect that the duration of a word can be captured, at least as a first approximation, in terms of the number of moras it contains. The following short experiment was designed in order to test this hypothesis.

Four phonological words made up of a nominative stem 'ataata (=father)' plus different affixes were prepared. They have an increasing number of moras and also contain various types of mora (i.e. CV, V, or C). They are all real words. A female subject read the list of words twelve times with the same intonation at moderate speaking rate. The durations of individual segments as well as of the whole word were measured from mingograms. The result is shown below:

	word	number of mora	duration in ms (S.D.)	ratio
1.	ataata	4	675 (31.0)	4.0
2.	ataataa	5	833 (35.7)	5.0
3.	ataataata	6	997 (41.9)	6.0
4.	ataatatta	6	978 (37.0)	5.9

In no. 2 one mora [a] is added, in nos. 3 and 4, two moras (a-ta or t-ta) are added. The mean duration of the word ataata was 675 ms. When one mora was added, it increased by 158 ms. When two moras were added, it increased either by 322 ms (no. 3) or by 303 ms (no. 4). Two observations were made. First, each additional mora increased the total word duration by roughly the same amount (152-161 ms). This is in contrast to languages with lexical stress such as English and Swedish that tend to keep the duration of a word relatively constant by adjusting the duration of a stressed vowel systematically when more and more unstressed syllables are added (Lehiste 1972, Klatt 1973, Lindblom and Rapp 1974, Port 1981). As there is no lexical stress in WGE, the duration of each segment in ataata, except for the last [ta] that is affected by prepausal position, stays basically the same for all four words.

Second, whether the mora is a CV, a vowel V, or a consonant C does not affect the duration of mora much. However there is evidence from the data above that a consonant mora C is slightly shorter than the other types of mora (cf. no. 4). This is in agreement with the figures obtained for the single-geminated ratios of this language. Geminated vowels have a higher ratio than consonants exceeding sometimes well over three times the length of a single one (Nagano-Madsen

forthcoming) while that of geminated consonants generally ranges between 2-3 that of a single one (Mase and Rischel 1971).

These points become clearer when the duration of each word is expressed in ratios with reference to the duration assigned to one mora. The total of the mean durations (3483 ms) was divided by the total number of moras contained in the material (21). We get 165 ms by this method and assume that it represents one mora at this speaking rate. The duration of each word was then simply divided by this figure. The ratio shows such a good correspondence to the number of moras that one can roughly predict the number of moras in a given duration, at least for the kind of material used here. Note that the regularity observed can only be captured in terms of constant temporal units (moras) and not in terms of segments or syllables. From a given duration, we can neither tell the number of segments nor the number of syllables it contains.

A syllable, defined in a traditional way, does not seem to play a significant role in determining the durational pattern for this language. Both nos. 1 and 2 consist of three syllables but their durations are very different. There is, however, an indication that a syllable is a relevant articulatory unit for this language as well since the duration of the last [t] in ataata was very similar in the first and second words when it occurred in prepausal syllable but much shorter in the third and fourth words.

The kind of regular mora-timing observed above was found not to exist to the same extent in a connected discourse (Nagano-Madsen forthcoming) but this is not contradictory to the perceptual impression since WGE sounds more mora-timed when spoken slowly. Likewise a strong version of mora, e.g. that each mora in WGE tends to be constant regardless of its inherent segment duration, was refuted (Nagano-Madsen 1983). At this point then, I am inclined to think that the reality of mora in the temporal dimension comes most strongly from the manifestation of the so-called single-geminated dichotomy discussed above. Since WGE is a typical quantity language in which most segments have this dimension of contrast, they are carefully manifested. Further study is needed in order to confirm some of the points made in this paper.

## References

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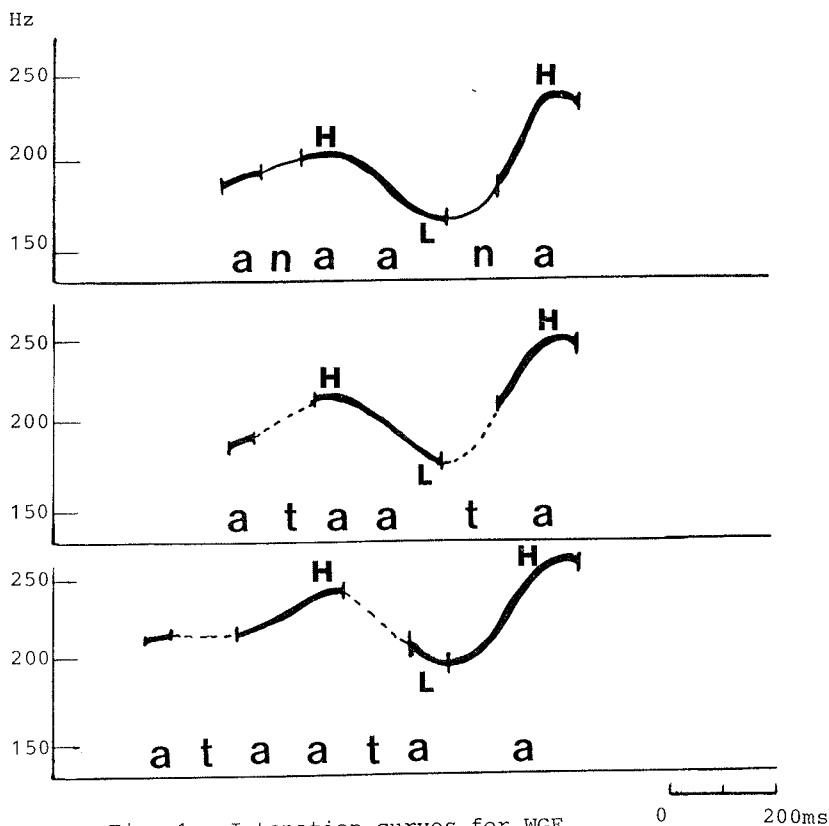


Fig. 1. Intonation curves for WGE.