

Normative preaspiration in Skolt Sami in relation to the distribution of duration in the disyllabic stress-group

Recent research has distinguished between normative and non-normative preaspiration (Helgason 1988, 1999a). The term *normative* refers to the fact that ...” the early timing of glottal abduction relative to oral closure in vowels preceding a voiceless stop consonant ... [is] an obligatory feature of the sequence of vowel and fortis stop”. (Helgason 1999a:1851) As a consequence of early voice offset before a stop or an affricate consonant, a noise resembling [h] is produced between the two segments. Durational patterns evident in Skolt Sami preaspiration indicate an interdependence between preaspiration duration and the duration of the two main stress-group locations (the first syllabic vowel and the stop or affricate consonant following). On account of this apparent interdependence it will be suggested that Skolt Sami preaspiration be considered as *constrained normative* preaspiration. It will further be argued that (i) there is an inverse relationship between prevocalic and preaspiration durations, and that (ii) preaspiration durations do not affect the characteristic ratio patterns associated with disyllabics belonging to different structural types.

1. Introduction

Preaspiration has long been considered to be an areal phenomenon in several Scandinavian and North-western European languages (Wagner 1964, Salmons 1992). Skolt Sami is one of those languages in which preaspiration is normative. While preaspiration in most regions of Scandinavia is non-normative,¹ Skolt Sami in this respect patterns with Icelandic in which preaspiration is obligatory, i.e., a normative feature of the vowel + voiceless stop sequence. In a recent paper Helgason argues that preaspiration has become normative in several languages and dialects in North-western Europe (Helgason 1999a). As will become clear below, the normative status of preaspiration in Skolt Sami is different from that in those languages and dialects which Helgason refers to in terms of the constraints apparent in the realization of preaspiration duration. Consequently, in addition to “normativeness”, reference has to be made to the durational pattern associated with Skolt Sami preaspiration; thus the term *constrained-normative* is suggested here as an appropriate characterization of preaspiration phenomena in Skolt Sami.

Although Sámi is well-documented as containing preaspiration, most of its dialects have not been sufficiently studied with regard to its phonetic properties. Preaspiration in Sami has been referred to by the term “voiceless vowel”² or, more recently, “voice offset time”.³ In a series of studies the issue of preaspiration duration in relation to the distribution of duration within the disyllabic stress group in Skolt Sami has been examined.⁴ The present paper further explores this issue by way of relating the normative status of the preaspiration to the apparent durational constraints.

The two sets of data – one obtained during the course of a controlled experiment, the other from spontaneous conversations – are presented in Section 2. The distribution of

¹ Non-normative preaspiration may be considered a general feature of all languages in Scandinavia (Helgason 1999).

² Liberman 1971.

³ Engstrand 1987.

⁴ McRobbie-Utasi 1991, 1992, 1999.

duration within the disyllabic stress group will be examined in connection with the data obtained during the course of (i) controlled experiment and (ii) spontaneous speech in Section 3. Discussion of the results and a summary of the findings will be presented in Sections 4 and 5 respectively.

2. Description of the data

This study examines preaspiration occurring in two speaking modes in the speech of two Skolt Sami subjects (both female, one a speaker of the Suonikylä dialect, the other of the Paatsjoki-Petsamo dialect).⁵ First, recordings were made in 1986 during the course of a controlled experiment; 63 target words with preaspiration were placed in a sentence frame and read three times by each speaker. The total number of test words suitable for acoustic analysis was 322. The recording was made with a Scully Full-Track Broadcast Machine tape recorder; the tape speed was 7.5” per second. The Signalyze software (Version 3.11) was used for the acoustic analysis of the data obtained during the controlled experiment. The second set of recordings was made of spontaneous conversations which took place around the same time in my home in Winnipeg, Canada, between the same two subjects. The data were analyzed with the Praat software, Version 3.9.13. The segmentation of preaspiration were made according to current practice: the onset of preaspiration was signalled by the presence of noise in formant frequencies above 750 Hz, the offset of preaspiration was identified at the beginning of the occlusion for the stop sound (Helgason 1999b).

3. The duration of preaspiration

Voiceless stops and affricates⁶ in Grades II and III occur with preaspiration in Skolt Sami. In examining the relationship between the duration of preaspiration and the relevant consonants in the two grades, the test words were grouped according to places of articulation. Details of the measurements obtained during the course of the controlled experiment were reported on in McRobbie-Utasi 1999; here it will suffice to provide a summary of these measurements.

3.1 Preaspiration durations: controlled experiment

3.1.1 Durations in grade alternation

The average duration of preaspiration in Grade II disyllabics is 63 msec; in Grade III disyllabics the average duration is 92 msec. The average duration of consonants in Grade II is 193 msec, in Grade III 270 msec. *Table 1* summarizes the measured durational values of preaspiration in relation to consonant durations in the two grades. In interpreting the tendency presented in the table, a correlation between preaspiration duration and consonant duration has to be recognized: longer preaspiration co-occurs with longer consonant duration

Table 1. Duration of preaspiration and duration of voiceless stops and affricates in Grade II and Grade III disyllabics

	Preaspiration duration		Duration of the following consonant	
	\bar{x}	SD	\bar{x}	SD
Grade II	63	12	193	31
Grade III	92	13	270	29

⁵ The speaker of the Suonikylä dialect lives in Sevettijärvi, the speaker of the Paatsjoki-Petsamo dialect lives in Nellimö.

⁶ The speaker of the Suonikylä dialect substitutes \check{z} with \check{s} .

The results of the durational measurements indicate that the difference in preaspiration durations between the two speakers is not significant. Further, place of articulation differences do not affect the duration of preaspiration.⁷

3.1.2 Preaspiration and prevocalic durations

The average duration of preaspiration in the two grades, together with the respective prevocalic durations, are presented in *Table 2*. Prevocalic durations average 175 msec in Grade II, and 148 msec in Grade III. It appears, then, that shorter prevocalic duration is associated with longer preaspiration duration. *Table 2* summarizes the obtained measurement values in relation to prevocalic durations.

Table 2. Preaspiration and prevocalic durations

	Preaspiration duration		Duration of the preceding vowel	
	\bar{x}	SD	\bar{x}	SD
Grade II	63	12	175	15
Grade III	92	13	148	11

The measurements pertaining to prevocalic durations do not show significant differences between the speakers of the two dialects.⁸ Vowel quality differences – with the exception of the close rounded vowel⁹ – do not appear to affect the duration of preaspiration.

In Skolt Sami there exists a compensatory relationship between the first syllabic vowel and the consonant(s) following it.¹⁰ The question that naturally arises here concerns the apparent arbitrariness with regard to the segment responsible for the differences in preaspiration duration: is it the duration of the stop or affricate, or the duration of the prevocalic segment, that affects preaspiration duration? As was argued earlier,¹¹ on the basis of research on preaspiration in other languages (most notably Icelandic),¹² prevocalic durations should be considered the crucial factor here. For example, Garnes states that preaspiration duration decreases with increasing duration of the preceding vowel, according with the tendency in Icelandic to maintain duration from the onset of the vowel to the onset of the consonant constant. The situation in Skolt Sami is similar in terms of maintaining durational patterns within the disyllabic stress group by assuring that the characteristic ratio values remain constant. Thus, by considering the Icelandic case where preaspiration durations could be related to prevocalic durations with more certainty, the arbitrariness apparent in Skolt Sami could thereby be resolved.

3.2 Preaspiration durations: spontaneous conversation

Data were examined containing preaspiration before stops in Grade II and Grade III disyllabics occurring during the course of spontaneous speech (see Section 2). One hundred words, fifty per speaker, were analyzed (arbitrarily the first fifty, as occurring in

⁷ Details of the analysis of preaspiration in relation to (i) dialect differences, and (ii) the place of articulation may be found in McRobbie-Utasi 1999.

⁸ *Ibid.*

⁹ It has been noted in earlier research that the feature [round] may be associated with the lack of preaspiration or with its decreased duration (Wolter 1965). This issue is somewhat problematic (for example, the opposite tendency has also been reported, see Tronnier 2002). In Skolt Sami there is no preaspiration attestable after the vowel /u/, or, if there is, its duration is significantly decreased in comparison with that of following other vowels (McRobbie-Utasi 1991, 1999).

¹⁰ For details of this issue see McRobbie-Utasi 1999.

¹¹ McRobbie-Utasi 1991, 1999.

¹² Haugen 1958, Garnes 1973.

an informal series of conversation). Because of the varied speech tempo, in addition to absolute durations, the ratios between the relevant segment durations were also computed. On the basis of findings stated in my earlier research (McRobbie-Utasi 1999), here it is hypothesized that the durational ratios between the two main stress-group locations (first syllabic vowel, and the consonant following) will remain constant regardless of the presence or absence of preaspiration. Variation in preaspiration durations as observed during the course of spontaneous conversations will thus be directly related to changes in absolute duration for the prevocalic segment and the stop consonant following preaspiration.

Tables 3 and 4 summarize the durational measurements together with the V/C ratio values for each of the two speakers¹³. Consonant duration (without preaspiration duration added) was chosen as the criterion for dividing the data into three groups. As shown in Section 3.1.1, in the two alternating grades the mean durations of the consonants were 193 and 270 msec respectively. The three groups representing variation in speech tempo are: (i) 200 – 240 msec (Grade II), 280-320 msec (Grade III); (ii) 160-199 msec (Grade II), 240-279 msec (Grade III), and (iii) 120-159 (Grade II), 200-239 (Grade III). The data presented thus in these three groups correspond with the measurement values relating to the varying speaking rates of the conversations; the first group representing the lowest, and the last group the fastest rate. The majority of data fall into one of the three groups; those falling outside of the values associated with these groups (a total of nine disyllabics for the two speakers) are disregarded here.

Table 3. Preaspiration durations together with the prevocalic and consonant durations (Grade II disyllabics)

	Speakers	Prevocalic duration		Preaspiration duration		Duration of the following consonant		V/C
		\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	
I	A	188	20	45	9	231	24	0.68
	B	206	24	40	7	238	31	0.74
II	A	147	16	39	10	174	26	0.69
	B	160	21	35	9	186	19	0.72
III	A	127	17	42	11	140	21	0.7
	B	145	18	40	11	158	18	0.73

Table 4. Preaspiration durations together with the prevocalic and consonant durations (Grade III disyllabics)

	Speakers	Prevocalic duration		Preaspiration duration		Duration of the following consonant		V/C
		\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	
I	A	138	22	71	11	292	29	0.38
	B	160	17	62	7	310	34	0.43
II	A	118	10	62	9	258	25	0.37
	B	117	9	70	12	272	27	0.4
III	A	107	12	51	8	211	26	0.41
	B	114	12	60	10	233	31	0.39

¹³ In Tables 3 and 4 “A” represents the speaker of the Suonikylä dialect, and “B” the speaker of the Paatsjoki-Pesamo dialect.

The measurement values presented in *Tables 3* and *4* clearly show the pattern predicted on the basis of the hypothesis spelled out above concerning the interdependence between preaspiration duration and the duration of the two main stress-group locations. The implications of this interdependence point to recognizing the importance of constant V/C durational ratios within the disyllabic stress group. It can be seen that, regardless of the varying speech rate, speakers of Skolt Sami tend to maintain the characteristic durational ratios that distinguish between disyllabics belonging to different morphological classes, in this case maintaining the ratios typical for disyllabics containing stops in Grades II and III¹⁴ -- ratio values in Grade II disyllabics 0.68-0.7 (for speaker A) and 0.70-0.74 (for speaker B); in Grade III disyllabics 0.37-0.42 (for speaker A) and 0.39-0.43 (for speaker B). It will be noted that ratio values have been calculated by adding the duration of preaspiration to the duration of the following consonants. As arguments for so doing have been discussed in detail elsewhere,¹⁵ in this context it will suffice to mention that consonant durations are comparable to those obtained for consonants without preaspiration – in other words, the presence or absence of preaspiration does not affect the realization of ratio values typical for a given group of disyllabics.

4. Discussion

The analysis of preaspiration duration in two speaking modes as presented above confirms the normativeness of this phonetic phenomenon of Skolt Sami. It also provides convincing evidence that “normativeness” in Skolt Sami is different from that observed in several Scandinavian languages (Helgason 1999a) in view of the durational pattern evident in the realization of preaspiration. On the basis of the controlled experiment, this pattern was examined in relation to prevocalic duration and the duration of the stop (or affricate) consonant following preaspiration. The correlation between these durations is illustrated in *Figures 1* and *2*. It may clearly be seen that preaspiration duration is not independent from the duration of the surrounding segments. There is a recognizable tendency for longer consonant durations (i.e., in disyllabics in Grade III) to occur with longer preaspiration. As was stated above, a compensatory relationship exists in Skolt Sami disyllabics between first syllabic vowel duration and the duration of the consonant(s) following. Consequently, shorter preaspiration duration will also co-occur with longer prevocalic duration (i.e., disyllabics in Grade III).

The analysis of preaspiration in spontaneous conversations presented here is no more but preliminary, due to the relatively low number of data examined. In studying the durational characteristics of disyllabics occurring in speech of varying rate the objective was to see whether different absolute durational realizations affected the characteristic durational ratios. Results indicate that these ratios remain relatively stable (see above). *Figures 3* and *4* summarizes the tendency of ratios to be maintained in relation to the three groups representing differing speech tempi.

¹⁴ Structural Types 1 and 6(a)₂ in McRobbie-Utasi 1999.

¹⁵ McRobbie-Utasi 1991, 1999.

Figure 1. Preaspiration duration of Grade II and Grade III disyllabics in relation to the duration of the following consonant

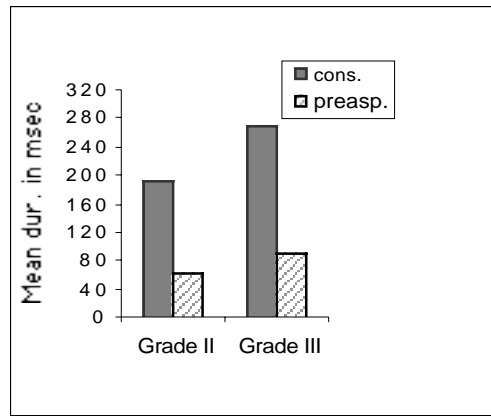


Figure 2. Preaspiration duration of Grade II and Grade III disyllabics in relation to prevocalic duration

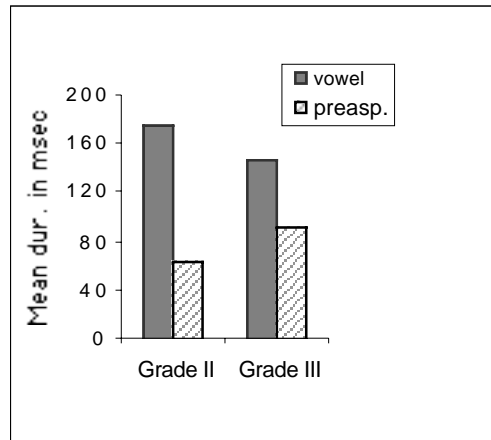


Figure 3. Preaspiration duration of Grade II and Grade III disyllabics in relation to V/C ratios at varying rates (speaker A)

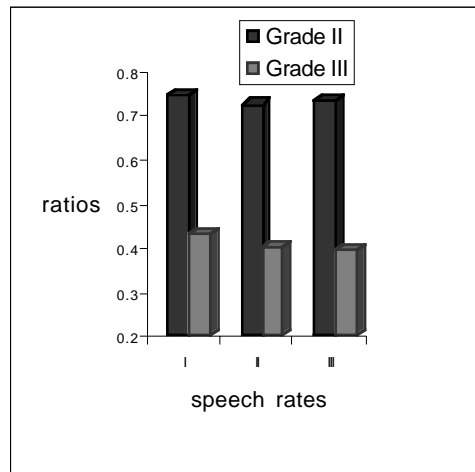
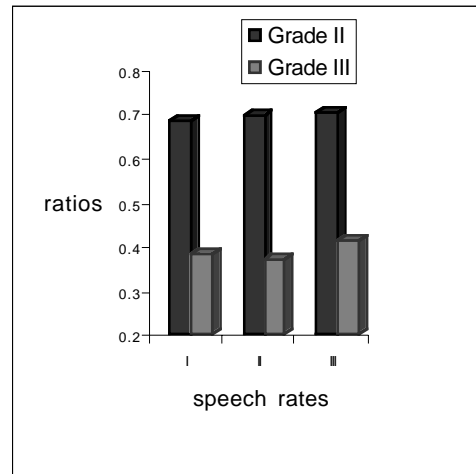


Figure 4.

Preaspiration duration of Grade II and Grade III disyllabics in relation to V/C ratios at varying rates (speaker B)



5. Summary

Two hypotheses were posited in connection with durational patterns apparent in the realization of Skolt Sami preaspiration. According to the first hypothesis, an inverse relationship exists between prevocalic and preaspiration duration. This hypothesis is upheld on the basis of the results emerging from the analysis of preaspiration in the controlled experience. The second hypothesis stated that preaspiration durations do not affect the characteristic ratio patterns associated with disyllabics belonging to different structural types. It was found during the course of analyzing preaspiration occurring in spontaneous conversations that ratio values do indeed remain stable. (This latter finding, however, have to treated with caution due to the relatively small database).

The consequences of these findings with regard to the characteristics of preaspiration in Skolt Sami tend to support the assumption stated earlier in this paper concerning the kind of normative preaspiration unique to this language -- i.e., it is not only an expected phonetic feature, but its manifestation is constrained by the interdependence within the disyllabic aimed at maintaining V/C durational ratios. For this reason, it is suggested that preaspiration in Skolt Sami be termed *constrained normative*.

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