

LIVONIAN STØD AND LENGTHENING DIRECTION¹

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Abstract: *The goal of this paper is to propose an analysis of Livonian stød (i.e. a laryngeal phenomenon occurring after the stressed vowel and phonetically realized as a falling tone, a creaky voice, or a glottal stop). The stød always co-occurs with a branching segment: a branching stressed nucleus, or a branching consonant. This lengthening of a segment in co-occurrence with the stød is predictable and, consequently, should not be included in the underlying lexical representation. However, the direction of the lengthening process (targeting either the stressed vowel or the following consonant) is not predictable and seems to be lexically determined. To account for the distribution of Livonian stød and the direction of lengthening, I propose that the stød involves two distinct underlying representations. In case of vowel lengthening, the stød is the realization of a segment (a glottal stop stemming from Proto-Fennic *h). And in case of consonant lengthening, the stød is analyzed as an expletive realization of an additional mora provided by stress.*

Keywords: *Livonian, stød, phonology*

1. Introduction²

Livonian (Fennic, Latvia) shows a laryngeal phenomenon – called stød and transcribed with [ʔ] – implied in the stressed syllable of numerous words. Independently of the context, this stød can be realized as: **i.** a falling tone; **ii.** a creaky voice; or **iii.** a glottal stop. (Kettunen, 1938:xxi; Posti, 1942:318; Pajupuu and Viitso, 1986:272; Viitso, 2007:47; Tuisk, 2014:269; among others). In this paper, I deal with the fact that this stød always involves a branching segment in disyllabic words³. This branching segment can be: **i.** the stressed nucleus (1a); or **ii.** the following consonant (1b).

¹ I would like to thank all the participants of IGG and the two anonymous reviewers for their helpful comments and remarks.

² Transcription is in IPA, except that: i. stressed nuclei are underlined; and ii. I follow the transcription of Thomsen (1890) for the stød: [ʔ]. The use of moraic representations despite some considerations in terms of Element Theory is a deliberate choice. My proposal starts from Kiparsky's analysis, which is based on moraic representations. Accordingly, I chose to maintain these moraic representations for convenience, but the differences with the x-slot representation are not relevant in this paper.

³ Except in disyllabic words stemming from trisyllabic words (e.g. *molempat > mo'lməd).

(1) Examples of branching segments co-occurring with stød

	e.g.	gloss
a.	<u>pu</u> 'udəz	<i>pure</i>
	vi'iri	<i>yellow</i>
	nɔ'ɔgə	<i>skin</i>
b.	ki'zzə	<i>to ask</i>
	pu'nni	<i>red</i>
	u'bbi	<i>horse</i>

The issue is that the *direction* of this lengthening (i.e. whether the branching segment is the stressed nucleus or the following consonant) is unpredictable in synchrony. My aim is to give a synchronic account to the fact that the lengthening involved by stød in disyllabic words does not always have the same direction (see 1). My hypothesis is that the stød that involves a vowel lengthening and the stød that involves a consonant lengthening do not have the same underlying representations. Based on phonotactic facts, I argue that the first is a segment belonging to the same natural class as sonorants, while the second is basically the expletive realization of a skeletal space introduced by stress.

In the **first section**, I give a brief overview of the basic facts concerning the synchrony and diachrony of Livonian stød. I point out that diachrony does not formally account for the direction of the segment lengthening involved by stød. In the **second section**, I address the synchronic representation of the stød involving a vowel lengthening. I show that vowel lengthening is not only restricted to the occurrence of stød: it can also be observed before short coda sonorants. Then, I argue that sonorants and glottal stop (which is one of the realizations of Livonian stød) belong to the same natural class: consonants without an [h] (i.e. *noise*) element (following the *element theory* introduced in Kaye, Lowenstamm and Vergnaud, 1985, 1989; Harris, 1990). Finally, in the **third section**, I show that the stød involving a consonant lengthening is the expletive realization of an additional skeletal space introduced by stress, the surface assimilation of which can result in a consonant lengthening.

2. Synchrony and diachrony of Livonian stød

In this section, I first introduce the synchronic properties of stød that are relevant for this study. Then, I give a brief summary of the diachronic analyses proposed in Wiik (1989) and Kiparsky (2006). I point out that neither the distribution of the stød nor its historical origin accounts for the lengthening direction.

2.1. Synchrony

Synchronically, Livonian stød shows three main properties: **i.** it occurs only in stressed syllables; **ii.** it is metrically conditioned by the quantity of the unstressed nuclei; and **iii.** it always involves a branching segment in (original) disyllabic words.

2.1.1. *Stød and stress*

First of all, Livonian stød occurs in stressed syllables only⁴ (2). The stressed syllable is usually the first syllable of the word (e.g. ka' llə), but it can also be the second syllable in a prefixed word (e.g. ispi' ddə).

(2) Examples of stressed vowels with stød

e.g.	gloss
ka' llə	fish (PartSg)
lu' ggəbəd	read (3Pl)
ispi' ddə	support (Inf)

2.1.2. *Stød and metrical conditioning*

Second, Livonian stød occurs only if the word does not show any branching unstressed vowel (3a). If a branching vowel is present in the unstressed syllable, then the stød never occurs (3b). This gives rise to the so called *consonant gradation*: i.e. a consonant alternation implying the consonant material of the root and conditioned by the quantity of the unstressed syllable (Lehiste *et al.*, 2007; Tuisk and Teras, 2009)⁵. The form with more consonant material is called *strong grade* (3a), and the form with less consonant material is called *weak grade* (3b).

(3) Correlation between the occurrence of stød and the length of the unstressed nucleus

a.	context	e.g.	gloss	b.	context	e.g.	gloss
	_V	su' g	relative		_VV	suguud	relatives
		pi' ni	dog			piniid	dogs
		ka' llə	fish (PartSg)			kālaa	fish
		pu' udəz	pure			-	
		vi' iri	yellow			-	
		nə' əgə	skin			-	

⁴ The stød can also sometimes be observed after a long final vowel in Eastern Livonian (Kettunen, 1938:xxi). However, this stød is not as strong as in stressed syllable.

⁵ Note that words with a vowel lengthening before stød do not alternate (see Lehiste *et al.*, 2007). This fact is not relevant for the present study. See Enguehard (2016a; 2016b) for a more precise description.

2.1.3. *Stød and length*

Last but not least, Livonian stød always involves a branching segment in original disyllabic words (4). Unpredictably, this branching segment is sometimes the preceding nucleus (4a), and sometimes the following consonant (4b).

(4) Examples of branching segments co-occurring with stød in disyllabic words

	e.g.	gloss
a.	<u>p</u> u'udəz	<i>pure</i>
	vi' <u>i</u> ri	<i>yellow</i>
	nə' <u>ɟ</u> gə	<i>skin</i>
	ɟ' <u>ɟ</u> gi	<i>grey</i>
	<u>u</u> 'udəg	<i>eve</i>
	næ' <u>æ</u> də	<i>to see</i>
b.	ki' <u>z</u> zə	<i>to ask</i>
	pu' <u>n</u> ni	<i>red</i>
	<u>u</u> 'bbi	<i>horse</i>
	ka' <u>l</u> lə	<i>fish (PartSg)</i>
	su' <u>g</u> gə	<i>relative (PartSg)</i>
	lu' <u>g</u> gə	<i>to read</i>

The co-occurrence of lengthening and stød is not restricted to disyllabic words. In monosyllabic words, the stød can co-occur with a branching nucleus (5a), but it never co-occurs with a geminate (5b).

(5) Examples of monosyllabic words showing a stød

	e.g.	gloss
a.	r <u>ɟ</u> 'ɟ	<i>money</i>
	m <u>ɟ</u> 'ɟ	<i>earth (IllSg)</i>
	ni' <u>i</u> ni	<i>strip of bark</i>
b.	su' <u>g</u>	<i>relative</i>
	ve' <u>ɟ</u>	<i>water</i>
	lu' <u>g</u>	<i>read!</i>

Thus, on the one hand, the lengthening involved by the stød is predictable (i.e. it always occurs in disyllabic words): it should not be part of the lexical representation:

the lexical Entry [...] must contain just enough information for the rules [...] to determine its phonetic form in each context; [...] the lexical entry must contain no indication of the effect of context on the phonetic form.

(Chomsky and Halle, 1968:11-12)

But on the other hand, the *direction* of this lengthening (i.e. whether the stressed vowel or the following consonant lengthens) is not predictable: it seems to be lexically motivated⁶. In sum, the question is: how to account for the lexically motivated direction of a redundant lengthening involved by stød?

In the following sub-section, I show that the diachronic analyses of the stød proposed in Wiik (1989) and Kiparsky (2006) offer some possible avenues of research, but I argue that they do not totally solve the issue of the lengthening direction.

2.2. Diachrony

Diachronically, Wiik (1989), Kiparsky (2006) and Viitso (2007) agree that Livonian stød is conditioned by: **i.** a resyllabification; **ii.** a *former* boundary (Wiik, 1989) or a tonal contour (Kiparsky, 2006); and **iii.** stress. In the following: **i.** I recall how their analysis accounts for the correlation between lengthening and stød; but **ii.** I point out that it does not account for the lengthening direction.

2.2.1. Lengthening

The main generalization highlighted in Wiik (1989:103) about the genesis of Livonian stød is the following: all syllables with a stød underwent a resyllabification. This resyllabification is due to the following three main mechanisms: **i.** vowel deletion (6a); **ii.** consonant deletion (6b); and **iii.** gemination (6c).

(6) Genesis of Livonian stød (adapted from Wiik, 1989:103)

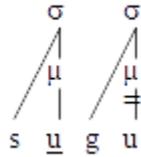
	Proto-Fennic	Livonian
a.	*va.lo	> va'l
	*mo.lempat	> mo'lməd
	*lu.mi	> lu'jm
b.	*ra.ha	> ra'ɔ
	*rii.hi	> ri'i
	*vihma > *vi.hima	> vi'im(ə)
c.	*ka.lađa	> ka'llə
	*vanhađa > *va.nađa	> va'nnə

⁶ Note that long segments can occur without any stød (e.g. kiittə 'to say'). This implies that the stød triggers a lengthening, not the contrary.

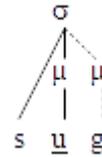
Following Kiparsky (2006), these three mechanisms give rise to the same configuration: a free mora occurring in the stressed syllable. In the case of vowel deletion (6a), the mora previously assigned to the deleted vowel (7a) links to the preceding consonant (which becomes a coda) (7b). There is no lengthening in this case.

(7)

a. *sug



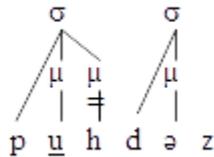
b. su'g



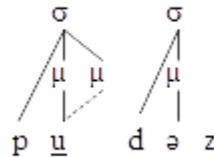
In the case of consonant deletion (6b), the mora previously assigned to the deleted consonant (8a) links to the preceding nucleus (which becomes branching) (8b).

(8)

a. *puhdəz



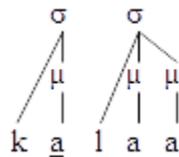
b. pu'udəz



Finally, in the case of gemination (6c), an additional mora is added in order to repair a former marked Light+Heavy foot (9a) into a new Heavy+Light foot (Kiparsky, 2006:11-13) (9b). This additional mora links to the consonant that follows the stressed vowel.

(9)

a. *kalaa



b. ka'llə



2.2.2. Stød

As for the genesis of Livonian stød itself, it is indirectly conditioned by the previously mentioned resyllabification. Following Wiik (1989:103), the stød is the realization of a

former syllable boundary losing its original function after resyllabification. See Table (10): Livonian stød always corresponds to the place of a syllable boundary in Proto-Livonian.

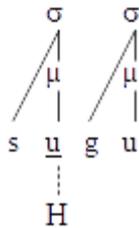
(10) Examples of støds stemming from a syllable boundary (adapted from Wiik, 1989:103)

Proto-Fennic	Livonian
*va.lo	> v <u>a</u> 'l
*mo.lompat	> m <u>o</u> 'lməð
*lu.mi	> l <u>u</u> 'jm
*ra.ha	> r <u>ə</u> 'ə
*rii.hi	> ri' <u>i</u>
*vihma > *vi.hima	> vi' <u>i</u> m(ə)
*ka.laða	> k <u>a</u> 'llə
*vanhaða > *va.naða	> v <u>a</u> 'nnə

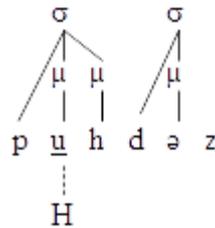
Kiparsky (2006:4-8) proposes another explanation based on stress and tones. He first assumes that stress assigns an H tone to all tone-bearing segments (i.e. voiced segments) of the stressed syllable (11).

(11)

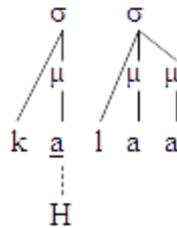
a. *sugu



b. *puhdəz



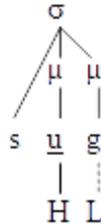
c. *kalaa



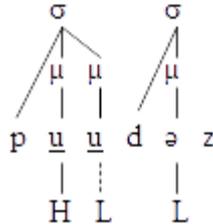
After resyllabification, this rule does not apply anymore, and an L tone is assigned (by default) to all new tone-bearing segments (12). It results a falling tone (which is one of the possible realizations of stød).

(12)

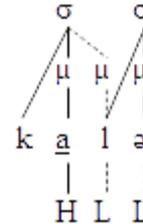
a. su'g



b. pu'udəz



c. ka'llə



In sum, the analyses proposed by Wiik (1989) and Kiparsky (2006) account for the correlation between stød and lengthening in disyllabic words. However, I argue that they do not satisfactorily explain the fact that this lengthening can concern both the stressed vowel and the consonant following the stød.

2.2.3. Lengthening direction

Following Kiparsky (2006), both vowel lengthening and consonant lengthening are due to a mora released after resyllabification. However, vowel lengthening more specifically stems from an h-dropping (Kettunen, 1938:xi-xii; Posti, 1942:319-320; Kiparsky, 2006:7-8) (13). Consonant lengthening does not: it always stems from a foot repair (6c-9).

(13) Examples of long vowels stemming from h-dropping (Enguehard, 2016a)

Livonian	gloss	cognate
pu'udəz	<i>pure</i>	fi. puhdas 'pure'
vi'iri	<i>yellow</i>	fi. vihreä 'green'
nə'əgə	<i>skin</i>	fi. nahka 'leather'
næ'ædə	<i>see</i>	fi. nähdä 'see'
kə'ədəks	<i>eight</i>	fi. kahdeksan 'eight'

The question is: why is a free mora linked to the preceding vowel when it stems from a consonant deletion, while it is linked to the following consonant when it stems from a foot repair?

Kiparsky does not give a clear analysis of the mechanism that involves h-dropping and/or vowel lengthening: *'whether this happens by assimilation or by deletion plus compensatory lengthening is immaterial for the analysis'* (Kiparsky, 2006:8). For his part, Wiik (1989) supposes that vowel lengthening is first due to a *total harmony*. In other terms, the stressed vowel is copied directly after the coda h (14b). Then, h is dropped and it result a stressed branching nucleus (14c). This step in the diachronic derivation of the stød is absolutely necessary for Wiik's analysis: without total harmony, the position of stød does

not correspond to the position of a former syllable boundary losing its function in Livonian (compare *vih.ma* and *vi'i.m*: the syllable boundaries are in the same position).

(14)

a. **vih*ma

b. > **vi*.hima

c. > *vi'i*m(ə)

The hypothesis of a former trisyllabic form of words with h-dropping is supported by the fact that the vowel /a/ is reduced or dropped when it occurs in an open third syllable (Kettunen, 1938:xxvi-xxvii). However, it must be emphasized that this phenomenon can also be observed after a branching nucleus in disyllabic words (e.g. *luud(ə)*, *fi. luuta*, see Kettunen, 1938:xxv). Thus we can also admit that the reduction of the final /a/ in **vih*ma > *vi'i*m(ə) is due to the presence of a branching nucleus on its left (a hypothesis which is not refuted in Kettunen, 1938:xxvi). Thus Wiik's hypothesis about vowel lengthening turns out to be to some extent *ad hoc*.

In sum, I recalled that the lexically motivated distribution of vowel lengthening and consonant lengthening is diachronically predictable: consonant lengthening stems from a foot repair, while vowel lengthening stems from an h-dropping. However, diachrony does not explain the lengthening direction in itself. In other words: why h-dropping triggers a vowel lengthening in Livonian, and not a consonant lengthening (compare for example Old Norse *sótti* with Old English *sōhte*)?

In the following sections, I propose a synchronic analysis of lengthening direction. Diachronically, it was pointed out in this section that the stød involving a vowel lengthening and the stød involving a consonant lengthening have two different origins. Synchronically, I will show that they have two different underlying representations which motivate the lengthening direction.

3. Synchronic conditioning of vowel lengthening

In this section, I show that the occurrence of redundant branching nuclei in stressed syllable is not restricted to the occurrence of a stød. It can also be observed before a short coda sonorant. Then I show that a generalization can be proposed to account for the fact that nuclei are branching before both **i.** short coda sonorants and **ii.** the stød stemming from an h-dropping.

3.1. Vowel lengthening in Livonian

Vowel length is contrastive in Livonian weak grade forms. Nevertheless, it is always neutralized in two specific contexts: **i.** before short coda sonorants; and **ii.** before *virtual* sonorant geminates.

3.1.1. Before short coda sonorants

First, before a short coda sonorant, all stressed nuclei are branching (Kettunen, 1938:xxii, xxxvii) (15).

(15) Examples of branching nuclei before a short coda sonorant (Enguehard, 2016a)

e.g.	gloss
<u>a</u> ambaz	<i>tooth</i>
<u>a</u> andab	<i>to give (1/3Sg)</i>
<u>n</u> iin	<i>town</i>
<u>l</u> aambaz	<i>sheep</i>

It must be emphasized that these branching nuclei have some specific properties: **i.** they do not involve the reduction of /a/ in the unstressed syllable (see Kettunen, 1938:xxv, mentioned in the preceding section); and **ii.** they alternate with a short nucleus in the *strong grade* (16).

(16)

Weak grade	Strong grade	gloss
<u>j</u> aalga (NomSg)	<u>j</u> al:gə (PartSg)	<i>legg</i>
<u>æ</u> ærga (NomSg)	<u>æ</u> er:gə (PartSg)	<i>beef</i>
<u>l</u> aambaz	<u>l</u> am:bə (GénSg)	<i>sheep</i>

3.1.2. Before virtual sonorant geminates

The second context in which stressed nuclei are systematically branching is a bit more complex. Weak grade sonorant onsets that are not preceded by a stød in the *strong grade* (17b) – as compared to weak grade sonorant onsets that are preceded by a stød in the *strong grade* (17a) – share the same property as short coda sonorants: they are systematically preceded by a branching nucleus, which is shortened in the strong grade.

(17) Examples of consonant gradations targeting sonorants

	Weak grade	Strong grade	gloss
a.	<u>k</u> alaa (NomSg)	<u>k</u> a'llə (PartSg)	<i>fish</i>
	<u>v</u> araa	<u>v</u> a'rrə	<i>power</i>
	<u>p</u> iñiid	<u>p</u> i'nj	<i>dog</i>
b.	<u>p</u> əəlab (1/3SgPres)	<u>p</u> al:lə (Inf)	<i>pray</i>
	<u>n</u> əəra (NomSg)	<u>n</u> ar:rə (PartSg)	<i>water nymph</i>
	<u>k</u> əəna (NomSg)	<u>k</u> an:nə (PartSg)	<i>pot</i>

Short coda sonorants (see the preceding sub-section) and the sonorant onsets alternating with an overlong geminate (17b) share another property: they can co-occur with a short non-reduced /a/ in the unstressed syllable (compare 16 and 17b). This is never the case with another consonant (see Kettunen, 1938:xxv). Consequently, weak grade sonorant onsets

alternating with an overlong geminate in the strong grade behave like codas. This is systematically verified by diachronic facts (Kettunen, 1938:xxxvii) (18).

(18) Sonorant onsets alternating with overlong geminates stem from codas

Livonian	cognate	gloss
pɔ̃lab (1/3SgPres)	fi. palvon	<i>pray</i>
nɔ̃ra (NomSg)	es. narr	<i>water nymph</i>
kɔ̃na (NomSg)	fi. kannu	<i>pot</i>

Accordingly, I assume that these onsets are *virtual geminates* (Ségéral and Scheer, 2001): underlying branching consonants that are realized as singletons but behave like codas (19).

(19) Representation as virtual geminates

Underlying form	Weak grade	Strong grade	gloss
/palla-/	pɔ̃lab (1/3SgPres)	pal:lə (Inf)	<i>pray</i>
/narrä-/	nɔ̃ra (NomSg)	nar:rə (PartSg)	<i>water nymph</i>
/kanna-/	kɔ̃na (NomSg)	kan:nə (PartSg)	<i>pot</i>

In sum, I showed that the systematic occurrence of a preceding branching nucleus is basically a property of short coda sonorants. In the following sub-section, I show that a generalization is possible between this case of vowel lengthening and the vowel lengthening occurring before a stød.

3.2. Stød and vowel lengthening

3.2.1. Generalization

The fact that only sonorants involve a vowel lengthening is correlated to the fact that these consonants are produced with a continuous and non-turbulent airflow. Accordingly, they are likely to maintain the production of a preceding vowel longer than obstruents do.

In the frame of element theory (Kaye, Lowenstamm and Vergnaud, 1985, 1989; Harris, 1990), this property of sonorants is represented by the absence of a *noise* feature, represented with the element [h]. Thus, I assume the generalization in (20).

(20) Nuclei are branching when they precede a coda with no element [h].

In the following sub-section, I argue that the stød involving a vowel lengthening is a segment /ʔ/ that belongs to the same natural class as sonorants.

3.2.3. *Stød as a segment*

First, recall that: **i.** one of the parametric realizations of stød is a glottal stop (i.e. a segmental realization); and **ii.** the stød that involves a vowel lengthening stems from an h (i.e. a segment). For these two reasons, de Sivers (1965, 2001:20-23) proposes to analyse this stød as an underlying segmental unit. In Enguehard (2016a), I bring a new synchronic argument to support this view: given that stød involves a skeletal space (i.e. a mora), it cannot be an underlying *suprasegmental* property, because:

il n'y a aucun phonème qui consiste exclusivement en particularités prosodiques. Ces particularités sont plutôt liées, selon les langues, à un phonème vocalique déterminé.
[There is no phoneme that consists exclusively in prosodic properties. These properties are rather bounded, depending on the language, to a specific vocalic phoneme.]

(Trubetskoj, 1939:96)

Henceforth, I assume a segmental representation of the stød stemming from Proto-Fennic *h. At this stage of the analysis, coda sonorants and the stød involving a vowel lengthening share a first common property: they are short coda segments.

3.2.4. *Stød as a segment with no /h/*

Now, the question is: are there some supporting facts to argue that both coda sonorants and the stød involving a vowel lengthening belong to the same natural class? It could be arbitrary assumed that the stød that involves a vowel lengthening is an underlying sonorant. This motivates the direction of the lengthening according to the generalization in (20). However, such a supposition is not based on any diachronic or synchronic fact.

Diachronically, the quality of the segment triggering the stød at issue is /h/. However, /h/ does not belong to the same natural class as sonorants: it contains the *noise* element |h| (in fact, /h/ is the realization of |h|, see Harris, 1990:263). But it is not sure that h itself involved vowel lengthening. This may have been involved by a reflex of h.

Synchronically, I mentioned that Livonian stød can be parametrically realized as a glottal stop. Following the *element theory*, glottal stop is the realization of an isolated |ʔ| element (Harris, 1990:263). In other words, glottal stop does not have any |h| (i.e. noise) element in its melodic structure. Accordingly, it belongs to the same natural class as sonorants in Livonian: i.e. |h|-free consonants.

In sum, I showed that the synchronic distribution of length in stressed syllables supposes that the stød involving a vowel lengthening is a segment: a glottal stop stemming from an h. This analysis gives a synchronic explanation of the vowel lengthening direction, based on distributional and phonetic facts: **i.** branching nuclei are systematically found before an |h|-free consonant; and **ii.** glottal stop, which is |h|-free, is one of the possible realizations of Livonian stød noticed in Kettunen (1938)⁷. Thus, we expect a lengthening of vowels before a stød⁸.

⁷ As for the tonal and ‘creaky voice’ realizations of Livonian stød, tonogenesis shows us that they can be derived from a glottal stop (Haudricourt, 1954; Maran, 1971; Thurgood, 2002; among others).

⁸ About the realization of the stød *inside* the long stressed vowel (e.g. puudəz ‘pure’), see Enguehard (2016a).

In the following section, I address the representation of the stød involving a consonant lengthening.

4. Synchronic conditioning of consonant lengthening

The occurrence of redundant consonant lengthening in stressed syllable is not restricted to the occurrence of stød. It is also observed in the strong grade of words implying a coda in the weak grade. First, I point out that this consonant lengthening with no stød and the stød involving a consonant lengthening are in complementary distribution. Second, I show that the foot repair of Kiparsky (2006) does not satisfactorily account for this complementary distribution. Finally, I argue that the stød that involves a consonant lengthening results from a skeletal space introduced by stress, as it was proposed for Danish stød in Larsen (1994).

4.1. Consonant lengthening in Livonian

4.1.1. Two types of consonant lengthening

Consonant lengthening systematically occurs in the stressed syllable of strong grade forms (i.e. when the word does not show any branching nucleus). This consonant lengthening can co-occur with a stød (21a), or without (21b).

(21) Examples of consonant lengthening in the strong grade form

	Weak grade	Strong grade	gloss
a.	<u>s</u> u <u>g</u> uud (NomPl)	su'g (NomSg)	<i>relative</i>
	k <u>i</u> zuub (1/3SgPres)	ki'zzə (Inf)	<i>to ask</i>
	ka <u>l</u> aa (NomSg)	ka'llə (PartSg)	<i>fish</i>
b.	ta <u>p</u> paab (1/3SgPres)	tap:pə (Inf)	<i>to kill</i>
	u <u>s</u> kuub (1/3SgPres)	us:kə (Inf)	<i>to believe</i>
	aa <u>n</u> dab (1/3SgPres)	an:də (Inf)	<i>to give</i>

These two types of lengthening in (21a, b) are in complementary distribution: **i.** the stød occurs in *underlying* open syllables (see the weak grade in 21); but **ii.** it does not occur in underlying closed syllables.

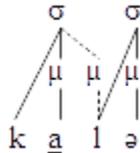
4.1.2. Representation of consonant lengthening with no stød

Recall that, following Kiparsky (2006), consonant lengthening diachronically results from a foot repair (i.e. a marked Light+Heavy foot is repaired into a Heavy+Light foot). The additional mora involved by the foot repair is assigned: **i.** to the following onset in open syllables (the onset becomes a geminate) (22a); or **ii.** to the coda in closed syllables

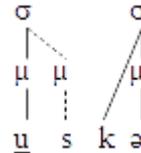
(the coda becomes long)⁹ (22b). In other terms, the free mora is assigned to the consonant that directly follows the stressed syllable.

(22)

a. kaʔllə



b. us:kə



In the second case (22b), the coda does not receive any L tone by default, because it already belonged to the stressed syllable before foot repair. Thus, if the coda is tone-bearing, it is already linked to a H tone before resyllabification. Accordingly, it results a consonant lengthening with no stød.

4.1.3. Consonant lengthening in monosyllabic words

I argue that this analysis accounts for disyllabic words only. Indeed, consonant lengthening, which is restricted to disyllabic words when it co-occurs with a stød, is also observed in monosyllabic words without stød (23).

(23) Examples of consonant lengthening in monosyllabic words

e.g.	cognate	gloss
læp:ʃ	fi. lapsi	<i>child</i>
kak:ʃ	fi. kaksi	<i>two</i>
pɔs:k	fi. poski	<i>face</i>
us:k	fi. usko	<i>belief</i>
tɛm:p	es. tempo	<i>feather</i>
lɪn:d	fi. lintu	<i>bird</i>
jeŋ:g	fi. henki	<i>spirit</i>
kur:g	fi. kurki	<i>crane</i>
k ^u ol:m	fi. kolme	<i>three</i>

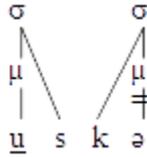
This consonant lengthening in monosyllabic words cannot be explained by the foot repair of Kiparsky, because this mechanism necessarily implies two syllables.

⁹ Kiparsky (2006:13-14) assumes that the short coda of weak grade is not moraic. When a mora occurs, it is realized as a long coda.

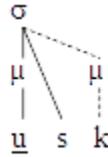
Recall that, in monosyllabic words, the stød is conditioned by a consonant deletion (when it co-occurs with a vowel lengthening), or a vowel deletion. In the second case, the mora previously assigned to the deleted vowel shifts to the preceding onset, which becomes a coda (see 7). I argue that this analysis of the stød genesis in monosyllabic words does not account for the consonant lengthening in (23) either. Indeed, the mora released after vowel deletion in (24a) can link to the preceding onset (which is linked to the preceding syllable as a coda) (24b) or to the preceding non-moraic coda (which becomes long) (24c), but it cannot link to both. Thus, we cannot get both: **i.** a coda lengthening; and **ii.** a resyllabification of the former onset (i.e. us:k 'belief').

(24)

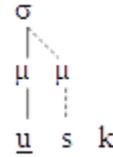
a. *uskə



b. *usk



c. *us:



In sum, the analysis of the stød involving a consonant lengthening as a foot repair mechanism does not account for the complementary distribution between stød and coda lengthening in monosyllabic words.

4.2. Stød and consonant lengthening

4.2.1. Additional mora inserted by stress

As a consequence, the generalization of Kiparsky (2006) in (25a) can be replaced by the generalization in (25b). This new generalization accounts for the fact that an additional mora is present in monosyllabic words too (i.e. not only in disyllabic words).

(25)

- a. An additional mora is added in order to repair a former Light+Heavy foot
- b. An additional mora is added in every stressed syllables, except if the word shows a branching nucleus

The statement in (25b) joins a more general generalization about the representation of stress: Chierchia (1986), Larsen (1998), Scheer (2000) and Svenonius (2008) (among others) proposed that stress inserts a skeletal space in the stressed syllable (a mora, an X slot or a CV unit, depending on the framework). More specifically, this analysis of stress has been proposed to account for Danish stød in Larsen (1994). Now, I propose a similar view for Livonian stød.

The fact that the insertion of this additional mora is conditioned by the phonotactic context is something that can be found in other languages. In Italian, Larsen (1998) stated that stress inserts a skeletal space, except if the stressed syllable is closed. In Enguehard

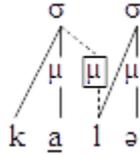
(2014a), I showed that the realization of the skeletal space inserted by stress in Southern Saami depends on the underlying length of unstressed vowels. In sum, the insertion of a skeletal space under stress seems to be generally subject to some templatic conditions¹⁰.

4.2.2. *Stød as the expletive realization of a skeletal space*

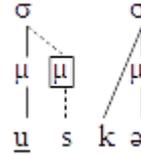
By admitting that stress inserts a mora in every stressed syllables, except if the word shows a branching nucleus, all the cases of consonant lengthening can be accounted for. In disyllabic words, the additional mora inserted by stress (boxed) involves the lengthening of the following onset in open syllables (26a), and the lengthening of the non-moraic coda in closed syllables (26b). This synchronic analysis of disyllabic words is not very different from the historical mechanism supposed in Kiparsky (2006).

(26)

a. ká:l̥ə



b. us:kə



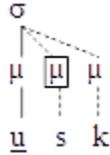
The novelty of the generalization in (25b) is that the same mechanism applies in monosyllabic words: if the stressed vowel is not branching, then stress inserts a mora. If the consonant that follows the stressed syllable is a non-moraic coda in the weak grade, it is lengthened (i.e. it is linked to the *stress mora*) (27a). But if it is an onset in the weak grade, it results only a *stød* (27a). In this last case, I assume the *stød* to be an expletive realization of the additional skeletal space (i.e. the additional mora)¹¹. (In terms of Government Phonology [Kaye, Lowenstamm and Vergnaud, 1990], the *stød* could be seen as the result of a governed consonantal slot introduced by stress.)

¹⁰ See Enguehard (2016b) for a more precise discussion. As for the length of the unstressed vowels, I show in Enguehard (2016b) that it is morphologically conditioned. However, these two points are not directly relevant for the present issue.

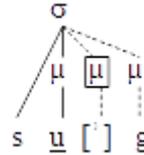
¹¹ About the expletive realization of skeletal spaces, see Rennison (1999); Dienes & Szigetvári (1999); Neubarth & Rennison (2005:101) and Pöchtrager (2006:49-53). More specifically, about the expletive realization of a skeletal space introduced by stress, see Enguehard (2014b; to appear b).

(27)

a. u:k



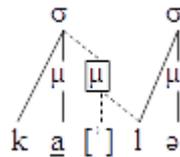
b. su'g



This representation of stød makes an interesting prediction: the consonant lengthening that co-occurs with it in disyllabic words is a surface assimilation, not a phonological lengthening (otherwise, we should not expect any expletive realization). This accounts for the fact that geminates that follow a stød are always voiced, while Livonian does not show any relevant contrast between voiced and voiceless obstruents (singletons are voiced and geminates [without stød] or obstruent clusters are voiceless) (Kettunen, 1938:xxx-xxxi; Vihman, 1971:73-75).

In sum, stress inserts a mora in every stressed syllable, except if the word shows a branching nucleus. Basically, this additional mora is expletively realized as a stød in underlying open syllables (see 27b). However, if the following consonant is in a strong position in surface (i.e. if it is an onset), this stød is partially assimilated in surface (28).

(28) ka'llə



This analysis motivates the direction of consonant lengthening by assuming that consonant lengthening is a partial assimilation of the stød conditioned by the strength of the following consonant.

5. Conclusion

As a conclusion, I pointed out that Livonian stød can involve two types of lengthening: **i.** vowel lengthening; and **ii.** consonant lengthening. The diachronic generalizations highlighted in Wiik (1989) and Kiparsky (2006) predict the distribution of these lengthenings on the diachronic plan, but they do not account for the lengthening direction in synchrony. I proposed an analysis based on distributional facts to show that vowel lengthening and consonant lengthening are conditioned by two different representations of the stød. In the case of vowel lengthening, the stød is a segment belonging to the same natural class as sonorants. And in the case of consonant lengthening, the stød is the

expletive realization of an additional mora inserted by stress, which is partially assimilated when it stands before a strong consonant position.

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