

# Developing Keyboards for the Endangered Livonian Language

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## Abstract

We present our current work on developing keyboard layouts for a critically endangered Uralic language called Livonian. Our layouts work on Windows, MacOS and Linux. In addition, we have developed keyboard apps with predictive text for Android and iOS. This work has been conducted in collaboration with the language community.

## 1 Introduction

Livonian is a Uralic language that is classified as critically endangered according to Unesco (Moseley, 2010). The number of speakers is around 250 people according to a recent census in Latvia, although only 20 people speak the language fluently (Ernštreits, 2019). In this paper, we describe our efforts in building keyboards for the Livonian language<sup>1</sup>.

Language users of any majority language take something as fundamental as keyboards for granted. For us, it is evident that we can type our language with ease on any operating system or device. This, however, is not the case for Livonian, despite of the availability of keyboard layouts for some other endangered Uralic languages (Moshagen et al., 2019). Livonian has letters that are not present in the superstrate language (Ernštreits, 2007), Latvian, spoken in the same country as Livonian, nor in the other larger Finnic languages, Finnish and Estonian. This means that many of the Livonian vowels such as  $\bar{a}$ ,  $\bar{o}$ ,  $\acute{o}$  and consonants  $l$ ,  $k$  and  $\eta$  are simply impossible to type.

It is evident that for any revitalization and documentation efforts, it is important to make it possible to type the language on modern devices. We have, in collaboration with the language community, developed keyboard layouts for Windows, MacOS and Linux together with keyboard apps for iOS and Android.

## 2 Layout for computers

The keyboard layout was developed based on the wishes of the Livonian Institute<sup>2</sup>, a national institute in Latvia that is dedicated to studying the Livonian language. The keyboard layout is based on the Latvian layout and it consists of two dead keys that provide access to the special characters in Livonian (see Figure 1).



Figure 1: The layout on computers

<sup>1</sup>Available here <https://rootroo.com/en/livonian-keyboard/>

<sup>2</sup><http://www.livones.net/>

For the practical matter of installing the keyboard on a computer, we ran into an interesting problem that many endangered languages are bound to face. While MacOS accepted the keyboard to be installed under the Livonian language, Windows forced us to have our keyboard install itself as a Latvian keyboard. This is because Microsoft maintains their own list of numerical language codes<sup>3</sup>. This list does not recognize Livonian at all as a language.

### 3 Layout for phones

For Android and iOS (see Figure 2), we included the special characters under their unaccented counterparts. In some languages, such as Finnish, the accented letters appear as their own dedicated keys (*ä*, *ö* and *å*). However, this is not a practical solution for Livonian because the layout has altogether 28 different accented characters. What increases the number of characters in Livonian is the orthographic decision of marking long vowels with a macron (*ē* vs. *e*). As all vowels in Livonian can be made long, this means that macron can be added to all vowels, even the ones that already have an accent (*ō* vs *õ*).

tierōdadrōt			tierābi				tierāviļa		
q	w	e	r	t	y	u	i	o	p
a	s	d	f	g	h	j	k	l	
⇧	z	x	c	v	b	n	m	⌘	
123	🌐	vait	,	.	↵				

Figure 2: The keyboard on phones

As opposed to the computer layouts, the mobile keyboards need to be able to predict text. Currently, we use the Livonian words from the Finnish-Livonian dictionary<sup>4</sup> to predict text. This is not an optimal solution as we can only recommend lemmas as opposed to inflectional forms. However, inflectional forms are problematic from the point of view of normativity. Even if we had access to data with inflections, not all inflectional forms have been studied well enough to derive a normative recommendation for them despite of the relatively extensive linguistic research on Livonian (cf. (Tuisk and Pajusalu, 2018)). Naturally, there are several dialectal ways of inflecting words, but the normative forms are yet to be established by the Livonian Institute.

Recommending forms that are dialectal or erroneous can be harmful for the language in the long run (cf. (Zeps, 1974)). This is a serious problem because a great part of the Livonian speaking community is not fluent in the language in the L1 level. This means that using a corpus-driven approach to derive the recommendations might result in non-normative or "bad" Livonian (cf. (Hämäläinen, 2021)).

### 4 Conclusions and future work

In this paper, we have described our practical work in building the most essential tool for any language in the modern era, namely a keyboard. We have described some of the challenges that are hindering the development such as the lack of recognition of Livonian by large companies and the reliability of any existing corpora as being representative of "good" or normative Livonian. Also, the language is under a process of getting normative forms, which means that currently it is not always clear what should be considered "good" and "bad" Livonian.

Our immediate future direction is to develop spell checkers in close collaboration with the language community. Although, it is to be remembered that the spell checkers can only recommend corrections for the forms that have already been established in the normative language. There is an extensive work on rule-based morphology for Livonian that has been conducted in the past (Rueter, 2014). We plan to build the spell checking using this resource as a starting point.

<sup>3</sup>[https://docs.microsoft.com/en-us/openspecs/windows\\_protocols/ms-icid/70feba9f-294e-491e-b6eb-56532684c37f](https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-icid/70feba9f-294e-491e-b6eb-56532684c37f)

<sup>4</sup><https://gtsvn.uit.no/langtech/trunk/words/dicts/finliv/>

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