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**becoming lyrics: how word prosody and musical meter  
negotiate the rhythmic terms of prominence**

**by**

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**THESIS**

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

**MASTER OF ARTS**

THE UNIVERSITY OF TEXAS AT AUSTIN

December 2022

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I think that when linguists discuss and dispute sound length and stress among themselves they would definitely benefit from inviting ethno-musicologists to join them. They could discuss the issues together, and not only based on written records but also sung records.  
That what is written is fiction. Only that what is sung is truth.

Tormis (2007)

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# Chapter 1

## Introduction

### 1.1 On words becoming lyrics

to join song and become lyrics, meaningful linguistic utterances are modified to fit the strict temporal structure of music while preserving intelligibility sufficient for semantic interpretation of the whole.

Estonian is famous for its ternary quantity distinction: both vowels and consonants have three distinct lengths or degrees. As can be seen in the examples in ??, the length of a given segment can indicate lexical contrasts as in sada vs saada ('hundred' vs 'send') (root minimal pairs) and also indicate case: the difference between 'receive' and 'send' is in the quantity of the first syllable' or directional case marking 'of' versus 'into' the cupboard.

Q1	sada <i>'hundred'</i>	kabi <i>'hoof'</i>
Q2	saada <i>'send'</i>	kapi <i>'of the cupboard'</i>
Q3	saada <i>'recieve'</i>	kappi <i>'into the cupboard'</i>

Table 1.1: ternary syllable weight contrast

. If the performer wishes the audience to perceive meaningful lyrical content, these contrasts must be crystallized at some level of salience in the

acoustic signal.

here I define metrical as the mapping of the pattern on a frame formed of equal time intervals: such patterns have been demonstrated to be more easily replicated by humans, something that is necessary for both the synchronization of musicians performing together and for the transmission of an oral tradition of songs (ess, 1985).

### **1.1.1 Metrical Principles of Estonian folksong**

In music, the smallest prosodic constituent is an individual note event whose relationship to the other notes in the song are indicated by the time signature, i.e., 3/4 or 4/4. The denominator corresponds to the number of divisions of a “whole” note, while the numerator refers to the number of “beats” in a single measure. So the prosodic hierarchy in music begins at the note level, then to each measure as constituent, larger phrases and motifs, and eventually the highest level which is the entire song.

In Eesti, attested segments are organized into syllables, which in turn combine in strong-weak relationships to form prosodic feet, which make up the words of phrases and so on. both regilaul and Eesti have hierarchical metrical systems by which long and short, stressed and unstressed constituents are arranged. In a regilaul verse line, each syllable corresponds to an eighth note in the measure, with every odd positioned syllable-note coinciding with the “beat” onset in a typical 4/4 measure. Falling on the beat in music generally coincides with increased prominence compared to

notes occurring “off” the beat. This is acoustically manifested in increased duration of notes on the beat compared to nominally isochronous notes in other positions. That is, in a measure containing eight eighth notes, the absolute durations of the four eighth notes corresponding to the beat will be longer than the absolute durations of the four eighth notes in even positions, while maintaining the perception of the nominal isochrony.

How do the word-prosodic requirements negotiate with the imposed prosodic hierarchy of music? The rhythmic organization of song is said to integrate the prosodic structure of the language with musical rhythmic principles (Palmer & Kelly, 1992). However, earlier studies of *regilaul* explored temporal aspects of the songs and found that duration characteristics that would usually indicate important semantic differences lost their distinctions partially or entirely. Assuming that the intention of the singer is for the lyrics to be understood, I hypothesize that if some durational correlates of contrasting word-prosodic constituents are made less distinct in the process of compromising with the song that some other acoustic correlate of the relevant contrast at the word-prosodic level will be present, if not enhanced.

the singable song Tormis (1985)

Tormis (2007)

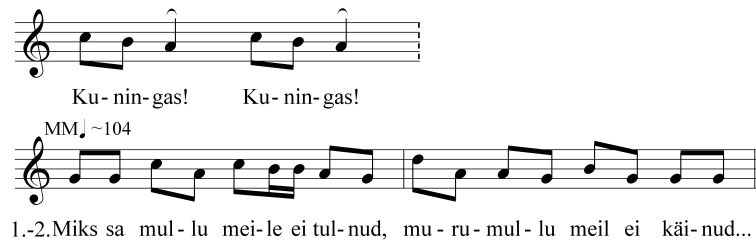


Figure 1.1: music notation of “The King Game” as performed by Liisa Küm-mel

## 1.2 Previous Studies with regilaul

The intuitions of ethnomusicologists who study the runosong tradition is that the burden of upholding the temporal structure of the song is the result of symbiosis between the musical rhythm and the natural prosodic features of the lyrical text (Ross, 1990; Tampere, 1934), inspiring over a decade of research at the interface of metrical phonetics and computational musicology.



Figure 1.2: ‘Kiik tahab kindaid’

Swinging songs are characterized by a swinging rhythm with alternating long and short notes, differing from the main body of *regilaul*'s iconic isochrony. Jaan Ross, a musicologist and native speaker of Estonian analyzed a 1936 recording of the swing song 'Kiik tahab kindaid' 1.2, publishing results on syllable-note duration Ross (1989) and later the vowel quality of odd-numbered syllables (?). In the study on syllable-note durations,

In the second, Ross measured formant frequencies f1 and f2, finding a reduced vowel space in song compared to measurements in spoken Estonian. However, upon examination of the song, it is clear that all the vowel space measurements are from syllable-notes in non-initial positions of Estonian words: that is, the sample of vowels taken from the song were all unstressed, and compared to a mixed sample of spoken Estonian. Thus, the conclusion needs to be evaluated again with comparable samples.

In 1992, Ilse Lehiste asked "Whether there is a correlation between poetic metre and the prosodic structure of a language.(?) by means of measuring the acoustic-phonetic realizations of so-called trochaic metrical poetic patterns across several languages including Estonian and Finnish. While these languages share in the more general Balto-Finnic tradition of *runosong* utilizing what is called the *Kalevala* meter, there were significant differences in the phonetic realizations of trochees in each language.

In 1994, their collaboration begins. Ross and Lehiste published several papers examining the temporal dimensions of Estonian word prosody and metrical prominence in *regilaul* folksongs. In (Ross & Lehiste, 1994),

they conclude that duration differences ordinarily present at the word level (stressed-unstressed) are “lost” to the temporal restrictions of the song. In another paper, syllable-notes are again measured, this time examining the role of syllabic quantity in the song. They likewise conclude that the duration of syllable-notes in *regilaul* match more closely with the metrical structure of the songs, that is, the durations of syllable-notes are best predicted by their beat position in the song: on the beat, syllables are longer, off the beat shorter. They extend this finding to conclude that the song “dominates” the metrical status of the words, claiming that the intelligibility of lyrics is enhanced more strongly by “top-down” processes (i.e., semantic context).

(Ross & Lehiste, 1996).

(Ross & Lehiste, 1998) Analyzed and concluded that the *regilaul* lyrics are the result of an interaction between word and song prosodic hierarchies. This conclusion relied critically on measuring the durations of syllable-notes, where they found being on or off the beat was the better predictor for duration.

Finally, in

### 1.3 The present study

I do not dispute the findings that syllable-notes are best predicted by their position in the song. Instead, I argue that instead of an hierarchical interaction between language and music, what occurs is more akin to entrainment. Specifically, bidirectional entrainment of two oscillators.

The syllable-notes, fit into the temporal structure of the music, still have possible acoustic-phonetic dimensions by which to indicate word boundaries (stressed-unstressed) and semantically-relevant quantity contrasts. The durational differences of stress and quantity in spoken Estonian could be indicated either at another level of the prosodic hierarchy, i.e., the segment, or by enhancing another acoustic cue for prominence: i.e., vowel space dispersion.

An EEG study of native Estonian speakers uncovered a perceptual asymmetry: shortening of constituents did not inducing MNN, but lengthening does (?). This suggests that stressed syllables, long in spoken Estonian, could be realized as shorter in a song without sounding “off,” but that lengthening of shorter elements would be less preferable. So long as syllable-notes maintain the relative durations in the song (i.e., heavy syllables are still longer than light ones), the metrical pattern of the musical phrase can be met.

### 1.3.1 Hypotheses

Null hypothesis: on or off-beat position is best predictor for vowel duration of syllables in all categories: stressed, unstressed, short, long, and overlong. This would mean that the syllable nucleus is proportional to the total syllable duration, and that the duration contrast is indeed “lost.”

H<sub>1</sub>: duration contrasts for syllable quantity will be evident in the vowel duration, with vowel duration *decreasing* as syllable weight increases. Given the findings of (Ross, 2001), isochronous syllable-notes would result in heavier syllables having shorter nuclei to accomodate for the coda and complex codas that distinguish the syllable weights from each other.

H<sub>2</sub>: stress/unstress contrasts will be evident in the nucleus in terms of hypo and hyper articulation. For this I measure both nucleus duration and vowel space dispersion.



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This thesis was typeset with  $\text{\LaTeX}^\dagger$  by the author.

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<sup>†</sup> $\text{\LaTeX}$  is a document preparation system developed by Leslie Lamport as a special version of Donald Knuth's  $\text{\TeX}$  Program.