

# The Accentual Structure of Estonian Syllabic-Accentual Iambic Tetrameter

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**Abstract.** This paper is part of a project aimed to analyse the rhythm of Estonian binary verse metres. It is the first complex analysis of Estonian syllabic-accentual iamb. The analysis is comprised of poetry by 20 prominent authors from the end of the 19th century and the beginning of the 20th century, and, all in all, more than 9000 verse lines. In order to find out which regularities are specific to poetry in general or to a particular poet, these data were compared with pseudoiambic segments extracted from prose. Differently from the earlier studies, stress is treated as a phenomenon of gradation, with altogether five different degrees of stress distinguished. The performed study showed that the rhythmical structure of iambic poems allows the clear distinction between two groups of poets, whom we conditionally call Traditionalists and Modernists.

Keywords: Estonian verse, iambic tetrameter, rhythm, statistical analysis of verse

## 0. About the project

This paper is part of a larger project which is the first systematic description of Estonian syllabic-accentual verse. The two most widespread verse metres in the 19th century Estonian poetry have been chosen as research subjects: trochaic tetrameter (T4) and iambic tetrameter (I4). The standard sample for the analysis is 500 lines per author; if an author has less than 500 lines in the given metre, the study includes all the lines in this metre that the author produced. The analysis comprises the accentual and quantitative structure of verse, as well as the distribution of word boundaries. Some results of the analysis of the accentual structure of Estonian T4 are presented in Lotman and Lotman 2011; the quantitative structure of Estonian T4 is described in Lotman and Lotman 2013.

The paper will give an overview of the syllabic-accentual structure of the Estonian iambic tetrameter.

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## 0.1. A historiographical note

One of the first to perform statistical analysis of Estonian verse rhythm was Walter Anderson, the results of whose study of the Estonian regisong (Anderson 1935) are still relevant. Jaak Põldmäe systematically analysed the rhythmical structure of literary poetry, but confined himself only to the legacy of one author (Betti Alver) and that too only partially (see Põldmäe 1975). Jaak Põldmäe chose for his analysis a remarkable author and gained some important results. Nevertheless, since his sample is restricted to just one author, the outcomes cannot be generalised and the methods are also problematic. He did not draw sufficient distinction between metrical and linguistic prosody and studied only the distribution of main stresses (Põldmäe 1975: 173; 1978: 59).

## 0.2. Binary metres

Iamb and trochee are the so-called binary metres, that is, verse forms where two elements ( $\alpha$  and  $\beta$ ) alternate in the deep structure:

(1)  $\alpha\beta\alpha\beta\alpha\beta\dots$

Since neither of these elements means anything else than that it is different from the other (that is,  $\alpha \neq \beta$ ), the given scheme can be the basis of description for both iamb and trochee. However, since our project involves the comparison of iamb and trochee, it is useful to fix the meaning of these symbols in a way that the correspondence rules would be the same in the case of both metres. That is, if we decide to mark in trochee the positions where stressed syllables are more frequent with the symbol  $\alpha$ , and accordingly the positions where unstressed syllables occur more frequently with the symbol  $\beta$ , it would be practical to use the same notation also in the case of iamb, keeping in mind symbols  $\alpha$  and  $\beta$  by themselves do not have anything which would connect them with stresses, meaning that the converse solution would be possible as well. It has to be added here that in actual verse, not all the  $\alpha$ - and  $\beta$ -positions behave similarly. For example, in the Estonian verse the constant stress is on the first strong position, in the Russian iamb on the last one. For that reason in the following description  $x$  is used to mark the first position, while indexes mark the sequence of positions. While the scheme (1) characterises a binary metre on the most general level, we will hereafter use a more particular form of it<sup>1</sup>:

<sup>1</sup> The symbols  $\alpha$  and  $\beta$  signify different metrical positions, while the subscripts indicate the corresponding sequential numbers.

$$(2) (x)\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4(\beta_4)$$

Metre is realised on linguistic units by the means of correspondence rules. A set of correspondence rules constitutes a system of versification. The system of versification is the central part of our model, since it is a way how metre is realised with the means of natural language.

$$(3) M \rightarrow SV \rightarrow R,$$

where M is metre, SV is system of versification and R is verse rhythm.

Theoretically, in Estonian, iamb can be realised in the following versification systems:

- 1) In the syllabic-quantitative system, the syllable corresponds to each metrical position and quantity is regulated, but these rules are more complicated (for example, instead of simple alternation of heavy and light syllables, some positions can be ancipitia). A simplified scheme of Estonian iambic dimetre is  $x-\cup-x-\cup$ .
- 2) In the quantitative-syllabic system, the number of quantities is fixed, while the syllable count can vary. An artificial and simplified example of it is  $\cup\cup\cup\cup\cup\cup\cup$ .
- 3) In the syllabic-accentual system, the syllable count is fixed, the disposition of stresses is regulated, but these rules are more complicated (for example, instead of simple alternation of stressed and unstressed syllables, more irregular configurations are admitted, like in most of syllabic-accentual verse metres in European poetry). An artificial and simplified example of it is  $\overset{(\prime)}{x}\overset{(\prime)}{x}\overset{(\prime)}{x}\overset{(\prime)}{x}\overset{(\prime)}{x}\overset{(\prime)}{x}$ , where (') marks potential stress.
- 4) In the accentual-syllabic system, the number of stresses is fixed while the number of unstressed syllables can vary within a certain range (for example, German Knittelvers). An example of it is  $x\overset{(\prime)}{x}(x)\overset{(\prime)}{x}(x)\overset{(\prime)}{x}(x)\overset{(\prime)}{x}$ .
- 5) In the syllabic-accentual-quantitative system, the syllable count is fixed, accent is more regulated than quantity (such system can be used in translating strictest ancient lyric metres into Estonian). An artificial and simplified example of it is  $x-\overset{(\prime)}{\cup}-x-\overset{(\prime)}{\cup}$ .
- 6) In the syllabic-quantitative-accentual system, the syllabic count is strictly regulated, quantity is more regulated than accent (for example, translations of strictest ancient lyric metres into Estonian). An artificial and simplified example of it is  $x-\overset{(\prime)}{\cup}-\overset{(\prime)}{\cup}-x-\overset{(\prime)}{\cup}$ .
- 7) In the accentual-quantitative-syllabic system, the number of stresses

is fixed, while quantity is more regulated than the syllabic structure:  $\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}$  (for example, translations of Roman comic iambus by Ain Kaalep and Ülo Torpats).

- 8) In the quantitative-accentual-syllabic system, the quantitative structure is strictly regulated, the number of accents and syllables can vary (for example, translations of ancient dramatic iambus by Mari Murdvee). Compare the following scheme:  $\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}\times(\times)\overset{\cup}{\cup}$ .

The given are purely illustrative and simplified examples: the actual verse has almost always additional constraints, while in the shortest text it is not easy to distinguish between the 7th and 8th.

## 1. Estonian iambus

In many European traditions iambus and trochee are antithetical. While in German and Russian poetry traditions of 18th to 19th century iambus is, first of all, iambic tetrameter, (I4) and trochee is, first of all, trochaic tetrameter (T4), contrasting as a metre of European high culture and as a popular verse form (Gasparov 1989: 214–215), in Estonian verse, just like in English tradition, trochaic tetrameter is, in the first place, opposed to the iambic pentameter. For that reason there are authors in our material whose work does not contain as much as 500 iambic tetrameters, which is a standard sample in our analysis. However, just like in other European verse traditions, in Estonian poetry I5 starts to dominate somewhat later at the beginning of the 20th century, when the native poetry tradition has already shaped out. In our previous studies (e.g., Lotman, Lotman 2011, 2013) we distinguished between Traditionalist and Modernist authors, and demonstrated how the scarcity of I4 is first and foremost characteristic to Modernists.

Just like the Estonian trochee, iambus as well is realised with the syllabic-accentual system of versification. There are some translations of ancient texts where we can find iambic verses governed by the quantitative principle. In these cases we can distinguish between at least two possibilities. The first can be seen, for instance, in the syllabic-accentual-quantitative iambic fragment from Prudentius's *Cathemerinon* (37–40)<sup>2</sup>, where every metrical position is filled with one and only one syllables, every  $\beta$ -position carries at least some stress signal, all  $\beta$ -positions are filled with heavy syllables, all  $\alpha_2$  and  $\alpha_4$  posi-

<sup>2</sup> See O'Daly 2012: 30–31 on Prudentius' metres.

tions with light syllables,  $\alpha_1$  and  $\alpha_3$  are ancipitia, all conveying the dipodic structure of the source text ( $\times\text{—}\cup\text{—}\times\text{—}\cup\cup$ ):

|                              |                                      |
|------------------------------|--------------------------------------|
| Öö rüpes rõõmsalt uitamas    | — — ' $\cup$ — ' — — ' $\cup\cup$    |
| on kuulu järgi deemoneid,    | — — ' $\cup$ — ' $\cup$ — ' $\cup$ — |
| kes kukelaulust kohkunult    | — — ' $\cup$ — ' — — ' $\cup$ —      |
| täis hirmu kiirelt taanduvad | — — ' $\cup$ — ' — — ' $\cup\cup$    |

(translated by Maria-Kristiina Lotman)

On the other hand, let us compare quantitative-accentual-syllabic (where the quantitative principle is the most important and the syllabic one is the freest) verses<sup>3</sup> from Plautus's *Pseudolus* (921–924a). In this form, iambic feet can be transformed into tribrachs (quantitative equivalence) or spondees (syllabic equivalence). As for anapestic feet, their frequency can be explained by the circumstance that they can be derived both from spondees (quantitative equivalence) and tribrach (syllabic equivalence). This can be summarised in the following simplified scheme (this scheme does not reflect an important constraint, according to which the feet shaped —  $\cup$  and  $\cup\cup$  are not allowed at the beginning of a verse):  $\cup\cup\text{—}\cup\cup\text{—}\cup\text{—}\cup\text{—}$ .

|                                     |  |
|-------------------------------------|--|
| Mis sa ruttad! Rahune, kõik on hea! | $\cup\cup\text{—}\cup\cup\text{—}\cup\text{—}\cup\text{—}$ |
| Niimoodi tehku Jupiter,             | — — ' $\cup$ — ' $\cup$ — ' $\cup\cup$                     |
| et siia ilmuks pealiku              | — — ' $\cup$ — ' — — ' $\cup\cup$                          |
| poolt läkitatuna mingi mees!        | — — ' $\cup$ — ' $\cup\cup\text{—}\cup\text{—}$            |

(translated by Ain Kaalep)

Our material, however, did not comprise any texts in quantitative iambic tetrameter or dipodic iambic dimeter. Differently from the trochaic tetrameter, which had a background of European syllabic-accentual verse (from the standpoint of Estonian poetry, the main influencers were the German and Russian poetry) as well as the tradition of *regisong* and its literary imitation, the Estonian iambic tetrameter is oriented only within the European literary tradition.

The main rule of Estonian syllabic-accentual binary metres is the prohibition of transaccentuation: the main accent of a polysyllabic word can occur in trochees only on odd syllables and in iambs only on even syllables. There are only a few exceptions in our material, all connected with the anacrusis of iambus (see below for the examples).

<sup>3</sup> See, e.g., Fortson 2008 on Plautus's iambic metres.

The ban of transaccentuation (or inverted verse feet) is valid in most European syllabic-accentual verse forms. English iambic pentameter admits certain licences under pressure of accentual verse, and so does Czech or Polish iambus under pressure of syllabic verse (Levý 1974: 282–283). This dependence is so strong in the analysis of rhythm masculine and feminine verses that it cannot be collected from the same sample; for example, in the case of trochaic tetrameter seven- and eight-syllabic lines, while in the case of iambic tetrameter eight- and nine-syllabic lines (in other terms, masculine and feminine verses) have to be analysed separately (Červenka 2011, Pszczołowska, Urbańska 1995). Just like in other languages where the accent is fixed on the first syllable of the word, the most important problem of Estonian (or Finnish) iamb is anacrusis: metre requires stress on the second syllable, language on the first syllable. As a result, the Estonian iambic verse line mostly starts with the accentual clash. Thus, the initial syllable of a line can be either a monosyllabic word or a monosyllabic stem. Often the Estonian iambus can be recognised also visually: monosyllabic words in the anacrusis form a vertical column, see, for example, Koidula's poem *Tütarlapse kaebtus* [A girl's complaint], 1866:

|                                 |               |
|---------------------------------|---------------|
| Küll eile peig mo ümber hakkas, | x́x́x́x́x́x́x |
| kui ennegi suud andis ta –      | x́x́x́x́x́x́x |
| mul siiski argself süda peksab, | x́x́x́x́x́x́x |
| nutt püüab silma veereda.       | x́x́x́x́x́x́x |

or Juhan Liiv's poem *Raudteel* [On the railway], 1892:

|                                 |               |
|---------------------------------|---------------|
| Rong lendab tuule kiirusega     | x́x́x́x́x́x́x |
| ja silmist kaovad metsad, mäed; | x́x́x́x́x́x́x |
| mul on, kui sõidaksin ma surma, | x́x́x́x́x́x́x |
| kui kisuksid mind surma käed.   | x́x́x́x́x́x́x |

There are occasional exceptions to it seen both in the 19th and 20th century, but the difference between them is exemplary. In the 19th century these cases include only inversions, that is, an iambic line begins with a pseudotrochaic verse foot. See, for example, a line from Lydia Koidula's poem *Lootus* [Hope] (1866):

|   |               |
|---|---------------|
| <i>kõige maailma!</i> – Vaikselt, tasa. | x́x́x́x́x́x́x |
|---|---------------|

This verse seems especially strange to a modern native reader, since the second foot is also “problematic”<sup>4</sup>.

Friedrich Kuhlbars’s poetry contains an example, where two verses of the similar character are almost side by side (*Õnnelik põllumees* [Happy farmer], 1884):

|                                  |              |
|----------------------------------|--------------|
| Mu riigi põhjaks rahu jääb,      | x́x́x́x́x́x́ |
| <u>kuni</u> mu päike looja läeb. | x́x́x́x́x́x́ |
| Ma annan, saan ta kojale,        | x́x́x́x́x́x́ |
| <u>kuninga</u> kepi pojale.      | x́x́x́x́x́x́ |

Paradoxically, we find rhythmic moves of this kind, most often in the poetry by a rigorist Jaan Bergmann (there are even five instances in our material, 1% of his sample), see Jaan Bergmann’s *Õhtul* [In the night] (1901):

|                                   |                |
|-----------------------------------|----------------|
| Kuu paistab kõrgest tähtistaevast | x́x́x́x́x́x́x́ |
| maa pääle hõbekumaga,             | x́x́x́x́x́x́   |
| ta täidab saunad, täidab lossid,  | x́x́x́x́x́x́x́ |
| <u>ühtlasi</u> armsa valgega.     | x́x́x́x́x́x́   |

Modernist poets have such inversions as well. Compare, for example, Henrik Visnapuu, *Proloog* 4, 3–4:

|                                  |                |
|----------------------------------|----------------|
| Kui viimast viha maale kallaks   | x́x́x́x́x́x́x́ |
| <u>issanda</u> ingel. Pole rahu. | x́x́x́x́x́x́x́ |

In Finnish iambic tetrameter, such accentual inversions in the beginning of verse line are much more common as compared to in Estonian poetry (cf. Kiparsky 2006). According to Pentti Leino, such rhythm is a new phenomenon in the Estonian 20th century verse and probably an influence of Anglo-Saxon or Finnish poetry:

“It is obvious that he [Henrik Visnapuu – *MKL*, *ML*] was looking for new opportunities to diversify rhythm and brought into Estonian poetry a practice long used in German and Anglo-Saxon poetry. He is hardly the only Estonian poet, who has attempted to domesticate the so-called iambic inversion in Estonian poetry” (Leino 1985: 1126).

<sup>4</sup> In this line, not only the first, but also the second word deserves attention. Following from the present-day accentual rules, there should be two trochaic units in succession: x́x́x́. But in the 19th century, most authors, especially in iambic poetry, use the word ‘maailm’ with the stronger accent on the second syllable, therefore, we are dealing with the model x́x́x́.

Indeed, in Finnish poetry the inversion in the beginning of iambus occurs more frequently. Compare, for example, verses by Julius Krohn *Vähäinen meida kansa on*, *Suurudet, voimat, vallat vaan* (1869), Kaarlo Kramsu *Rajusti aateet iskee toisihinsa*, *Ovatpa meille rakkahat* (1883), and so on. The initial reasons of inversion are different, almost contrary in English and Finnish poetry: in English, it results from the pressure of accentual verse; in Finnish, where the stress is phonologically less relevant and phonetically weaker, it results from the preponderance of the syllabic principle over the accentual one. Estonian is, for that matter, in the intermediary position, although closer to Finnish.

As we saw, verses with inversion in the beginning were even more common in the 19th century. Lydia Koidula's verse, where not the first, but the third foot is inverted, is highly exceptional (Koidula, *Õhturahu*, 1867)<sup>5</sup>:

sind teretab, vaikne maailm!                      x́xxxx́x́x́

There were no other instances of the kind in our material<sup>6</sup>.

In the 20th century, on the other hand, some authors, Betti Alver for example, place barbarisms with a stress on the second syllable at the beginning of a verse line with the purpose to avoid columns of monosyllabic words. See, for example, Betti Alver's, *Lugu valgest varesest* [A story of a white crow]:

|   |                  |
|---|------------------|
| Meid pimestavad aastasajad,                 | x́x́x́x́x́x́x́x́ |
| <u>Egiptus</u> , Kreeta, rokokoo,           | x́x́x́x́x́x́x́   |
| <u>bojaarid</u> , paatrid kepi najal,       | x́x́x́x́x́x́x́   |
| mustlannad, kahvatud Pjerrood,              | x́x́x́x́x́x́x́   |
| <u>suleikad</u> , radžad, arlekiinid,       | x́x́x́x́x́x́x́   |
| <u>sandaalid</u> , tuhvliid, mokassiinid... | x́x́x́x́x́x́x́   |

Thus, to avoid monotony in the beginning of verse lines, 19th century authors preferred rhythmic inversions, while in the 20th century, barbarisms are more frequent.

<sup>5</sup> About the accentuation of the word 'maailm' (x́x́, x́x or x́x́) see footnote 4.

<sup>6</sup> Jakob Tamm's translation of Pushkin's "The bronze horseman" includes a flawed line: Admiralteedi nõela kuld; the source text has a so-called rhythmical italics, not a metrical flaw: Адмиралтейская игла (xxxxxx x́x́).



Accordingly, Estonian iambic tetrameter have the following constants:

- a) a verse line consists of eight (with feminine endings nine) syllables;
- b) the primary or secondary accent falls on the initial syllable of a line;
- c) a stress of a polysyllabic word can occur only in even positions.

Note 1: exceptionally, this rule can be violated in the beginning of line. “Exceptionally” means that the proportion of such lines does not exceed 1%.

Note 2: monosyllabic stems of compound words can function as monosyllabic words (for example, ‘maailm’, ‘kesköö’, ‘ükskõik’, etc).

For a more illustrative comparison between the statistical indices of trochee and iamb, we will use the scheme (2):  $(x)\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4(\beta_4)$ .

This scheme can be realised in four different versions:

- (i)  $\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4$  – trochaic tetrameter with a masculine ending
- (ii)  $\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4\beta_4$  – trochaic tetrameter with a feminine ending
- (iii)  $x\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4$  – iambic tetrameter with a masculine ending
- (iv)  $x\alpha_1\beta_1\alpha_2\beta_2\alpha_3\beta_3\alpha_4\beta_4$  – iambic tetrameter with a feminine ending

Another argument in favour of this approach is a widespread understanding, according to which Estonian iamb is not an independent verse metre, but a trochee with a monosyllabic word attached to its beginning (compare, for example, Lehiste 1994: 253–261). However, this understanding should not be overly emphasised, but rather regarded as a hypothesis yet to be controlled rather than an axiom to be followed.

## 2. Material

The analysis included altogether 6235 iambic tetrameters, of which 2088 have feminine endings and 4147 masculine endings. There were 19 different authors and the samples of different authors were as follows (in brackets, the proportions of feminine and masculine verses are indicated): Kreutzwald 500 verses (196; 304); Kuhlbars 500 (76; 424); Veske 191 (29; 162); Koidula 500 (186; 314); Reinvald 500 (113; 387); Bergmann 500 (121; 379); Jakob Liiv 500 (260; 240); Tamm 500 (220; 280); Sööt 119 (28; 91); Juhan Liiv 311 (49; 262); Haava 500 (208; 292); Enno 50 (0; 50); Mölder-Proletaarlane 218 (65; 153); Under 68 (24; 44); Suits 134 (64; 70); Ridala 500 (72; 428); Visnapuu 327 (233; 94); Alle 12 (0; 12); Heiberg 305 (144; 161).

### 3. Overall stressing: I4

On the first stage of analysis we will study stresses without any differentiation, revealing all the accentual signals at every given position. To illustrate the results, we have chosen four typical authors: two Traditionalists and two Modernists. We will compare their data with the “random” I4 sampled from prose. Compare Chart 1:

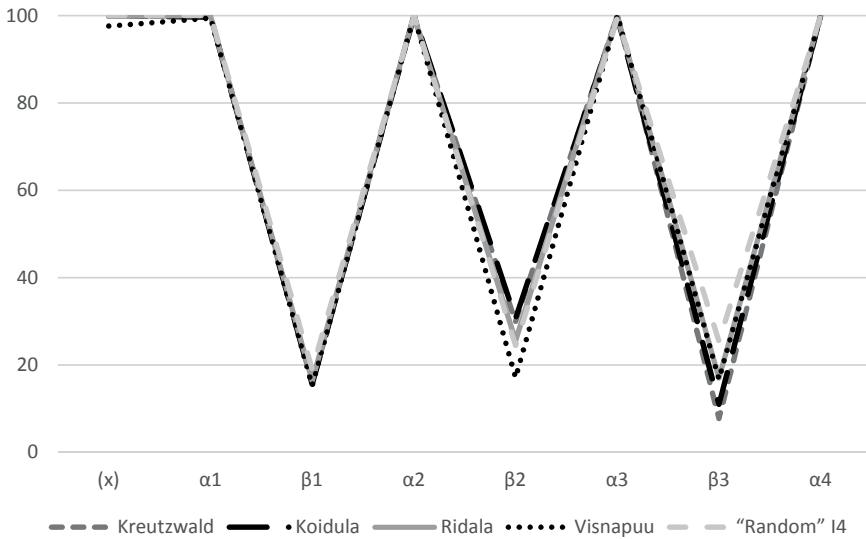


Chart 1. I4: overall stressing (without  $\beta_4$ )

With the exclusion of the first position, the general profile of summarised stresses resembles that of the Estonian trochaic tetrameter: here, as well, there are no considerable differences between authors (see also Table 9 in Addendum). The even positions are almost always filled with a stressed syllable (although the range of variation is a bit higher than in the case of trochee; first of all, this is due to some metrical licences in the beginning of Marie Under’s verse it is 1,5%).

More differences are revealed in odd positions (Table 1 below).

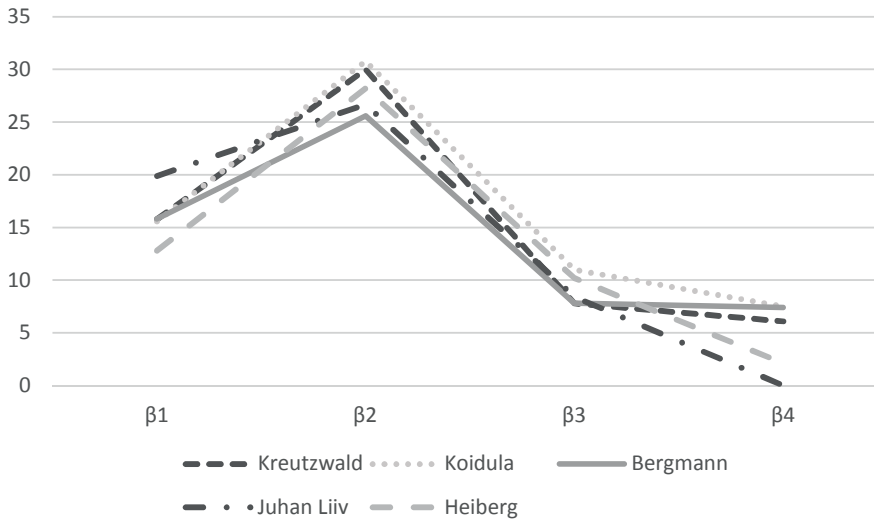


Chart 2. Overall stressing in odd positions in I4 of Traditionalist authors

There are no considerable differences in Traditionalists' verse: the highest proportion of stresses can be seen in position  $\beta_2$ , the number of accentual signals decreases towards the end of the line and the lowest stressing is in the final position.

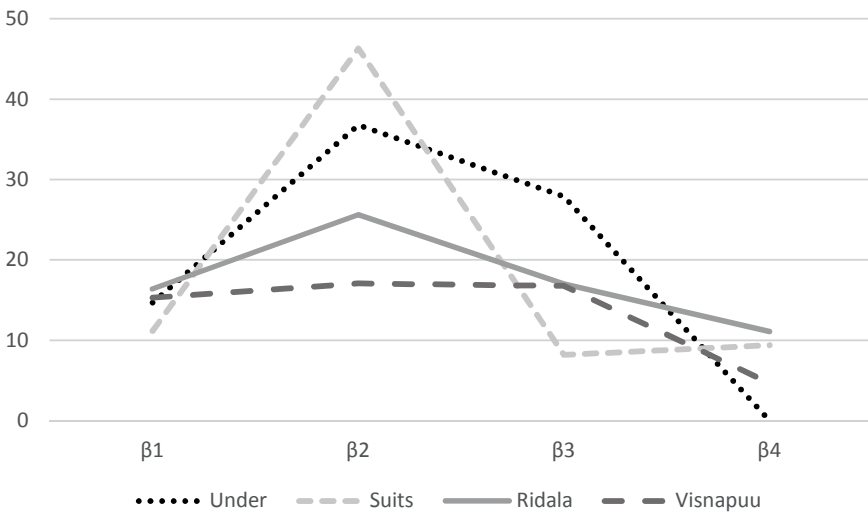


Chart 3. Overall stressing in odd positions in I4 of Modernist authors

The rhythmic profile of Modernists varies to a greater degree. There are authors with more pronounced rhythmic profile (for example, in Suits's I4 the rate of stressed syllables in position  $\beta_2$  is about 50%, but less than 10% in position  $\beta_3$ ), and there are authors whose verse shows rather even distribution of stresses, like, for example, Visnapuu's I4. We can see some decrease there only in the last position, while he is the only author whose indices do not peak in position  $\beta_2$ . Similarly to Traditionalists, in the verse of the majority of Modernists the most stressed position tends to be  $\beta_2$ , while towards the end of line the stressing decreases.

Table 1. I4: overall stressing in odd positions %%

| Author               | (x)  | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | AVG  | STDEV* |
|----------------------|------|-----------|-----------|-----------|-----------|------|--------|
| Kreutzwald           | 99.8 | 15.8      | 30        | 7.8       | 6.1       | 31.9 | 10.9   |
| Koidula              | 100  | 15.6      | 30.8      | 11        | 7.5       | 33   | 10.3   |
| Ridala               | 99.8 | 16.4      | 25.6      | 17        | 11.1      | 34   | 6      |
| Visnapuu             | 97.6 | 15.3      | 17.1      | 16.8      | 4.7       | 30.3 | 5.9    |
| "Random" I4 (Vilde1) | 99.5 | 15        | 21.5      | 20        | 10.8      | 33.4 | 4.9    |
| "Random" I4 (Vilde2) | 100  | 19        | 24.5      | 25.5      | 17.2      | 37.2 | 4.1    |
| "Random" I4 (Tuglas) | 100  | 15.5      | 21        | 24        | 21.9      | 36.5 | 3.6    |

\* Standard deviation without (x)

In the fifth position ( $\beta_2$ ) the range of variation is 12%, in the seventh a range that exceeds 20% (not taking into account Alle's and Enno's data, whose samples are too small for the statistical analysis). High stress index can be seen in these positions already in 19th century authors Kreutzwald and Koidula (exceeding 30% in the fifth position); as for Modernist authors, Suits and Under stand out with their higher stress indices. Just like in the case of trochaic tetrameters, in I4 too, the same author can have considerable differences at varied odd positions: for example, in Kreutzwald I4 the stress index of the fifth position ( $\beta_2$ ) is 22.2% higher than that of the seventh position ( $\beta_3$ ).

Table 2. I4: Overall stressing in even positions %%

| Author               | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\alpha_4$ | AVG  | STDEV |
|----------------------|------------|------------|------------|------------|------|-------|
| Kreutzwald           | 99.8       | 99.8       | 100        | 100        | 99.9 | 0.1   |
| Koidula              | 99.6       | 100        | 99.6       | 100        | 99.8 | 0.2   |
| Ridala               | 100        | 100        | 100        | 100        | 100  | 0     |
| Visnapuu             | 99.4       | 100        | 100        | 100        | 99.9 | 0.3   |
| "Random" I4 (Vilde1) | 99.5       | 99.5       | 99         | 99.5       | 99.4 | 0.3   |
| "Random" I4 (Vilde2) | 100        | 100        | 99.5       | 100        | 99.9 | 0.3   |
| "Random" I4 (Tuglas) | 100        | 100        | 100        | 100        | 100  | 0     |

The same way as in the trochaic tetrameter,  $\alpha$ -positions in every analysed sample almost always carry at least some stressed signal, and therefore here we are also dealing with a constant or near constant (the weakest odd positions carry stress in 99,4% of the cases, which means that the range of variation is 0,6%). Consequently, from the aspect of overall stressing, the even positions in Estonian I4 are quite close to the ideal rhythm. The “random” I4 demonstrates the same tendencies as the actual verse.

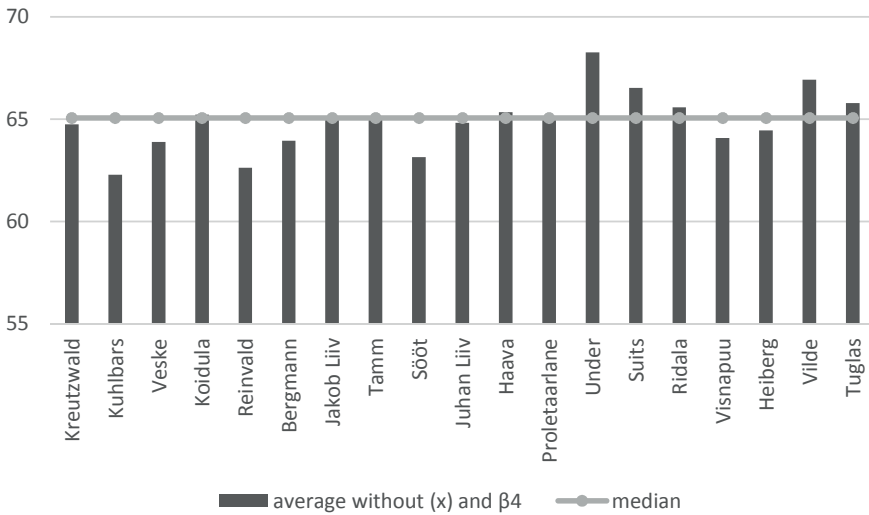


Chart 4. I4: average stressing (all stresses without (x) and  $\beta_4$ )

The analysis of the average stressing by position (in calculating these data position (x) as the almost constant anacrusis and position  $\beta_4$  as a facultative ending were not taken into account) revealed the rise of average stresses in 20th century authors. The highest average is in Marie Under’s verse (68,3%), the lowest average is in Kuhlbars’s verse (62,3%). At the same time there are authors in the 19th century too, who stand out with a rather high stress index: Kreutzwald, Koidula, both Liivs, Haava and Tamm, whose stress index is almost 65,1%. Visnapuu’s average is slightly lower (64,1%).

#### 4. I4: Stem, main and phrasal stresses

During the next stage of analysis we will leave aside the weakest stresses and summarise morphological, lexical and phrasal stresses. These data are presented in Table 10, Addendum.

Just like the analysis of trochaic tetrameters revealed, a tendency to dissimilate rhythm can be noticed in iambic verse as well. Authors in the 19th century tended to have progressive dissimilation ( $\beta_1 \geq \beta_3 \geq \beta_2 \geq \beta_4$ ), while in the 20th century the last  $\beta$ -position strengthens. Nevertheless, Modernist iambus does not display homogeneous rhythm, but different authors show different trends.

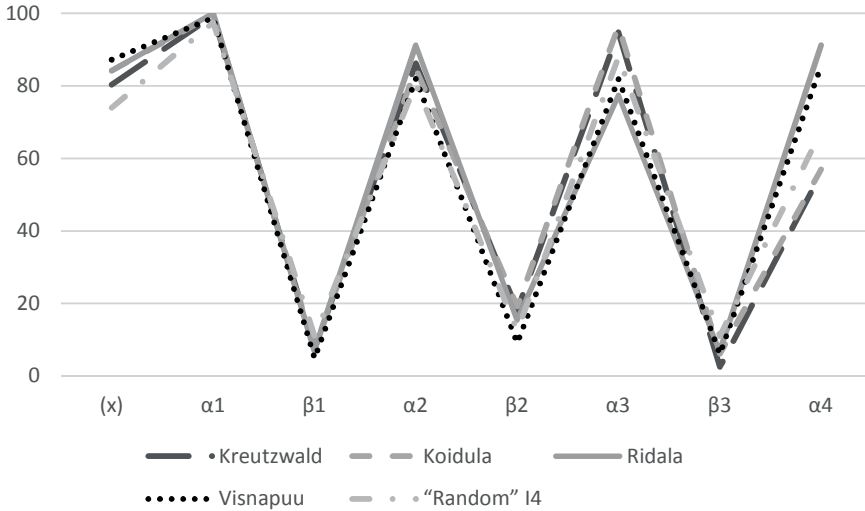


Chart 5. Lexical stressing in I4 (without  $\beta_4$ )

Tab. 3. I4: lexical stressing in odd positions %%

|                      | (x)  | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | AVG  | AVG* | AVG** | STDEV | STDEV*** |
|----------------------|------|-----------|-----------|-----------|-----------|------|------|-------|-------|----------|
| Kreutzwald           | 80.4 | 7.6       | 18.2      | 2.6       | 0         | 21.8 | 7.1  | 9.5   | 33.5  | 8        |
| Koidula              | 84.2 | 7.6       | 19.2      | 6.2       | 0         | 23.4 | 8.3  | 11    | 34.7  | 8        |
| Ridala               | 84.2 | 7         | 15.4      | 6.8       | 0         | 22.7 | 7.3  | 9.7   | 34.8  | 6.3      |
| Visnapuu             | 87.2 | 4.9       | 9.2       | 6.1       | 0         | 21.5 | 5.1  | 6.7   | 36.9  | 3.8      |
| "Random" I4 (Vilde1) | 75   | 7.5       | 12        | 12        | 3.9       | 22.1 | 8.9  | 10.5  | 29.8  | 3.9      |
| "Random" I4 (Vilde2) | 74   | 11        | 12.5      | 11        | 8.2       | 23.3 | 10.7 | 11.5  | 28.4  | 1.8      |
| "Random" I4 (Tuglas) | 77   | 10        | 12        | 14.5      | 10.4      | 24.8 | 11.7 | 12.2  | 29.2  | 2        |

\*Average without (x); \*\*Average without (x) and  $\beta_4$ ; \*\*\*Standard deviation without (x)

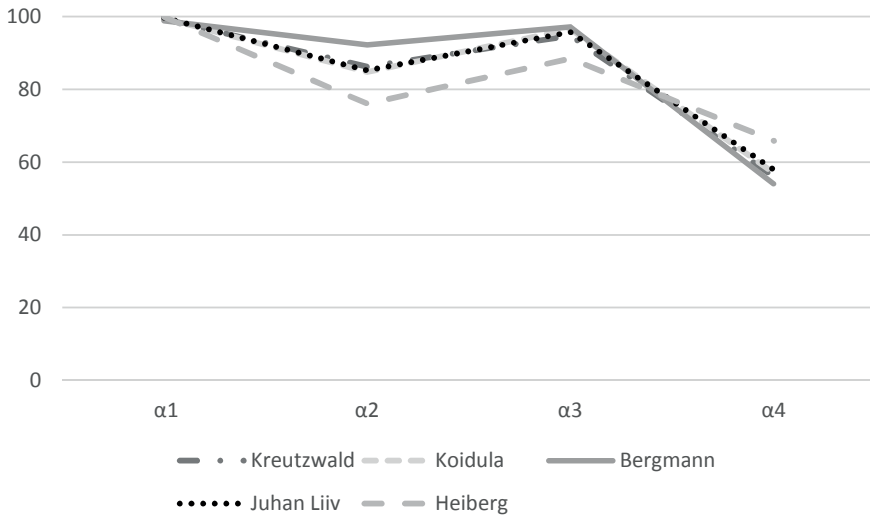


Chart 6. Lexical stressing in even positions in I4 of Traditionalist authors

Here, too, Traditionalists do not show any significant differences in rhythmic tendencies. The common trend is that in position  $\alpha_2$  the proportion of stresses is lower than in  $\alpha_1$ , while it rises again in position  $\alpha_3$ . At the same time the incidence of stress in the final  $\alpha$ -position is the smallest.

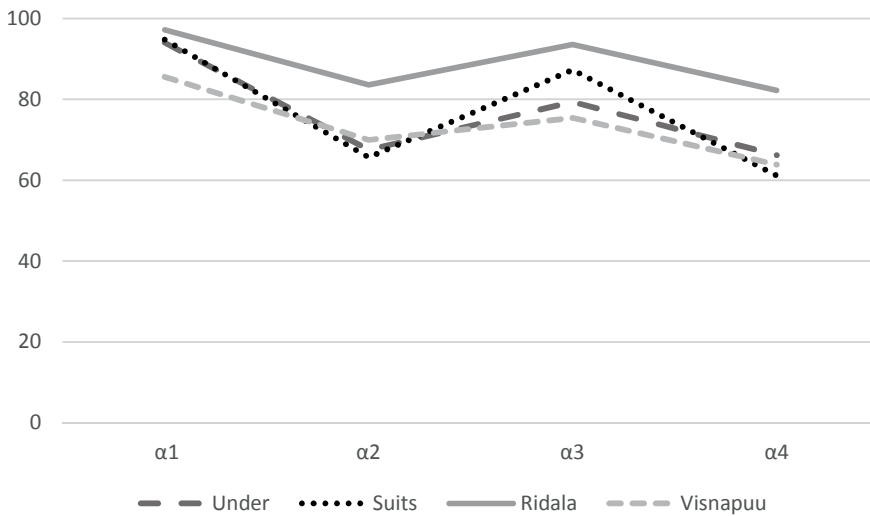


Chart 7. Lexical stressing in even positions in I4 of Modernist authors

The profile of Modernist verse resembles that of the Traditionalists, although the decrease of stresses in the end of the verse is of less contrast and retains about the same level as in position  $\alpha_2$  (which, with the exclusion of Ridala's verse, is lower as compared to the Traditionalists).

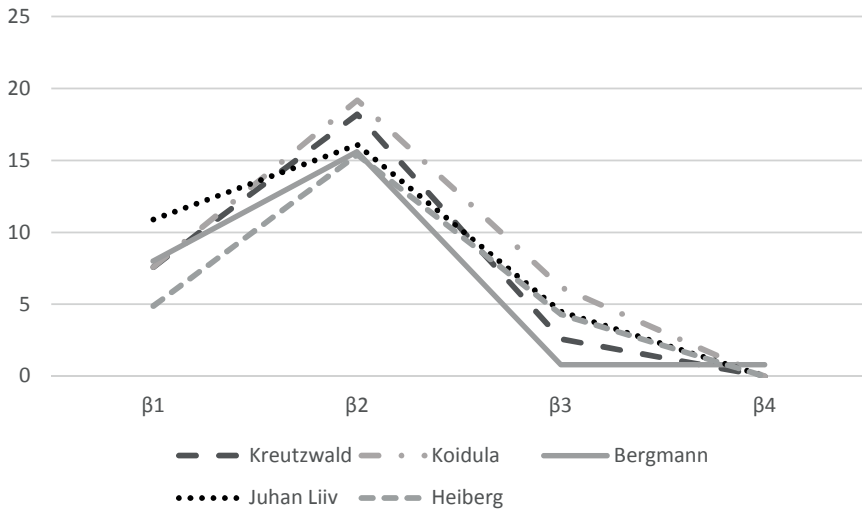


Chart 8. Lexical stressing in odd positions in I4 of Traditionalist authors

The data reveal a rather similar rhythmic structure in verse of different Traditionalist authors. The highest incidences of stresses is on position  $\beta_2$ , while in penultimate odd positions morphological stresses occur more rarely (for example, Bergmann completely avoids such stresses there, yet in Koidula's and Juhan Liiv's verse these occur more often). All analysed authors avoid morphological stresses in position  $\beta_4$ .



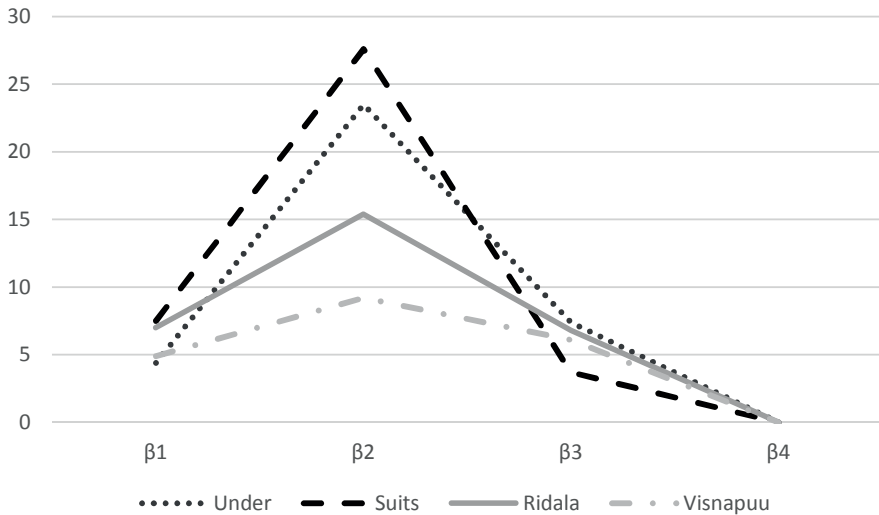


Chart 9. Lexical stressing in odd positions in I4 of Modernist authors

Differences between Modernist authors are more pronounced than those between Traditionalists. In Under's and Suits's verses the incidence of morphological stresses in contrast with Traditionalists is higher on  $\beta_2$ , while in Ridala's iamb the occurrence of such stresses is comparable to the level of Traditionalists, and in Visnapuu's iamb it is considerably lower. In Visnapuu's sample, the distribution of morphological stresses is quite uniform between the odd positions of different feet; in Suits's iamb, on the other hand, there is a notable contrast between positions  $\beta_2$  and  $\beta_3$ .

Tab. 4. I4: lexical stressing in even positions %%

| Author               | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\alpha_4$ | AVG  | STDEV |
|----------------------|------------|------------|------------|------------|------|-------|
| Kreutzwald           | 99.4       | 86.2       | 94.8       | 56         | 84.1 | 19.5  |
| Koidula              | 99.6       | 84.8       | 96.6       | 57         | 84.5 | 19.4  |
| Ridala               | 100        | 91.2       | 77.4       | 91.2       | 90   | 9.3   |
| Visnapuu             | 98.8       | 82         | 82         | 85.6       | 87.1 | 8     |
| "Random" I4 (Vilde1) | 99.5       | 83.5       | 84.5       | 61         | 82.1 | 15.9  |
| "Random" I4 (Vilde2) | 97.5       | 80.5       | 88         | 67.5       | 83.4 | 12.7  |
| "Random" I4 (Tuglas) | 100        | 81.5       | 75         | 65.5       | 80.5 | 14.6  |

The analysis of the occurrence of morphological stresses in even positions show considerable differences between Traditionalists and Modernists. In Ridala's iambus the stress index is higher in positions  $\alpha_1$  and  $\alpha_2$ , while  $\alpha_3$  is contrastively lower and  $\alpha_4$  again higher; Ridala's average index is also the highest of the analysed authors. Visnapuu's verse differs also from that of Traditionalists' due to the higher proportion of stresses on the last even position. While the  $\alpha_4$  of Traditionalists' iambic tetrameter has lower index than in "random" iambs, in both Modernists it is, in turn, higher.

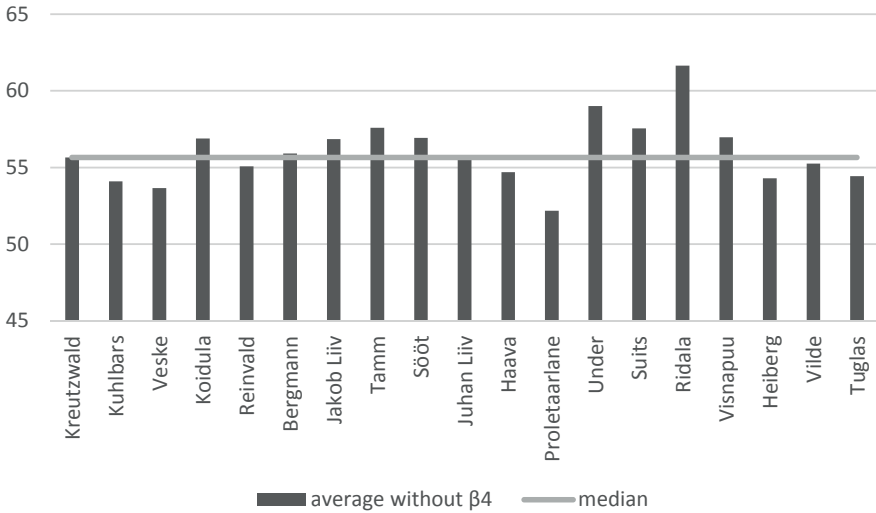


Chart 10. I4: average stressing (lexical stresses without  $\beta_4$ )

Just like in the case of trochaic tetrameter, in I4, too, the stressing is higher in Modernist verse: in all analysed samples of Modernist authors the stressing exceeds median level, especially remarkable is Ridala's stress index. On the other hand, the random iambs selected from prose are characterised with lower stressing, being comparable to Traditionalists' figures.

The exclusion of the first position reveals some differences. Stressing is still the highest in Ridala's, Under's and Suits's verse, but Visnapuu's figures are lower than in several Traditionalists, coinciding with the median (52,6%). There is a small difference in the average stressing of Vilde's random iambs, which is also in agreement with the median figure.

## 5.14: Main and phrasal stresses

Next, we will leave aside the morphological stresses and study the incidence of main and phrasal stresses. Under this subdivision we will analyse the syllables which carry either lexical or phrasal stress (usually phrasal stress coincides with the main accent of the word, but in case of the emphasis it may also occur on a syllable marked with morphological stress).

In chart 11 we can see the distribution of main stresses by position in Kreutzwald's, Koidula's, Ridala's and Visnapuu's iambic tetrameters.

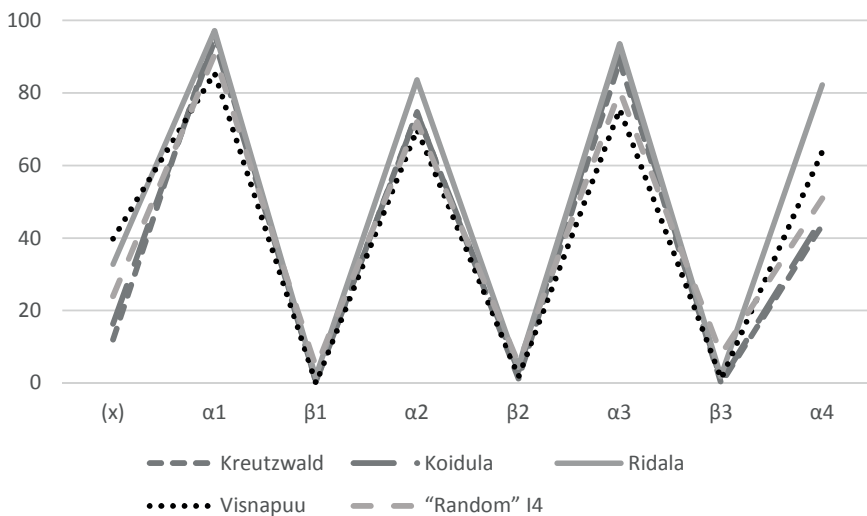


Chart 11.14: primary stresses (without  $\beta_4$ )

The comparison of two Traditionalists and two Modernists reveals that, just as in the case of morphological stresses, the difference between Traditionalists and Modernists is most pronounced in position  $\alpha_4$ , where the stressing of Traditionalists is considerably lower than in Visnapuu's and even more so in Ridala's verse.

Tab. 5. I4: main and phrasal stresses (3–4) on odd positions %%

| Author               | (x)  | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | AVG  | AVG* | AVG** | STDEV | STDEV*** |
|----------------------|------|-----------|-----------|-----------|-----------|------|------|-------|-------|----------|
| Kreutzwald           | 12   | 0.4       | 1.2       | 0         | 0         | 2.7  | .4   | .5    | 5.2   | .6       |
| Koidula              | 16.4 | .6        | 3.4       | .6        | 0         | 4.2  | 1.2  | 1.5   | 6.9   | 1.5      |
| Ridala               | 32.8 | 1.6       | 4.4       | 1.8       | 0         | 8.1  | 2    | 2.6   | 13.9  | 1.8      |
| Visnapuu             | 39.8 | 0         | 1.8       | 1.2       | 0         | 8.6  | 0.8  | 1     | 17.5  | .9       |
| “Random” I4 (Vilde1) | 25.5 | .5        | 4         | 4         | 2         | 7.2  | 2.6  | 2.8   | 10.3  | 1.7      |
| “Random” I4 (Vilde2) | 24   | 4.5       | 5.5       | 8         | 2.5       | 8.9  | 5.1  | 6     | 8.7   | 2.3      |
| “Random” I4 (Tuglas) | 33   | 3.5       | 4         | 8         | 3.1       | 10.3 | 4.7  | 5.2   | 12.8  | 2.3      |

\*Average without (x); \*\*Average without (x) and  $\beta_4$ ; \*\*\*Standard deviation without (x)

In this table, initially, the first position deserves to be noticed. As compared to the random iambi, in Traditionalists’ verse the incidence of main stresses is significantly lower here, while in Modernists’ iambus this index is much larger. As for the rest of the odd positions, in the iambic tetrameter sampled from poetry main stresses occur only occasionally; Ridala’s slightly higher figure in  $\beta_2$  (4,4) is also lower than the corresponding index of random iambi.

Tab. 6. I4: main and phrasal stresses (3–4) on even positions %%

| Author               | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\alpha_4$ | AVG  | STDEV |
|----------------------|------------|------------|------------|------------|------|-------|
| Kreutzwald           | 96.4       | 74.8       | 88.8       | 43.6       | 75.9 | 23.3  |
| Koidula              | 94.4       | 74.4       | 91.2       | 45.6       | 76.4 | 22.3  |
| Ridala               | 97.2       | 83.6       | 93.6       | 82.2       | 89.2 | 7.4   |
| Visnapuu             | 85.6       | 70         | 75.5       | 63.9       | 73.8 | 9.2   |
| “Random” I4 (Vilde1) | 93.5       | 79.5       | 77         | 43.5       | 73.4 | 21.2  |
| “Random” I4 (Vilde2) | 90.5       | 72         | 80.5       | 51         | 73.5 | 16.8  |
| “Random” I4 (Tuglas) | 93         | 73.5       | 66.5       | 49.5       | 70.6 | 18    |

The figures of even positions of the Traditionalists' verse are rather homogeneous (the differences do not exceed a few percent, the general model is  $\alpha_1 > \alpha_3 > \alpha_2 > \alpha_4$ ), while the Modernists' verse departs from these patterns. Visnapuu's indices of the first three even positions are lower than that of the Traditionalists and of the random I4. The figure of the fourth position is somewhat higher, but still smaller than the proportion of main stresses in Ridala's I4. However, the general rhythmic profile of his verse is also  $\alpha_1 > \alpha_3 > \alpha_2 > \alpha_4$ . Ridala, on the other hand, stands out with the highest proportion of main stresses on these positions: it never falls below 80%, but in  $\alpha_1$  exceeds 97%.

The next chart demonstrates the average incidence of main and phrasal stresses in I4 by authors with the exclusion of the initial position.

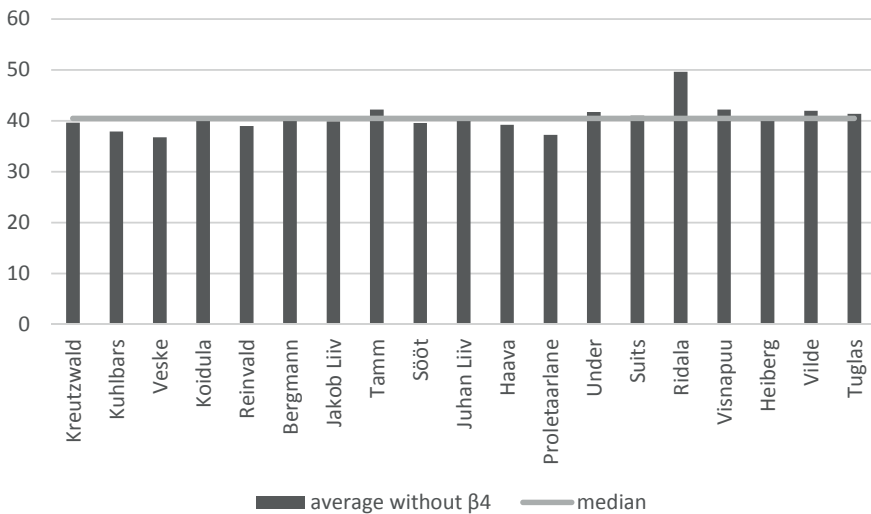


Chart 12. I4: average stressing (primary stresses without  $\beta_4$ )

Here again Ridala stands out with considerably stronger than average stressing. Yet, in general the data are rather uniform, except for the lower figures of some Traditionalists (including Kuhlbars, Veske, but also Proletaarlane).

If we leave aside the first position, Ridala's stressing is still the highest, while the proportion of main stresses in Kuhlbars', Veske's and Proletaarlane's verse is lower than in the rest of the authors.

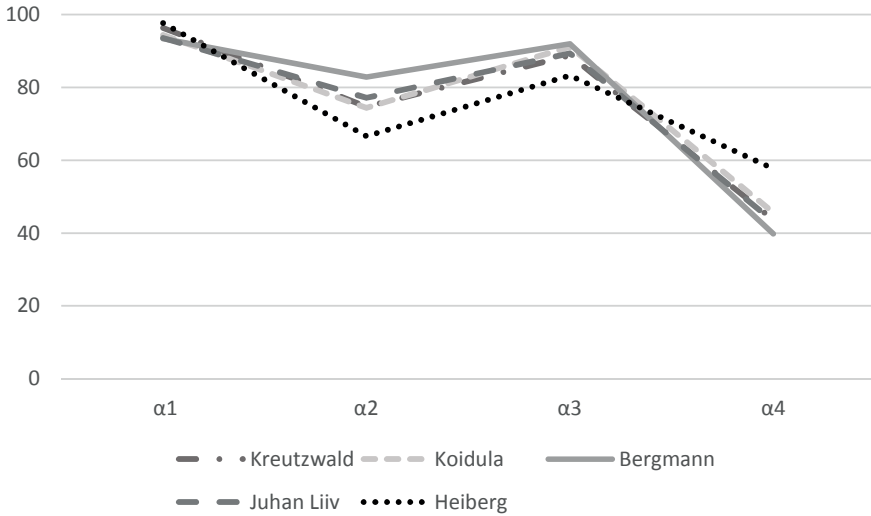


Chart. 13. Primary stresses in even positions in I4 of Traditionalist authors

If we discard the level of morphological stresses in the rhythmic profile, the general trend remains the same: we can still see the lowest stressing at the end of verse, while in position  $\alpha_3$  the incidence of stress signals is higher than in position  $\alpha_1$ .

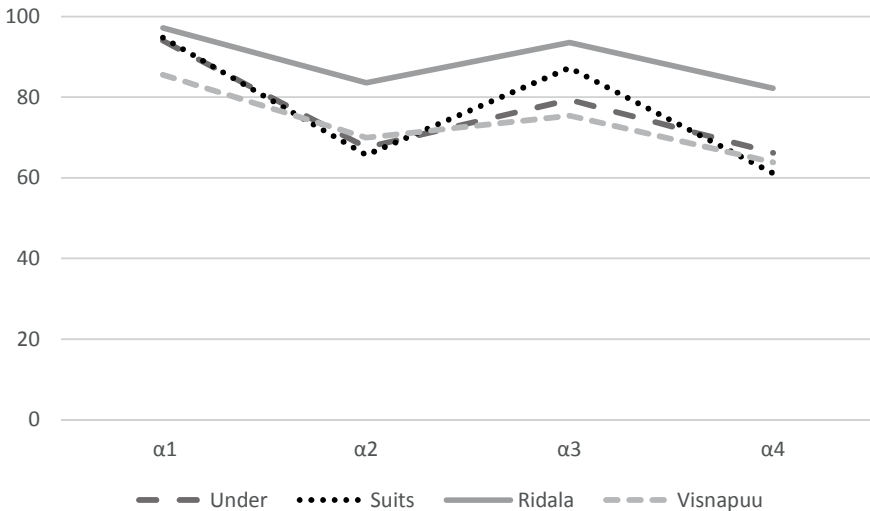


Chart. 14. Primary stresses in even positions in I4 of Modernist authors

The main difference from the Traditionalists can be seen in position  $\alpha_4$ , where the incidence of stresses is higher. Unlike other authors, until position  $\alpha_3$  Ridala follows the profile of Traditionalist verse, but differently from the latter, the stressing also does not decrease in the last  $\alpha$ -position, retaining about the same level as it had in  $\alpha_2$ . In regard to other Modernists, their rhythmic trend is similar with that of Ridala (approximately the same level of  $\alpha_2$  and  $\alpha_4$ , somewhat stronger stressing in  $\alpha_3$ ), but the incidence of stresses in all these positions is somewhat lower.

## 6. Phrasal stresses

The distribution of phrasal stresses is presented on the following Chart.

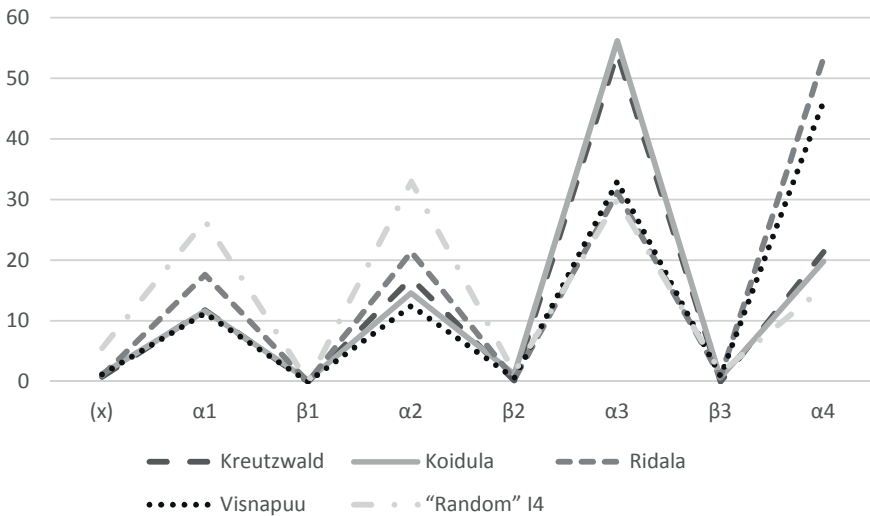


Chart 15. I4: phrasal stresses

It is on this very level where the difference between the rhythmic profiles of Traditionalists and Modernists becomes most apparent. In Koidula's and Kreuzwald's verse the phrasal stresses accumulate in position  $\alpha_3$ . Ridala's and Visnapuu's figures are considerably smaller here, while the almost even level of phrasal stresses of Traditionalists, as well as that of Modernists, deserves to be noticed. As for random iambi, the contrast in two final positions is the quality of verse and does not follow from linguistic reasons. The culmination of Ridala's and Visnapuu's verse is in position  $\alpha_4$ , where in Traditionalist verse phrasal stresses occur more rarely.

The following table indicates the incidence of phrasal stresses in odd positions.

Tab. 7. I4: phrasal stresses in odd positions %%

| Author               | (x) | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | AVG* | AVG** | STDEV | STDEV*** | AVG without (x) |
|----------------------|-----|-----------|-----------|-----------|-----------|------|-------|-------|----------|-----------------|
| Kreutzwald           | .8  | 0         | .2        | 0         | 0         | .2   | .1    | .1    | .3       | .4              |
| Koidula              | 1.2 | .2        | 1.2       | .6        | 0         | .6   | .5    | .7    | .6       | .5              |
| Ridala               | 1   | 0         | .4        | .8        | 0         | .4   | .3    | .4    | .5       | .4              |
| Visnapuu             | 1.2 | 0         | .6        | .9        | 0         | .5   | .4    | .5    | .5       | .5              |
| “Random” I4 (Vilde1) | 5.5 | 0         | 1.5       | 1.5       | 0         | 1.7  | .8    | 1     | .3       | .4              |
| “Random” I4 (Vilde2) | 7   | 2         | 2         | 2.5       | 0         | 2.7  | 1.6   | 2.2   | .6       | .4              |
| “Random” I4 (Tuglas) | 6.5 | 2         | 2.5       | 3         | 0         | 2.8  | 1.9   | 2.5   | .4       | 2               |

\* Average without (x), \*\* Average without (x) and  $\beta_4$ , \*\*\* Standard deviation without (x)

As expected, phrasal stresses occur in  $\beta$ -positions only by exception and never in the last  $\beta$ -position.

In table 8 data of phrasal stresses in  $\alpha$ -positions are given.

Tab. 8. I4: phrasal stresses in even positions %%

| Author               | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\alpha_4$ | AVG  | STDEV |
|----------------------|------------|------------|------------|------------|------|-------|
| Kreutzwald           | 11.8       | 17         | 54.2       | 21.4       | 26.1 | 19.1  |
| Koidula              | 11.6       | 14.6       | 56.2       | 19.8       | 25.6 | 20.7  |
| Ridala               | 17.6       | 21.4       | 31.2       | 53.4       | 30.9 | 16.1  |
| Visnapuu             | 11.3       | 12.5       | 33         | 46.2       | 25.8 | 16.9  |
| “Random” I4 (Vilde1) | 26.5       | 33         | 30         | 15.5       | 26.3 | 7.6   |
| “Random” I4 (Vilde2) | 25.5       | 24.5       | 22         | 15         | 21.8 | 4.7   |
| “Random” I4 (Tuglas) | 24         | 27.5       | 20         | 12         | 20.9 | 6.7   |

These data confirm the revealed tendency: in Kreutzwald’s and Koidula’s verse the culmination of phrasal stresses occurs in  $\alpha_3$ , in Ridala’s and Visnapuu’s iambus in position  $\alpha_4$ . What also deserves attention here is that in first two  $\alpha$ -positions the figures of all studied authors are below that of the random iambi, while in the last two these are exceeded. The study of average data also does not reveal any significant differences from iambi sampled from prose; the only exception is Ridala, whose average rate is slightly higher here.



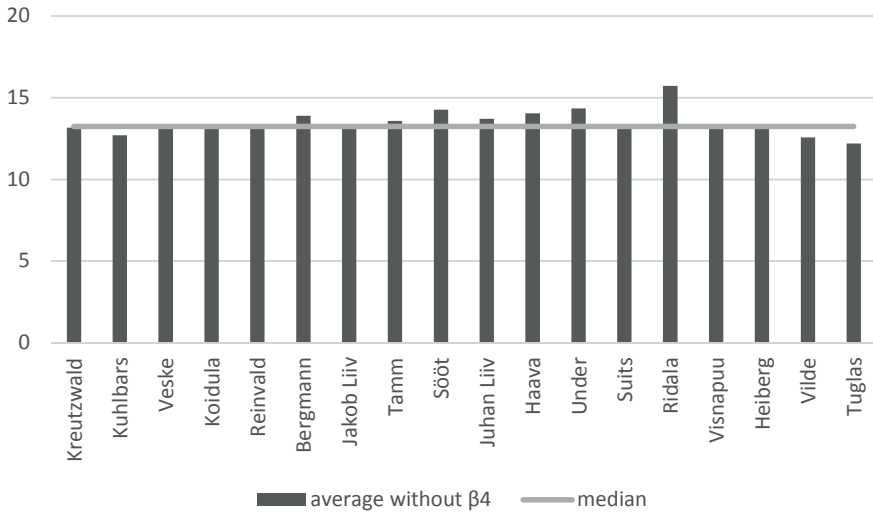


Chart. 16. I4: average stressing (phrasal stresses without  $\beta_4$ )

If we compare the average incidence of phrasal stresses in analysed authors after the exclusion of position  $\beta_4$ , Ridala's highest average stands out, but the median is also exceeded by other authors: Bergmann, Sööt, Haava and Under. The figures of both analysed samples of random iambi are below the median.

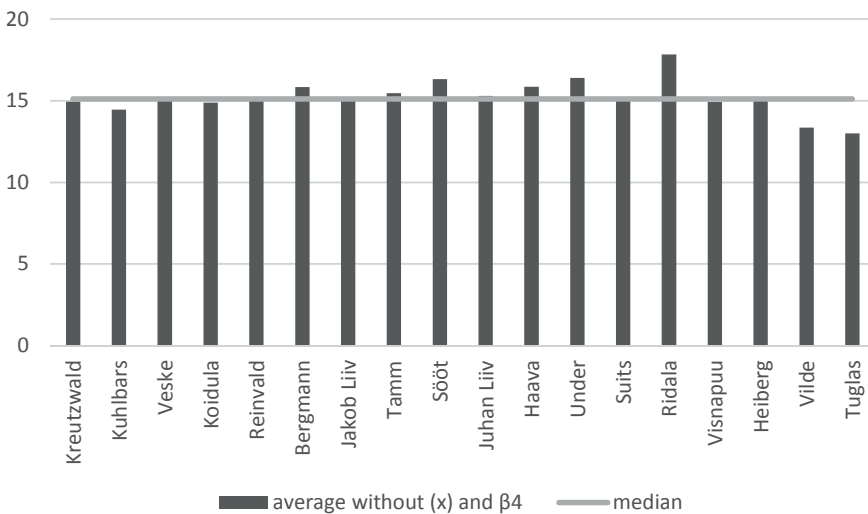


Chart 17. I4: average stressing (phrasal stresses without (x) and  $\beta_4$ )

The typical pattern of phrasal stresses in 19th century authors is  $\alpha_3 > \alpha_4 > \alpha_2 > \alpha_1$  (the same pattern characterises trochaic tetrameter of this period). However, this scheme is not followed by some poets: in Reinvald's, Sööt's and Haava's I4  $\alpha_1$  is somewhat stronger than  $\alpha_2$ .

In the 20th century, similarly with trochees, in iambi the strongest phrasal stressing can also be seen in  $\alpha_4$ : thus, the general scheme is  $\alpha_4 > \alpha_3 > \alpha_2 > \alpha_1$ . Here too, some authors digress from this pattern: in Visnapuu's verse the incidence of phrasal stresses is similar in positions  $\alpha_1$  and  $\alpha_2$ , in Ridala's I4 it is slightly higher in the  $\alpha$ -position of the second foot (which is a typical beginning of the 19th century iambus).

Accordingly, the nature of both Ridala's and Visnapuu's rhythmic profile can be characterised as regressive.

Just like in the case of trochee, here too Marie Heiberg and Vassili Proletaarlane are different from other authors of the 20th century, whose, like with 19th century authors, phrasal stressing is the strongest in the third foot.

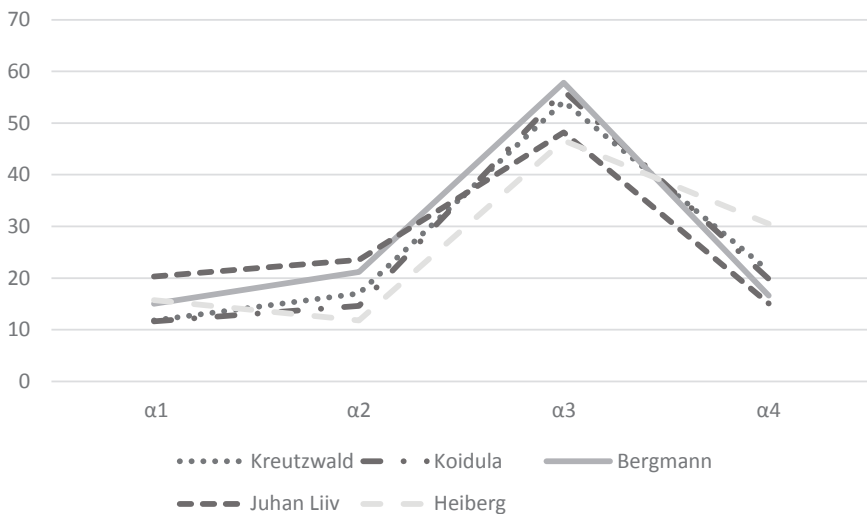


Chart. 18. Phrasal stresses in even positions in I4 of Traditionalist authors

These observations reveal that the level of phrasal stressing shows similar tendencies in Traditionalists' I4: the peak of their verse is in position  $\alpha_3$ , while there is not much variation in other positions. The exception here is Heiberg, whose index in position  $\alpha_4$  is to some extent higher than in other authors, which seems to be consistent with her being a more recent poet, as compared to the rest of the Traditionalist authors.

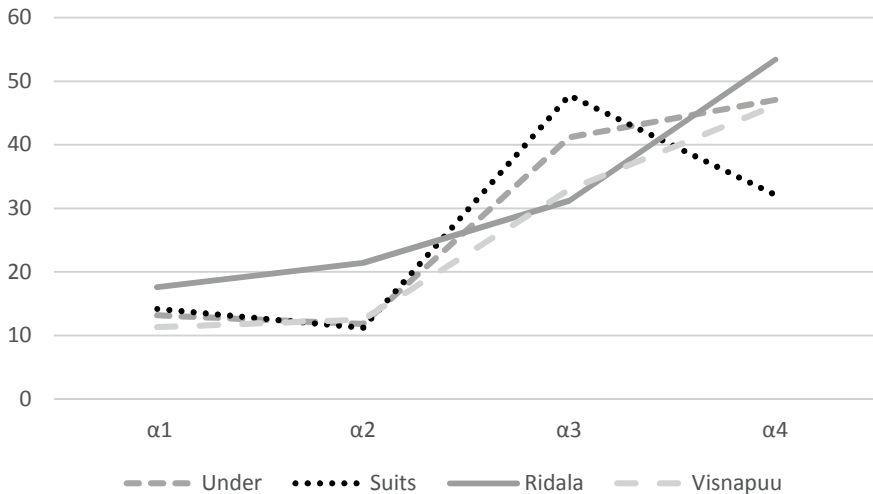


Chart. 19. Phrasal stresses in even positions in I4 of Modernist authors

As concerns the Modernists, we see a different picture. Although they also tend to have a rather low incidence of phrasal stresses, and, with the exclusion of Ridala's data, rather similar indices, we can see quite remarkable differences in the second half of the verse. For instance, just like in Traditionalists, the peak of Gustav Suits's verse is in  $\alpha_3$ , but differently from the latter, it does not decrease as much in the final  $\alpha$ -position. The culmination of phrasal stressing in the rest of the authors is in position  $\alpha_4$ , while in Ridala's verse the proportion of such stresses even exceeds there 50%.

The same tendencies can be seen, when the initial position is not counted. Here the random iambi are the most amorphous; as concerns the poets, Koidula and Visnapuu are more amorphous, while Kreutzwald and Reinvald display the contrastive rhythm.

## 7. Summary

The rhythm of Estonian syllabic-accentual I4 is very stable; in contrast with random iamb, where the secondary rhythm is formed by firm preferences. Furthermore, analogical tendencies were observed in the rhythm of Estonian trochaic tetrameter.

The results of the analysis of I4 confirm the outcomes received with the analysis of trochaic tetrameter both in regards to its secondary rhythm as well as the chronological and esthetical framework of verse rhythm. At this point

we can claim that it was not an accidental specification of a single verse metre, but a significant tendency in Estonian verse culture. Both Traditionalists and Modernists have different secondary rhythm in Estonian syllabic-accentual iambic tetrameter as well. While in Traditionalist verse the strongest stressing accumulates on the sixth syllable, in Modernist verse the culmination of these is on the eighth syllable.

In trochaic tetrameter the accentual constant is on the first syllable. In I4 the status of the first syllable (that is, anacrusis) is something in between the constant and strongly dominant, since, first, in foreign words the main stress can fall on non-initial syllables and such authors as Betti Alver intentionally place words carrying the main stress on the second syllable to the initial position of verse. Secondly, this position is often filled with proclitics, and compounds with the main stress on the second syllable. Thus, the accentual constant is shifted to the second syllable, although we can see some exceptions in both Traditionalists and Modernist authors, who allow the inversion of stress in the first verse foot.<sup>7</sup>

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Table 9. All stresses (1–4) in I4 by position %%

| <b>Author</b>        | <b>(x)</b> | <b><math>\alpha_1</math></b> | <b><math>\beta_1</math></b> | <b><math>\alpha_2</math></b> | <b><math>\beta_2</math></b> | <b><math>\alpha_3</math></b> | <b><math>\beta_3</math></b> | <b><math>\alpha_4</math></b> | <b><math>\beta_4</math></b> |
|----------------------|------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
| Kreutzwald           | 99.8       | 99.8                         | 15.8                        | 99.8                         | 30                          | 100                          | 7.8                         | 100                          | 6.1                         |
| Kuhlbars             | 99.8       | 99.4                         | 8.6                         | 100                          | 21.8                        | 100                          | 6.2                         | 100                          | 5.3                         |
| Veske                | 100        | 100                          | 12.6                        | 100                          | 30.9                        | 100                          | 3.7                         | 100                          | 10.3                        |
| Koidula              | 100        | 99.6                         | 15.6                        | 100                          | 30.8                        | 99.6                         | 11                          | 100                          | 7.5                         |
| Reinvald             | 99.6       | 100                          | 13.4                        | 99.4                         | 22.2                        | 100                          | 4.2                         | 99.2                         | 3.5                         |
| Bergmann             | 100        | 99                           | 15.8                        | 99.8                         | 25.6                        | 100                          | 7.8                         | 99.8                         | 7.4                         |
| Jakob Liiv           | 100        | 100                          | 14.4                        | 100                          | 28.4                        | 100                          | 12.6                        | 100                          | 1.5                         |
| Tamm                 | 99         | 99.8                         | 16.4                        | 99.8                         | 27.8                        | 99.8                         | 12.2                        | 99.6                         | 1.8                         |
| Sööt                 | 100        | 100                          | 6.7                         | 100                          | 26.1                        | 100                          | 9.2                         | 100                          | 3.6                         |
| Juhan Liiv           | 100        | 99.7                         | 19.9                        | 100                          | 26.7                        | 100                          | 8.4                         | 99                           | 0                           |
| Haava                | 99.8       | 100                          | 13.6                        | 99.8                         | 31.8                        | 100                          | 12.2                        | 100                          | 3.8                         |
| Enno                 | 100        | 100                          | 28                          | 100                          | 16                          | 100                          | 4                           | 100                          | 0                           |
| Proletaarlane        | 100        | 100                          | 20.6                        | 100                          | 27.1                        | 100                          | 7.8                         | 100                          | 4.6                         |
| Under                | 98.5       | 98.5                         | 14.7                        | 100                          | 36.8                        | 100                          | 27.9                        | 100                          | 0                           |
| Suits                | 98.5       | 100                          | 11.2                        | 100                          | 46.3                        | 100                          | 8.2                         | 100                          | 9.4                         |
| Ridala               | 99.8       | 100                          | 16.4                        | 100                          | 25.6                        | 100                          | 17                          | 100                          | 11.1                        |
| Visnapuu             | 97.6       | 99.4                         | 15.3                        | 100                          | 17.1                        | 100                          | 16.8                        | 100                          | 4.7                         |
| Alle                 | 100        | 100                          | 0                           | 100                          | 50                          | 100                          | 0                           | 100                          | 0                           |
| Heiberg              | 99.7       | 100                          | 12.8                        | 100                          | 28.2                        | 100                          | 10.2                        | 100                          | 2.1                         |
| Total                | 99.6       | 99.7                         | 14.7                        | 99.9                         | 27.2                        | 99.97                        | 10.2                        | 99.8                         | 4.2                         |
| “Random” I4 (Vilde1) | 99.5       | 99.5                         | 15                          | 99.5                         | 21.5                        | 99                           | 20                          | 99.5                         | 10.8                        |
| “Random” I4 (Vilde2) | 100        | 100                          | 19                          | 100                          | 24.5                        | 99.5                         | 25.5                        | 100                          | 17.2                        |
| “Random” I4 (Tuglas) | 100        | 100                          | 15.5                        | 100                          | 21                          | 100                          | 24                          | 100                          | 21.9                        |

Table 10. Morphological stresses (2–4) in I4 by position %%

| Author               | (x)  | $\alpha_1$ | $\beta_1$ | $\alpha_2$ | $\beta_2$ | $\alpha_3$ | $\beta_3$ | $\alpha_4$ | $\beta_4$ |
|----------------------|------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Kreutzwald           | 80.4 | 99.4       | 7.6       | 86.2       | 18.2      | 94.8       | 2.6       | 56         | 0         |
| Kuhlbars             | 81   | 99.4       | 4.2       | 83.8       | 14.6      | 95.4       | 3         | 51.4       | 0         |
| Veske                | 78.5 | 100        | 8.4       | 80.1       | 22        | 98.4       | 1.6       | 40.3       | 0         |
| Koidula              | 84.2 | 99.6       | 7.6       | 84.8       | 19.2      | 96.6       | 6.2       | 57         | 0         |
| Reinvald             | 79.2 | 100        | 5.8       | 83.2       | 13        | 95.4       | 1         | 63         | 0         |
| Bergmann             | 80.8 | 98.8       | 8         | 92.2       | 15.6      | 97.2       | .8        | 54         | .8        |
| Jakob Liiv           | 79.6 | 100        | 6         | 82.8       | 16.8      | 91.2       | 4.6       | 73.8       | 0         |
| Tamm                 | 82.8 | 99.6       | 6.4       | 86.6       | 13        | 91.6       | 5.6       | 75.2       | .5        |
| Sööt                 | 81.5 | 100        | 5         | 79         | 16        | 90.8       | 5         | 78.2       | 0         |
| Juhan Liiv           | 74.6 | 99.7       | 10.9      | 85.2       | 16.1      | 95.8       | 4.5       | 57.9       | 0         |
| Haava                | 76.4 | 100        | 5.2       | 82         | 14.2      | 95         | 5.6       | 59.2       | 0         |
| Enno                 | 90   | 100        | 10        | 92         | 10        | 98         | 2         | 40         | 0         |
| Proletaarlane        | 75.7 | 100        | 4.1       | 77.1       | 13.3      | 95.9       | 2.8       | 48.6       | 0         |
| Under                | 82.4 | 98.5       | 4.4       | 75         | 23.5      | 86.8       | 7.4       | 94.1       | 0         |
| Suits                | 79.9 | 99.3       | 7.5       | 74.6       | 27.6      | 94.8       | 3.7       | 73.1       | 0         |
| Ridala               | 84.2 | 100        | 7         | 91.2       | 15.4      | 97.4       | 6.8       | 91.2       | 0         |
| Visnapuu             | 87.2 | 98.8       | 4.9       | 82         | 9.2       | 82         | 6.1       | 85.6       | 0         |
| Alle                 | 75   | 100        | 0         | 91.7       | 16.7      | 83.3       | 0         | 91.7       | 0         |
| Heiberg              | 79.3 | 100        | 4.9       | 76.1       | 15.4      | 88.5       | 4.3       | 65.9       | 0         |
| Total                | 80.7 | 99.6       | 6.5       | 84.2       | 15.7      | 92.4       | 4.1       | 64.7       | .1        |
| “Random” I4 (Vilde1) | 75   | 99.5       | 7.5       | 83.5       | 12        | 84.5       | 12        | 61         | 3.9       |
| “Random” I4 (Vilde2) | 74   | 97.5       | 11        | 80.5       | 12.5      | 88         | 11        | 67.5       | 8.2       |
| “Random” I4 (Tuglas) | 77   | 100        | 10        | 81.5       | 12        | 75         | 14.5      | 65.5       | 10.4      |

Table 11. Main stresses (3–4) in I4 by position %%

| Author               | (x)  | $\alpha_1$ | $\beta_1$ | $\alpha_2$ | $\beta_2$ | $\alpha_3$ | $\beta_3$ | $\alpha_4$ | $\beta_4$ |
|----------------------|------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Kreutzwald           | 12   | 96.4       | .4        | 74.8       | 1.2       | 88.8       | 0         | 43.6       | 0         |
| Kuhlbars             | 8.6  | 97.6       | .2        | 72         | .2        | 91.4       | 0         | 33.2       | 0         |
| Veske                | 2.6  | 97.9       | .5        | 69.1       | 1         | 95.8       | 0         | 27.2       | 0         |
| Koidula              | 16.4 | 94.4       | .6        | 74.4       | 3.4       | 91.2       | .6        | 45.6       | 0         |
| Reinvald             | 7.4  | 94.8       | 0         | 73.4       | .4        | 93         | 0         | 42.8       | 0         |
| Bergmann             | 11.4 | 93.4       | .6        | 82.8       | .6        | 92         | 0         | 39.8       | 0.8       |
| Jakob Liiv           | 9    | 96.4       | 0         | 71.6       | .6        | 83         | .4        | 58.2       | 0         |
| Tamm                 | 16.2 | 95.4       | 0         | 76.6       | 1.2       | 86.4       | .4        | 61.4       | 0.5       |
| Sööt                 | 9.2  | 99.2       | 0         | 64.7       | 2.5       | 89.1       | 0         | 52.1       | 0         |
| Juhan Liiv           | 19   | 93.6       | 0.6       | 77.2       | 1.6       | 89.4       | .3        | 43.1       | 0         |
| Haava                | 9.8  | 96.4       | .2        | 71.4       | .4        | 89         | .4        | 46.2       | 0         |
| Enno                 | 24   | 94         | 0         | 84         | 0         | 94         | 0         | 34         | 0         |
| Proletaarlane        | 13.3 | 94         | .5        | 64.2       | 3.2       | 86.7       | 0         | 36.2       | 0         |
| Under                | 23.5 | 94.1       | 0         | 67.6       | 2.9       | 79.4       | 0         | 66.2       | 0         |
| Suits                | 17.9 | 94.8       | 0         | 65.7       | .7        | 87.3       | .7        | 61.2       | 0         |
| Ridala               | 32.8 | 97.2       | 1.6       | 83.6       | 4.4       | 93.6       | 1.8       | 82.2       | 0         |
| Visnapuu             | 39.8 | 85.6       | 0         | 70         | 1.8       | 75.5       | 1.2       | 63.9       | 0         |
| Alle                 | 33.3 | 100        | 0         | 75         | 0         | 83.3       | 0         | 83.3       | 0         |
| Heiberg              | 16.1 | 97.7       | 0         | 66.6       | 2.3       | 83.3       | .3        | 57.7       | 0         |
| Total                | 15.3 | 95.3       | .4        | 73.9       | 1.5       | 88.6       | .4        | 50.2       | 0         |
| “Random” I4 (Vilde1) | 25.5 | 93.5       | .5        | 79.5       | 4         | 77         | 4         | 43.5       | 2         |
| “Random” I4 (Vilde2) | 24   | 90.5       | 4.5       | 72         | 5.5       | 80.5       | 8         | 51         | 2.5       |
| “Random” I4 (Tuglas) | 33   | 93         | 3.5       | 73.5       | 4         | 66.5       | 8         | 49.5       | 3.1       |