Studia Metrica et Poetica 10.1, 2023, 36–68

The Development of a Poetic Tradition. A Study of a Dutch Renaissance Poetry Corpus

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Abstract: The present paper introduces a corpus of Dutch Renaissance poetry which was automatically annotated by using neural networks. The analysis of the annotations provides a clear picture of the process of implementing the new poetic form into Dutch poetic tradition, and of its different stages. The development of iambic metre was a gradual process that required various attempts; this can be well observed when comparing Dutch poems from a 100 year time window. While syllabic instances can be observed among the first attempts, most of the earlier poems are not isosyllabic and have a rather varied syllable length. This study shows that isosyllabicity developed together with iambicity. Finally, automatic poetry annotation allows for testing and validating theoretical hypotheses and for investigating literary questions with the aid of large amount of data.

Keywords: automatic poetry annotation, alexandrine, pentameter, Dutch poetry

1. Introduction

Automatic poetry annotation enables to analyse large amount of data, far beyond the numbers of lines which can be annotated manually. This paper introduces an automatic scansion machine which was used to annotate a Dutch Renaissance Poetry Corpus (DRP Corpus, henceforth) and describes the analysis of its resulting data. The automatically generated annotations allowed to delineate a detailed picture of the development of early-stage Dutch iambic pentameter and alexandrine and to investigate a number of theoretical questions related to the metrical differences among the first attempts.

The automatic scansion machine uses bidirectional LSTM networks. Two models were trained on two types of manually annotated material: a dataset containing syllable and stress annotation of the corpus 4100 most frequent words and one of 9673 lines, annotated in terms of stress and syllable, without word boundaries.

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https://doi.org/10.12697/smp.2023.10.1.02

In order to increase the accuracy of the model, data was augmented by exploiting orthographic variation. Renaissance Dutch was not standardised yet, hence, a number of spelling variants are available in the corpus. An example is the first-person pronoun 'I', for which three variants are available: *ic, ick* and *ik*. Sentences which contained words with different possible spellings were duplicated and included in the training dataset in all possible variants. Data augmentation improved the accuracy of the model. The final tool is able to define the stress pattern of Dutch Renaissance verse. At the current stage, one poetic practice constitutes a problem for the automatic tool, that is, synalepha: the scansion machine seems not to be able to learn it. However, in the Dutch corpus analysed here, only one author makes large use of synalepha, namely, Joost van den Vondel.

The analysis of the annotations highlights how the implementation of the new metre constituted a long process which led to the formulation of a metrical form strongly different from its source: a strictly iambic foot-based metre which originated from a not-foot-based isosyllabic form with no stress pattern line internally, except the prominence at the edge of each colon.

The paper is structured as follows. Section 2 provides a description of the DRP Corpus, such as the source of the data, the authors and poems included, as well as the number of lines composing the corpus. Section 3 gives a brief outline of the development of iambic metre in Dutch poetry, while Section 4 focuses on the automatic annotation of the corpus and on the characteristics of the model used for this task. The process of calculating the deviation percentage from a perfect iambic pattern is described in Section 5. The results of the data analysis are discussed in Section 6. Finally, the last Section (7) concludes the paper.

2. The corpus

The DRP Corpus is partially based on works available on the *Digitale Bibliotheek voor de Nederlandse letteren* (DBNL),[1] while other works were provided by the *Koninklijke Bibliotheek* (KB).[2] Ten authors were included in the corpus, viz., Dick Volkertsz Coornhert (1522–1590), Lucas de Heere (1534–1584), Peter Heyns (1537–1598), Jan van der Noot (1539–1595), Jan van Hout (1542–1609), Roemer Visscher (1547–1620), Karel van Mander

[1] https://www.dbnl.org/.

[2] https://www.kb.nl/.

(1548–1606), Hendrik Laurensz Spiegel (1549–1612), Joost van den Vondel (1587–1679) and Pieter Corneliszoon Hooft (1581–1647). The term 'Dutch Renaissance poetry' used in this paper indicates poetry written in Dutch, hence, not strictly referring to poetry written within the exact borders of the Netherlands. In fact, while some of the poets included in the corpus were born and lived within Dutch borders, some of them were close to the cultural center of Antwerp (part of the Habsburgian empire then and modern Belgium now). In addition, due to religious persecution or political matters, numerous poets travelled to different countries (Meijer 1978).

Fifty-four works were selected. The DRP Corpus covers a time span which goes from mid fifteen hundred to mid sixteen hundred. The main Dutch poets were considered, and the selection was based on the availability and accessibility of digitised versions of their works. For instance, the sonnets collection by Van der Noot had to be excluded because the only available version[3] comprised pictures of the manuscript in PDF format. The transcription of such type of text without an expertise would lead to high risks of misinterpretations, hence, the decision to exclude it from the analysis.

Longer works, for instance, Coornhert's translation of the *Odyssey*, were subdivided into different entities in the corpus. Similarly, miscellanea works of one author were divided according to their metre, namely pentameter or alexandrine. A total of 35520 lines was collected. For the annotation of the corpus an automatic annotation system was used. For a detailed list of the works included and the number of lines considered per each author see the Appendix. Two iambic metres coexist in the Dutch corpus: pentameters and alexandrines, the latter being more frequent.

A GitHub repository[4] hosts the corpus, including the original and the automatic annotated lines.

3. Iambic metre in Dutch poetry

During Renaissance, Dutch poets were highly influenced by French and (to a lesser extent) Italian poetry. This brought to the development and spread of iambic verse, a new verse form, which quickly replaced accentual verse and became the predominant metrical form in Dutch poetic tradition.

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[3] Available on https://www.dbnl.org.

[4] https://github.com/mirsdev/Dutch_Renaissance_poetry_corpus.

Some prior iambic instances are attested in Medieval Dutch poetry, such as *Het Leven van Sinte Lutgart* by Willem van Affligem (Zonneveld 1998, 2000), *Saladijn,* 300 lines from a poem found in two manuscripts, the Marshall 29 and the Comburgone (Sytsema, Lahiri 2018), and the *Limburgse Aio*l (Goossens 2002). Nevertheless, these iambic poems remained isolated instances.

In the process of incorporation of the new poetic trend, the metrical source underwent a deep change, in order for it to be adapted to the recipient tradition and language: while the source was syllabic (that is, it specified no internal stress pattern and only had two prominent positions at the right edge of each colon), the new Dutch form had a fixed number of iambic feet and not much space for deviations from the metrical template.

The incorporation of the new metre into the Dutch poetic tradition was far from straightforward. According to the literature (Meijer 1978; Gasparov 1996; Zonneveld 1998), two types of attempts can be distinguished from among the first instances of implementing the new metre: a syllabic and a foot-based attempt. The former consisted of trying to reproduce the same structure of French verse, by having a fixed number of syllables and no precise stress pattern, except the two prominent positions coinciding with the right edge of each colon. The latter consisted of a line composed of a sequence of iambic feet, specifically a stressed syllable preceded by an unstressed syllable, and in some cases divided by a caesura.

Gasparov (1996) and Zonneveld (1998) observed that these two groups follow a geographical pattern; syllabic types were attested in the south of Low Countries, while foot-based forms were first documented in the north. According to this claim, differences in the incorporation strategies are a reflection of the differences in the degree of understanding the French language. It has been suggested that the poets from the south were usually bilingual, speaking both Dutch and French, while those in the north were monolingual with limited knowledge of French. According to this claim, the different incorporation strategies were due to a different degree of understanding the functioning of French poetry.[5]

However, it is important to mention that it would be very difficult to determine without any doubt the linguistic background of the poets, given their studies, their travels and the socio-political situation of the Low Countries at that time.

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[5] An alternative account could be to consider that southern poets spoke Flemish, which, in terms of prosodic organisation, is closer to French, due to extensive language contact (Noske 2005). Based on this perspective, the syllabicity of the southern metre might be related to the prosody of the variety in which it was written.

Kazartsev (2008), on the other hand, observes that the two types of attempts are connected to the theorisation of the new metre. The freer verse, namely the syllabic line, would be allowed in a stage where theory had yet to be elaborated; the iambic line, instead, exhibiting a more regular stress pattern, would be typical of the period following the elaboration. Given the theorisation of Dutch metre took place in the 17th century (Kossmann 1922), this distinction is to a certain extent temporal and potentially divides earlier from later poets.

In addition to comparing the evolution of Dutch metres, this chapter also investigates the two aforementioned hypotheses. Specifically, I will test whether the analysis of the Dutch lines shows a geographical division and whether the elaboration of the theory represents a breaking point within the tradition.

4. Automatic annotation of DRP Corpus

Automatic annotation of poetry is an expanding field. Some previous examples of scansion tools are AnalysePoems (Plamondon 2006) and ZeuScansion (Agirrezabal et al. 2013) for English poetry, Automatische Mittelhochdeutsche Metrik 2.0 for Middle High German poetry (Dimpel 2015), the Scansion Generator (Koppelaar, Van Oostendorp 2013; van Oostendorp 2014) for Modern Dutch, Rantanplan (De la Rosa et al. 2020) for Spanish poetry and Aoidos (Mittman et al. 2016) for Portuguese poetry.

The DRP Corpus, was annotated automatically for the present study. Since no previous annotation was available and the corpus was too large to be manually annotated, an automatic tool was needed. Consequently, a recurrent neural network with bidirectional Long Short Term Memory cells (Hochreiter, Schmidhuber 1997) was used to train a language model in detection of stressed and unstressed syllables in each line. A label of 0 was assigned to unstressed syllables and 1 to stressed syllables. In addition, two extra annotations were added: a label of 3 indicated an elided vowel, and 4 indicated synalepha. Training material consisting of manually annotated lines was used to train the model; the algorithm learnt from the material and, consequently, could annotate new lines accordingly. In 1, an example of the manually annotated training material is given.

(1)
a. *Original text*
Heur ooghen syn als twee schoon Esmerauden,
Blinckende claer gheensins om te verlichten
Fraeykens gheset voor alle mans ghesichten,
In tweé peerlen de schoonste die bedauden
Jan van der Noot (1581)

Annotated text
heur/0 oo/1 ghen/0 syn/1 als/0 twee/0 schoon/1 es/0 me/0 rau/1 den/0 blinc/1 ken/0 de/0 claer/1 gheen/0 sins/1 om/0 te/0 ver/0 lich/1 ten/0 fraey/1 kens/0 ghe/0 set/1 voor/0 al/1 le/0 mans/1 ghe/0 sich/1 ten/0 in/0 twee/0 peer/1 len/0 de/0 schoons/1 te/0 die/1 be/0 dau/1 den/0

English translation: "Her eyes are like two emeralds, / [so] shiningly clear that could not be more brilliant / charming for the eyes of all people / in the most beautiful dewy two pearls"

b. *Original text*
Op 't heerlijck spoor der Hollantsche amiraelen
Joost van den Vondel (ca. 1645–1656)

Annotated text
Op/0 t/3 heer/1 lijck/0 spoor/1 der/0 Hol/1 lant/0 sche/4 a/0 mi/0 rae/1 len/0
English translation: "On the glorious footsteps of the Dutch admirals"

As can be observed in 1, the training material for the automatic model presents the numerical marking after every syllable (preceded by a slash), so the model can learn to which syllables in the line to assign a 1, a 0, a 3 or a 4.

4.1. The model

The model was trained on two types of manually annotated material: one dataset containing words syllabified and annotated in terms of stress and another composed of lines from the DRP Corpus, also syllabified and with stress annotation.

For the word dataset, a list of the most frequent polysyllabic words in the Dutch corpus was annotated. The lines for the line datasets were selected randomly from across the corpus.

A total of 4100 words and 524 lines were first completely manually annotated for the initial training. Stresses in polysyllabic words were placed by checking the position in the line, with particular attention to line final stresses, and by consulting *Historische woordenboeken Nederlands en Fries*[6] and *Van Dale Online*.[7] Rhyme was used as a strong clue for stress placement. Generally, word accentuation appeared to coincide with that of contemporary Dutch. Monosyllables were included in the annotated word list in a second training phase, in order for the model to be able to recognise them.

After the first round of training, the model was used to annotate 1500 lines, which were manually checked; errors were fixed, and words annotated wrongly were corrected and added to the original list of words. The manually corrected lines were added to the training set of lines. The two models were combined in two different ways. In the first instance, the annotation of monosyllables was checked by the line model, while that of polysyllabic words was assigned based on the word list. In contrast, the second used the word model only to syllabify the material, and the line model (which was trained without word boundaries, only with syllabification) determined stress annotation (see the Example in 2 to compare the training material of the two-line models). The two systems were compared by using them to annotate the same material. This comparison led to the selection of the second model: the one trained with no word boundaries but only syllables.

(2)
a. Original line
Terwijl myn lippen op haer lieve lippen weydden
P. C. Hooft (1610)

b. First model annotation
Ter/0 wijl/1myn/0 lip/1 pen/0 op/1 haer/0 lie/1 ve/0 lip/ pen/0weyd/1 den/0

c. Second model annotation (no syllable boundary)
Ter/0 wijl/1 myn/0 lip/1 pen/0 op/1 haer/0 lie/1 ve/0 lip/1 pen/0 weyd/1 den/0

English translation: “While my lips lightly touched her lovely lips”

6 http://gtb.inl.nl/search/ provided by Instituut voor de Nederlandse taal.

7 https://www.vandale.nl/.

In order to increase the accuracy of the model's performance, data augmentation for text (Mueller, Thyagarajan 2016) was used on the training dataset. Data augmentation is a way to increase the size of the dataset by applying minor alterations to the existing dataset. In the case of texts, this is normally achieved, for instance, by replacing a word in a text or sentence with a synonym, randomly adding or removing a word, or randomly swapping words. In the present model, given the importance of the position of stress and of the number of syllables within a line for metre detection, these techniques were unsuitable. To explain, replacing a word with a synonym might lead to a modification of the line stress pattern and this risk would become a certainty if a word was randomly removed or added. In 3, hypothetical examples of synonym substitution and random word removal are shown.

(3)
a. Original sentence
Ben ***ick*** *een* ***Dief****, om* ***dat*** *ick* ***heb*** *ghe****ghe****ven?* Roemer Visscher (1614)
English translation: "Am I a thief, because I have given?"

b. Synonym substitution
Ben ***ick*** *een* ***Dief****, om* ***dat*** *ick* ***heb*** *ghedo****neerd****?*

c. Random word removal
Ben ***ick*** *een* ***Dief****,* ***dat*** *ick* ***heb*** *ghe****ghe****ven?*

In the Examples in 3, syllables in bold are stressed and the others unstressed. As can be observed, using a synonym or deleting a word would modify the stress pattern of the line, hence the model would train on potentially misleading data.

Consequently, a different type of data augmentation was needed. For this purpose, I decided to exploit the orthographic variance attested in the corpus. To explain, since Dutch had not yet achieved standardisation in this period, spelling differences can be noticed among authors or even within works by the same poet. For instance, three variants of the first person singular personal pronoun 'I' are present in the corpus, namely *ic*, *ick* and *ik*. Similarly, as it can be observed in 3, the modern *ge-* was spelled as *ghe-* by some authors or in some cases.

Using the different spellings attested in the corpus for data augmentation helps avoid the risks of the other methods mentioned above, because enables data alteration in a way that does not modify words' syllabic groupings or stress placement.

Sentences which contained words with different possible spellings were duplicated and both versions included in the training material. For example, the sentence in 4a was duplicated to form the almost identical sentence in 4b; both sentences were then included in the training material.

(4)

a. Original line

*De kamer, daer **ick** eenzaem lagh en sliep*

Joost van den Vondel (1655)

De/0 ka/1 mer/0 daer/1 ick/0 een/1 zaem/0 lagh/1 en/0 sliep/1

b. Duplicate

*De kamer, daer **ik** eenzaem lagh en sliep*

De/0 ka/1 mer/0 daer/1 ik/0 een/1 zaem/0 lagh/1 en/0 sliep/1

English translation: "The room where I, lonesome, lay and sleep"

This was done with a number of spelling variations, summarised in Table 1, by replacing *dit*, 'this', with *dat*, 'that' and by replacing the numeral *twee*, "two", with *drie*, "three".

Table 1. Spelling variations used for data augmentation

Variant	Direction manipulation	Variant	Variant
Ic	< >	Ick	Ik
Mijn	< >	Myn	
Godt	< >	God	
Zijn	< >	Sijn	
Vriendt	< >	Vriend	
Hy	< >	Hij	
Sich	< >	Zich	
Laett	< >	Laet	
heid	< >	heidt	
lyck	< >	lijck	
dt	>	d	lijk
vw	>	uw	
wt	>	uit	
ck	>	k	
gh	>	g	
ae	>	aa	

By using data augmentation, the training material was increased to a total of 9673 annotated lines. The final training phase led the line annotation model to achieve 97% accuracy and a validation loss of 8%. The previous line annotation model without augmented data had accuracy of 91% and a validation loss of 35%. The word syllabification model also presents 96.7% accuracy and a validation loss of 9%. The combination of the two models leads to an annotation tool which is quite accurate. In Figure 1, two samples, one with manual annotation and one with automatic annotation, are compared. They consist of 100 lines from *Hert spiegel* by Spiegel. Figure 1 shows the number of stresses assigned to each metrical position in the sample. It can be observed that the two annotation methods do not completely coincide but are not far apart.

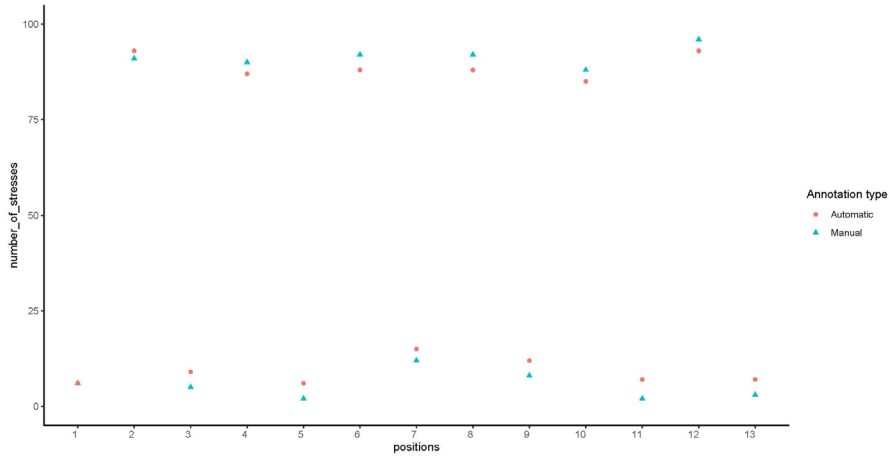

Figure 1. Comparison manual and automatic annotations

A limitation of the automatic annotation model which needs to be mentioned is that it is not yet able to learn how to use synalepha and this imposes some limits on its use in annotation of authors who use this frequently in their lines. Counting two adjacent vowels as two distinct metrical positions leads not only to a miscount of line length but also to a misplacing of stressed and unstressed syllables. This is the case with Vondel, who makes use of synalepha much more often than other Dutch poets of the period. It is important to highlight that synalepha is a difficult element for machine learning because, in addition to its low incidence rate, it does not follow strict rules of application and distribution, but it is rather subjected to the individual author's decision making. The model was much more efficient and successful in learning elision, which applies quite regularly.

More work would be needed in order to increase the efficiency of the tool.

5. Calculation of deviation from an iambic pattern

A label of either 0 or 1 was assigned to each position for each line of every poetic work. The resulting binary sequences were used to calculate the percentage deviation from a perfectly iambic pattern, namely one unstressed syllable followed by a stressed syllable. Specifically, an automatic calculation was made of the number of times the label 1 (that is, a stressed syllable) occurred in each odd position and the label 0 (an unstressed syllable) in each even position. This process was automatically repeated for all metrical positions in each corpus item.

The deviation from iambicity was calculated by assuming that a perfect iamb always has stressed syllables (1) in even positions and unstressed syllables (0) in odd positions, leading to a perfect sequence 0101010101 for a pentameter and 010101010101 for an alexandrine. By comparing the results of annotating the samples to a perfect iambic pattern, it was possible to define how many times in each sample each metrical position deviated from the ideal pattern. In other words, the binary stress pattern sequences calculated for every work were compared to a perfect repeating 01 sequence; for every instance of a mismatch with the perfect iambic sequence, a deviation point was assigned.

6. Results

After having automatically annotated the stress pattern of every line of the corpus, the rate of deviation from an iamb was calculated for each metrical position in every poem or poetic work. The resulting vectors represented the deviation percentage in every metrical position of each text. The following subsections describe the findings of the analysis of these vectors.

6.1. Isosyllabicity

A number of works, especially the earlier ones, exhibit longer lines than expected based on the metre. Some of the cases might be caused by miscalculations of the annotating system due to, for instance, the overlooking of synalepha. However, the number of such cases and the fact that some lines are much longer than expected cannot be solely motivated by the occurrence of a not particularly common practice like synalepha. An exception to this observation is Vondel's work, since he made large use of synalepha, as it could be observed by manually checking his works (see De Sisto 2020); consequently,

in his case the present calculation of syllables beyond the line limit is most probably falsified by the annotating system not detecting synalepha.

The extra syllables found in longer lines were excluded from the vectors used to visualise metrical patterns and their attestation was calculated separately.

In Table 2, an overview of longer lines for each work and the percentage of syllables occurring in positions after the expected metrical line limit is presented.

Table 2. Percentage of syllables beyond the expected line limit for each Dutch work

	Pentameters	Syllables beyond line limit				
Author	Dutch work	11th	12th	13th	14th	15th
Coornhert	Op 't beclagh	9.7%				
Coornhert	De eerste vrucht	6.23%	4.17%			
De Heere	Den Hof	20.12%	3.3%	0.3%	0.6%	0.3%
Van der Noot	Pentameters	7.6%	0.1%			
Van Mander	Georgica:					
	First book	5.83%	0.3%	0.1%	0.1%	
	Second book	4%	0.3%			
	Third book	6.1%	0.5%			
	Fourth book	6.38%				
Van Mander	Sonnets	3.6%				
Spiegel	(Iaar lied 1595)	15.1%	1.6%			
Vondel	Gedichten	14.2%	7.3%	1.4%		
Vondel	Altaer Geheim.	12.9%	1.2%	0.1%		
Vondel	Transl. Virgilius	13.8 %	2.7%			
Hooft	Pentameters					
	Alexandrines	Syllables beyond line limit				
Coornhert	Odysseia:					
	Eerste Boek	42.3 %	21.5%	3.7%	0.6%	0.2%
	Tweede Boek	40.7%	40%	9.6%	1.8%	0.2%
	Derde Boek	38.3%	42.3%	10.1%	1.9%	0.5%
	Vierde	46.3%	29.1%	8.4%	1.2%	0.1%
	Vijfde Boek	44.7%	33.7%	7.4%	0.7%	
	Zeste Boek	46.8%	25.5%	3.1%	0.5%	
	Zevende Boek	42.9%	28.9%	7.1%	1.3%	0.2%
	Achste Boek	44.1%	33%	7.9%	0.3%	

	Alexandrines	Syllables beyond line limit				
	Negen Boek	39.5%	34.8%	14.6%	2.1%	
	Tiende Boek	42.8%	34.1%	13.2%	2.2%	
Coornhert	Recht ghebruyck	25.9%	8.1%	1.4%		
De Heere	Den Hof	18.3%	3.7%	0.2%	0.1%	0.1%
De Heere	Den Hof: Sonnets	16.4%	1.9%			
De Heere	Refrain	20.2%	2.1%	1%		
De Heere	Tot den Leser					
De Heere	Transl. Marot	14.6%	2.5%	0.5%		
Peter Heyns	Various	14%	4.3%	0.8%		
Van der Noot	4 Sonnets					
Van der Noot	Sonnets (Bosk)	0.7%				
Van der Noot	Alexandrines (Bosk)	6.8%				
Van Hout	In mate	19.5%	15.2%	12.3%	10.8%	7.9%
Visscher	Brabbeling	6.1%	1.5%	0.4%	0.2%	
Spiegel	Hertspiegels:					
	Kalliop	4.4%	0.1%			
	Taleye	3.7%	0.4%			
	Melpomen	3.6%				
	Kleio	3.9%				
	Terpsichore	1.6%				
	Erato	2.6%				
	Euterpe	1.4%	0.4%			
Spiegel	(In Brabbeling)	5.1%	0.6%			
Spiegel	Lofdicht	1.8%				
Vondel	Gijsbreght	8%	0.4%			
Vondel	Lust	9.6%	0.9%			
Vondel	De vaderen	19.6%	2%			
Vondel	Den Gulden	23.9%	2.2%	0.5%	0.1%	
Vondel	Gedichten	9.6%	0.9%			
Hooft	Emblemata	0.3%	0.1%			
Hooft	Alexandrines	06.^%				

As can be observed in Table 2, some of the authors, in particular, Coornhert, De Heere and Van Hout, frequently exhibit lines which are much longer than expected. An extreme case is constituted by the *Odyssey* translated by Coornhert. The works of Hooft, however, are the most isosyllabic in the whole corpus.

The fact that line length appears to be surprisingly unstable for a number of authors might suggest that isosyllabicity was not the main element Dutch poets were considering when imitating French poetry (even in those cases in which they were clearly not implementing a foot-based metre). One hypothesis could be that, rather than focusing on the number of syllables, these poets were focusing on the lack of a stress pattern, hence, still on stress somehow, even if on its avoidance.

6.2. General overview of the patterns of deviation

The vectors generated for each poetic work were used to visualise rhythmical patterns. They have been plotted into Figure 2 and 3, where each chart represents the works of one author. In the case of a large number of works per author, for example, Coornhert, the texts were divided into two charts or more. Starting from the top left, the authors are chronologically ordered. In these two charts, pentameters and alexandrines are displayed together.

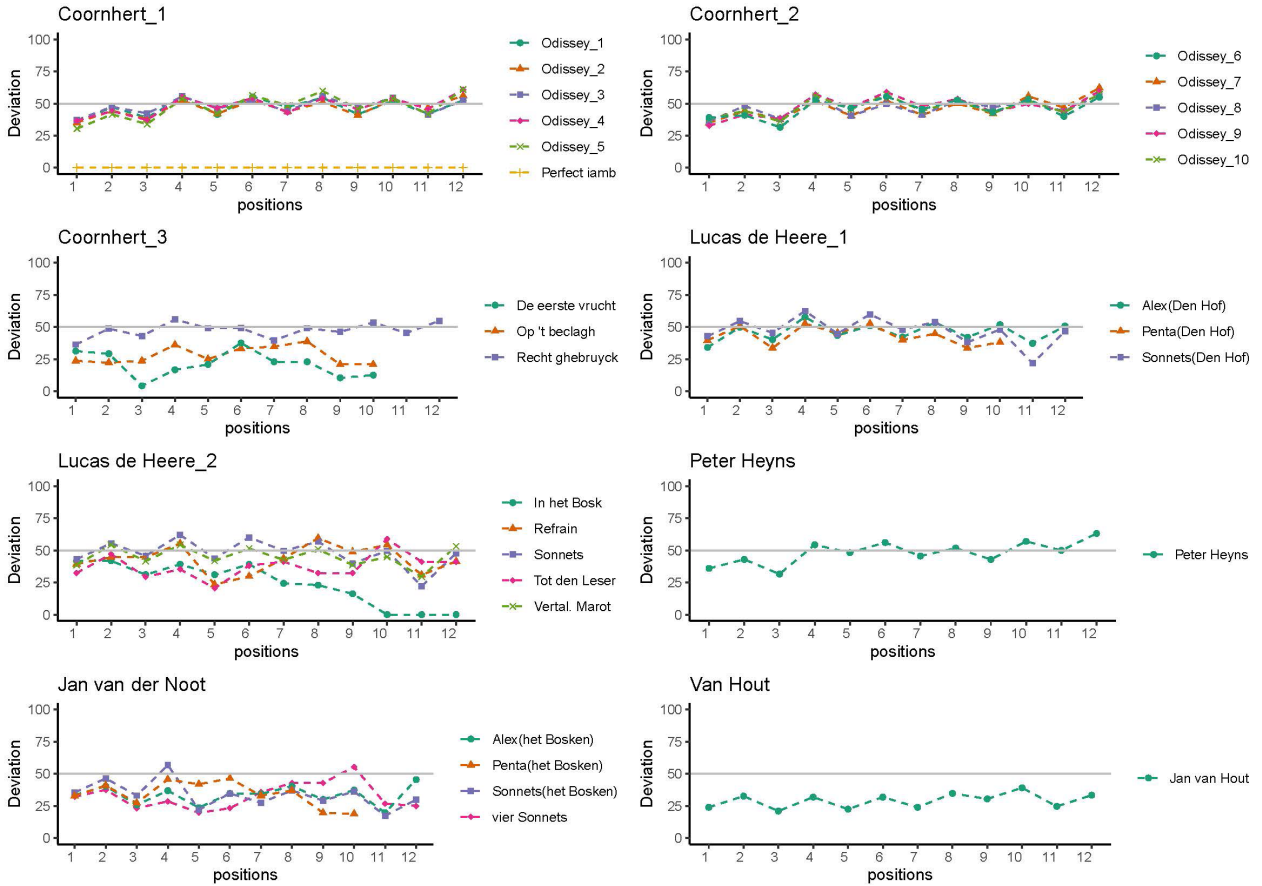

Figure 2. Possibility of deviation from iambic pattern in the Dutch corpus: Coornhert, De Heere, Heyns, Van der Noot and Van Hout

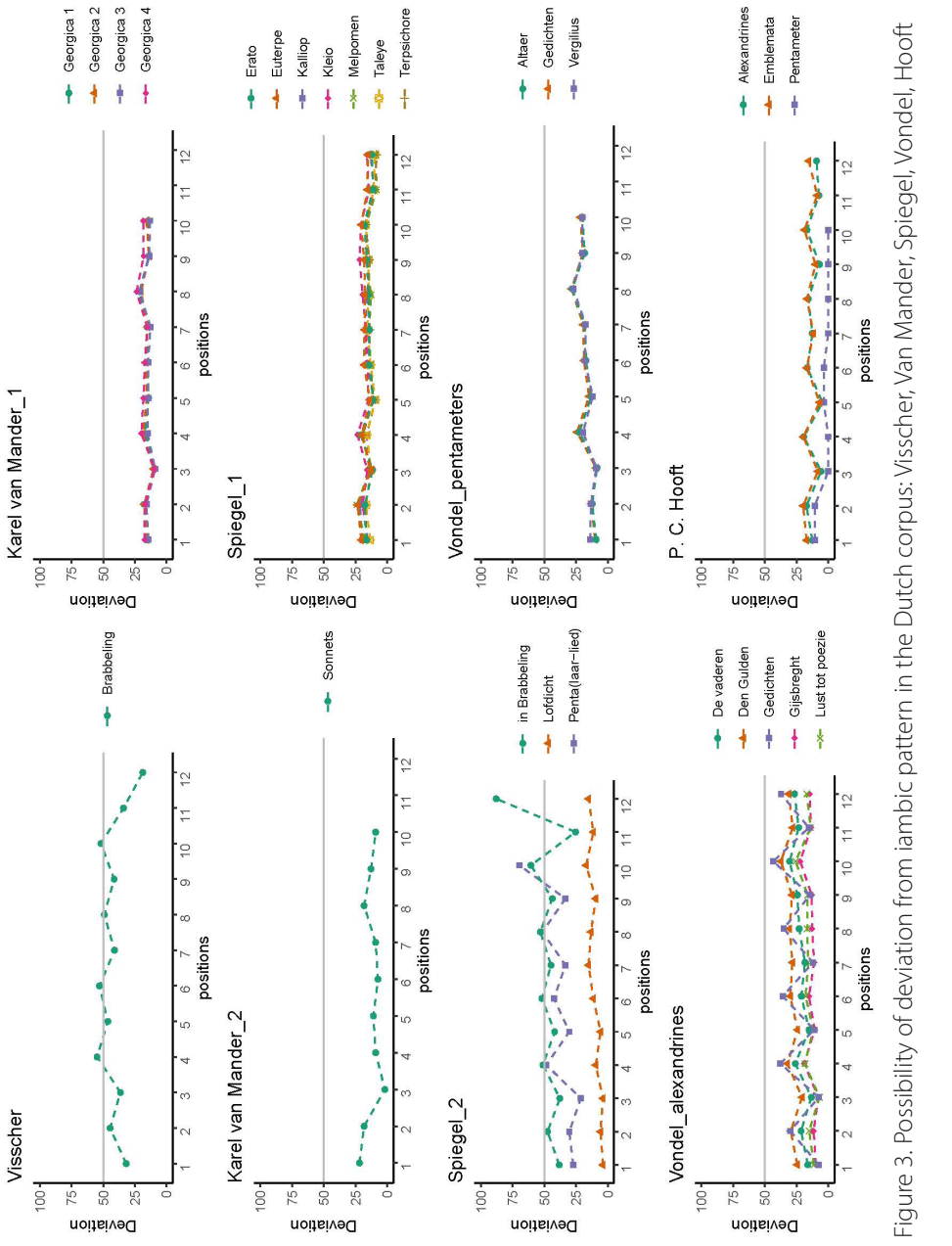

Figure 3. Possibility of deviation from iambic pattern in the Dutch corpus: Visscher, Van Mander, Spiegel, Vondel, Hooft

In the first row in Figure 2, the pattern of deviation of Coornhert's ten parts of *Odyssey* can be observed, all of them showing a relatively highly deviating structure similar to one another. In Coornhert 3, the other of his works can be compared, two of them being pentameters, namely *De eerste vrucht van Ducdalve was de Banninge der uutghewekene* and *Op 't beclagh van 't mesbruyck des avontmaels* (*De eerste vrucht* and *Op 't beclagh* in the chart, respectively); the *Recht ghebruyck* (complete title *Recht ghebruyck ende misbruyck van tydlycke have*), however, is written in alexandrines and resembles the *Odyssey*'s lines.

The next two charts show the works by Lucas de Heere. The small sample by Peter Heyns (only 114 lines) show high deviation percentage, therefore, his metre does not seem to be exactly iambic. The writing of Van der Noot exhibits different patterns, which do not appear to be close to an iambic alternation. Finally, the small sample by Van Hout (only 138 lines) show a higher regularity than that of previous authors but it is important to highlight that it also has strongly varying line length.

Figure 3 starts with Visscher's line, which exhibits high degree of deviance. In general, Visscher's poetry is also characterised by a large variety of line types in terms of length. In the present study, the much shorter (not longer than six syllables plus one extrametrical) and much longer (more than fifteenth syllables) lines were excluded. However, the lines included are still imparisyllabic.

In contrast, the following author in the next two charts, Karel van Mander, exhibits a greater regularity, when compared to the previous authors. His innovative regularity can be explained by considering that he has been among the theorisers of the new poetic form in the preface of his *Het schilder boeck* (Kossmann 1922; Prandoni 2012). In addition, it has been suggested that he had direct connection to the Italian language and poetry (Meijer 1978); this can also account for the fact that he wrote only pentameters.

Spiegel's alexandrines, in the next chart, all contained in *Hert spiegel*, have a low deviation rate; the same can be seen for *Lofdicht tot eer van Amsterdam*, while the work in pentameter and that found in *Brabbeling* by Visscher is much more deviating.

Vondel's pentameters are strongly regular, while his alexandrines appear to be more varying. In this respect, it is important to recall that the automatic annotating system failed in learning synalepha and this might result in showing more irregularity than actually attested.

Finally, Hooft displays a very low deviation percentage from an iamb in both his alexandrines and pentameters.

The first observation that can be made by comparing the various charts in Figure 2 and 3 is that a gradual increase in regularity characterises them. Despite the differences amongst the authors and their works, one common

trait can be identified, namely that even positions are generally more deviating than odd positions.

An unexpected result relates to the deviation percentage in positions towards the end of the line. Most of the works do not show a gradual increase in regularity line finally. This contrasts with the observed cognitive tendency regarding line final regularity (Kiparsky 1968; Hayes 1983; Prince 1989; DeCastro Arrazola 2018). However, this might be due to the embryonal stage of the poetic form consisting of numerous, often diverging, attempts to adapt the Romance metre. By contrast, Van Mander, Spiegel, Vondel and Hooft do present an increase in regularity. In the alexandrines by the latter three authors, a relative deviation peak occurs, maybe as a tool of Poetic Closure (Herrnstein Smith 1968).

6.3. Geographical and theory related distinction

Recalling the two hypotheses regarding the development of Dutch Renaissance metre, the geographical distinction predicts two poet groups (see Table 3): a southern group, composed by Lucas de Heere, Jan van der Noot, Peter Heyns and Karel van Mander, and a northern group with the other poets considered in this study.

Table 3. authors of DRP Corpus divided according to the geographical hypothesis

South of the Low Countries	**North of the Low Countries**
Lucas de Heere	Dick Volkertsz Coornhert
Jan van der Noot	Jan van Hout
Peter Heyns	Roemer Visscher
Karel van Mander	Hendrik Laurensz Spiegel
	Joost van den Vondel
	Pieter Corneliszoon Hooft

According to this grouping, southern poets are expected to exhibit a more syllabic metre more deviating from an iambic rhythm; in contrast, the northern group would be expected to make an easier transition into an iambic metre. The patterns of deviation in Figure 2 and 3 suggest that while De Heere, Van der Noot and Heyns do indeed present a less regular metre in terms of both iambicity and line length, Van Mander's lines show relatively longer iambic structure. In addition, Coornhert (Amsterdam – Gouda), which should be a representative of the northern group, displays a deviation rate much more similar to that of the southern group.

It could be claimed that the regularity of Van Mander is due to his knowledge of Italian and Italian poetry; however, Coornhert should conform to the northern group, if the geographic aspect is considered as the main criterion.

A further observation in this respect can be made regarding isosyllabicity. As mentioned above, earlier poets do not seem to strongly follow isosyllabicity, their line length varies and appears to be quite unstable. An important aspect of French poetry is isosyllabicity; since the French form lacks metrical stress patterns, line length is a fundamental element of French metre. If the geographical hypothesis were true, that is, if the metrical difference was due to a different degree of understanding French poetry, isosyllabicity would be expected in lines written by Dutch bilingual poets. However, such is not the case and line length is highly variable in the corpus, particularly in the works of earlier poets, regardless of their origin.

As for the role of theory, it can be noted that the elaboration of theory can also be seen as playing a role in the regularisation of the metre. In fact, from Van Mander onward, deviation rate generally decreases. At the same time, theorisation cannot be the only factor, since the final form of Dutch iambic metre was achieved much later, with the poetry of Vondel and Hooft. Consequently, theory is undoubtedly a contributing factor, but it does not represent a clean break in the development of the Dutch poetic tradition. The present study confirms what was observed by Kossmann (1922) regarding the elaboration of the theory being a process in which poets participated actively and not something categorical. In fact, the possibility of variation from the template varies among authors, just as claimed by Kossmann (1922).

A comparison of the various works according to their metre can reveal more details about the two poetic forms and their development.

6.4. Pentameters and alexandrines

Figure 4 shows works written in pentameters. The comparison of the various charts clearly shows the increase in regularity from one author to the other, until Hooft, whose works shows extreme regularity. However, it is important to highlight that Hooft wrote very few lines in pentameter, exactly only two sonnets. Consequently, it cannot be excluded that with a bigger sample the deviation percentage might have been higher. Pentameters by Coornhert, Van der Noot, Vondel and Hooft show an increase in regularity towards the end of the line. In contrast, in the other works the deviation rate in the last two metrical positions is comparable to that of other positions. In addition, not all lines are composed by ten syllables. In Vondel and Van Mander, an irregularity peak

is attested in the eighth position. Surprisingly, Spiegel's pentameter, instead, shows a strong degree of deviation percentage (higher than 60%) in the tenth position which is completely unexpected in an iambic line and especially, line finally.

Figure 5 displays the alexandrines included in the corpus. For this particular metre, a gradual decrease in deviation over time as well as high variability in line length can be observed, especially in the works of earlier authors. Aside from the higher regularity attested in later poets, in Vondel, Spiegel and Hooft, a deviation peak occurs in the antepenultimate position.

Of particular note is the alexandrine written by Spiegel found in Visscher's work: the pattern observed here does not conform to that of Spiegel in other works. This might suggest that Visscher was the real author or, at least, that those lines are not by Spiegel. Indeed, the sample resembles Visscher's, except for the line final positions which are quite anomalous.

In order to investigate the relationship and similarities among the works included in the corpus, two dendrograms were plotted, one containing the works written in pentameters and one with the alexandrine lines. Two dendrograms were produced because comparing two different metres could lead to incorrect calculations and misleading results.

The two dendrograms are provided in Figure 6 and in 7. In both of them, works are generally grouped based on the author. In the leftmost branch of Figure 6, Hooft is in one isolated branch connected to a branch dividing into works by Van Mander, on the left, and, on the right, into two sub-branches, one with Coornhert *De eerste vrucht* and the other with Vondel's works. A completely different branch contains the works by De Heere, Van der Noot, Spiegel and the other pentameter by Coornhert. It is likely that with a more exact annotation of Vondel's poetry its position would not be so close to Coornhert, but rather closer to Hooft (see for instance the 300 lines samples manually annotated in De Sisto 2020).

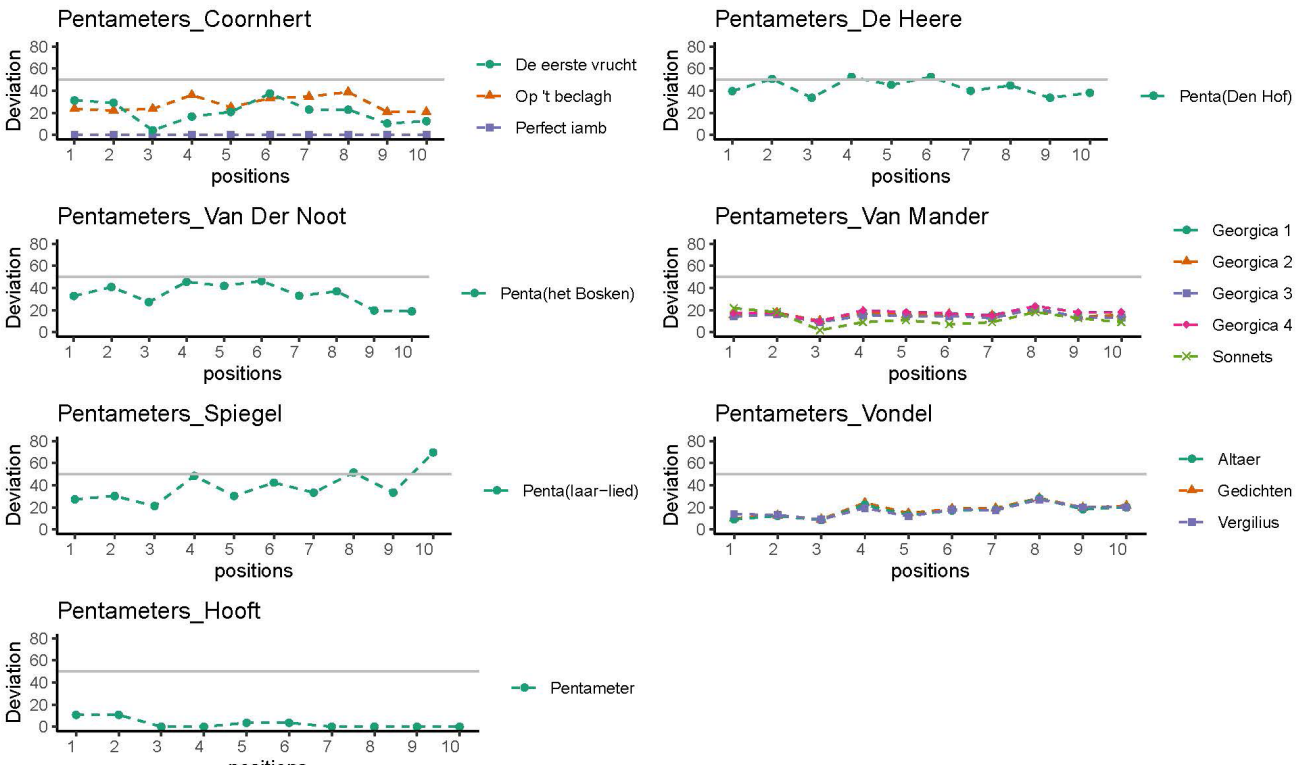

Figure 4. Possibility of deviation from iambic pattern in Dutch pentameters

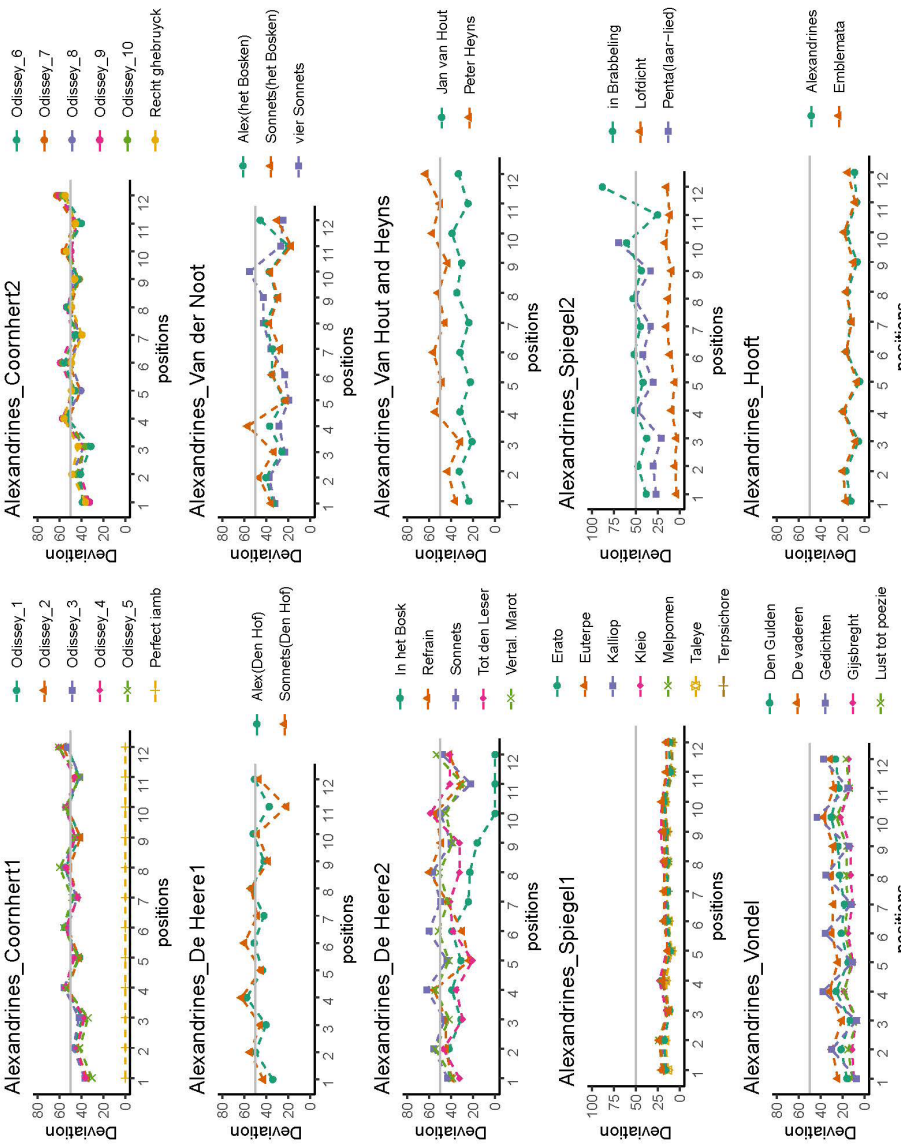

Figure 5. Possibility of deviation from iambic pattern in the Dutch alexandrines

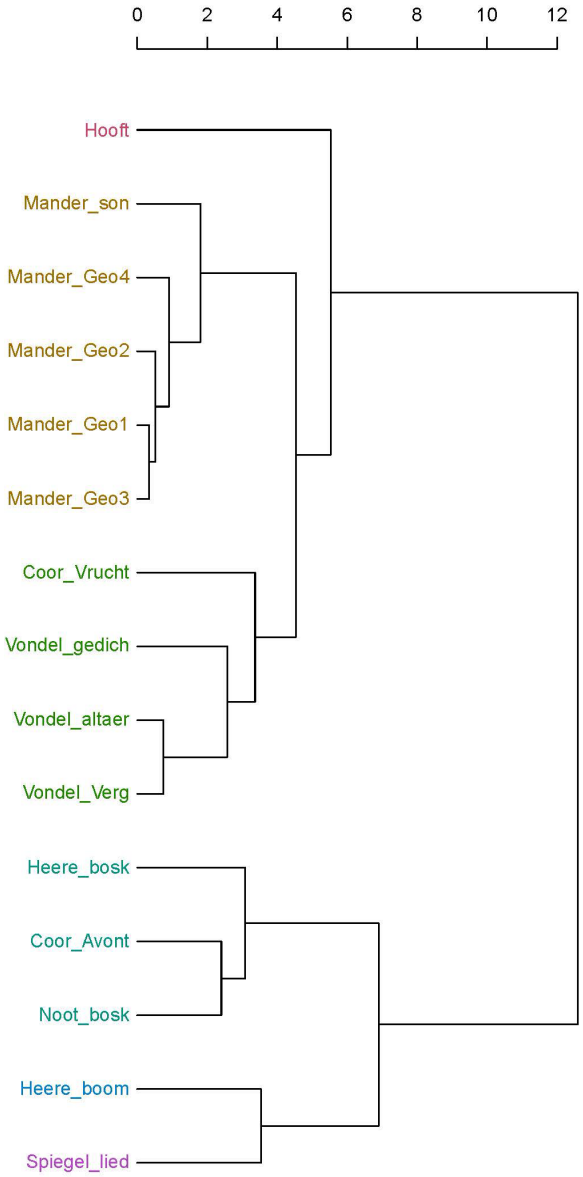

Figure 6. Dendrogram pentameters

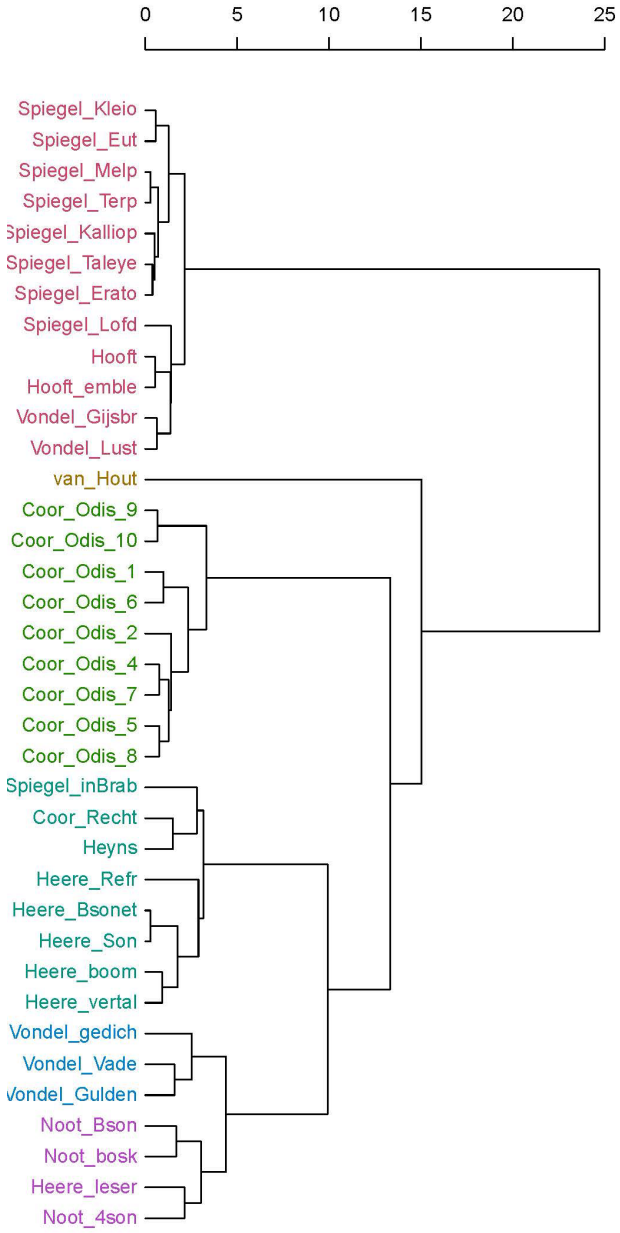

Figure 7. Dendrogram alexandrines

Figure 7 represents Dutch alexandrines. The leftmost group is *Hertspiegel* by Spiegel, followed by his *Lofdicht*. Next to it, two sub-branches contain Hooft's alexandrines and Vondel's *Gijsbrecht van Aemstel* and *Lust tot poëzie*, respectively. A different main branch subdivides into three subgroups, the rightmost is further divided into two sub-branches. Starting from the left, the small sample by Van Hout is in one branch. To its right, the *Odyssey* by Coornhert is in another group. Spiegels lines from Visscher's book are grouped together with Coornhert's *Recht ghebruyck ende misbruyck van tydlycke have* and the lines by Peter Heyns. The works by Lucas de Heere are close to each other. Next sub-branch shows Vondel's alexandrines and the last sub-branch contains poetry by Van der Noot and *Tot den Leser en Ziender by De Heere*.

In Figure 6, it can be observed that, with the exception of one work by Coornhert, more regular works are placed in the left branch, while those with a higher deviation rate are on the right branch. Similarly, in Figure 7, the leftmost main branch contains the more iambic lines. Apart from the poetry by Van Mander, the lines exhibiting a stronger iambic alternation are from later poets and this is clearly shown in the two dendrograms. In a way, the two dendrograms also display the development of the metre from unstable and syllabic to a precisely iambic form.

6.5. S shaped curve of the data

The data from DRP Corpus are comparable to what is typically observed when analysing language change over time. More specifically, the development of iambic metre in Dutch poetry appears to behave like a phenomenon of language change in that it follows an S shaped curve (Nevalainen 2015). To explain, the S curve model in language change refers to a "slow beginning when only a few speakers use the incoming form or pattern, followed by a middle stage when it is gaining ground rapidly among the speakers, and a slower final phase in which the vast majority have adopted it." (Nevalainen 2015). Similarly, Dutch iambic poetry has a slow start when its form is still quite blurred and unstable, with poets attempting to implement it in divergent and varying ways. After a certain moment, the stage is reached when the line has a stable form, and no strong variation occurs. The curve for Dutch alexandrine can be observed in the graph in Figure 8; the mean of deviation percentage of each work is displayed, and authors are organised in chronological order. Given the number of items, authors and titles are abbreviated. Table 4 outlines the abbreviations used in Figure 8.

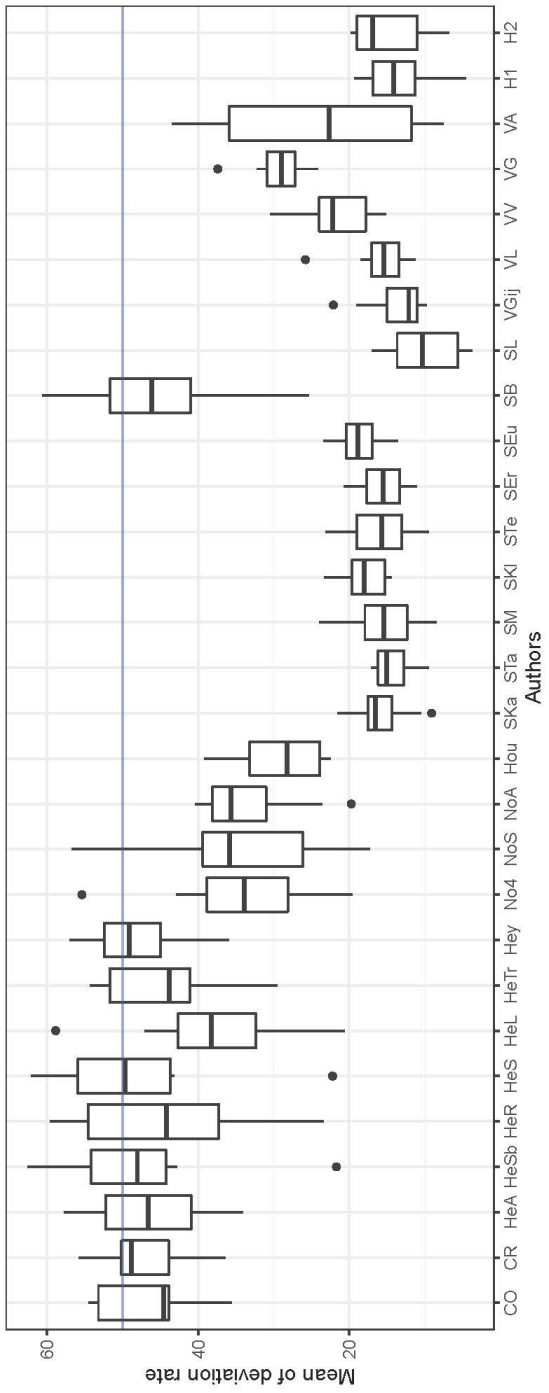

Figure 8. Development of the Dutch alexandrine

Table 4. List of abbreviations used in Figure 8

CO: Coornhert Odisseia	SM: Spiegel Melpomen
CR: Coornhert Recht ghebruyck	SKl: Spiegel Kleio
HeA: De Heere Alexandrines	STe: Spiegel Terpsichore
HeSb: De Heere Sonnets (Hof)	SEr: Spiegel Erato
HeR: De Heere Refrain	SEu: Spiegel Euterp
HeS: De Heere Sonnets	SB: Spiegel (in Brabbeling)
HeL: De Heere Tot den Lezer	SL: Spiegel Lofdicht
HeTr: De Heere Translation Marot	VGij: Vondel Gijsbrecht
Hey: Peter Heyns	VL: Vondel Lust tot poezie
No4: Van der Noot 4sonnets	VV: Vondel De Vaderen
NoS: Van der Noot Sonnets (Bosk)	VG: Vondel Den Gulden Winckel
NoA: Van der Noot Alexandrines (Bosk)	VA Vondel Gedichten
Hou: Jan van Hout	H1: Hooft Gedichten
SKa: Spiegel Kalliop	H2: Hooft Emblemata Amatoria
STa: Spiegel Taleye	

As can be observed in Figure 8, the deviation rate gradually decreases until it reaches a much lower rate in the second part of the graph (an exception is the text by Spiegel found in *Brabbeling*, but its problematic aspect has already been mentioned). As for Vondel, the higher deviation rate in some of his works is probably due to two factors. The first is the automatic annotating system failing to detect synalepha which might increase the deviation rate. Secondly, differences in genre might motivate the higher regularity in some works and the stronger deviation in others. For instance, a theatre play will be undoubtedly less metrically strict than verse in poetry.

7. Conclusion

The implementation of the Renaissance metre into Dutch poetic tradition was a process characterised by different phases. The analysis of the automatically annotated Dutch Renaissance Poetry Corpus allows to delineate a clear picture of this process and to fully display the changes of a poetic form under development. In addition, it also contributes to test the two major theoretical hypotheses about the distinction between syllabic and iambic first attempts. Besides highlighting the limits of the geographical and theorisation hypotheses, this study shed light on an element of Dutch Renaissance poetry which had not previously identified: even among the not-iambic instances, isosyllabism was not a prominent element of the earlier poems; in fact, isosyllabicity developed together with iambicity.

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Appendix

List of works included in the Dutch corpus

Author	Work	Metre	Period	N. of lines
Dick Volkertsz Coornhert	Odysseia	alexandrine	1562	
	Eerste Boek			451
	Tweede Boek			444
	Derde Boek			522
	Viderde Boek			857
	Vijfde Boek			512
	Zeste Boek			352
	Zevende Boek			363
	Achste Boek			614
	Negen Boek			554
	Tiende Boek			542
	De eerste vrucht van Ducdalve was de Banninge der uutghewekene.	pentameter	1570	48
	Op 't beclagh van 't mes-bruyck des avontmaels	pentameter	1630	72
	Recht ghe-bruyck ende misbruyck van tydlycke have	alexandrine	1585	602
Lucas de Heere	Den Hof en Boomgaerd der poesien:	alexandrine	1565	
	Sonettern	alexandrine		152
	Pentameters	pentameter		333
	Alexandrines	alexandrine		783
	Various found in Het bosken en het theatre	alexandrine	1570	74

Author	Work	Metre	Period	N. of lines
	Refrain van Lucas de Heere door Degroote	alexandrine	1568	94
	Sonetten	alexandrine	1560 1620	153
	Tot den Lese en Ziender	alexandrine	1567	34
	Translations of Marot	alexandrine	1560 1620	396
Peter Heyns	Various found in Spieghel der Werelt	alexandrine	1583	114
Pieter Corneliszoon Hooft	Emblemata amatoria	alexandrine	1611	586
	Alexandrines	alexandrine	1636	756
	Pentameters	pentameter	1636	28
Jan van Hout	From In mate volget me and Loterijspel	alexandrine	Ca. 1561	138
Karel van Mander	Georgica	pentameter	1597	
	First book			908
	Second book			879
	Third book			961
	Fourth book			1034
	1 sonnet and sonnets in Bucolica	pentameter	1597	55
Jan van der Noot	4 Sonetten	alexandrine	1597	56
	In het bosken:		1570	
	Sonnets	alexandrine		127
	Pentameters	pentameter		616
	Alexandrines	alexandrine		233
Hendrik Laurensz Spiegel	Hetspiegels:	alexandrine	1614	
	Hertspiegels:			
	Kalliop			581
	Taleye			474

Author	Work	Metre	Period	N. of lines
	Melpomen			496
	Kleio			480
	Terpsichore			492
	Erato			570
	Euterpe			500
	From Iaar lied 1595	pentameter	1595	33
	Various found in Brabbeling by Visscher	alexandrine	1614	583
	Lofdicth tot eer van Amsterdam	alexandrine	1549 1612	53
Roemer Visscher	Brabbelin	both	1614	942
Joost van den Vondel	Gijsbreght van Aemstel	alexandrine	1637	1646
	Lust tot poezie	alexandrine	1607	531
	De vaderen	alexandrine	1616	489
	Den Gulden Winckel	alexandrine	1613	1693
	Gedichten pentameters	pentameter	1645 1674	1448
	Gedichten alexandrines	alexandrine	1645 1674	8123
	Altaer Geheimenissen	alexandrine	1645	1799
	Translations of Virgilius (Herderskout tusschen Melibeus en Tityr)	alexandrine	1646	144