The Foot in the History of English: Challenges to Metrical Coherence

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Abstract

Dresher & Lahiri (1991) propose that Old English displays "metrical coherence": different phonological processes are sensitive to the same metrical structure. We will look at how English grammar has dealt with challenges to metrical coherence. We show that the resolved moraic trochee that is assumed to have characterized the early Old English foot (Bermúdez-Otero 2005; Goering 2016a, b) became untenable after the shortening of unstressed vowels. We argue that this stage of Old English, at least, requires the Germanic Foot, an extended and resolved trochee. After 1570 (Lahiri 2015) the direction of parsing changed from left-to-right to right-to-left when the number of Latin loanwords with stress-affecting suffixes had passed a threshold derived from Yang's Tolerance Principle (Yang 2016). This change reestablished the metrical coherence that had been disrupted by these words.

Keywords: metrical coherence, Germanic Foot, moraic trochee, stress, Tolerance Principle

1. Introduction

Dresher & Lahiri (1991) argued that Old English displays a property called *metrical coherence*, whereby different phonological and poetic processes are all sensitive to the same metrical structure. A grammar is a complex system, and over time it is affected by phonological or morphological changes that result in patterns that may not be consistent with the previous metrical structures. Such changes pose a threat to the metrical coherence of the grammar. In this paper we will look at how the grammar of English has dealt with some such challenges to metrical coherence. In some cases the challenges have come from within, as when a sound change makes a previous analysis untenable; other challenges have come from without, in the forms of large-scale borrowing of lexical items that are not compatible with the prevailing metrical system. We will show how the grammar has met these challenges, either by modifying the metrical system itself, or by modifying the segmental phonology to bring it in line with the metrical system, or, for words that cannot be easily integrated into the new system, by treating them as exceptions subject to special treatment of some kind.

2.   Change in the early Old English metrical system

Many have proposed that the Old English foot was a moraic trochee (Keyser & O'Neil 1985; Halle et al. 1993; Idsardi 1994; Hutton 1998; Bermúdez-Otero & Hogg 2003; Bermúdez-Otero 2005; Goering 2016a, b). We have argued rather for what we have called the Germanic Foot (Dresher & Lahiri 1991), a resolved and extended trochee. As the name suggests, we proposed that this foot was inherited by Old English from its Germanic ancestor. Here we will review the moraic trochee analysis and show why we think it is untenable for Old English as it is attested in the written record.

The moraic trochee analysis is most plausible when applied to a stage of the language in which some inflectional vowels still retained length inherited from Proto-Germanic, as illustrated by (1), which gives the Pre-Old English paradigm of the neuter *a*-stem nouns, according to Hogg & Fulk (2011).

(1)   Pre-Old English paradigms of neuter *a*-stem nouns (Hogg & Fulk 2011, p. 15)

NOM/ACC.SG	*STEM-Ø	NOM/ACC.PL	*STEM-u
GEN.SG	*STEM-as	GEN.PL	*STEM -ṍ
DAT.SG	*STEM-ǣ	DAT.PL	*STEM-um

The rule of High Vowel Deletion (HVD) deleted short *u* and *i* under certain conditions when in an open syllable. Bermúdez-Otero (2005) and Goering (2016a, b) show that the contexts for HVD emerge clearly from positing moraic trochees assigned from left to right, as in (2).

(2)   Pre-Old English moraic trochees and HVD (Bermúdez-Otero 2005; Goering 2016a, b)

a.   Stem-initial syllable is heavy: 'head'

	Pre-Old English	*Old English*
NOM/ACC.SG	(xau) (ƀud)	hēafud
GEN.SG	(xau) ƀu (das)	hēafdes
DAT.SG	(xau) ƀu (dǣ)	hēafde
NOM/ACC.PL	(xau) (ƀu du)	hēafudu
GEN.PL	(xau) ƀu (dṍ)	hēafda
DAT.PL	(xau) ƀu (dum)	hēafdum

b. Stem-initial syllable is light: 'army'

	Pre-Old English	*Old English*
NOM/ACC.SG	(we rud)	weorud
GEN.SG	(we ru) (das)	weorudes
DAT.SG	(we ru) (dæ)	weorude
NOM/ACC.PL	(we ru) du	weorud
GEN.PL	(we ru) (dõ̃)	weoruda
DAT.PL	(we ru) (dum)	weorudum

The vowels affected by HVD in heavy stems (2a) are those that cannot be parsed into a moraic trochee, as in all the oblique cases. In the GEN.SG, for example, the first syllable *xau* is heavy (as it is throughout the paradigm) and forms a moraic trochee by itself; the final syllable, *das*, is also heavy and forms a foot on its own, leaving the medial light syllable, *ƀu*, on its own and unparsed into a foot, and subject to deletion. By contrast, the second syllable in the NOM/ACC.SG is heavy and not subject to HVD. The NOM/ACC.PL is the only form in this paradigm in which the final syllable is light; hence, the medial and final syllable can make up a moraic trochee, and both *u* are retained in OE *hēafudu*.

This analysis has the merit of being able to explain why we find *hēafudu* rather than **hēafdu* as the earliest attested form of the NOM/ACC. PL (Fulk 2010), in contrast to the other oblique forms which show HVD. Notice that in this analysis deletion depends not only on the weight of the syllable *preceding* the unstressed high vowel, but also on the weight of the syllable that *follows* it.

The Pre-Old English foot was more complicated than a simple moraic trochee, however. Old English allowed stems with initial light syllables, as in (2b), and these had to be parsed into licit metrical feet. In (2b), the second vowel joins the initial one to form a moraic trochee (wé ru) in all the inflected forms. In the NOM/ACC.PL, the result is that the final suffixal -*u* is left unfooted and deletes. Note that the NOM/ACC.SG *weorud* shows that it is not the case that all feet have two moras: if a stem-initial syllable is light,[1] it must form a foot with whatever syllable follows, creating in this case a tri-moraic trochee (wéo rud). In verse this phenomenon is called *resolution* (Sievers 1893; Kuryłowicz 1949, 1970; Russom 1987), whereby the two syllables together make up a single metrical position. Therefore, if the pre-Old English foot was a moraic trochee, it must have been a *resolved* moraic trochee that could have up to three moras.

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[1] Though the phonetics of the 'short diphthongs' <ea, eo, io> has been disputed, there is broad agreement that they functioned as short vowels (Hogg 1992: 16–20); hence the first syllable of *weo.rud* is light. The 'long diphthongs', as in the first syllable of *hēa.fud*, have always been assumed to pattern with the long vowels in making their syllable heavy.

The shortening of unstressed vowels in early Old English made the metrical analysis just presented problematic, particularly in the heavy stem paradigm, as can be seen in (3).

(3)   Expected moraic trochees after shortening of unstressed vowels

	Pre-Old English	*Old English*
NOM/ACC.SG	(hēa) (fud)	hēafud
GEN.SG	(hēa) fu (des)	hēafdes
DAT.SG	(hēa) (fu de)	*hēafude
NOM/ACC.PL	(hēa) (fu du)	hēafudu
GEN.PL	(hēa) (fu da)	*hēafuda
DAT.PL	(hēa) fu (dum)	hēafdum

The shortening of the inflectional vowels in the DAT.SG and GEN.PL lead us to expect that the medial high vowel should be the head of a binary foot and hence not subject to HVD, but this result is not observed in Old English. Rather, the medial vowel continues to delete in all the inflected cases, except for the NOM/ACC.PL. These latter cases now appear to be an exception to a new, and simpler, generalization governing HVD: an unstressed high vowel in an open syllable deletes when it directly follows a heavy syllable or a sequence of two light syllables. That is, the weight of the syllable that follows the potential HVD target is no longer relevant to the operation of HVD.

Therefore, after the shortening of unstressed vowels in early Old English, the moraic trochee became untenable. Rather, the synchronic facts of Old English are what motivated Dresher & Lahiri (1991) to propose what we called the Germanic Foot, given in (4) (see also Lahiri et al. 1999; Fikkert et al. 2006). Some sample parsings are shown in (5).

(4)   Old English metrical analysis (Dresher & Lahiri 1991; Lahiri et al. 1999; Fikkert et al. 2006)

   a.   Germanic Foot: From left to right, construct a resolved and expanded moraic trochee of the form (|head| dependent), where the head must consist of at least two moras and the dependent may have at most one mora.
   b.   Main stress is on the leftmost foot.
   c.   Defoot a foot (|≭|) that does not carry the main stress, is final in the word, and has no dependent.

(5) Old English stress: sample parsings (the head of the foot is indicated by |x |)

a. 'word GEN.PL'   b. 'army GEN.PL'   c. 'king DAT.SG'

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   x                      x                      x
(|x|   .)              (|x   |   .)           (|x   |   .)
[H    L]ω             [L   L   L]ω          [L   H    L]ω
wór   da              wéo ru  da            cý  nin  ge
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d. 'dwelling NOM.PL' e. 'other NOM.SG'   f. 'other ACC.SG'

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   x                      x                      x
(|x   |)              (|x|)  (|✳|)          (|x|)   (|x|   .)
[L  L]ω              [H      H ]ω          H       H    L
ló fu                 ő      þer            ő       þèr   ne
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Comparing the Germanic Foot with the moraic trochee, we can see that the moraic trochee corresponds to the head of the Germanic Foot, and that an unfooted light syllable that follows a moraic trochee is incorporated as a weak branch into the Germanic Foot. HVD now deletes a high vowel in the weak branch of a foot, as shown in (6).

(6) High Vowel Deletion in the weak branch of a foot

a. 'head NOM.SG'   b. 'head DAT.SG'   c. 'head DAT.PL'

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   x                      x                      x
(|x|) (|✳|)           (|x|   .)   .          (|x|   .) (|✳|)
[H      H]ω           [L   L   L]ω          [H   L]   H]ω
héa    fud            héa fʉ  de            héa fʉ   dum
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d. 'army, NOM.SG'   e. 'army NOM.PL'   f. 'word NOM.PL'

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   x                      x                      x
(|x     | )           (|x    | . )          (|x|   .)
[ L    H]ω            [ L  L   L]ω          [ H    L]ω
wéo rud               wéo ru  dʉ            wór  dʉ
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g. 'journey, NOM.SG' h. 'journey GEN.PL'   i. 'journey DAT.PL'

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   x                      x                      x
(|x     | .)          (|x    | . )          (|x    |) (|✳|)
[ L   H  L]ω          [ L  H   L]ω          [ L  H    H]ω
fǽ rel dʉ             fǽ rel da            fǽ rel   dum
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HVD applies in a straightforward fashion to all forms in the *a*-stem paradigms except for *hēafudu*. Putting that form aside for the moment, we observe in (6b, c) that HVD applies consistently to the stem vowel *u* when it is in an open syllable following a heavy syllable, regardless of the weight of the following syllable. In (6a), *u* is in a closed syllable and does not delete. In (6d–e), the stem-internal *u* follows a light syllable and must be part of the head of the foot, where it does not delete; an inflectional final -*u*, however, is in the weak branch of the foot and deletes (6e). In (6f) the head of the foot is a heavy syllable and the inflectional -*u* deletes in the weak branch of the foot. In (6g–i), the stem-initial light syllable of the masculine *u*-stem (or neuter *a*-stem) noun *fǽreld* (*fǽrelt*) must join with the following heavy syllable to make up the head of the foot, leaving room for an additional light syllable in the weak branch; a final -*u* deletes in this position (6g), as it does after a single heavy syllable (6f) and after two light syllables (6e).

The form *hēafudu* stands out, in that it does not fit the pattern in (6). We have seen diachronically how this form came to be the odd man out in its paradigm, and indeed it appears to have been problematic even for Old English speakers, as shown by the fact that such forms show considerable variation across dialects (Fulk 2010); it is clear that the same analysis will not be adequate for all Old English dialects. We also find intra-dialect variation, sometimes in the same document. Because of all this variation it is difficult to disentangle the effects of phonology from analogy. Nevertheless, Fulk (2010) argues that the phonologically expected outcome in early Old English is indeed *hēafudu*, a form that appears (though not the only form that appears) in the Mercian *Vespasian Psalter* (*Ps(A)*). We will here focus on that dialect.

This form and other nominal forms with inflectional -*u* require special treatment in any analysis. Bermúdez-Otero & Hogg (2003, p. 22) and Bermúdez-Otero (2005, p. 7), for example, propose that the nominal *a*-stem inflectional affixes have become *phonologically stratified*: "the neut.nom/acc.pl. ending is added at the stem level, whilst other *a*-stem noun affixes are word-level." Similar in spirit is the analysis of Dresher (1985), who posits a special boundary before nominal inflectional -*u*. However, in that analysis the levels are the reverse of Bermúdez-Otero's: Dresher (1985) posits that -*u* is a word-level affix, while the other affixes are stem level. This analysis is consistent with that of Dresher (1993), shown in (7), which proposes that in Mercian, verbal inflectional agreement affixes are word level, and everything else—roots, stems, and noun affixes—are stem level, what is called there the extended stem, or E-stem level, because it includes stem extensions. Dresher's (1993) analysis of levels does not consider the problem of Vowel Deletion, but is based on the behaviour of several other rules that affect stressed vowels.

(7) Mercian lexical phonology (Dresher 1993, p. 333)

	MORPHOLOGY	PHONOLOGY
E-stem level:	Roots, stems, nominal affixes	Breaking, Retraction, Back Mutation, Smoothing, *i*-Monophthongization, *i*-Mutation
Word level:	Verb AGR	Breaking, Retraction, Back Mutation

In terms of that stratification, the nominal *-u* inflection falls in with the word-level affixes. The rationale is that HVD applies to the second *u* of *hēafudu* as if the final *-u* were not present, treating *hēafudu* as if it were *hēafud*, as shown in (8a); compare *hēafde* in (8b).

(8) High Vowel Deletion at the extended stem level (based on Dresher 1985)

 a. 'head NOM/ACC.PL' b. 'head DAT.SG'

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        x                          x
  (|x|) (|x|)        .        (|x|   .)   .
  [H    H ]E-stem  L          [L   L   L ] E-stem
  hḗa   fud        u          hḗa  fu̶  de
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There is other evidence for the special status of *-u* in *Ps(A)*. In (9a), we find a stem-internal vowel *e* when the stem precedes a consonant, a word boundary, and *-u*; the vowel does not appear before other suffixes that begin with a vowel. Dresher (1985) argues that this stem has been reanalyzed in the *Ps(A)* dialect as deriving from an underlying mono-syllable, with *e* the result of epenthesis when a vowel does not follow the stem; inflectional *-u* acts as if it is not present when epenthesis applies. A similar distribution occurs in (9b) 'many'.

(9) Adjectives in *Ps(A)*

 a. miċel- ~ micl- 'great'

	FEMININE			NEUTER
NOM.SG	miċelu (3x) ~ miċel (1x)		NOM.PL	miċelu (5x) ~ miċel (3x)
DAT.SG	miċelre		GEN.PL	miċelra
NOM.PL	micle		DAT.PL	miclum

b. moniġ- ~ monġ- 'great'

	MASCULINE	FEMININE	NEUTER
NOM.PL	monġe	monġe (1x) ~ mong (1x)	moniġ (1x)
ACC.PL	monġe	monġe	monigu (1x)
GEN.PL	monigra	monigra	
DAT.PL	mongum		

The application of HVD and Epenthesis to stem-medial vowels is very consistent in *Ps(A)*. The same is not the case for the deletion of the final *-u* when it follows a stem of more than one syllable. We can see this already in (9), where we find *miċel* varying with *miċelu*, and *moniġ* varying with *monigu*. The presence of *-u* is unexpected no matter what the underlying representation of these stems (Fulk, 2010, suggests that these adjectives may be influenced by *lȳtelu* 'little', where retention of *-u* after a heavy-light sequence is what we expect).

We also find variation in nouns. A sample of such variation in *Ps(A)* is given in (10).

(10) Variation between *-u* ~ -Ø in NEUTER NOM/ACC.PL nouns in *Ps(A)*

a. hēafudu (2x)   ~   hēafud (5x)   'head'
b. wolcenu (2x)   ~   wolcen (6x)   'cloud'
c. calferu (1x)   ~   calfur (2x)   'calf'
d. lomberu (1x)   ~   lombur (1x)   'lamb'

The variation after surface disyllables is in contrast with the regular behaviour of *-u* after surface monosyllables in (11):

(11) Behaviour of *-u* after surface monosyllables in *Ps(A)*

a. *-u* after light syllable in neuter *a*-nouns: *lofu* 'glory', *geatu* 'gate', etc.
b. -Ø after heavy syllable in neuter *a*-nouns: *word* 'word', *gōd* 'good thing', etc.
c. *-u* after heavy syllable in neuter *ja*-nouns: *rīċu* 'dominion', *styċċu* 'piece', *wītu* 'punishment', etc.

Evidently, there was some uncertainty as to how *-u* was incorporated into the metrical system at the word level in the former cases, but not in the latter one; see further Dresher & Lahiri (1991, p. 279–281) for why HVD became opaque when following two surface syllables in *Ps(A)*. This

situation was unstable, and in other dialects of Old English it was regularized in various ways (Fulk 2010; Bermúdez-Otero 2005).[2]

The above discussion has assumed that the advocates of a moraic trochee were correct for pre-Old English, and that the shortening of unstressed inflectional vowels made the original moraic trochees an unsuitable environment for HVD, necessitating their replacement by the Germanic Foot. This scenario raises the question of the status of the latter: did it begin as a pan-Germanic foot, give way to the moraic trochee in pre-Old English, and then return in Old English, or was the moraic trochee in fact the Germanic foot, with the 'Germanic Foot' arriving on the scene only in Old English? This question merits a separate study, and here we will only make the following points.

First, Dresher & Lahiri (1991: 264–269) argue that Sievers's Law in Gothic and High Vowel Deletion in Old High German provide evidence for the Germanic Foot (see also Lahiri 1982 and Fikkert et al. 2006), which suggests an early origin for this metrical constituent. Second, we observe that in many forms, the moraic trochee and the Germanic Foot yield similar results, making it hard to discern which one is correct. Thus, if we apply the principles in (4) and the parsings in (5) and (6) to the pre-Old English paradigms in (2), we find that we can account for all the cases of HVD just as for Old English. Again, the NOM/ACC.SG of 'head' requires some special treatment. This raises the question of how early this special treatment began.[3] An answer to this question requires a wider study of other relevant forms, particularly the *ja*-nouns mentioned in (11c).

To sum up this section, whether the moraic trochee or the Germanic Foot was present in pre-Old English, the metrical system had to make an accomodation for data that did not fit. In the first scenario, the shortening of unstressed inflectional vowels posed a challenge to the metrical coherence of the early Old English metrical system by making the original moraic trochees an unsuitable environment for HVD. We propose that metrical coherence was restored by adding one mora to the trochee, and

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[2] The nouns in (11c) have NOM/ACC.SG *rīċe*, *styċċe, wīte*, with a final *e* derived from *j* or *i* that is not deleted by HVD, whereas the NOM/ACC.PL *rīċu*, *styċċu, wītu* consistently have final *u* that is also not deleted by HVD, despite its surface occurrence after a heavy syllable. The history and synchronic analysis of these nouns have been controversial: see Lahiri (1982) and Fikkert et al. (2006) for synchronic analyses, and Fulk (2010) for discussion of their diachrony.

[3] This analysis is consistent with the observations by Hogg (2000) that HVD was to some extent morphologically conditioned, and may have been from an early point, and was in other respects problematic and subject to analogical pressures and much variation. Contrary to what his title might suggest, he does not in fact argue that HVD did not exist.

treating the formerly regular *-u* suffix of forms like *hḗafudu* as exception-al. On the second scenario, the Germanic Foot was already in place in pre-Old English, as was the exceptional treatment of forms like **xauƀudu >* *hḗafudu.*

3.   The change in directionality

Foot form is only one aspect of English foot-related metrical structure that has changed over time. Present Day English metrical structure resembles that of Latin (12)–(13): a moraic trochee computed from the right edge, and main stress is assigned to the rightmost foot (with various exceptions).[4]

(12) Latin main stress (Roca 1999)

    a. Stress the penultimate syllable if it is heavy: *amī́cus* 'friend', *refḗctus* 'restored'.

    b. Otherwise, stress the antepenultimate syllable, if there is one: *dóminus* 'master', *fḗmina* 'woman', *refíciunt* 'they…restore'.

    c. Otherwise, stress the first syllable: *vénīs* 'you-SG. come', *cónsul* 'consul'.

(13) Latin stress: metrical analysis

    a. A final syllable is extrametrical.

    b. Build quantity-sensitive trochees from the right edge of the word.

    c. Main stress falls on the rightmost foot in the word.

As in other Germanic languages, this shift in the metrical system occurred under the influence of Romance loanwords, but was not abrupt. We sum-marize our proposed chronology in (14).

(14) Approximate dates of changes in direction and position of English stress

    a. Gmc.–Middle Eng.: Foot direction *left*, main stress *left*;

    b. c1570:   Foot direction is changing to *right*.

    c. c1660–:   Main stress changes to *right* in stages.

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[4] We present the Latin stress system because this system characterized the Latin words that were imported into English (French borrowings followed a different rule; see Halle & Keyser 1971 and Dresher & Lahiri 2005). The Present Day English stress system is more complicated, being the result of how the Latin system was adapted to English, including the complications discussed below.

It can be shown that the influx of Anglo-Norman and Old French words following the Norman conquest made little impact on Middle English prosody (Minkova 1997; Redford 2003; Dresher & Lahiri 2005; Lahiri 2015), contrary to what has sometimes been claimed.

Rather, the extended trochee survived long and the direction of parsing changed from left-to-right to right-to-left only in early Modern English (after 1570: Dresher & Lahiri 2015; Lahiri 2015), when the number of Latin loanwords with stress-affecting suffixes, shown in (15), had passed a threshold derived from Yang's Tolerance Principle (Yang 2016) (16). In (15), we compare the number of stress-affecting Latinate suffixes in 1400 and in 1570.[5] Rough numbers are shown in (17).

(15) Latinate words with stress-affecting suffixes in English (*L*) in 1400 and 1570

	L	*1400*	*1570*	*% δ*
a.	*-able*	204	906	344%
b.	*-al* (adj)	163	745	357%
c.	*-an* (adj)	64	313	389%
d.	*-ar* (adj)	41	104	154%
e.	*-ation*	242	957	295%
f.	*-efy*	3	10	233%
g.	*-etude*	2	3	50%
h.	*-ety*	19	40	111%
i.	*-ible*	40	146	265%
j.	*-ic*	87	279	221%
k.	*-ify*	26	80	208%
l.	*-ile*	35	69	97%
m.	*-ion*	507	1,717	239%
n.	*-ison*	34	52	53%
o.	*-itude*	9	41	356%
p.	*-ity*	144	563	291%
q.	*-ous*	168	657	291%

(16) Tolerance Principle (Yang 2005; 2016)

Let *R* be a rule that is applicable to *N* items, of which *e* are exceptions. *R* is productive if and only iff $e \leq \theta_N$ where

$$\theta_N = \frac{N}{\ln N}$$

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[5] See Dresher & Lahiri (2015) for further discussion of Yang's principle and of the rationale behind our calculations. The figures in (15) are based on searches of the *Oxford English Dictionary* (*OED*) done by Dec. 2015.

(17) Latinate suffixes and the Yang Threshold, Y

	Category	1400	1570
a.	All words (N)	30,568	69,364
b.	ln N	10.33	11.15
c.	N/ln $N = Y$	2,960	6,223
d.	Latin suffixes (L)	1,788	6,682
e.	L/Y	60.4%	107.4%

In 1400, the number of words with Latinate stress-affecting suffixes (L) is 60% of the Yang Threshold, Y: they can be treated as exceptions to the stress rule. In 1570, L is 7% over Y: these words can affect the directionality of the English stress rule, changing it from *left* to *right*.

The shift in directionality reestablished a degree of metrical coherence that had been disrupted by the increasing number of Latin loanwords that were inconsistent with the old system. This is because many native words were also compatible with parsing from the right; again, special adjustments were required to incorporate some words into the new system.

An interesting snapshot of the stress patterns in the period close to where we believe the change in directionality was taking hold is provided by Peter Levins' *Manipulus Vocabulorum*, published in 1570. It is a reverse (rhyming) dictionary and indicates main stress in many words. Some words are shown in (18).

(18) Levins' *Manipulus Vocabulorum* (1570): some stress patterns

Non-initial Stress		
FINAL	PENULT	ANTEPENULT
quarrél (*v*)	oriéntall	antíquitie
rebéll (*v*)	aduénture	seuéritie
lamént (*v*)	recógnise	memóriall
flagón (*n*)	conféssour	opínion

Initial Stress		
2 σ	4, 5 σ	3 σ
quárel (*n*)	díuisible	túrpentine
rébel (*n*)	húmidity	défectiue
députe (*n*)	bárbaritie	cánonise
récorde (*n*)	príncipalitie	mármalad

Levins' list leaves little doubt that the grammar of stress was in flux, though how to interpret this is not obvious (see Halle & Keyser 1971, p. 109–123 for a detailed study in a different framework). We propose that main stress is still mainly on the left, and that much of the variability in Levins can be accounted for by two ongoing changes summarized in (19).

(19) Changes in Levins' grammar of stress (Lahiri 2015)

    a. An increase in the number of morphologically governed stress-alternating doublets, consistent with parsing from the *right*, with the final syllable of nouns becoming extrametrical.

    b. Words with Latin stress-affecting suffixes show variation: the direction of parsing is changing from *left* to *right*.

The first change is an increase in the number of morphologically governed stress-alternating doublets: we find verbs *quarrél, rebéll, depúte, recórde* versus nouns *quárel, rébel, députe, récorde* (a few nouns like *flagón* are exceptions). It becomes increasingly difficult to regard the first syllables of these verbs as unstressed prefixes, suggesting a right-edge oriented reanalysis as in (20a). Nouns can continue to be parsed in the old way, or can accommodate to the shift in the verbs by making their final syllable extrametrical, as in (20b).

(20) Noun~verb pairs in Levins

    a. 'quarrel VERB'   b. 'quarrel NOUN'

```
        x                           x
      (|x |)                      (|x |)
    [  L    H ]VERB            [   L   <H> ]NOUN
     qua    rél                 quá    rel
```

Here we will focus on the second change in (19b). This change concerns the treatment of complex Latin words with stress-affecting suffixes. In the earlier period such words had come in as simplex forms, and were assimilated to the native pattern of stress assignment from the left. Such words remained in the grammar. Hence, we find *dívisible* and *húmiditie*, which must be parsed from the left edge (21); there is no plausible way to get main stress on the first syllable parsing from the right.

(21) Words in Levins with Main stress *left*, Direction *left* (older grammar)

    a. 'dívisible'   b. 'húmidity'

```
     x                            x
   (|x   |  .)   .              (|x   |   .)   .
   [L  L  L   L ]ADJECTIVE      [ L   L   L   L ]NOUN
    di ui si  ble                hu  mi  di  tie
```

Nevertheless, unlike the earlier period where *all* words were parsed from the left, we now find words like *sevéritie* and *opínion* which must be parsed from the right (22).

(22) Words in Levins with Main stress *left*, Direction *right* (newer grammar)

    a. 'sevérity'   b. 'opínion'

```
          x                                    x
     .  (|x    |    .)                   .  (|x    |    .)
     [L  L    L    L ]NOUN              [L   L   L    L ]NOUN
      se  ve  ri  tie                    o   pi  ni   on
```

Many words with initial stress have ambiguous directionality, because the main stress parameter remains set to *left*, and Levins does not indicate secondary stresses; therefore, words like *bárbaritie, príncipalitie* can be parsed from either direction (23).

(23) Words in Levins with Main stress *left*, Direction ambiguous

    a. 'bárbarity' from the *left*   b. 'bárbarity' from the *right*

```
       x                                    x
    (|x|   .)  |x    |)                  (|x|)  (|x    |    .)
    [ H   L    L    L ]NOUN             [ H     L   L    L ]NOUN
     bar  ba   ri   tie                   bar    ba   ri  tie
```

These facts suggest that the direction of parsing is changing from *left* to *right*, while main stress remains set to *left*. To say that a grammar is changing is shorthand for what is really going on, which in our case could be a number of things. It is important to bear in mind that a written record may not be a perfect reflection of any individual's grammar, but could include forms generated by the grammars of a previous generation, as well as from slightly different contemporaneous grammars. An individual might acquire such forms as exceptions to the prevailing rule, or as a special class subject to their own rule. Or, as has been proposed by Kroch (1989) and Kroch & Taylor (1997), individual speakers might internalize two or more different grammars.

    Any of these scenarios may apply in Levins' case: thus, *húmidity* might be a word still in common use that he learned as an exception to his working grammar, or perhaps as one of a class of exceptions that must be parsed from the left; or he might himself have internalized two different grammars, one with stress parsed from the left and one with stress parsed from the right. While the exact state of Levins' grammar may not be knowable, with the benefit of hindsight we can say that over time, the older grammar with stress from the left eventually ceased to be acquired

by learners of the language, and the newer grammar with stress computed from the right came to prevail.

4.   The change in the edge of main stress

While the change in directionality of foot parsing was well underway by 1600, the change in the position of main stress (14e), from *left* to *right*, started later. As pointed out by Dresher & Lahiri (2005), Latin/French borrowings remained subject to the Countertonic Principle (Danielsson 1948, who attributes the observation to Walker 1791), whereby the tonic and countertonic of the Latin/French original were switched when Englished to maintain main stress on the left even when the directionality was from the right; e.g., Latin *àcadémia* became English *ácadèmy*; French *acàdemíe* became English *acádemỳ*.

While the immediate trigger for the change in main stress is not as clear as for the shift in directionality, in Dresher & Lahiri (2005) we speculated that the change may have begun around 1660, the year, which according to Danielsson (1948, p. 29) was the "turning point" when French words kept their final accent in English, as with suffixes like those in (24).[6]

(24) Suffixes retaining main stress
      -ade, -ee, -eer, -esque, -ette, -oon.

(25) Words with final stressed suffixes in Present Day English
      cannoneer (1562), *arabesque* (1611), *parade* (1656), *grenadier* (1676), *payee* (1758), *musette* (1811).

While the addition of these suffixes would have helped to push main stress to the right, Lahiri (2015) finds that the change to main stress *right* took a long time to complete, and may not be entirely completed yet.

John Walker's 1791 *A critical pronouncing dictionary and expositor of the English language* is a justly celebrated account of English stress in his time (see Halle & Keyser 1971 for discussion). We observe that the change in parsing direction that was ongoing in Levins appears to have been competed in Walker. Thus, we observed that the words with initial stress in the penultimate column of (18), parsed in (21) and (23), were either parsed from the left, or had ambiguous directionality in Levins.

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[6] 1660 marked the start of the Restoration with the return of King Charles II from exile. According to Blake (1996, p. 238): "The antipathy towards anything foreign, particularly if it had a papist tinge, shown by the Puritans was replaced by the wish to emulate all that was sophisticated and modern in France in particular. Latin loanwords became less frequent as French loans proliferated." See further Dresher (2013).

These words are stressed in Walker on the antepenultimate; all these words are now consistent with a direction of parsing from the right edge.

(26) Words in Walker (1791) with Main stress *right*, Direction *right*

divísible, humídity, barbárity, principálity

That is, *divísible* and *humídity* can now be parsed like *sevérity* and *opínion* in (22). Moreover, *barbárity* and *principálity* also show that main stress is on the right (27).

(27) Walker: Main stress *right,* Direction *right*

a. 'barbárity'   b. 'principálity'

```
       x                                                    x
(|x|) (|x   |   .)                       (|x|   .) (|x   |   .)
 H    L L   L                             H   L   L   L   L
bar   ba ri  ty                          prin ci  pa  li  ty
```

Nevertheless, the old rule of putting main stress on the left continued to have influence. Walker writes (1791, p. 67):

nor has even the interposition of two consonants been always able to keep the accent from mounting up to the antepenultimate syllable, as we may see in *minister, sinister, character, magistrate,* &c. and this may be said to be *the favourite accent of our language* [emphasis added].

Note that the antepenultimate syllable in these words is the initial syllable.
    We still have words like in (28), such as *mátrimony, húrricane, láboratory*, etc., with main stress on the left, against the now general rule. These words require some sort of special treatment in the modern language: in terms of Halle & Keyser, a series of stress retraction rules, for example.

(28) Words that continue to have main stress on the *left*
        mátrimony, húrricane, ánecdote, tábernacle, cávalcade, brígantine, túrpentine, láboratory (N. American)[7]

Like *hēafudu* long before, words that were once mainstream in the old grammar persist as exceptions in the new one.

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[7] The *OED* comments that the British pronunciation with stress on the second syllable seems to have been first noted in 1895.

Acknowledgements

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