Diagnostics of the moraic trochee from Proto-Germanic to present-day English

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INTRODUCTION

§1 Analyses of word prosody relying on **moraic trochees** have been proposed for several periods in the history of English since Proto-Germanic:

e.g.
- PGmc (e.g. Kiparsky 1998)
- Prehistoric OE (e.g. Goering 2016)
- Classical OE (mid 9C to early 11C) (e.g. Hutton 1998; Bermúdez-Otero 2005, 2015b)
- PDE (e.g. Prince 1990, Hayes 1995)

§2 This suggests the following hypothesis:

> **The moraic trochee has remained unchanged as the unmarked foot type of English from PGmc to the present day.**

§3 Hayes's (1987, 1995) asymmetric inventory of foot types affords a series of **diagnostics** of moraic trochee parsing with increasing evidential value.

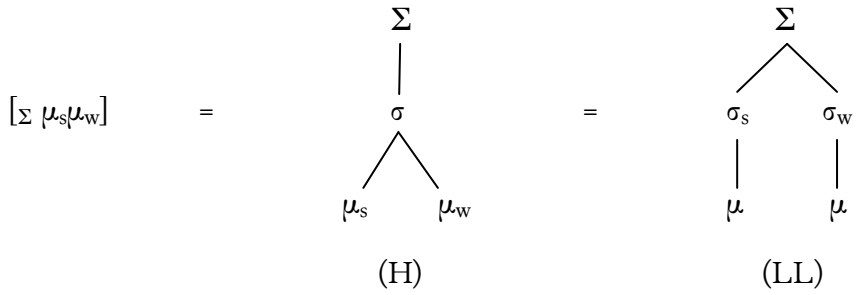
I show that instances of the more reliable diagnostics are found throughout the history of English:

value	*diagnostic*	*example*	*§§*
low	(H)=(LL) equivalence (§4)	word minimality (all periods)	§5
		resolution in OE metre	§6-§7
	stress attraction to H (§9)	Latin-style stress in PDE nouns	§10
		ictus on suffixal H in OE metre	§11
high	LH/HL underparsing (§14)	Sievers' Law in PGmc	§16-§19
		High Vowel Deletion in (pre-)OE	§20-§24
		pretonic secondary stress in PDE	§25-§33
highest	trochaic shortening (§34)	Trisyllabic Shortening since ME	§35-§36

(H)=(LL) EQUIVALENCE

The diagnostic

§4 By definition, moraic trochee parsing establishes an **equivalence between (H) and (LL) feet**:



(H) (LL)

Word minimality

§5 Throughout the history of English, word minimality is satisfied by (H) and (LL), but not *(L):

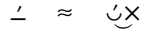
• Content words:	✓	(ω CVV)	e.g.	OE *sǣ*	PDE *sea*
	✓	(ω CVC)	e.g.	OE *gŏd*	PDE *god*
	✓	(ω CVCV)	e.g.	OE *nămа* 'name'	PDE *city*
	✖	(ω CV)		—	—

- Function words consisting of single open syllables have long vowels in strong (stressed) forms:

e.g.	OE		ModE
	þū	>	*thou*
	þē	>	*thee*

Resolution in OE metre

§6 In OE metre, Ḯ and Ĺσ strings are equivalent under ictus and count as a single position:



e.g. 

under heofenes hāðor beholen weorþeð (*Beo* 414)
'under heaven's vault'

- The first lift must be resolved if there is to be only one expanded dip.
- The second lift must be resolved if the half-line is not to contain 5 positions.

§7 **Kaluza's Law** (Fulk 1992: 153-168, 381-390):
In *Beowulf*, resolution under secondary ictus is strictly confined to ÌL strings;
and ÌH strings do not resolve.

E.g. ´ ◡◡ ´ ×
brimc̲lifu̲ **b**līcan, **b**eorgas stēape, (*Beo* 222)
'bright sea-cliffs'
[ÌL resolved, avoiding 5 positions.]

but ´ ◡ x̲ ´
nīwe ge**n**eahhe: **n**orð-d̲enu̲m stōd (*Beo* 783)
'the North-Danes stood'
[ÌH not resolved; resolution would result in 3 positions.]

☛ *Beowulf* permits the sloppy H≈LH equivalence only under primary ictus (cf. §21 below); otherwise, resolution requires strict bimoraic equivalence, i.e. H=LL.

Limitations of the diagnostic

§8 (H)=(LL) equivalence is a **necessary, but not sufficient,** criterion for moraic trochee parsing.

E.g. Anguthimri (Hayes 1995: 103, 198)

- syllabic trochees from left to right and no degenerate weak feet: (σ́)
  (σ́σ)
  (σ́σ)σ
  (σ́σ)(σ́σ)
  ...

but also • bimoraic word minimality restriction: ✓ ($_{\omega}$ CV:)
✓ ($_{\omega}$ CVCV)
but ✖ ($_{\omega}$ CV)

STRESS ATTRACTION TO H

The diagnostic

§9 Moraic trochee parsing can cause **stress to be attracted to heavy syllables**:

e.g. Latin-style stress assignment:

- stress the penult if heavy, else the antepenult
- results from building a right-aligned moraic trochee under final syllable extrametricality

/...σHσ/ → ...σ(H́)<σ>
/...LLσ/ → ...(ĹL)<σ>

Latin-style stress in PDE nouns

§10 Latin-style stress is the default pattern for PDE monomorphemic nouns (Chomsky & Halle 1968: 71ff):

e.g. ...(ĹL)<σ>	...σ(Ĥ)<σ>	
	CVV penult	CVC penult
América	*aróma*	*agénda*
cínema	*aréna*	*veránda*
metrópolis	*horízon*	*synópsis*
jávelin	*angína*	*asbéstos*
análisis	*Minnesóta*	*uténsil*

Ictus on suffixal H in OE metre

§11 In OE metre, a suffixal H will normally bear primary or secondary ictus
if not word-final
and not immediately preceded by a Ĺ requiring resolution (cf. §6).

E.g. ×⟶× ◡́ ◡̀ ×
hū ðā **æ**þel̤i̤n̤g**a**s **e**llen fremedon (*Beo* 3)
'how those nobles'

NB Some scholars regard such ictuses as corresponding to linguistic secondary stresses: e.g Campbell (1959: §89-§91) and, following him, Dresher & Lahiri (1991: 259-260).

Others scholars are more circumspect in their interpretation of the verse evidence: e.g. Minkova (1996).

Limitations of the diagnostic

§12 Stress attraction to H provides **suggestive, but not conclusive**, evidence of moraic trochee parsing, since it can also reflect the effects of the Weight-to-Stress Principle:

WSP (Prince 1990)
If heavy, then stressed.

§13 In consequence, stress attraction to H can occur in unbounded stress systems:

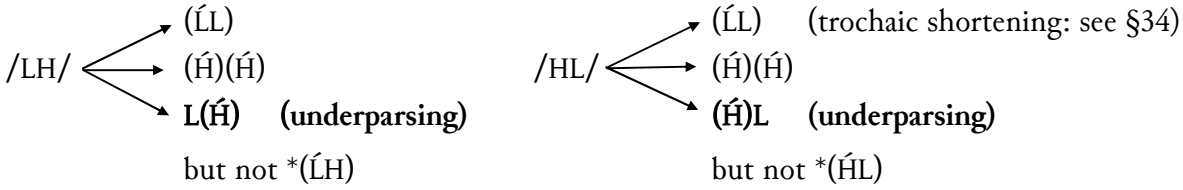
e.g. Selkup (Halle & Clements 1983: 189, though cf. Gordon 2000: 105)
Stress the rightmost heavy syllable (CV:), else the leftmost syllable.

LLLĤ	pünakɨsɔ́:	'giant!'
HLĤL	u:cɨkkó:qɪ	'they two are working'
ĹLL	ű̀ŋŋɨntɨ	'wolverine'
ĹLLL	qól^{y}cɨmpatɨ	'found'

LH AND HL UNDERPARSING

The diagnostic

§14 Moraic trochee parsing predicts the **avoidance of trimoraic (ĹH) and (ĤL) feet**:



Underparsing of LH and HL sequences is thus

- predicted in moraic-trochee systems
- not expected in syllabic-trochee systems, which favour bisyllabic feet without regard for their internal quantitative balance.

§15 (ĹH) and (ĤL) avoidance through different forms of segmental and syllabic underparsing is attested throughout the history of English:

- PGmc: Sievers' Law (§16-§19)
- (pre-)OE: High Vowel Deletion (§20-§24)
- PDE: pretonic secondary stress (§25-§33)

Sievers' Law in PGmc (Kiparsky 1998)

§16 PGmc footing: build moraic trochees iteratively from left to right.

Foot bimoraicity governs the realization of a front high vocoid /I/ in the environment C__V:

/...CIV.../ → { [...C.jV...] iff coda [C] belongs in a well-formed moraic trochee; [...Ci(.)V...] otherwise }

E.g. 'to set' /sat-I-anã/ → **(sat)**(ja.nã) ← the strong foot is perfectly bimoraic

cf. 'to feed' /fo:d-I-anã/ → **(fo:)**(di.a)nã

*__(fo:d)__(ja.nã) ← the strong foot is trimoraic!

§17 The PGmc pattern can be inferred from the incidence of WGmc Gemination, which repairs the bad syllable contact between a low sonority coda C and a following onset [j]:

		'to set'		'to feed'
PGmc	C.jV	sat.ja.nã	Ci.V	fo:.di.a.nã
WGmc	C.CjV	sat.tjan	Ci.V	fo:.di.an
OE	C.CV	*se**tt**an*	CV	*fē**d**an*

§18 **(LH) avoidance**

PGmc /aðal-I-as/ > OE *æðeles* 'noble.M/N.GEN.SG'
⇨ no WGmc Gemination
⇨ therefore, /I/ → [i] in PGmc

So: /aðal-I-as/ → (a.ða)(li.a)<s>

Why? Because *__(a.ðal)__(jas) contains an **ill-formed (LH) strong foot**.

§19 **(HL) avoidance**

PGmc /liːk-at-I-anã/ > OE *līċettan* 'feign.INF'
⇨ WGmc Gemination
⇨ therefore, /I/ → [j] in PGmc

So: /liːk-at-I-an/ → (liː)(kat)(ja.nã)

Why? Because *__(liː.ka)__(ti.a)nã contains an **ill-formed (HL) strong foot**.

High Vowel Deletion in OE (Goering 2016)

§20 Premises of the analysis:

- HVD was actuated prehistorically before the shortening of long vowels in final nontonic syllables.
- Final syllables diagnosed as H by Kaluza's Law (§7) behave as H in HVD.
- The *lautgesetzlich* outcome of HVD for the NOM/ACC.PL of *hēafod* 'head' is *hēafudu*.

  See Fulk (2010) for discussion. Bermúdez-Otero (2015b: 13-14) provides several arguments against Ringe & Taylor's (2014) NOM/ACC.PL **hēafd*.

§21 Footing before HVD:

- Build moraic trochees iteratively from left to right (= §16).
- **(HL) avoidance by underparsing:** skip a L if necessary to avoid a (HL) foot
  e.g. NOM.PL (*wor*)***du***, not ***(wor.du)**
  DAT.PL (*hēą*)***fu***(*dum*), not ***(hēą.fu)**(*dum*)
- **(LH) avoidance by underparsing:** skip a L if necessary to avoid a (LH) foot, except at the left edge of the footing domain (≈ §7).
  e.g. DAT.PL (*hēą*)***fu***(*dum*), not *(*hēą*)(*fu.dum*)

§22 Neuter *a*-stem paradigms before HVD

	'ship'	'word'	'troop'	'head'	'water'	'star'
NOM.SG	(*sci̯p*)	(*word*)	(*we.rud*)	(*hēa̯*)(*fud*)	(*wætr̥*)	(*tungl̥*)
NOM.PL	(*sci.pu*)	**(*wor*)*du***	**(*we.ru*)*du***	(*hēa̯*)(*fu.du*)	**(*wæt*)*ru***	**(*tun*)*glu***
DAT.SG	(*sci.pǣ*)	(*wor*)(*dǣ*)	(*we.ru*)(*dǣ*)	**(*hēa̯*)*fu*(*dǣ*)**	(*wæt*)(*rǣ*)	(*tun*)(*glǣ*)
DAT.PL	(*sci.pum*)	(*wor*)(*dum*)	(*we.ru*)(*dum*)	**(*hēa̯*)*fu*(*dum*)**	(*wæt*)(*rum*)	(*tun*)(*glum*)

Forms containing an unfooted L are highlighted in bold.

§23 ⇨ HVD targets all and only high vowels in syllables left unfooted by moraic trochee parsing:

NOM.PL			OBLIQUE		
(*wor*)*du*	>	*word*	(*hēa̯*)*fu*(*dǣ*)	>	*hēa̯fde*
(*we.ru*)*du*	>	*werod*	(*hēa̯*)*fu*(*dum*)	>	*hēa̯fdum*
(*wæt*)*ru*	>	*wæter*			
(*tun*)*glu*	>	*tungol*			

§24 Bermúdez-Otero & Hogg (2003: §3) and Bermúdez-Otero (2005, 2015b) trace the various restructurings undergone by HVD in the historical period until its eventual death, explaining the relative order of analogical innovations.

In this account,

- OE retains bimoraic trochees in the historical period
- and the original pattern of iterative footing remains active at the stem level.

Pretonic secondary stress in PDE

§25 The Abracadabra Rule:

In a word-initial pretonic LLL sequence, secondary stress falls on the initial syllable.

E.g. ***àbraca****dábra*
dèlica*téssen*
Mèditer*ránean*
Wìnnepe*sáukee*

⇨ In PDE, a pretonic weak foot is aligned with the left edge of the word.

§26 Word-initial pretonic LHL sequences:

- left alignment fails
- stress falls on the second (heavy) syllable.

E.g. ***Anàxi****mánder*
Balènci*ága*
Monònga*héla*
Vièntiá*ne*

(data from Dabouis, Fournier & Girard 2017)

⇨ (LH) avoidance: *Mo*(*nòn*)*gahéla* the weak foot is bimoraic
*(*Mònon*)*gahéla* the weak foot is an ill-formed trimoraic (LH)

§27 **The *Monongahela* argument (Bermúdez-Otero 2015c)**

How do we know that the failure of left alignment in word-initial pretonic LH̀L sequences is not caused by the WSP (cf. §12)?

In other words, how do we know that *Mo*(*nòn*)*gahéla*
and not **Mo*(*nònga*)*héla* ?

§28 Key datum: *Monò*[ng]*ahéla*
In American English, /ng/→[ŋg] assimilation is optional in this item.

- Recorded in Kenyon & Knott (1949) and Merriam-Webster (2009).
- Replicated by Joe Pater in an informal survey of UMass phonologists in Feb 2017: https://blogs.umass.edu/phonolist/2017/02/10/

§29 This is extremely surprising:
assimilation is otherwise strictly obligatory between a stressed and an unstressed vowel.

E.g.	[ŋ]	Cf.	[n]~[ŋ]	[n]
	*cóng**a***		*cón**c**rète*$_{N}$	*còn**c**réte*$_{V}$
	*cón**q**uer*		*cón**q**uèst*	*con**g**réssional*
	*cón**g**regàte*		*ín**c**rèase*$_{N}$	*ìn**c**réase*$_{V}$
	*còn**g**regátional*			

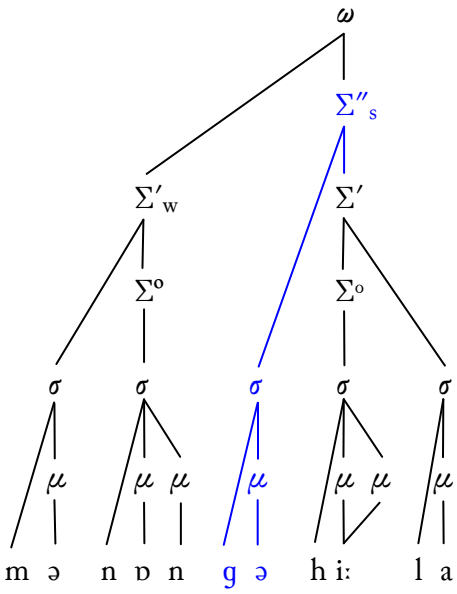
§30 Key generalization:

The obligatory assimilation of /n/ to velars is **foot-bound** (Kiparsky 1979: 439-440):
more specifically, it applies iff there is a left-strong foot-projection that contains both the trigger and the target.

E.g.			
	(Σ° *si**ng***)	*-ng-* contained within Σ°	⇨ assimilation
	(Σ′ (Σ° *cón*) ***g**a*)	*-ng-* contained within Σ′	⇨ assimilation
	(ω (Σ° *còn*)(Σ° ***c**réte*))	*-nc-* split between feet	⇨ no assimilation

§31 Since /n/ does not obligatorily assimilate to /g/ in *Monò*[ng]*ahéla,*
it follows that /n/ and /g/ belong to different feet

⇨ The final L in a word-initial pretonic LH̀L sequence adjoins to the right, not to the left.



§32 Another instance of a well-known phenomenon:
The final L in a word-initial pretonic ÌLL sequence also adjoins to the right

e.g. *Mèdi*(Σ′ ***te***(Σº *rránean* /t/ initial in Σ′: aspirated and not flapped
Wìnne(Σ′ ***pe***(Σº *sáukee* /p/ initial in Σ′: aspirated

See Davis (1999, 2005) and Davis & Cho (2003).

§33 In sum, the evidence of *Monò*[ng]*ahéla* shows that, in PDE, zero-projections of the foot are strictly bimoraic:

i.e. *Mo*(Σº *nò*[n])*gahéla*
not *(Σº *Mònon*)*gahéla* (LH) avoidance
**Mo*(Σº *nò*[ŋg]*a*)*héla* (HL) avoidance

TROCHAIC SHORTENING

The diagnostic

§34 The best diagnostic of moraic trochee parsing is **trochaic shortening**,
whereby underparsing of the L in a HL sequence is avoided by removing one of the H's moras:
i.e. /HL/ → (ĹL) (Prince 1990: §6.1, Hayes 1995: 142-149)

Trochaic shortening is an excellent diagnostic because it involves the violation of other well-established constraints:

- positional faithfulness in metrically strong positions (Beckman 1998)
- the Stress-to-Weight Principle (SWP): 'If stressed, then heavy' (Prince 1990)

§35 Trochaic shortening in PDE

- Under final σ extrametricality: Trisyllabic Shortening
  e.g. *sāne* (*sắ.ni*)<*ty*> cf. *(*sā́*)*ni*<*ty*> with a trapped L
- Under final C extrametricality: *-ic* Shortening
  e.g. *cōne* (*cŏ́.ni*)<*c*> cf. *(*cṓ*)*ni*<*c*> with a trapped L

Note that the type of extrametricality associated with a particular suffix can be determined independently:

-ic must trigger final C extrametricality because it attracts stress to light penults
  e.g. *métal* *me.*(*tắ.lli*)<*c*>

§36 There is a debate as to whether Trisyllabic Shortening applied in neogrammarian fashion in ME as traditionally assumed: cf. Minkova & Stockwell (1996) and Lahiri & Dresher (1999).

Be that as it may, there is no doubt that TSS was active in ME as a default metrical pattern for loanword adaptation.

FINAL REMARKS

§37 There has been no change in foot type between PGmc and PDE:

☛ English is—and has always been— a moraic trochee language.

§38 The striking persistence of the moraic trochee in the history of English raises difficult questions:

notably, PDE has many **segmental processes** that are sensitive to stress;

then why do so few of these processes target minimal feet,

e.g. applying		after a short stressed vowel	V́_V	(LL)	
	but	not after a long stressed vowel	V̄́_V	(H)L	?

§39 The case of **/t/-flapping** suggests an answer to this question:

- Early in its life cycle, /t/-flapping is indeed confined to minimal feet, i.e. to V̆́_V:
  e.g. New Zealand ‘acrolect’ (Bye & de Lacy 2008)
  Blackburn females and young males (Turton 2017).
- Subsequently, this effect is obscured by **rule generalization**, which widens the prosodic spans within which phonological processes apply (Bermúdez-Otero 2015a: 394–395).

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