

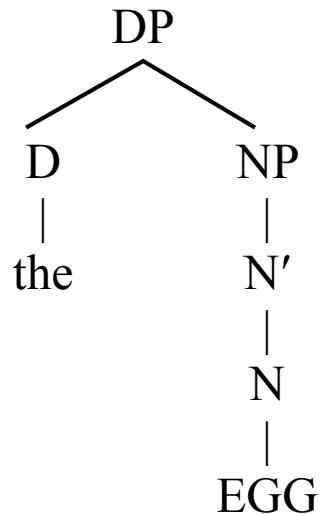
Introduction to stress

Eastern Generative Grammar

26.7.21 to 30.7.21

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A metrical theory of stress

Hiawatha,
H W Longfellow

On the shores of Gitche Gumee,
Of the shining Big-Sea-Water,
Stood Nokomis, the old woman,
Pointing with her finger westward,
O'er the water pointing westward,
To the purple clouds of sunset

Fiercely the red sun descending
Burned his way along the heavens,
Set the sky on fire behind him,
As war-parties, when retreating,
Burn the prairies on their war-trail;
And the moon, the Night-sun, eastward,
Suddenly starting from his ambush,
Followed fast those bloody footprints,
Followed in that fiery war-trail,
With its glare upon his features

In many languages,
poetry has a meter

Meter = patterns of sounds

Meter = phonology

On the shores of Gitche Gumee, 8
Of the shining Big-Sea-Water, 8
Stood Nokomis, the old woman, 8
Pointing with her finger westward, 8
O'er the water pointing westward, 8
To the purple clouds of sunset 8

Every line has
eight syllables, σ

This is too regular for
chance and must be part
of the art, the *meter*

(On the)(shores of)(Gítche)(Gúmee)
(Of the)(shíning)(Bíg-Sea)(Wáter)
(Stood No)(kómis), (the old)(wóman),
(Póinting)(with her)(finger)(wéstward),
(O'er the)(wáter)(póinting)(wéstward),
(To the)(púrple)(clouds of)(súnset)

Stress (in polysyllables)
is on

syllables 1, 3, 5, 7

not on

syllables 2, 4, 6, 8

This is part of the meter too

Analysis

$(\sigma\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)$
 $(\sigma\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\sigma\sigma)(\sigma\sigma)(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\sigma\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)$
 $(\sigma\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)(\acute{\sigma}\sigma)$
 $(\sigma\sigma)(\acute{\sigma}\sigma)(\sigma\sigma)(\acute{\sigma}\sigma)$

FOOTBIN:

Feet are binary $(\sigma\sigma)$

(σσ)(́σ)(́σ)(́σ)
(σσ)(́σ)(́σ)(́σ)
(́σ)(σσ)(σσ)(́σ)
(́σ)(σσ)(́σ)(́σ)
(σσ)(́σ)(́σ)(́σ)
(σσ)(́σ)(σσ)(́σ)

TROCHEE:

Every ́σ is φ-initial

	TROCHEE	FTBIN
☞ $(\acute{\sigma})(\sigma\sigma)(\sigma\sigma)(\acute{\sigma}\sigma)$		
$(\acute{\sigma}\sigma)(\sigma)(\sigma\sigma)(\acute{\sigma}\sigma)$		*
$(\acute{\sigma}\sigma)(\sigma\sigma)(\sigma\sigma)(\sigma\acute{\sigma})$	*	
$(\acute{\sigma}\sigma)(\sigma)(\sigma\sigma)(\sigma\acute{\sigma})$	*	*

Buddha in der Glorie
Rainer Maria Rilke

(Mítte)(áller)(Mítten)(Kern der)(Kérne)
(Mández)(die sich)(éinschließt)(und ver)(süßt —)
(díeses)(Álles)(bis an)(álle)(Stérne)
(ist dein)(Frúchtfleisch)(Sei ge)(grüßt —)

Same pattern,
with some unary feet

(σσ)(́σ)(́σ)(́σ)
(σσ)(́σ)(́σ)(́σ)
(́σ)(́σ)(σσ)(́σ)
(́σ)(σσ)(́σ)(́σ)
(́σ)(́σ)(́σ)(́σ)
(σσ)(́σ)(́σ)(́σ)

= TROCHAIC TETRAMETER

Sonnet 18
William Shakespeare

(Shall I)(compáre)(thee to)(a súm)(mer's dát)
(Thou art)(more lóve)(ly and)(more tém)(perate)
(Rough winds)(do shake)(the dárt)(ling buds)(of May)
(And súm)(mer's lease)(hath all)(too short)(a date)

10 syllable per line
Stress (if it occurs)
is on 2, 4, 6, 8, 10

Analysis

(σσ)(σ́)(σσ)(σ́)(σσ)
(σσ)(σ́)(σσ)(σ́)(σσ)
(σσ)(σσ)(σ́)(σσ)(σσ)
(σ́)(σσ)(σσ)(σσ)(σσ)

FTBIN:
Feet are binary ($\sigma\sigma$)

IAMB:
Every $\acute{\sigma}$ is φ -final

(σσ)(σ́)(σσ)(σ́)(σσ)
(σσ)(σ́)(σσ)(σ́)(σσ)
(σσ)(σσ)(σ́)(σσ)(σσ)
(σ́)(σσ)(σσ)(σσ)(σσ)

= IAMBIC PENTAMETER

	IAMB	FTBIN
☞ $(\sigma\sigma)(\sigma\acute{\sigma})(\sigma\sigma)(\sigma\acute{\sigma})(\sigma\sigma)$		
$(\sigma\sigma)(\sigma\acute{\sigma})(\sigma)(\sigma\acute{\sigma})(\sigma\sigma)$		*
$(\sigma\sigma)(\acute{\sigma}\sigma)(\sigma\sigma)(\sigma\acute{\sigma})(\sigma\acute{\sigma})$	*	
$(\sigma\sigma)(\acute{\sigma}\sigma)(\sigma)(\sigma\acute{\sigma})(\sigma\sigma)$	*	*

(σ́)(σ́)(σ́)(σ́)(σ́)
(σ́)(σ́)(σ́)(σ́)(σ́)
(σ́)(σ́)(σ́)(σ́)(σ́)
(σ́)(σ́)(σ́)(σ́)(σ́)

Perfect rhythm
would have no
clash σ́σ
or lapse σσ

	NOCLASH	NoLAPSE
☛ $(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})$		
$(\sigma\sigma)(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})$		*
$(\acute{\sigma}\sigma)(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})(\sigma\acute{\sigma})$	*	

(Shall I)(compáre)(thee tó)(a súm)(mer's dáy)
(Thou árt)(more lóve)(ly ánd)(more tém)(peráte)
(Rough wínds)(do sháke)(the dár)(ling búds)(of Máy)
(And súm)(mer's léase)(hath áll)(too shórt)(a dáte)

But Shakespeare
isn't meant to
be read like this

Stress in natural languages works something like meter:

Iambs, Trochees, no clash, no lapse

hence....

A metrical theory of stress

Hayes 1980. *A metrical theory of stress rules. MIT dissertation.*

Malakmalak
(Birk 1976)



múnankàra
arkíniyàŋka
nónkorònoyùnka
wuwúntunùnuwàkna
núŋkurùntuwòrowàkka

‘beautiful’
‘we are all going to stand’
‘you all will lie down’
‘he would have given you meat’
‘you all would have given them meat’

(múnan)(kàra)	‘beautiful’
ar(kíni)(yàŋka)	‘we are all going to stand’
(nónko)(ròno)(yùnka)	‘you all will lie down’
wu(wúntu)(nùnu)(wàkna)	‘he would have given you meat’
(núŋku)(rùntu)(wòro)(wàkka)	‘you all would have given them meat’

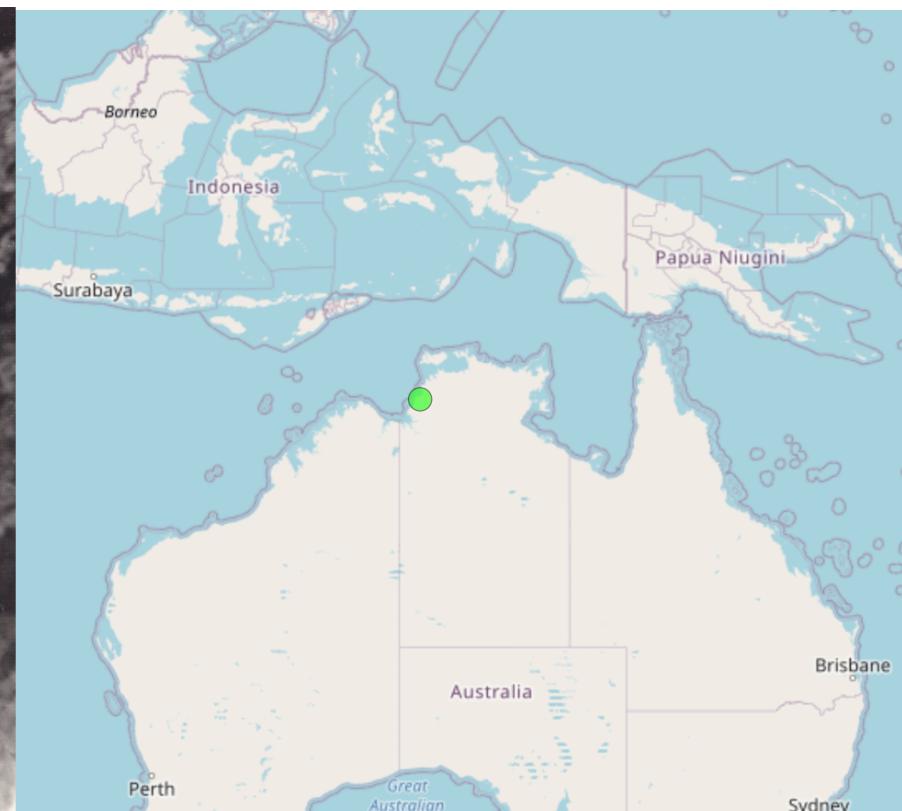
(́σ)(̀σ)
σ(́σ)(̀σ)
(́σ)(̀σ)(́σ)
σ(́σ)(̀σ)(̀σ)
(́σ)(̀σ)(̀σ)(̀σ)

TROCHEE: Every ́σ is φ-initial
NOCLASH: No ́σ follows σ
NOLAPSE: No σ follows σ
FTBIN: Every foot has 2σ
> PARSE-σ: Every σ is in a φ

	TROCHEE	NOCLASH	NOLAPSE	FTBIN
shake $\sigma(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)$				
$(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma})$				*!
$(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$			*!	
$(\acute{\sigma})(\grave{\sigma}\sigma)(\acute{\sigma}\sigma)$		*!		
$(\sigma\acute{\sigma})\sigma(\acute{\sigma}\sigma)$	*!			

Maranungku

Tryon 1970



(Tryon 1970)

tíralk
mérepèt
yángarmàta
lánkaràteti
wélepènemànta

‘saliva’
‘beard’
‘the Pleiades’
‘prawn’
‘kind of duck’

Like Malakmalak but
every word starts ó
and
there is no stress lapse

(́σ)
(́σ)(̀σ)
(́σ)(̀σσ)
(́σ)(̀σσ)(̀σ)
(́σ)(̀σσ)(̀σσ)

TROCHEE: Every ́σ is φ-initial
NOCLASH: No ́σ follows σ
NOLAPSE: No σ follows σ
INITIAL: Every ω starts with φ

$\sigma\sigma\sigma\sigma$	TROCHEE	NOCLASH	NOLAPSE	INITIAL
☞ $(\acute{\sigma})(\grave{\sigma})(\acute{\sigma})$				
$\sigma(\acute{\sigma})(\grave{\sigma})$				*!
$(\acute{\sigma})(\grave{\sigma})\sigma$			*!	
$(\acute{\sigma})(\grave{\sigma})(\grave{\sigma})$		*!		
$(\acute{\sigma})(\grave{\sigma})(\sigma\grave{\sigma})$	*!			

Pintupi

Hansen & Hansen 1969



Weapons Research Authority team
and Pintupi men in the Southern
Central Reserve, 1950
Photo: Department of Defence

tjúṭaya
máļawàna
púliŋkàlatju
tjámulìmpatjùŋku
tílirìŋjulàmpatju
yúmaļiŋkamàratjùŋaka

‘many’
‘through (from) behind’
‘we (sat) on the hill’
‘our relation’
‘the fire for our benefit flared up’
‘because of mother-in-law’

(tjúŋa)ya	‘many’
(mála)(wàna)	‘through (from) behind’
(púlin)(kàla)tju	‘we (sat) on the hill’
(tjámu)(lìmpa)(tjùŋku)	‘our relation’
(tíli)(rìnu)(làmpa)tju	‘the fire for our benefit flared up’
(yúma)(lìŋka)(màra)(tjùŋa)ka	‘because of mother-in-law’

$(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)\sigma$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$

TROCHEE: Every $\acute{\sigma}$ is φ -initial
NOCLASH: No $\acute{\sigma}$ follows $\acute{\sigma}$
INITIAL: Every ω starts with φ
FTBIN: Every foot has 2 σ
 $>$ PARSE- σ : Every σ is in a φ

$(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←

If

FTBIN: Every foot has 2σ

then

σ can't be part of a foot

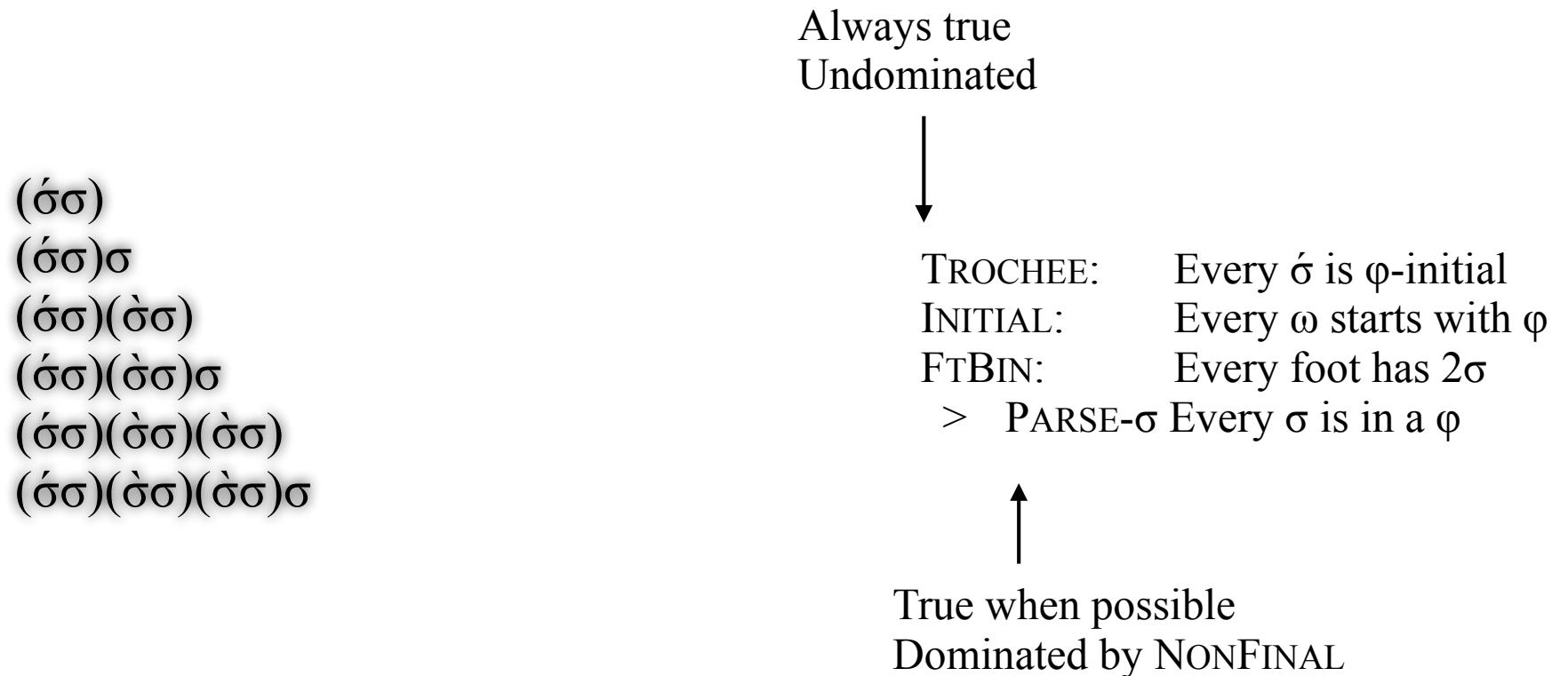
$(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←

FTBIN > PARSE- σ

$(\acute{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)$
 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$ ←

which is bad for

NOLAPSE: No σ follows σ



$\sigma\sigma\sigma\sigma$	TROCHEE	INITIAL	FTBIN	NoLAPSE
👉 $(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)\sigma$				*
$(\acute{\sigma}\sigma)(\grave{\sigma}\sigma)(\grave{\sigma})$			*!	
$\sigma(\grave{\sigma}\sigma)(\grave{\sigma}\sigma)$		*!		
$(\acute{\sigma}\sigma)(\grave{\sigma})(\sigma\grave{\sigma})$	*!			

Grounding the Basic Ideas

Rhythm

Perception is based in alternation.

aaaaaaaaaa	hard to percieve
ffffffflllll	hard to percieve
fafafafafafa	easy to perceive

Obligatory Contour Principle (Leben 1973)

Sequences of identical tones are banned.

HHHHHHHH	*
LLLLLLLLL	*
HLHLHLHL	√

OCP generalized to things other than tone

*s-s, *z-z, *s-z... *t-t, *d-d, *t-d...

sɪŋ-z	fil-d
læf-s	mis-t
raɪz-əz	rənt-əd
dæns-əz	fold-əd

Principle of Rhythmic Alternation (Selkirk 1984: 52)

Every strong position should be followed by at least one weak position
Any weak position may be preceded by at most one weak position

NOCLASH: no $\acute{\sigma}$ follows $\acute{\sigma}$

$\acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma} \acute{\sigma}$

NO LAPSE: no σ follows σ

$\sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma$

NOCLASH, NOLAPSE

$\acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma$
 $\sigma \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma} \sigma \acute{\sigma}$

These constraints

inviolable in Malakmalak ...σ ó σ ó σ...

violable in English

tópàz	Híttìte	
mándàte	trànsfér	violate NOCLASH

fámily	Cánada	
térrible	háppily	violate NOLAPSE

σσσσσ	NoCLASH	NoLAPSE
↙ σσσσσ		
σσσσσ		
σσσσσ		*
σσσσσ		**
σσσσσ	*	
σσσσσ	**	

Alignment

Feet align to words

(́σ)(́σ)(́σ)σ	left-aligning
(σ́)(σ́)(σ́)σ	left-aligning
σ(́σ)(́σ)(́σ)	right-aligning
σ(σ́)(σ́)(σ́)	right-aligning

Stated as ‘non-intervention’ constraints

ALLFTL No σ between φ and beginning of ω

($\acute{\sigma}\sigma$) σ	✓
$\sigma(\sigma\acute{\sigma})$	*

ALLFTR No σ between φ and end of ω

($\acute{\sigma}\sigma$) σ	*
$\sigma(\sigma\acute{\sigma})$	✓

Stress aligns to feet.

Trochaic ($\acute{\sigma}\sigma$), ($\sigma\sigma$) > ($\sigma\acute{\sigma}$)

Iambic ($\sigma\acute{\sigma}$), ($\sigma\sigma$) > ($\acute{\sigma}\sigma$)

Stated as ‘non-intervention’ constraints

TROCHEE No σ between $\acute{\sigma}$ and beginning of φ

($\acute{\sigma}\sigma$)	✓
($\sigma\acute{\sigma}$)	*

IAMB No σ between $\acute{\sigma}$ and end of φ

($\acute{\sigma}\sigma$)	*
($\sigma\acute{\sigma}$)	✓

Typology

We'd expect to find

<i>Trochaic</i>	(́σ)(́σ)(́σ)σ	'left-aligning'
	σ(́σ)(́σ)(́σ)	'right-aligning'

<i>Iambic</i>	(σ́)(σ́)(σ́)σ	'left-aligning'
	σ(σ́)(σ́)(σ́)	<u>'right-aligning'</u>

But the last case hasn't been found in *any* language

Alber (2005) shows this follows from rhythm plus alignment

ALLFTLEFT	no σ comes between a φ and the beginning of a ω		
Trochaic	($\acute{\sigma}$)($\acute{\sigma}$)($\acute{\sigma}$) σ	‘left-aligning’	✓
	σ ($\acute{\sigma}$)($\acute{\sigma}$)($\acute{\sigma}$)	‘right-aligning’	*
NOLAPSE	no σ follows σ		
Trochaic	($\acute{\sigma}$)($\acute{\sigma}$)($\acute{\sigma}$) σ	‘left-aligning’	*
	σ ($\acute{\sigma}$)($\acute{\sigma}$)($\acute{\sigma}$)	‘right-aligning’	✓

ALLFTLEFT	no σ comes between a φ and the beginning of a ω		
Iambic	$(\sigma\acute{)}(\sigma\acute{)}(\sigma\acute{)}\sigma$	‘left-aligning’	✓
	$\sigma(\sigma\acute{)}(\sigma\acute{)}(\sigma\acute{)}$	‘right-aligning’	*
NOLAPSE	no σ follows σ		
Iambic	$(\sigma\acute{)}(\sigma\acute{)}(\sigma\acute{)}\sigma$	‘left-aligning’	✓
	$\sigma(\sigma\acute{)}(\sigma\acute{)}(\sigma\acute{)}$	‘right-aligning’	*

- | | | |
|-----------|--|------------------|
| ALLFTLEFT | > | NOLAPSE |
| Trochaic | ($\acute{\sigma}$ σ)($\acute{\sigma}$ σ)($\acute{\sigma}$ σ) σ | ‘left-aligning’ |
| NOLAPSE | > | ALLFTLEFT |
| Trochaic | σ ($\acute{\sigma}$ σ)($\acute{\sigma}$ σ)($\acute{\sigma}$ σ) | ‘right-aligning’ |
| ALLFTLEFT | > | NOLAPSE |
| Iambic | ($\sigma\acute{\sigma}$)($\sigma\acute{\sigma}$)($\sigma\acute{\sigma}$) σ | ‘left-aligning’ |
| NOLAPSE | > | ALLFTLEFT |
| Iambic | ($\sigma\acute{\sigma}$)($\sigma\acute{\sigma}$)($\sigma\acute{\sigma}$) σ | ‘left-aligning’ |

If a language prefers

ALLFTLEFT > NOLAPSE

(́σ)(́σ)(́σ)σ

‘left-aligning trochaic’

or (σ́)(σ́)(σ́)σ

‘left-aligning iambic’

If a language prefers

NOLAPSE > ALLFTLEFT

σ(́σ)(́σ)(́σ)

‘right-aligning trochaic’

or (σ́)(σ́)(σ́)σ

‘left-aligning iambic’

Neither preference produces

σ(σ́)(σ́)(σ́)

~~‘right-aligning iambic’~~

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