

THE MEASURE OF MIDDLE DUTCH

**Rhythm and Prosody
Reconstruction for Middle Dutch
Literature, A Data-driven Approach**

Utrecht
13 April 2017

Supervisors: prof. Frank Willaert & prof. Mike Kestemont

Wouter Haverals



RHYTHM IN RENAISSANCE

x	/	x	x	x	/	x	/	x	/	x	/	x	x
Het	he	-mel	-sche	ge	-recht	heeft	zich	ten	lang	-en	les	-ten	
x	/	x	/	x	/	x	/	x	/	x	/	x	x
Er	-bar	-remt	o	-ver	my	en	mijn	be	-nauw	de	ves	-ten	

– Vondel, Gijsbrecht van Aemstel (1638)

RHYTHM IN MIDDLE DUTCH

Doe quamen tes sconinx hove	8
Alle die diere, groet ende cleene,	10
Sonder vos Reynaert alleene.	8
Hi hadde te hove so vele mesdaen	11
Dat hire niet dorste gaen.	7
Die hem besculdich kent, ontsiet!	8

- Willem, Van den vos Reynaerde (ca. 1250)

RHYTHM IN MIDDLE DUTCH

x	/	x	x	/	x	/	x
Doe	qua	-men	tes	sco	-ninx	ho	-ve
/	x	x	/	x	/	/	x
Al	-le	die	die	-re	groot	en	-de
/	x	x	x	/	x	/	x
Son	-der	vos	Rey	-naert	al	-lee	-ne
x	/	x	x	/	x	/	x
Hi	had	de	te	ho	-ve	so	ve
x	/	x	x	/	x	/	/
Dat	hi	-re	niet	dor	-ste	gaen	
x	x	x	/	x	x	x	/
Die	hem	be	-scul	-dich	kent	ont	-siet

– Willem, Van den vos Reynaerde (ca. 1250)

RHYTHM IN MIDDLE DUTCH

Fraeye historie ende al waer	9
Magic u tellen, hoorter naer!	8
Het was op enen avontstonde	9
Dat Karel slapen begonde	8
T'Engellem op den Rijn	6

– Anonymous, Karel ende Elegast (ca. 1270)

RHYTHM IN MIDDLE DUTCH

/	x	x	/	x	/	x	x	x
Frae	-ye	his	-to	-rie	en	-de	al	waer
/	x	x	/	x	/	x	/	
Mag	-ic	u	tel	-len	hoort	-er	naer	
x	x	x	/	x	/	x	/	x
Het	was	op	een	-en	a	-vont	-ston	-de
x	/	x	/	x	x	/	x	
Dat	Ka	-rel	sla	-pen	be	-gon	-de	
/	x	x	x	x	/			
T'eng	-el	-em	op	den	Rijn			

– Anonymous, Karel ende Elegast (ca. 1270)

RHYTHM IN MIDDLE DUTCH

Fraeye **historie** ende al waer
Magic u tellen, hoorter naer!
Het was op enen avontstonde
Dat Karel slapen begonde
T'Engelem op den Rijn

– Anonymous, Karel ende Elegast (ca. 1270)

RHYTHM IN MIDDLE DUTCH

histórie ?

hístorie ?

historié ?

SO WHAT?



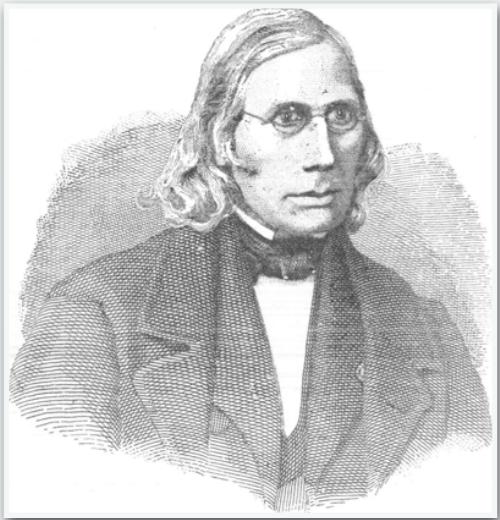
AURAL ASPECT



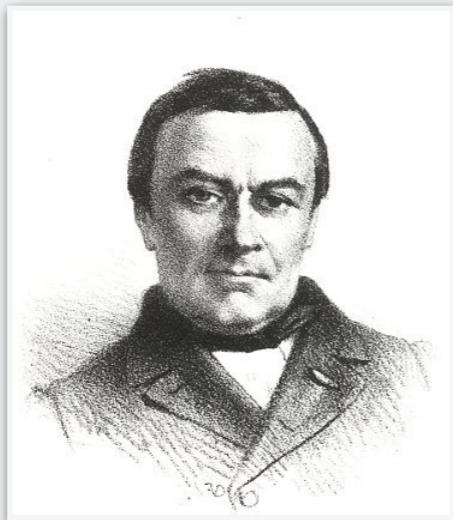
CONTROVERSY



CONTROVERSY



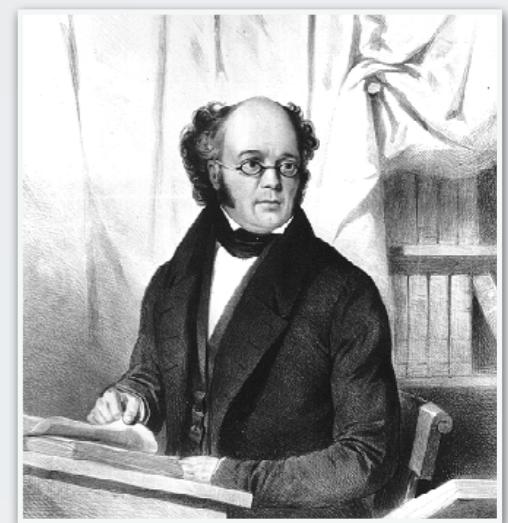
Bormans



Van Duyse



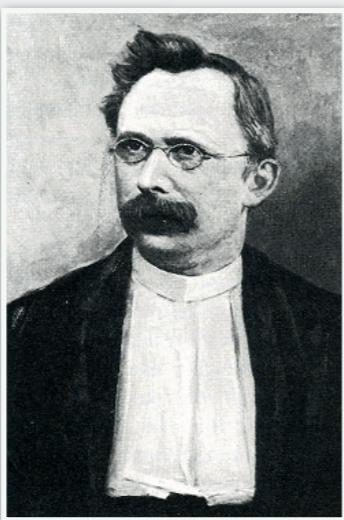
Kossmann



Willems



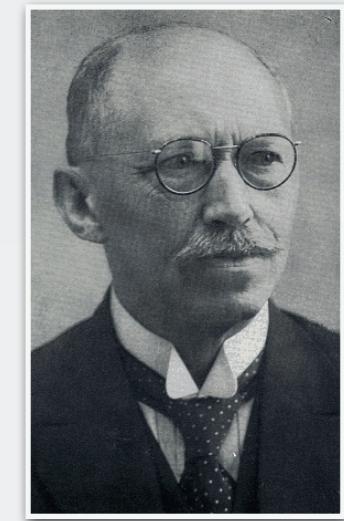
Jonckbloet



Van Helten



De Geyter



De Vooys

RESULT OF THIS CONTROVERSY

- Result: vague and emotion-based descriptions of rhythm in Middle Dutch poetry.
- Example: the rhythm of Van den vos Reynaerde has been characterized as 'snappy' and 'fluid'.



RESULT OF THIS CONTROVERSY

“The rhythm in Karel ende Elegast is mostly fluent and serene. However, when the tension rises in the story, we can also feel the rhythm rising in such a way that the poet’s excitement and compassion are being reflected.”

- Van den Ent (1954)

RESULT OF THIS CONTROVERSY

“The rhythm in Hadewijch’s poetry is like the undulation of a wide-bellowing voice, carried by a deep, long-time continuing breath.”

– Bouman (1940)

SO WHAT?

Need for a **quantitative** approach.

DATA-DRIVEN APPROACH



DATA-DRIVEN APPROACH

histórie ?

hístorie ?

historié ?

DATA-DRIVEN APPROACH

- In the acoustically corresponding part of verse-final rhyme words, emphasis is always on the first identical vowel.

histórie

glória

memória

DATA-DRIVEN APPROACH

- Total number of verse lines
in the corpus Cd-rom
Middelnederlands: 699.508



DATA-DRIVEN APPROACH

- 49.583 unique rhyme words
- These words are fully annotated for word stress
- Use them to build an inventory of stress-annotated words



DATA-DRIVEN APPROACH

maecte -- waecte
haerde -- reynaerde
bleven -- vulscreven
soucken -- boucken
begonnen -- jonnen
zin -- begin
doren -- horen
woort -- ghehoort
onbescaven -- raven
malsch -- valsch
weten -- heeten
leven -- begheven
wille -- ghestille
ghebeden -- hovesscheden
saken -- maken
reynaerde -- grongaerde
doren -- horen
eeren -- keeren
hoofsichelike -- rike
sinne -- beghinne
daghe -- haghe
bevaen -- ghedaen
al -- gheval
love -- hove
cleene -- alleene
mesdaen -- gaen
ontsiet -- ghesciet

/	x
maec	te
waec	te

x	/	x
rey	naer	de
grong	gaer	de

x	/
be	vaen
ghe	daen

DATA-DRIVEN APPROACH

- 49.583 unique rhyme words
- These words are fully annotated for word stress
- Use them to build an inventory of stress-annotated words



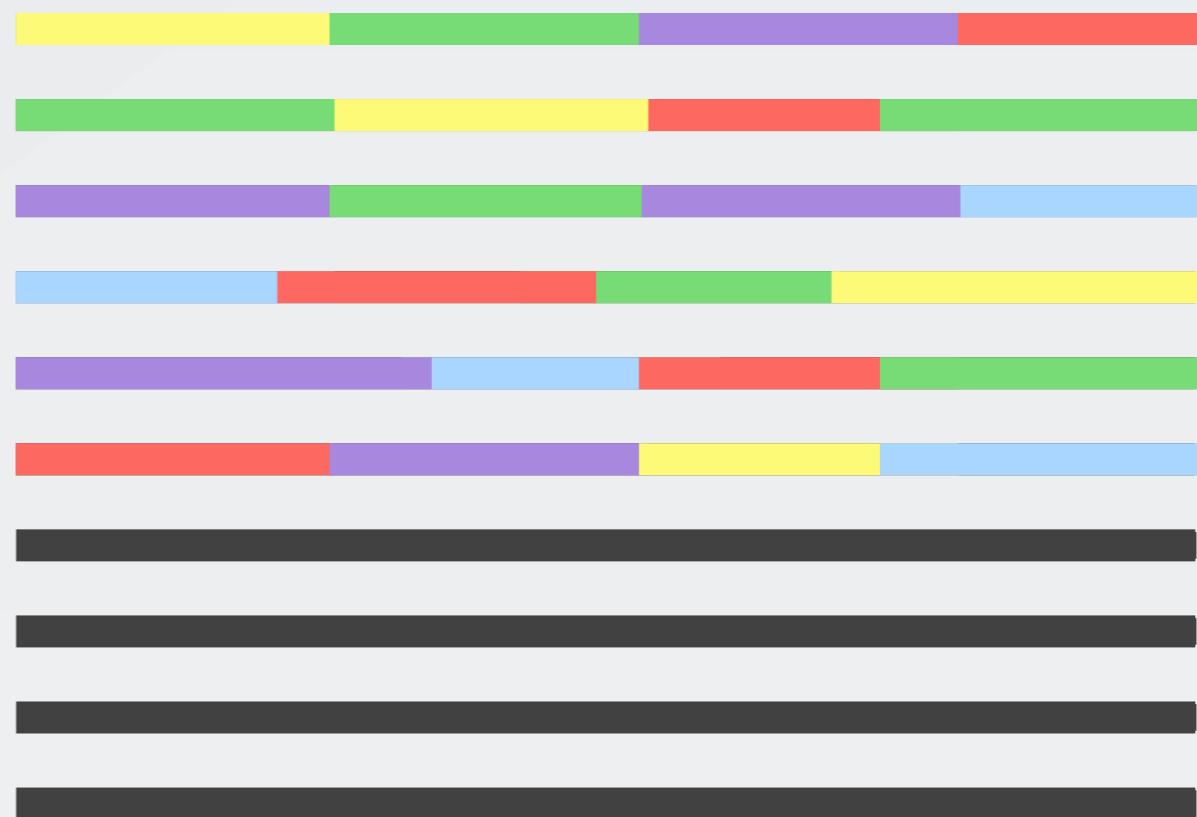
DATA-DRIVEN APPROACH

- Project the prosodic patterns of these rhyme words onto their duplicates that occur outside rhyme position.



DATA-DRIVEN APPROACH

- Doing so, we are able to reconstruct ca. 61% of full verse lines.

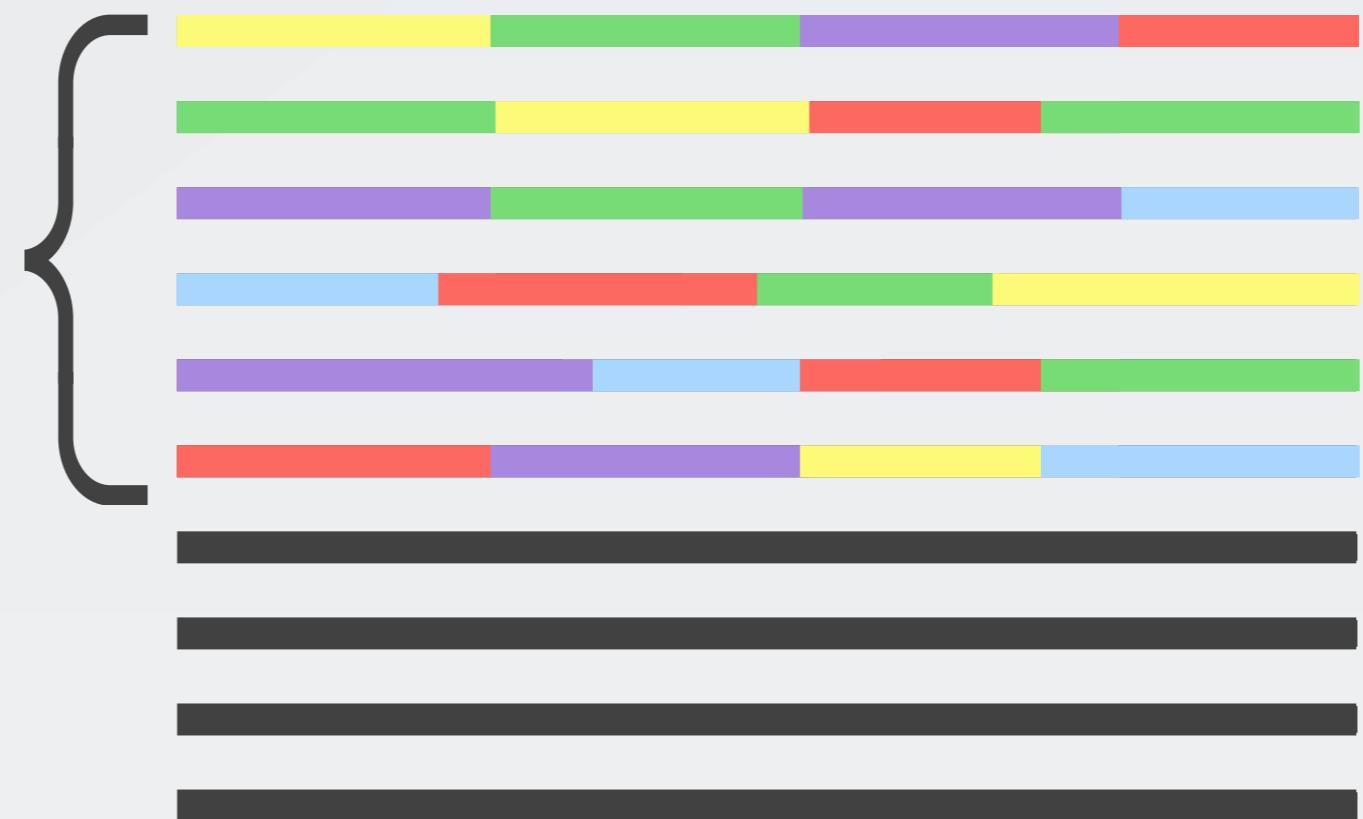


MACHINE LEARNING



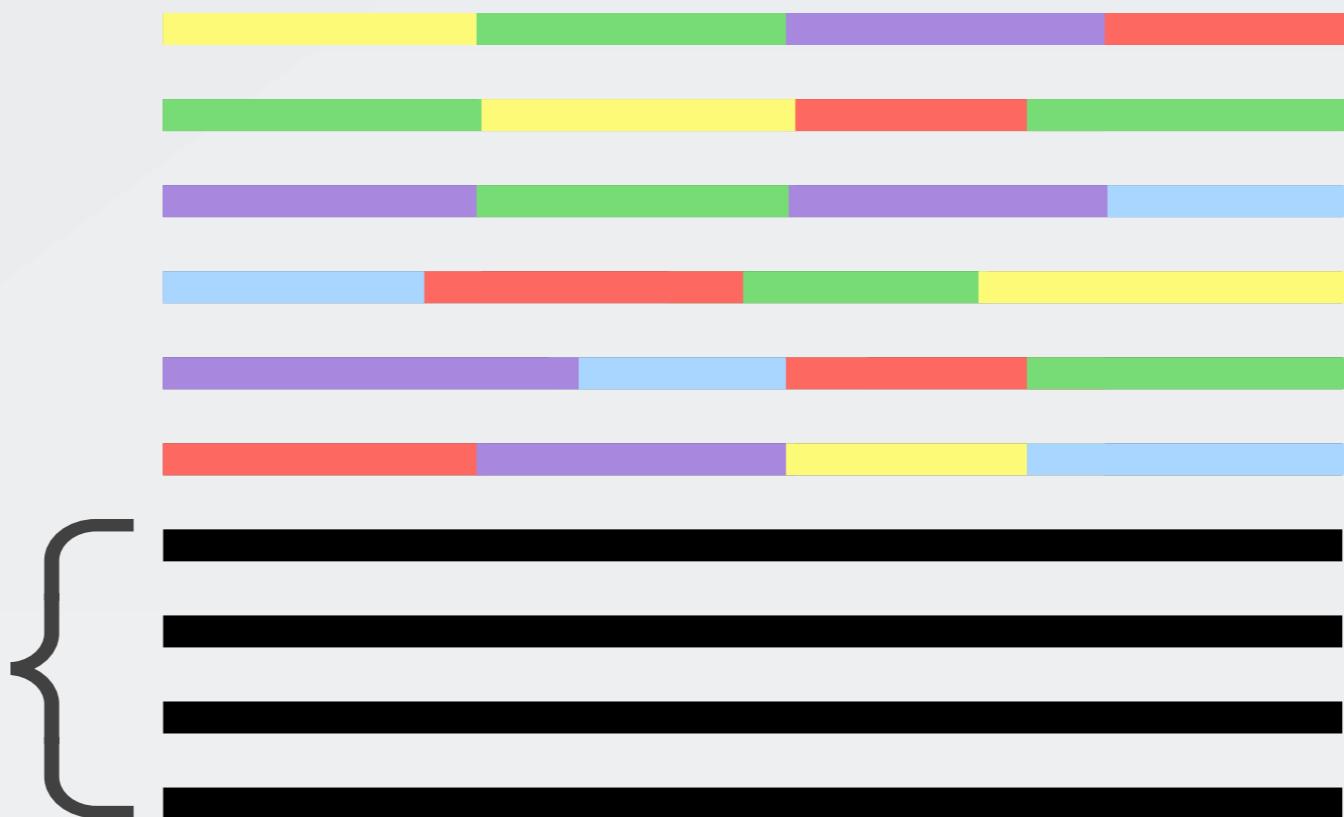
MACHINE LEARNING

- This 61% of stress-annotated verse lines will serve as input data for a machine learning algorithm

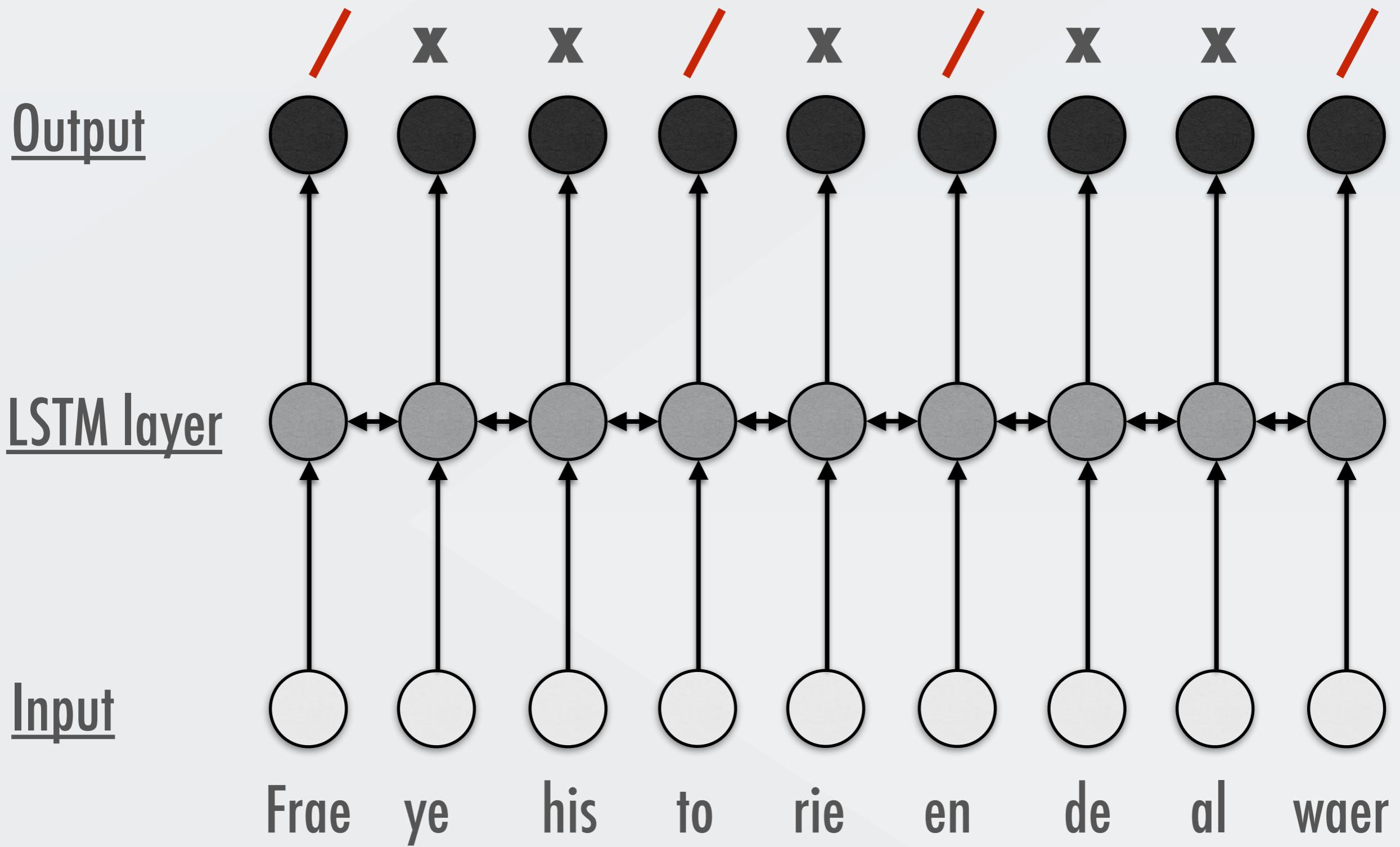


MACHINE LEARNING

- Learn the stress patterns of the remaining 39%



MACHINE LEARNING



SYLLABIFICATION



histo[•]rie

SYLLABIFICATION

historie → his-to-rie

clooster → cloos-ter

bedevaerd → be-de-vaerd

SYLLABIFICATION

	Hyphenation accuracy	Word accuracy
Bouma & Hermans (2012)	97,9%	96,5%

nucleus a, aaC, ae, ai, au, e, ee, ei, eu, ey, i, ie, ii, iae, J, o, oe, ooC, ou, oi, oy, u, uuC, ue, uy, ui, V, Vy, W, y, ye

onset b, bl, br, c, ch, cl, cr, d, dr, dw, f, fl, fr, g, gh, gl, gr, h, j, k, kl, kn, kr, l, m, n, p, ph, pl, pr, Q, r, s, sc, sch, schr, scr, sl, sn, sp, spl, spr, st, str, t, th, tj, tr, U, v, vl, vr, w, wr, x, z, zw

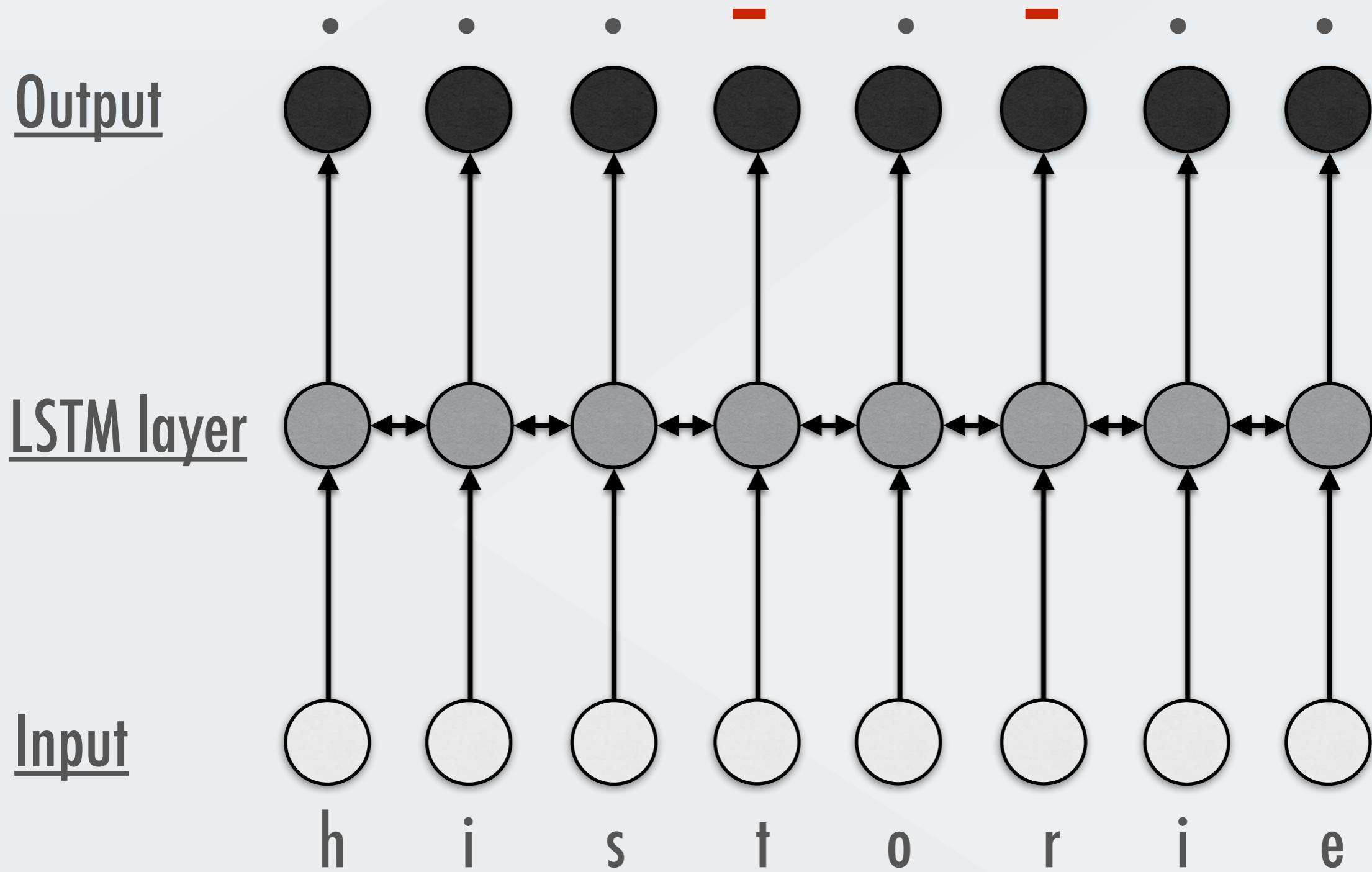
SYLLABIFICATION

2014 manually
hyphenated Middle
Dutch words

Training data

crey-ten
jon-frou-we
be-scri-uen
de-gen
hoe-ke-len
hein-rycs
deyrt
boy-de-wiin
gra-ue-ma-ker
hirt
beems
hamt-kier
ghe-suo-ren
clair-lic

SYLLABIFICATION



SYLLABIFICATION

	Hyphenation accuracy	Word accuracy
Bouma & Hermans (2012)	97,9%	96,5%
Kestemont & Haverals (2016)	99,3%	97,0%

SCHOLARLY INSECURITY



SCHOLARLY INSECURITY... (1)

siet hiet
coninc ontfinc
remise prise
na versta
las was —————
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal —————
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat —————
pippijn sijn

/
las
was

/
al
sal

x	/
hof	stat
	dat

SCHOLARLY INSECURITY... (1)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

According to the model, one-syllable words receive stress.

This causes an unfavourable stress assignment in verse lines:

/	/	x	/	x	/	x	/
Die	hem	be	-scul	-dich	kent	ont	-siet

How to cope with sentence stress?

SCHOLARLY INSECURITY... (2)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

x	x	x	/	x
car	na	ti	o	ne
			doe	ne

x	x	/	x
has	pen	gou	we
		scou	we

SCHOLARLY INSECURITY... (2)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

x	\	x	/	x
car	na	ti	o	ne
			doe	ne

\	x	/	x
has	pen	gou	we
		scou	we

The model does not recognise
secondary stress...

SCHOLARLY INSECURITY... (3)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

x	/
bra	bant
ghe	nant

x	/
hof	stat
	dat

x	/
co	ninc
be	ghinc
	dinc

SCHOLARLY INSECURITY... (3)

siet hiet
 coninc ontfinc
 remise prise
 na versta
 las was
 voerwaer jaer
 gheweest leest
 kinnen beghinnen
 heren leren
 carnatione doene
 gaen verstaen
 tsamen namen
 saen staen
 al sal
 tiden overliden
 was las
 sat stat
 haspengouwe scouwe
 karleman ghewan
 brabant ghenant
 verschiet niet
 plach mach
 hofstat dat
 pippijn sijn

/	x
bra	bant
ghe	nant

/	x
hof	stat
	dat

/	x
co	ninc
x	/
be	ghinc
	dinc

SCHOLARLY INSECURITY... (3)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

/	x
co	ninc
x	/
be	ghinc
	dinc

In the acoustically corresponding part of verse-final rhyme words, emphasis is always on the first identical vowel.

SCHOLARLY INSECURITY... (3)

siet hiet
coninc ontfinc
remise prise
na versta
las was
voerwaer jaer
gheweest leest
kinnen beghinnen
heren leren
carnatione doene
gaen verstaen
tsamen namen
saen staen
al sal
tiden overliden
was las
sat stat
haspengouwe scouwe
karleman ghewan
brabant ghenant
verschiet niet
plach mach
hofstat dat
pippijn sijn

/	x
co	ninc
x	/
be	ghinc
	dinc

In the acoustically corresponding part of verse-final rhyme words, emphasis is always on the first identical vowel.

How much trust can I put in this rule?

CODE



GitHub.com/wHaverals

REFERENCES

Cd-rom *Middelnederlands. Woordenboek en teksten*. Den Haag/Antwerp, 1998.

BOUMAN, A.C., 'Over rythme, met name in Middelnederlandse verzen'. In: B. Hendrick Erné (ed.), *Bundel opstellen van oud-leerlingen aangeboden aan Prof. Dr. C.G.N. de Vooys [...]*. Groningen: Wolters, 1940, p. 26-45.

BOUMA, G. & HERMANS, B., 'Syllabification of Middle Dutch', *Proceedings of the Second Workshop on Annotation of Corpora for Research in the Humanities*. Lissabon, 2012, p. 27 - 39.

GEURTS, J., *Bijdrage tot de geschiedenis van het rijm in de Nederlandsche poëzie*. Deel 1. Gent, 1904.

STUIVELING, G., *Versbouw en ritme in de tijd van '80*. Groningen: Wolters, 1934.

TROMMELEN, M. & ZONNEVELD, W., *Klemtoon en metrische fonologie*. Muiderberg, 1989.

VAN DEN ENT, W. (ed.), *Karel ende Elegast*. Zwolle, 1954.

VAN OOSTROM, F., *Stemmen op schrift. Geschiedenis van de Nederlandse literatuur vanaf het begin tot 1300*. Amsterdam, 2006.

ZONNEVELD, W., '700 jaar Nederlandse klemtoon (en weinig veranderd)', *Spektator* 22 (1993), p. 198- 222.