racking the code

Challenges of Encoding Medieval Manuscripts

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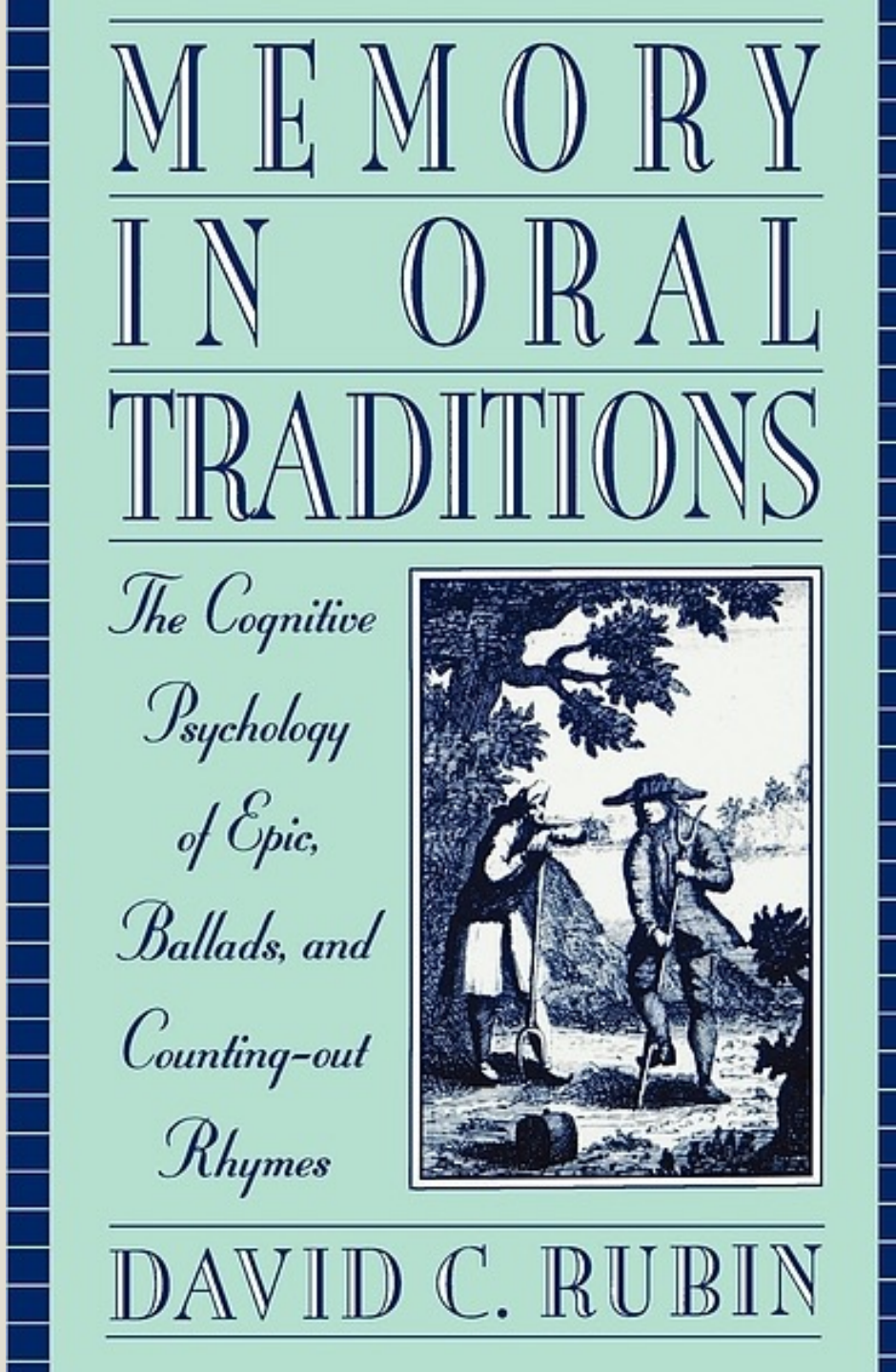
Variation is what the medieval text is about. (Driscoll 2010)

Constrained

- Middle Ages: scribes making copies of copies (of copies…) by hand
- Each manuscript copy: unique variants
- Material Philology; research into how copyists manipulate a text (Van Dalen-Oskam 2012; Kestemont 2018; Haverals & Kestemont *forthcoming*)

- Little research on **underlying mechanisms** in copying process
- Influence of **text form** (such as rhyme scheme, stanza form, and text structure)
- Evidence from **psycholinguistics**: formal features = constraining character (Rubin 1995)
- Slowly, more **computational** research on this topic is shaping up (Thaisen 2014)



- Computational investigation of the transmission of ***Martijn Trilogy*** by Jacob van Maerlant

- **Computational alignment** of 17 different manuscripts, fragments, and prints before 1500

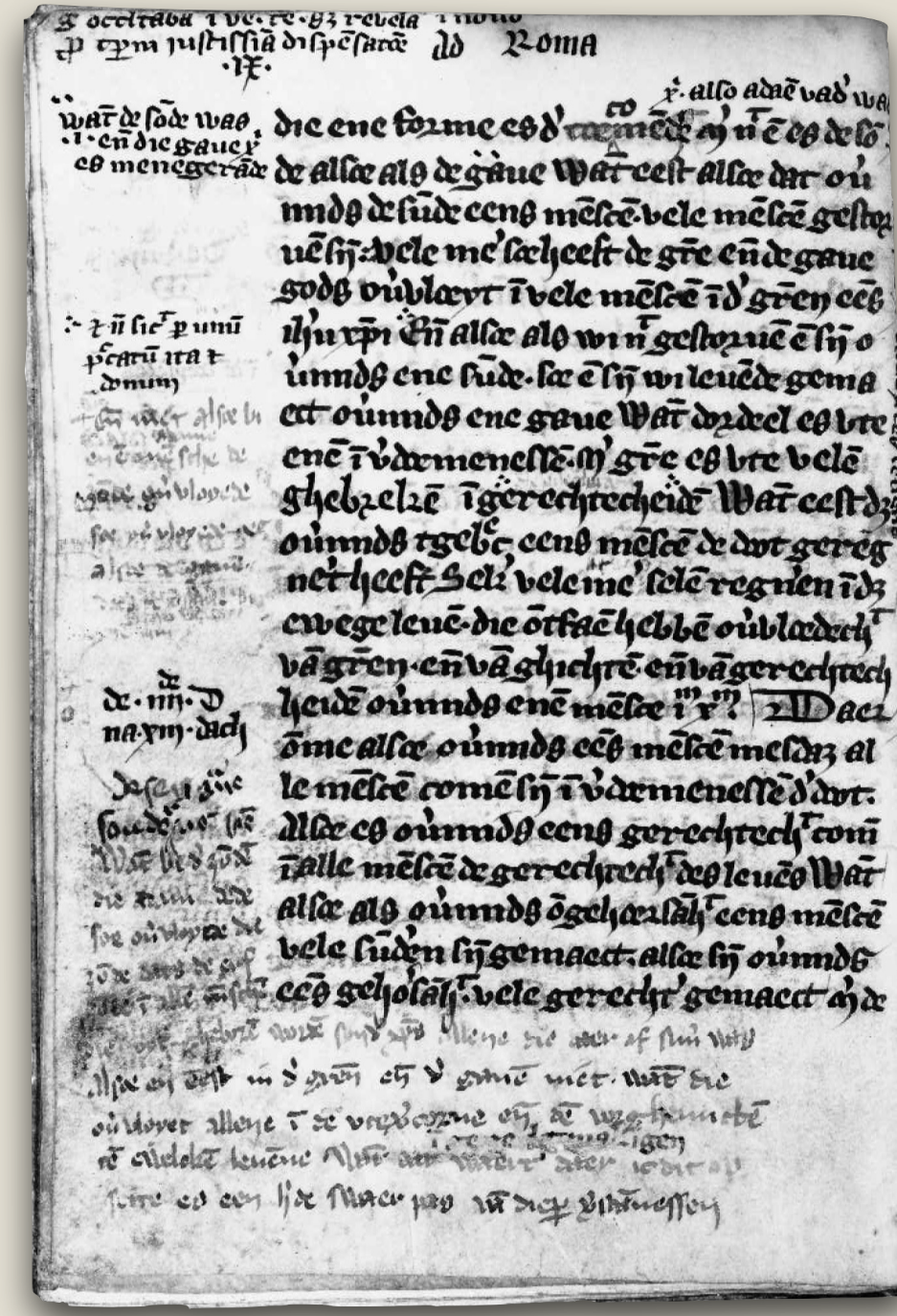
- **Empirically validate** existing hypotheses

Silent Voices

- 1350-1400
- +25 manuscripts
- produced at the monastery of Herne

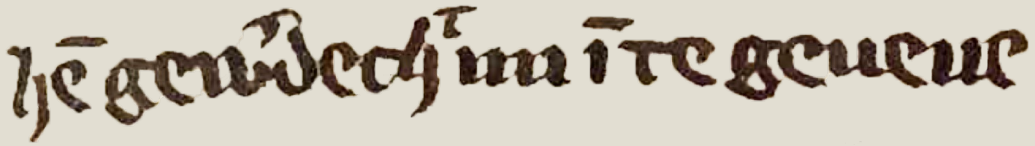
- 13 scribes, working closely together on
  - translations from Latin to Dutch
  - copying texts for their own use
  - … for other communities
  - … for weatlhy citizens of Brussels

- Marginal conversations!



What are the copying strategies that made this group of monks such an incredibly well-oiled machine?

Editing the medieval text



Diplomatic transcription
hē gew’dechᵗ mi ī te geuene

Semi-Diplomatic transcription
he*m* gew*er*dech*eit* mi i*n* te geuene

Normalised transcription
hem gewerdecheit mi in te gevene

Un-editing the medieval text

Edition	UnEdition
Printed on paper	Digitally in the cloud
Static — for eternity	Dynamic — until the next bugfix
Critical	(Hyper-)Diplomatic
Hide the sources	Foreground the sources
Old philology	New philology
Accuracy	Accessibility
Commercial	Open access

CD-ROM Middelnederlands

Wealth of Middle Dutch texts!

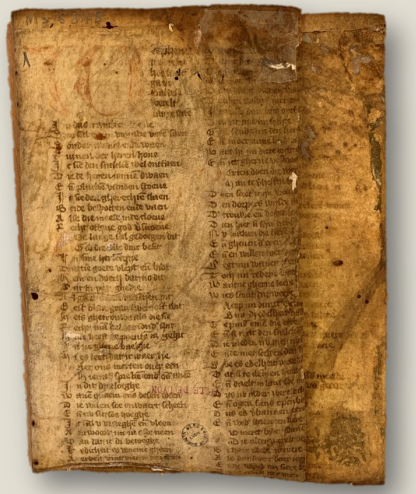
19th and 20th-century normalized editions…

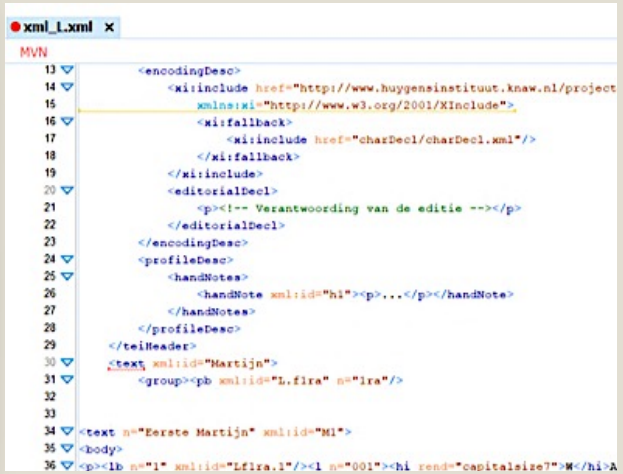
Not all textual witnesses…

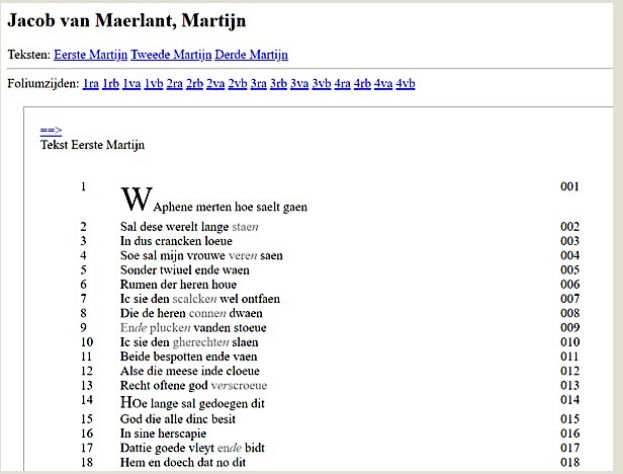
XML-TEI transcriptions

MVN framework by Herman Brinkman and Peter Boot (Huygens Institute)

- Options to keep or exclude the **markup** for capital letters, abbreviations, punctuation, etc.
- Lemmas, material aspects, …
- Advanced
- Legacy







Character encodings with MUFI

Medieval Unicode Font Initiative

MUFI characters that are part of the Private Use Area (PUA), cause for problems…

Ṅ	**1E44**	LATIN CAPITAL LETTER N WITH DOT ABOVE
ṅ	**1E45**	LATIN SMALL LETTER N WITH DOT ABOVE
Ṇ	**1E46**	LATIN CAPITAL LETTER N WITH DOT BELOW
ṇ	**1E47**	LATIN SMALL LETTER N WITH DOT BELOW
n⊣	**A774**	LATIN SMALL LETTER NUM
N̄	**E1DC**	LATIN CAPITAL LETTER N WITH HIGH MACRON (ABOVE CHARACTER)
n̂	**E5D7**	LATIN SMALL LETTER N WITH CIRCUMFLEX
n̄	**E5DC**	LATIN SMALL LETTER N WITH MEDIUM-HIGH MACRON (ABOVE CHARACTER)
n̥	**E5EE**	LATIN SMALL LETTER N WITH RING BELOW

Alignment using **CollateX software**

(Dekker and Middell 2011)

Latin Small Letter N With Medium-High Macron (uE5DC): wrong visualisation 

A	dat	neen	wart	ja	e	□	ia	–	neen
B	dat	neen	was	ja	e	□	ja	–	neen
C	dat	neen	was	ja	e	□	ja	was	neen
D	ende	neen	was	ia	ende	–	ia	was	neē
F	dat	neen	w’t	ia	e	□	ia	–	neen
G	dʒ	neen	was	ia	e	□	ia	was	neē
O	dat	neen	was	ja	e	□	ia	–	neen
Y	dat	neen	was	–	–	–	ia	–	neen

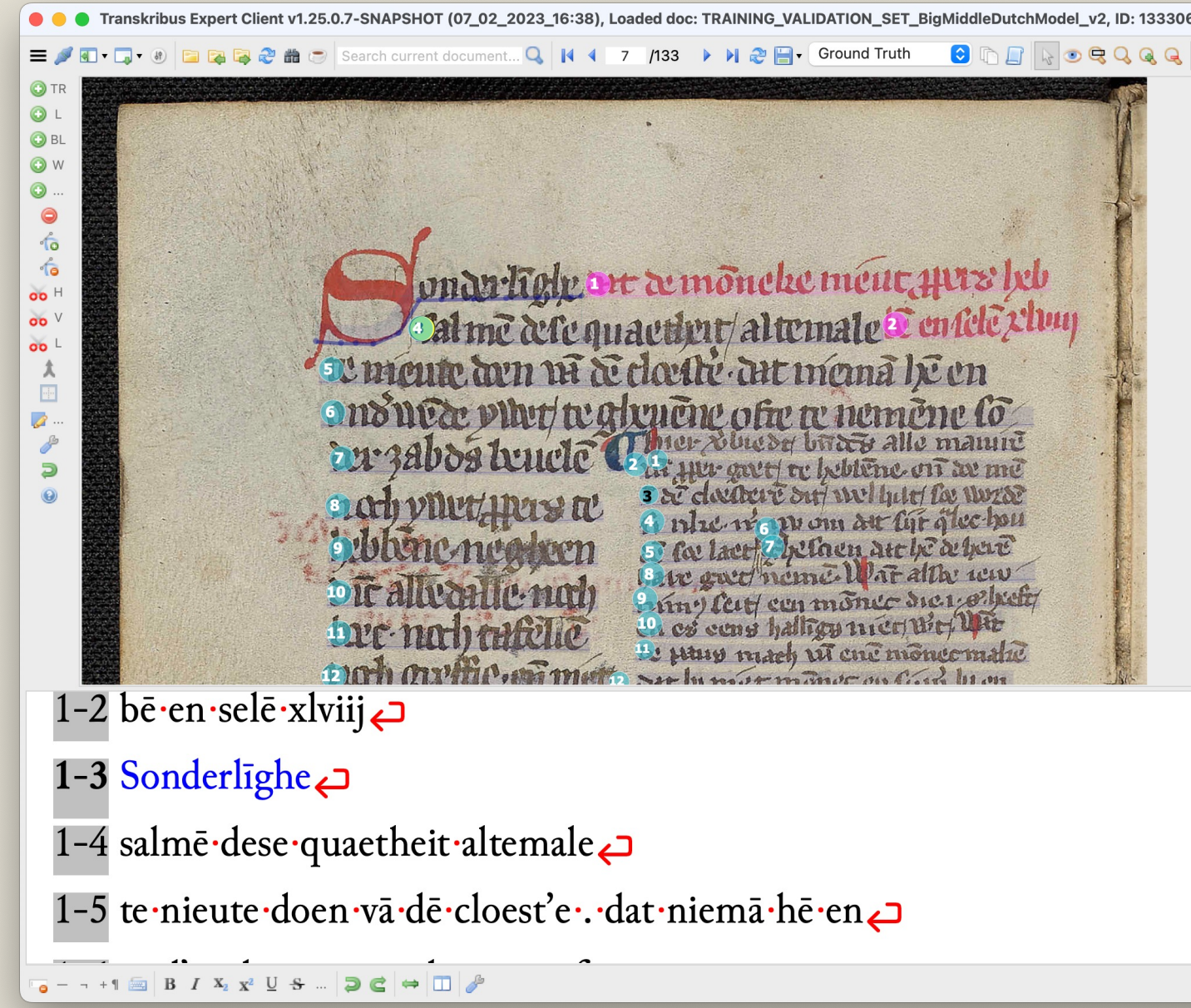
Latin Small Letter N With Tilde (u00F1): pragmatic solution 

A	dat	neen	wart	ja	eñ	ia	-	neen
B	dat	neen	was	ja	eñ	ja	-	neen
C	dat	neen	was	ja	eñ	ja	was	neen
D	ende	neen	was	ia	ende	ia	was	neē
F	dat	neen	w’t	ia	eñ	ia	-	neen
G	dʒ	neen	was	ia	eñ	ia	was	neē
O	dat	neen	was	ja	eñ	ia	-	neen
Y	dat	neen	was	-	-	ia	-	neen

Combining macron (u0304): wrong collation 

A	dat	neen	wart	ja	en	-̄	ia	–	neen	–
B	dat	neen	was	ja	en	-̄	ja	–	neen	–
C	dat	neen	was	ja	en	-̄	ja	was	neen	–
D	ende	neen	was	ia	ende	–	ia	was	nee	-̄
F	dat	neen	w’t	ia	en	-̄	ia	–	neen	–
G	dʒ	neen	was	ia	en	-̄	ia	was	nee	-̄
O	dat	neen	was	ja	en	-̄	ia	–	neen	–
Y	dat	neen	was	–	–	–	ia	–	neen	–

- In the Silent Voices project:
  - Ca. 15,000 manuscript folios to be transcribed
  - Relying on the popular Handwritten Text Recognition tool *Transkribus*

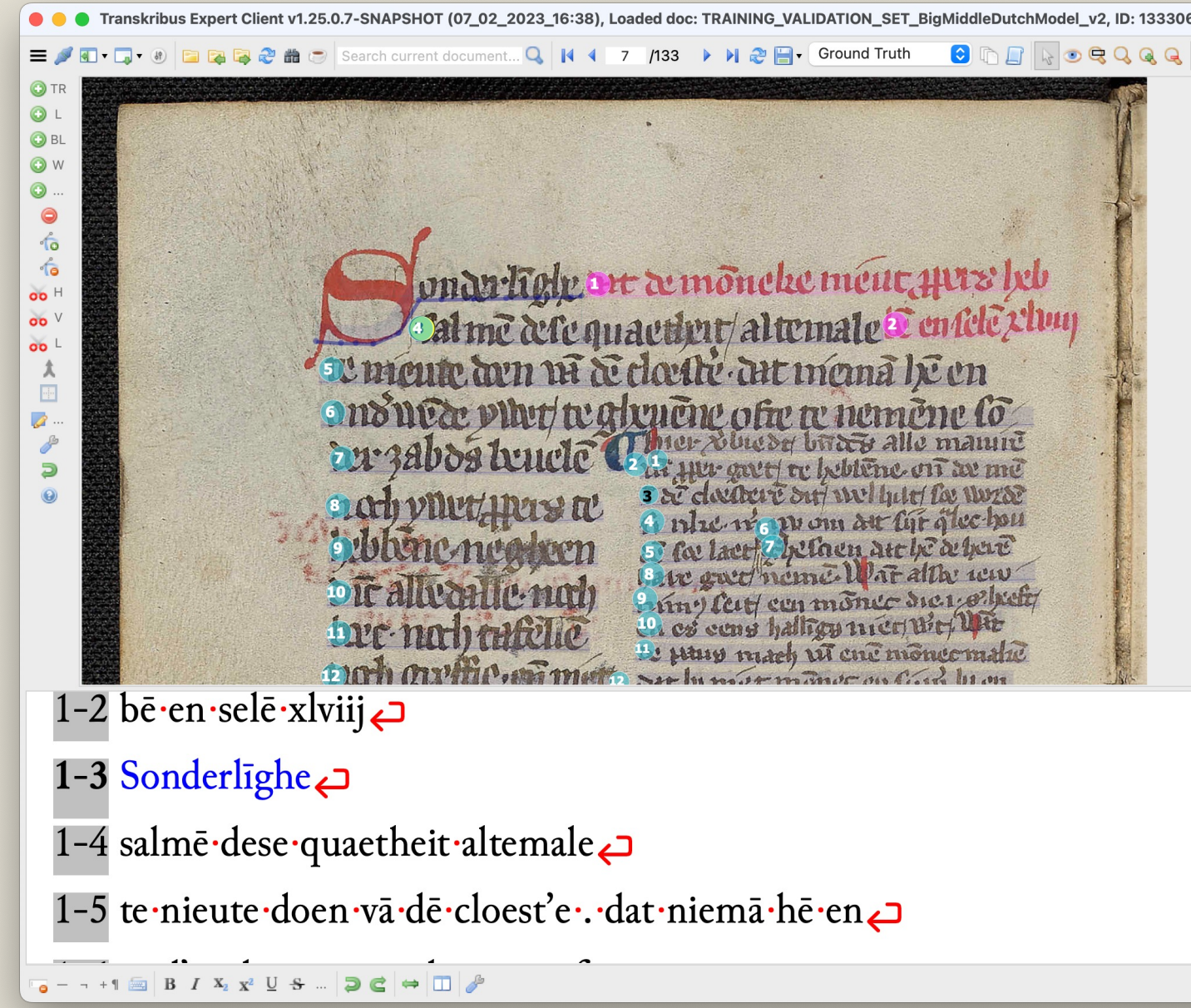


Data

Training

Model

Prediction

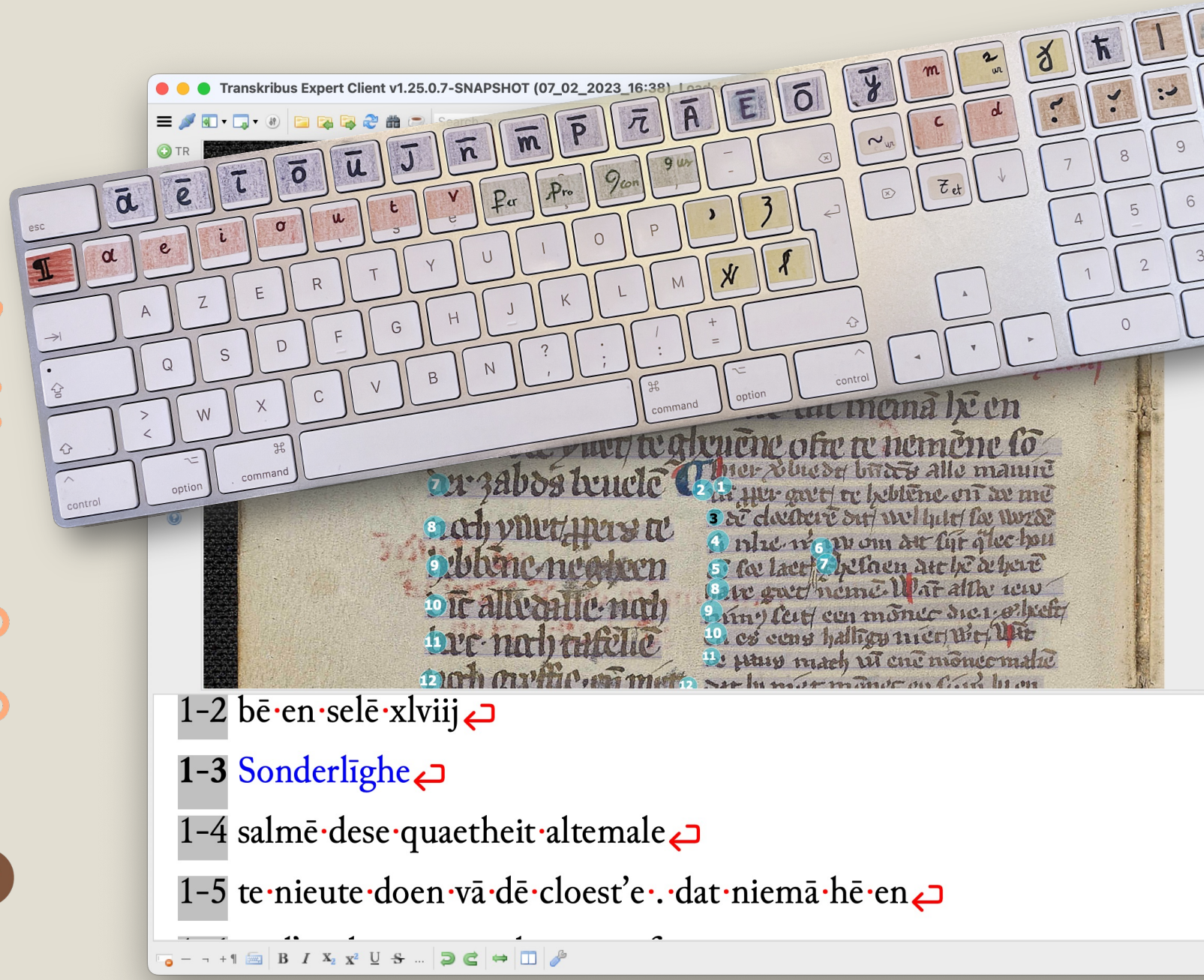


3,000 pages

Training

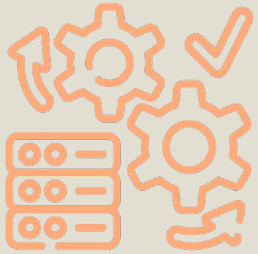
Model

12,000 pages

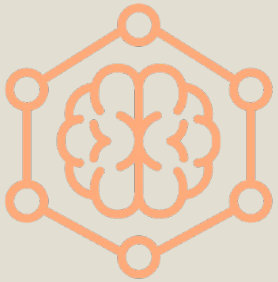


3,000 pages

Training



Model



12,000 pages

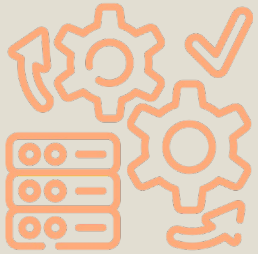
Risk: are these 3,000 pages a representative sample of the entire corpus?

Risk management: make sure training material is well-stratified across:

- all manuscripts
- different handwriting styles
- topics
- text layouts
- image resolutions
- etc.

3,000 pages

Training



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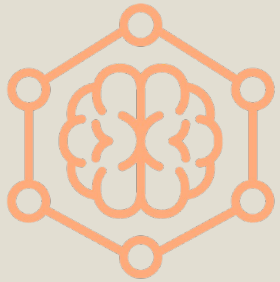
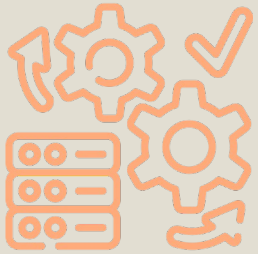


12,000 pages

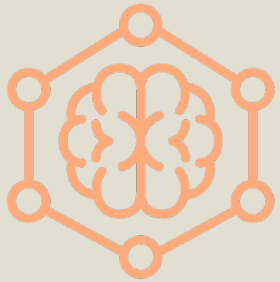
	Character Error Rate (CER)	
	Train	Test
BigMiddleDutchModel	2.00%	2.70%

3,000 pages

Training



Model



12,000 pages

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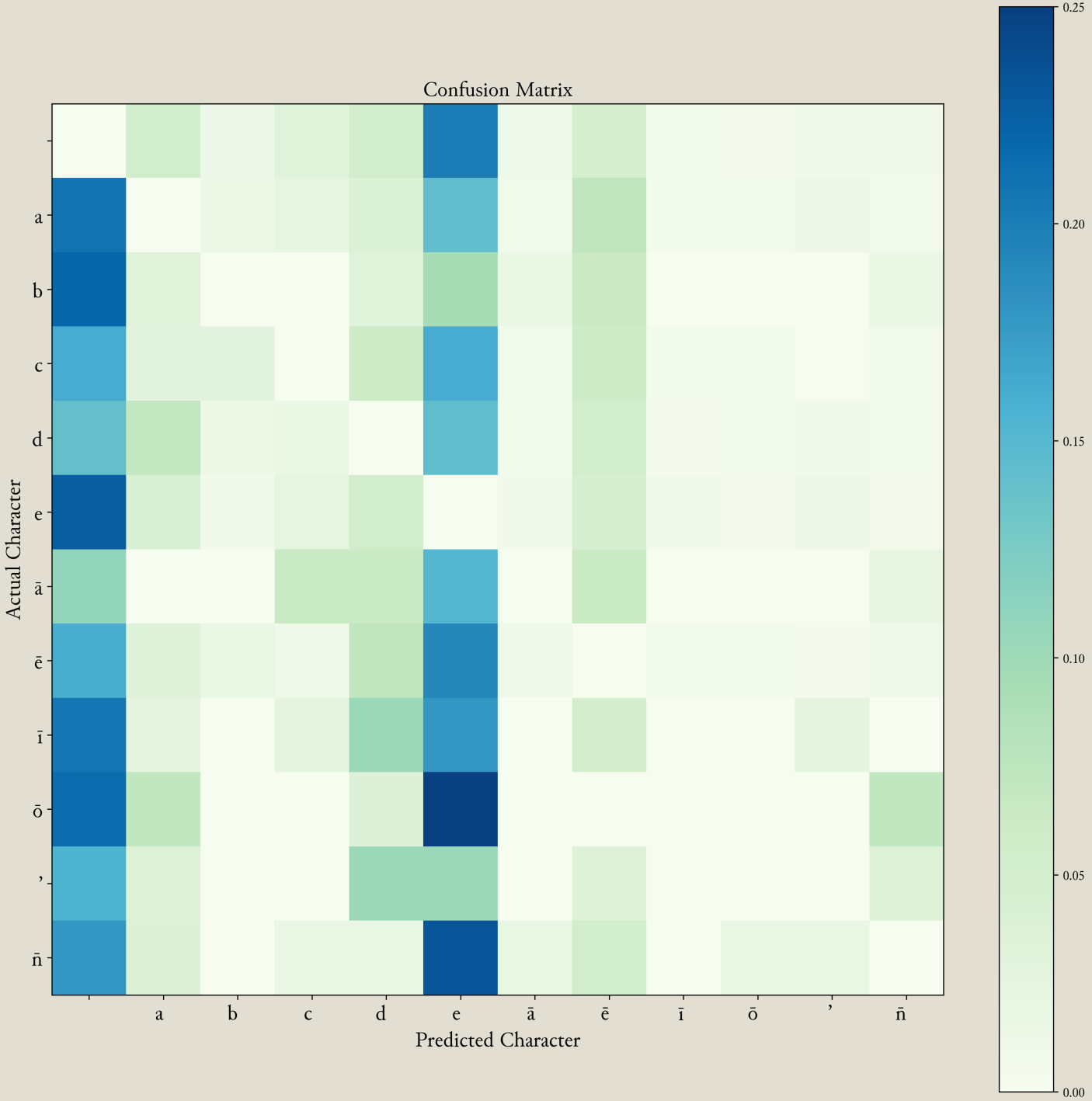
Is this good? Probably.
But not very informative…



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References

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Cracking the code

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