From Stylistics to Statistics: Computational Approaches to Latin Medieval Composition and Authorship

Ghent, 27 November 2024

LW Research Day 2024 – From Source to Understanding



From source to understanding

- Stylometry applied to medieval Latin: a long bridge / distance?

- Source

- Dictation / self-dictation
- Wax tablets /notes
- Manuscripts

- Understanding (hermeneutics)

- Edition
- Digitized text (OCR)
- Electronic text
- Vectors (= numerical representations of lexical properties)

Stylometry

History

"One class of words that we use has been called **function words**—the filler words of the language, such as *a*, *an*, *by*, *to*, and *that*. Generally they include prepositions, conjunctions, pronouns, and certain adverbs, adjectives, and auxiliary verbs. [...]

We like the function words rather well because many of them are not much influenced by the context of the writing [...]."



The Wallaces [left] with the Mostellers [right] at the University of Chicago in 1973.



Example of IBM 7090.



Features





Features





	AUTHORA	L		AUTHOR B			
	segment l	segment 2	segment 3	segment 4	segment 5	segment 6	
et	116	114	131	130	123	104	
in	156	119	134	130	88	80	
est	52	37	45	48	31	55	
ad	46	29	43	63	43	28	
qui	19	11	12	22	14	18	
cum	30	62	58	82	45	66	
ut	31	13	27	36	30	19	
me	33	22	30	33	34	43	
non	20	35	30	29	32	21	
	41	45	23				

Features and Vectors



Features and Vectors



Features







Features







Principal Components Analysis (PCA)



	AUTHORA			AUTHOR B			
	segment l	segment 2	segment 3	segment 4	segment 5	segment 6	
et	116	114	131	130	123	104	
in	156	119	134	130	88	80	
est	52	37	45	48	31	55	
ad	46	29	43	63	43	28	
qui	19	11	12	22	14	18	
cum	30	62	58	82	45	66	
ut	31	13	27	36	30	19	
me	33	22	30	33	34	43	
non	20	35	30	29	32	21	
de	41	45	23				



Individual vs. Shared Authorship

- Individual authorship: writing alone in the Latin Middle Ages?
 - difficult and technical
 - slow, physically demanding
 - expensive
 - autographs (copy where roles of author and scribe combined in one person) = very rare
- Shared authorship: contributors (secretaries) and scribes
 - Secretaries and scribes
 - Writing personnel attached to scriptoria / chanceries (official documents)
 - Involved in intellectual, spiritual, and administrative life
 - Proficiency in Latin, book learning and technical know-how in copying and manuscript production.
- Every scribe a new author, every copy a new text?

Hildegard of Bingen & Ghent MS 241

irracionale aut ai al nicht altud lett. In de senteren et tradine pipeue milicie creat. ita de nee isepso nee iastifi iquirari ullaren praue cedat. I de di urrite e. In co f. creat de p dona dunne gre boi ipeccarii uninetato cu mia parcat. & ur milerias ipie una adrendar des unini pentrente ei isunoar più q. oleo mie unquat. sie ne ipie bo pre excedente misura e iremulibule pentrentia cadat. A e ne repiclus iuanitate prauo opu iuoluat: de di femmen e. e thud de benedicit da bu

nt fit et ietou refectionul aie.' wa ut 7 ond unentel untu tel phumilitate do fubieche. & usure i celefti mulicia uolan tel & ouverneel que boie airent reb'ad celefta remouer. augomit uncutel quib'unientel unel de plantatione fpc fei fr. cu eo iaia ipie palcant.' 12 mfe 9 cu ulu i bit opiubul paleat. Et bec onna iboie ulo ua fuit.' d fie iclo fludet. Vidure de cuncta que fecerar.' 14 erat ualde bona Lunc fudet de do omia que fecerar.' 14 erat ualde bona fia da iplentudine omit un turi pfecta fi.'cu pri una quequur tul ilemeripia tantu umi bonu fuit. bu aut omita pariri bona fr. da tuc omita bona i bou ulto funt. bu aut omita pariri

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Hildegard of Bingen receiving inspiration from the Holy Ghost, and engraving her ideas on a wax tablet. She is assisted by a male monk transcribing her words to parchment (left) and a female nun (right). *MS Lucca 1942, Biblioteca Statale, fol. 1v.*

#	ante corr.	post corr.	freq.	#	ante corr.	post corr.	freq.
1.	quod	ut	392	11.	cum	-	22
2.	ac	et	207	12.	prefato	-	22
3.	que	-	73	13.	autem	sententie	21
4.	quod	-	70	14.	quod	quia	19
5.	-	et	69	15.	prefati	-	19
6.	etiam	-	34	16.	quod	quatenus	14
7.	ut	-	26	17.	que	quoque	14
8.	qui	-	26	18.	est	sit	13
9.	ad intellectum	intellectui	24	19.	predicto	-	13
10.	quoque	-	24	20.	-	que	12

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aller .	18	exortul fice
Ad intellectupater.	19	p-ducto
queq,	20	partgocciden

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Two recensions of the LDO

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m parat lam homm i pdeler of funderi sacer to uffin land daver lybe en ague assagular & agua gfundar ur forma se polin: A prita ena omné forma qua face sent & ama piere 13 una muent hun i aque oura h mma classferre un de los y ufu unale lum maner/deu ir end sont de faquer de hounie sone coquer de aqua p fundmit lafog, end aqua er minio catore famint banen rnber 4 manar fr an anoment eer ur lie rendrefen manarer a de laname charefert 14 44 fe in monarer en de some smoot Qued fe lie ables ope ur: e fe babunen tie it haberer: i manuf forer Ham de upof et tax exuber. gonan heren mumant & y neurations en menterie era ifere norts com mundie ereaut a babracula bai i name pir babrarios q en comb bai apa ina opera. Not. fie de du en vennie grecht feetr. er spint tenaver gelmt Watern gin decept ereator of fan oblit 6. 'n tile of malla attagethe obundering agraemante alle adolunt. Si en dualo int mulary nehma mideffer: immida feremta quafe in de ello pierte composite un le federando ar de den alt meitren dedeter fe ipfü deerpfirt ur Tapeltalipft fermi e er sona undur denebo de prectul e miri y fermi e untrette que pepter matentin. Er dant fur una hern die ale aquite magne un notaver ideferrit te eff fuil ater ater prenat & remps of damatin margar afane forpente boe studentide morfie e chrestant denobe udent qu teet ufit gehehnler sque fede ind penery addear, qui itartavea loca puchi erat main find imminery exacute quite mile more ound tournant generif p parti de cognoniti de îmaprimo edu com habent me fe doent qo nuqua collarer ma giomende que ofq offi adar imari foffecaver/que ca pani

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horpat: 5; 19fa gii partende angultana serrationii adumerii det mont van fe arryun: dannag postsone fafstes i omti noht datote fe opotan: Ha yfi data far dae munifin bea urndmit feit edett dahderm 4 fanme annasene en bei ife reta cordif fin rendertr dall mitita Court acceptel g remp st ante debutta fur: 4 remps y fatenti. 4 doondai rempt. id jereviethone surg jearnamone fitts met cont. 4 galannur ng ad pleni mup engli ique and plenendo nere 4 uthe Anumont adverted annapri to pente fur rectt. Ant den aŭ eni 4 polt datumi, nee ŭ 4 ienvientone din celemti fue ritt. A redeptione amongs time patholis languate fittis met ad oper fei Cu. auer remay vantlannt envere saf e plene unfurte p this well never antiqual forpart noide ceiver debupant que mutsere under unugine word daepe a Quape & ifierere ine our alls exactis: ur instantate was forni ? for unfit for perf corre fas y mutuere aqua ting flam. ut ea facerer ma aftamme /4 admme in materilyor ofdermili fiel. luie ma annant gienner e nafilma aracume ina redunding makers que un'à puteurs southtune & ch datana îmfal under 4 pagnar, ber inndem ur dal plu rund gierment anruta un fatmener un emine father rer queidindi nami p nantingui futfocat quari neni qui roni de riu deleretti fie 4 ref ita de ina delet que m Fundle flamment general be adapters for maner erepeat." qua fili ment uelle frumemente finç de upfa faipfiet/ a plure na depretena & palletal ad afrejoni dal inspensi i corpe ing, wie fermane ac pen fe mil glormeaner ang pala que innundo fair lone inbimant en ale oma trena vabre un' udm: serun men seren me ever otenda chenda and a paapse cremu: di edi e in be addemañ fe e n



post correctionem

Jeroen De Gussem

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ante correctionem

Reconstruction to ante correctionem

PARS TERTIA

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- Sed et ante faciem einsdem imaginis quasi tabula ut cristallus 25 perlucida appaleebat, in qua scriptum erat: Pulcram forman p. 342 argentei coloris manifestabo, quia diuninista, que inicio caret, magnam claritatem habet: sed unumquodque quod inicium habet ambiguum in terroribus est nec secreta Dei in plena scientia caprer potest.
- 30 El imago hec predictam tabulam inspiciebat. Vnde et linea in qua sedebat mouebatur; et mox ubi eadem linea predicte rote in sinistra eius parte coniuncia uidebatur, exterior pars ibsius rote per breue spacium algiuantum aquosa, et deinde aliquantum ultra medietatem medietatis eiusdem rote, que sub prefata linea in
- 35 transuersum ducebatur, rubicunda, et postmodum pura et lucida, et tandem uelut turbida et procellosa tempestas efficiebatur, scilicet prope finem eiusäem medietatis ubi prefata linea esdem rotę affixa erat.

Audiuique uocem de celo michi dicentem:

II. O homo, audi et intellige uerba illius qui erat et qui est absque officio mutabilitatis temporum; quia in ipso hoc antiquum consilium fuit, quod diuersa opera facere uoluit, et hec quasi radium solis ante antiquitatem dierum inspexit, quoniam 5 futura erant. Nam Deus unus est et huic unitati michil se conferre potest; sed ipse presciuit quia quoddam opes, quod facturus erat, similitudinem huius unitatis sibi usurpare temptaret. Vnde et illi obstaculum repercussionis opposuit, quoniam ipse illa unitas est, que nullum sibi similem habet: aliquin

10 unitas nominari non posset. Et ideo etiam illum a se abicit qui similitudinem hanc peruerse appetit; et sic quelibet racionalis anima in homine, que de illo qui ueus. Deus est existit, ut quod sibi placet eligat et quod sibi displicet abiciat, quia quid bonum seu quid nociuum sibi sit cognoscit. Sed quamuis Deus unus sit, 15 in ui tamen cordis sui opus quoddam presciuit, quod magnifice

24 tabula ut cristallus] cfr Hildeg., ibides: tabula eburnes

25 sppa[-cuit',rebar] C2 31/33 rote in sinistra - aquosa : in ras: C1 35 1*: ducts [-fuit',ernt] C2; 2*: [-ducts erat\ducebatur] C2 [uc-et] postmodum 36 tempetas \efficiebatur/ C2

 2. 5/6 [se>et] huie unitari [-nulla similiitudo adest/uichil se conferre potest]

 G2
 6 [-quol/quia] quoddam G2
 6/8 quol facturus - temptates: part. in nu_part. in mug. 111. (habtere copit/perutena appetia)

 qu[i>e] de illo
 12/13 /ut/ quod = elig[/u]; et = ubic/u/t

33 aliquantum : aliquantulum L.M 37 cidem rote : eiusdem r. L.M 39 Audiuique : hie huijte ags. 2 in T 24 tabula ut cristallus] cfr Hildeg., ibidem: tabula eburnea

25 appa[-ruit\rebat] C2 31/33 rote in sinistra - aquosa; in rat. C1 35
1°: ducta [-fuit\erat] C2; 2°: [-ducta erat\ducebatur] C2 [ac>et] postmodum
36 tempestas \efficiebatur/ C2

2. 5/6 [ac>et] huic unitati [-nulla similitudo adest\nichil se conferre potest] C2 6 [-quod\quia] quoddam C2 6/8 quod facturus - temptaret: part. in rat. part. in marg. 11 [-habere cupit\perverse appetit] C2 [ac>et] sic 12 qu[i>e] de illo 12/13 \ut/ quod ... elig[i \a]t et ... abici \a/t

33 aliquantum: aliquantulum LM 37 eidem rote: eiusdem r. LM 39 Audiuique: bie incipit cap. 2 in T







The Algorithmic Scribe























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Conclusions

