INTERFACES
A Journal of Medieval European Literatures

VOL 8 · 2021

Astronomy and Literature
Canon and Stylometrics

Laurits Gulløv, *Untitled (Free floating item)*, 2017, lino print on paper, 30 x 64 cm – By kind permission of the Artist – https://lauritsgulloev.com

INTERFACES
A Journal of Medieval European Literatures

VOL 8 · 2021

Published by
Università degli Studi di Milano,
Dipartimento di Studi letterari,
filologici e linguistici:
riviste.unimi.it/interfaces/

Edited by
Paolo Borsa
Christian Høgel
Lars Boje Mortensen
Elizabeth Tyler

Initiated by
Centre for Medieval Literature
(SDU & York) with
a grant from the The Danish
National Research Foundation

UNIVERSITÀ DEGLI STUDI DI MILANO, DIPARTIMENTO
DI STUDI LETTERARI FILOLOGICI E LINGUISTICI

CENTRE FOR MEDIEVAL LITERATURE

Contents

DALE KEDWARDS

Astronomy, Literary Criticism, and Medieval Literature: An Introduction

Despite misconceptions about an incurious or unscientific Middle Ages, the literatures of medieval Europe abound in astronomical speculation and enquiry. Voyages through the cosmos and visions of the Earth in space recur as narrative devices in both learned treatises on natural philosophy and in poetry. The prevailing literary genre for writing about the stars and those who looked up at them was the philosophical dream vision, which usually centred on a vertiginous ascent among the stars that granted the dreamer, usually a poet, an elevated perspective on the Earth they leave behind. In Geoffrey Chaucer's *House of Fame* (*c.* 1380), his dream persona is seized by an enormous and very talkative eagle, who carries the poet skywards until he finds himself "Flowen fro the ground so hye / That al the world, as to myn ye, / No more semed than a prikke" (*House of Fame* 2.904–07). As the ground falls away beneath them, the eagle urges the poet to "cast up thyn ye," and "se yonder, loo, the Galaxie, / Which men clepeth the Milky Wey" (2.935–37), all the time lecturing the frightened poet on the stars and their relation to poetry.[1]

Written only a couple of decades later, Christine de Pizan's *Le Chemin de Longue Étude* ("The Path of Long Study") (1402–03), is also a dream vision that centres on a guided ascent to a place among the stars, but while Chaucer ascended "wyth fetheres of Philosophye" (l. 2.975), Christine uses a ladder.[2] Christine's dream persona is led by the Cummaean Sibyl, who had guided Virgil's Aeneas through the underworld, through a capacious world geography, visiting Constantinople, the Holy Lands, Troy, India, and China before coming to a certain high place. There the Sibyl calls a name in Greek, and a figure "estrange, mais n'y ot laidure" ("strange but without ugliness") (l. 1580) descends from the sky. This being, whom the Sibyl identifies as "Ymaginacion", lets down a ladder wrought of an ingenious material called "Speculacioun" (ll. 1645–48), fabulously light

1. On the celestial ascent in Chaucer's *House of Fame* see Swinford, "Stellification" and *Daemon's Gate.* On aerial voyages in early modern literature, and their ancient influences, see Maus de Rolley.

2. It is unlikely that Christine had encountered the *House of Fame* directly. See Coletti.

and portable, for the pair to climb. From its highest rung Christine looks down at the Earth below, evoking its image, "comme une petite pellote" ("like a small ball") (l. 1703), to critique the moral state of a world divided by war.

Both Chaucer and Christine de Pizan model their cosmic visions on the *Somnium Scipionis* ("Dream of Scipio"), which concludes Cicero's dialogue on Roman politics *De re publica* (54–51 BCE). On the eve of battle, the young Roman soldier Scipio dreams that he is visited by his departed grandfather, the famous general Scipio Africanus, and taken to a high place among the stars to look on the Roman Empire in its entirety and hear a lesson in cosmic and political order. Scipio's dream was the narrative space for a digression on the nature and structure of the physical universe, as the elder Scipio, the prototype of Chaucer and Christine's knowledgeable chaperones, points out to the young soldier the stars, planets and Milky Way. These astronomical allusions were elaborated upon in the *Commentarii in Somnium Scipionis* ("Commentary on the Dream of Scipio") written by the Latin grammarian and philosopher Macrobius Ambrosius Theodosius (fl. *c.* 400), which canonised the dream's cosmological teachings for the European Middle Ages. Macrobius's *Commentary* circulated widely in Latin manuscripts – both *in extenso* and in an abridgement of its cosmological contents – and was translated into Greek by the Greek Byzantine scholar Maximos Planudes (*c.* 1260–*c.* 1305), becoming one of the most widely read and influential works on the matter of both dreams and astronomy in the Middle Ages.[3]

3. I would like to thank Divna Manolova and Chiara D'Agostini for their insights into the Byzantine transmission of the *Commentary*, and D'Agostini in particular for drawing my attention to Planudes' epigrams.

The cosmic dream vision traversed medieval European literatures, taking with it a potent narrative means of placing a human observer among the stars, and establishing a perspective from which the whole world and its geography could be seen to "resolve into a single sphere" (Cohen and Elkins Tanton 8). The genre's facility for intellectual experimentation was appealing to both poets and natural philosophers. Boethius uses the dream vision in his *Consolation of Philosophy* (*c.* 524) to convey a dialogue between his dream persona and Lady Philosophy, reprising Macrobius's description of the physical universe, while the natural philosopher Nicole Oresme (*c.* 1320/25–1382) used a dream at the close of his *Tractatus de commensurabilitate vel incommensurabilitate motuum celi* ("Treatise on the Commensurability or Incommensurability of the Heavenly Motions") to advance a pair of parallel orations by Arithmetic and Geometry theorising the planets' revolutionary motions (Kruger 141–

49). Three centuries later, the form was adapted by Johannes Kepler, whose *Somnium* ("The Dream"), published posthumously in 1634, uses a dream to send a young astronomer to the moon, and develop a detailed mathematical description of how the Earth might look from its surface. The cosmic dream vision was a mobile and adaptive form that provided thinkers with a narrative space for intellectual experimentation, an imaginative means of freeing the intellect to achieve an elevated perspective on the Earth and its cosmic environment.

The cosmic dream vision was not only, however, an inventive means for writing about astronomy. Macrobius's *Commentary* was not written solely, or perhaps even primarily, as a treatise on cosmology, but as a work of literary criticism; its aim to demonstrate that Cicero and Virgil, whom Macrobius calls "the authors of our vocabulary" (1.15.10) and "the two founders of Roman eloquence" (2.5.7), did not contradict one another in their descriptions of the cosmos. Macrobius's astronomical explanations, that is, were calibrated precisely towards enabling a more receptive reading of poetry. Authors who subsequently developed Cicero's astronomical imagery tended also to inherit this preoccupation with poetics and literary production. As Kathryn L. Lynch has shown, the philosophical dream vision possessed a remarkable propensity for literary self-consciousness, most visible in its intense and allusive engagement with its literary precursors, most notably in the visions of Cicero, Boethius, and Dante (Lynch 2). In the *House of Fame*, Chaucer uses the dream vision to explore his relation to Classical authority as a poet writing in the vernacular, his eagle demonstrating through his reading of the skies that keener astronomical awareness can enable a more receptive reading of literature (ll. 1008–10). Planudes, who translated Macrobius's *Commentary* into Greek, similarly couples the elevated perspective on the Earth with literary criticism in one of his epigrams on Claudius Ptolemy's *Geography*, in which he exalts Ptolemy's geometrical means of describing the "entire round curve of the earthly world" (l. 2) above the "false verses and strange myths" (l. 23) of poets (Pontani 195, 199–200). The histories of astronomy and literary criticism are more mutually constitutive, and characterised by a far greater degree of parity and interaction, than is generally recognised.

Astronomy and literary criticism are the twin themes explored in this issue of *Interfaces*. Its essays emerge from an interdisciplinary symposium that took place in August 2018, hosted by the Centre for Medieval Literature (Syddansk Universitet and the University of

York). We assembled on the Swedish island of Hven, positioned in the sound between Denmark and Sweden, which has long been an important place in the histories of both literature and science. It was on Hven that the Danish astronomer Tycho Brahe had his observatory Uraniborg, a sumptuous research palace (at the time of its building, 1–4% of the Danish national budget was directed into Brahe's research) where Brahe astronomically described – for the first time – the appearance of a new star, or *nova*, in the night sky. Hven also features as the setting of the early chapters of Johannes Kepler's *Somnium*, his Icelandic protagonist acquiring an understanding of the new astronomy at Brahe's school before returning to Iceland and, with his mother's magical assistance, conversing with a daemon about how the Earth might look when viewed from the moon. Our meeting was also timely. The symposium marked the half-centenary of *Earthrise* (1968), among the earliest – and certainly the most famous – images of the Earth taken from the moon's surface. The experience of looking up at the stars, and eventually looking down on the Earth from a place among them, has often been co-opted into triumphalist narratives of scientific and cultural progress, with advances in science – whether the Copernican moment of the sixteenth century or the Apollo moment of the twentieth – credited with transforming our thinking about the Earth and its cosmic position in ways that were previously unimaginable. *Somnium* and *Earthrise*, seventeenth- and twentieth-century views of the Earth from the moon's surface, challenged us to rethink the periodisations that frame the histories of literature and science. The four essays assembled here examine critical matters at the intersection between literature and science in four remarkable works, bearing witness to the relations between the two in moments between the ninth and twenty-first centuries.

Within the Middle Ages, this special issue examines two astronomically-involved works, one from the ninth-century Latin West and another from fourteenth-century Byzantium. Tom McLeish and Mary Garrison's essay epitomises an integrated approach to research in the natural sciences and the humanities in a scrupulous dissection of an extraordinary exchange between Charlemagne and Alcuin of York. Charlemagne, while engaged in a series of battles in Saxony, writes to his adviser, Alcuin, querying what he sees as an irregularity in Mars's orbit. Though Charlemagne's original letters are lost, Alcuin's two replies, written sometime in 798, constitute the most detailed examination then written of apparent retrograde motion, the mechanism by which a planet appears temporarily to reverse direction in its orbit around the Earth. McLeish and Garrison's examination of this remarkable correspondence reveals the deep astronomical interest of not only a scholar and clergyman, but of a king and emperor, who, embroiled in battle and apparently keeping watch on the skies, may have been especially troubled by apparent irregularities in the planet of the god of war. The depth of astronomical speculation and enquiry that characterises medieval thought is a through line of this collection, brought to the fore in Divna Manolova's essay. Manolova examines the lunar theory of the fourteenth-century Byzantine scholar Demetrios Triklinios, who produced the earliest known detailed drawings of the moon's surface. Triklinios conceptualises the moon as a great mirror, applying his considerable optical knowledge to thinking about how the dark shapes on its surface might reveal to the observer the terrestrial geography of the known world. Manolova demonstrates how a Byzantine scholar looked to the moon's pale orb to see the Earth, and on it the Empire to which he belonged reflected back at a cosmic scale.

Turning to the seventeenth century, we examine two works that focalise the moon and our imaginative attachments to it. The conceptualisation of the moon as a place from which to see the Earth animates Kepler's *Somnium*, a thought experiment that, some three centuries before the photograph Earthrise, places a young astronomer on the moon to think imaginatively about what the Earth would look like from its surface. Victoria Flood's essay opens up the *Somnium* through an exploration of Kepler's familiarity with early modern witch theory. Although Kepler's biographers have called attention to the mathematician's involvement in his mother's witch trial, the broader influence of early modern witch-theory on Kepler's writings has been largely overlooked. Flood shows us how Kepler's *daemon* – the supernatural entity he conjures to take his astronomer's gaze to the moon's surface – relates to the writings of contemporary European demonologists and witch theorists, demonstrating that such works constitute parallels and likely sources for Kepler's translunar voyage. Matthew Francis's essay sheds light on his own poetic retelling of Francis Godwin's *The Man in the Moone* (1638), published in his 2013 collection *Muscovy*, in which a Spanish explorer, taking inspiration from the *Travels of Sir John Mandeville*, voyages to the moon and describes its unique flora and its otherworldly yet Christian inhabitants. Francis's poetic retelling of Godwin's goose-drawn ascent into the sky captures the triplicate sense of the moon as an object of scientific study, a destination, and a poetic figure. As he nears his destination, the lunar voyager's realisation that "the moon became a place" reveals the strong role that literature can play in making the cosmic knowable.

The relations between premodern literatures and astronomy are far greater, and more poignant to our own times, than we might suppose. Medieval imagery permeates the ways in which we conceptualise space and its exploration today. In the last fifty years of space history, more than 7000 names have been assigned to mountains, volcanoes, craters, and other features on planets and moons in our solar system. These names, assigned by the International Astronomical Union (IAU), are used by planetary scientists in their post-mission analysis of images from space probes, orbiters, and landers, and help us to think about distant planets not simply as astronomical 'data' – as faraway formations of rock and ice – but as 'worlds.'[4] Modern day astronomers and planetary scientists draw the preponderance of these names from historical European cultures and mythologies, many of them emanating from the European Middle Ages.[5] Chaucer, for example, lends his name to a crater, 45.48 km in diameter, on the far side of Earth's moon, while Arthur, Merlin, and Tintagil Catena, among other names adapted from Thomas Malory's *Le Morte d'Arthur* (*c.* 1470), attach to craters and other geological features on Saturn's moon Mimas. Such names work to draw new worlds into the realm of human experience and culture, but they can also, in their overwhelming reliance on specifically western European historical imagery, replicate its prejudices. Saturn's moon Iapetus, for example, in distinguishing lighter regions from dark, takes its names from the eleventh-century *Chanson de Roland*, twinning the moon's striking two-tone colouration, troublingly, with the poem's racialised distinction between the Franks and their monstered Muslim adversaries. While we might look up to space expecting to see visions of humanity's future, then, our solar system might already better resemble its past.

The essays presented in this special issue traverse the usual periodisations that frame the histories of literature and science to free the experience of looking up towards the stars, and eventually back down at the Earth from a place among them, from the broader narratives of scientific progress to which they are often assigned. Their perspectives on literature and astronomical subjects illuminate the histories of both, and bring us closer to understanding the historical construction of our own developing relationship with the universe.[6]

4. On the place-making practices of planetary scientists, see Messeri.

5. On medievalisms in planetary nomenclature see Kedwards.

6. My thanks to Kristin Bourassa, for bringing Christine de Pizan's *Chemin* to my attention, and to all participants at the conference *Interstellar Skies: The Lunar Passage in Literature through the Ages* (Hven, 2018), for the early conversations that enriched this collection.

Bibliography

Chaucer, Geffrey. *The Riverside Chaucer*, 3rd edition. Ed. Larry D. Benson. Boston: Houghton Mifflin, 1987.

Christine de Pizan. *Le Chemin de Longue Étude*. Ed. Andrea Tarnowski. Paris: Librairie Générale Française, 2000.

Coletti, Theresa. "'Paths of Long Study': Reading Chaucer and Christine de Pizan in Tandem." *Studies in the Age of Chaucer* 28 (2006): 1–40.

Cohen, Jeffrey Jerome and Linda T. Elkins-Tanton. *Earth*. New York: Bloomsbury, 2017.

Kedwards, Dale. "Writing Futures". *Reception and Reinvention: Old Norse in Time and Space*. 2021, online exhibition.

Kruger, Steven F. *Dreaming in the Middle Ages*. Cambridge: Cambridge University Press, 1992.

Lynch, Kathryn L. *The High Medieval Dream Vision*. Stanford: Stanford University Press, 1988.

Maus de Rolley, Thibaut. *Élévations: L'écriture du voyage aérien à la Renaissance*. Geneva: Droz, 2011.

Messeri, Lisa. *Placing Outer Space: An Earthly Ethnography of Other Worlds. Durham and London: Duke University Press, 2016.*

Pontani, Filippomaria. "The World on a Fingernail: An Unknown Byzantine Map, Planudes, and Ptolemy." *Traditio* 65 (2010): 177–200.

Swinford, Dean. *Through the Daemon's Gate: Kepler's* Somnium. *Medieval Dream Narratives, and the Polysemy of Allegorical Motifs.* London: Routledge, 2006.

---. "Stellification and Poetic Ascent in the *House of Fame*." *Modern Philology* 111,1 (2013): 1–22.

TOM MCLEISH AND MARY GARRISON

Reversals in Wartime: Alcuin and Charlemagne discuss Retrograde Motion

Abstract

The apparent retrograde motion of the planets was a puzzle for astronomers from the ancient world to the final establishment of heliocentric cosmology in the early modern period, but enjoyed an especially rich discussion in the Carolingian Renaissance. We explore the first stirrings of an eighth-century response to this epistemological challenge in a remarkable series of letters between Alcuin of York and Charlemagne, sent while the latter was on campaign against the Saxons in 798 CE. Their exchange constitutes the longest discussion of the phenomenon of Mars' retrograde motion in the West up to that date.

Our consideration of the relevant letters explores Alcuin's ability to marshal diverse and complex explanatory narratives and observational traditions around the problem of the retrograde motion of the planet Mars, even as he was unable to fully reconcile them. Attention to his ultimately unsuccessful (and at times contradictory) attempts at explanation suggest that he relied on knowledge from sources beyond those previously recognized, which we identify. Charlemagne's curiosity about the matter can be located in the much longer context of an ancient tradition of imperial and royal concern with heavenly phenomena; at the same time, the exchange with Alcuin heralds the ninth-century expansion of astronomy away from the computists' preoccupation with the solar and lunar calendrical data required to calculate the date of Easter and towards a more wide-ranging curiosity about observed planetary motion irrelevant to Easter dating and computistical calculations. Alcuin's functional, if not geometrical, assumption of the centrality of the sun in his explanation merits a further examination of the more general sense in which lost ancient heliocentric ideas sustained early medieval echoes.

1 Introduction: Retrograde Planetary Motion and Alcuin's Carolingian Position

To an observer on planet earth, all the planets appear to travel through the stars from West to East most of the time. However, for exceptional intervals, the outer planets (Mars, Jupiter, and Saturn) become stationary in the night sky[1] and then can be seen to move,

1. The inferior planets also display retrograde motion, but when they are at their closest to the earth in inferior conjunction.

for a time, in the opposite direction, a phenomenon known as retrograde motion. This apparent disruption to their accustomed course challenged astronomers from antiquity until the eventual establishment of heliocentric cosmology in the early modern period. The reversed motion is not real, but is an artifact of the observer's observation point on the moving earth. From a geocentric perspective, retrograde motion cannot be satisfactorily explained without resorting to hypotheses that add significant complexity to any prevailing model of planetary motion. Thus, for example, in the second century, Ptolemy had refined Apollonius of Perga's notion of epicycles into a complex system to account for observations of retrograde motion. The Ptolemaic epicyclic model was not the only explanatory scheme available, and was in any case unavailable *in extenso* to the West before the twelfth century. Before contact with Arab astronomers and the recovery of Greek learning, without the full exposition of Ptolemaic theory, and working from a geocentric vantage point, medieval stargazers in the Latin West lacked the two most important alternative concepts (heliocentricity and a full account of epicycles) that could provide satisfactory explanations of the perceived phenomenon.

Today we understand readily that the phenomenon of the apparent temporary East to West, or retrograde, motion of the planets further from the Sun than the earth (Mars, Jupiter and Saturn) is a simple consequence of observations made from the earth in a heliocentric cosmos (see figure 2 below). But for eighth-century stargazers tracking the course of the planets through the night sky, retrograde motion was a troubling anomaly: there was no fully satisfactory explanation for the way that these planets appeared, periodically, to remain stationary and then to reverse direction for fixed intervals before resuming their dominant eastward course. This phenomenon called out for explanation; it would inspire increasingly refined (and sometimes mutually incompatible) hypotheses until the heliocentric understanding of the universe revealed it to be merely a consequence of a terrestrial vantage point. Aristotle, for example, had drawn on earlier Hellenistic sources to propose, in his *De caelo*, a complex system of multiple nested rotating crystalline spheres, one for each outer planet and others to compensate each planetary sphere for the motion of its neighbours.[2] According to his account, counter-rotating spheres provided a mechanism for the observed retrograde loops. In the second century, Ptolemy replaced Aristotelian nested spheres with the epicycles of his celebrated system. In his scheme, the planets orbit along these small circles whose centres, rather than

2. See *e.g.* Grant 66. Note that for primary source references, both in text and footnotes, the internal divisions of the text will be given. Aristotle, *De Caelo* 287a–293a and Aristotle, *Metaphysics* xii. 8,1073b–1074a.

the planets themselves, perform steady geocentric orbits. Thus, according to Ptolemy, retrograde motion results when the epicyclic motion is contrary to the central motion.

When astronomical study in the Latin West contracted under the umbrella of the Easter computus,[3] the calculations and observations associated with the lunar and solar calendars eclipsed planetary astronomy. We can see these priorities reflected even in Bede's writings, for although he alluded to retrogradation in *De natura rerum*, he omitted it entirely from both his nearly contemporary *De temporibus* and from his later, fuller, *De temporum ratione*; indeed, *De temporibus* mentions Mars only in connection with names for the days of the week.[4]

It is astonishing that the longest discussion of the phenomenon anywhere in the Latin West before 800 was conducted not in a treatise or encyclopedia, but rather in a series of letters sent to and from a military campaign over 1220 years ago. That exchange took place in 798, between Charlemagne, then campaigning in Saxony, and his advisor, Alcuin of York.[5] The sources on retrogradation available to Alcuin constituted only a small subset of the full range of ancient thought on the topic. The relevant letters have been studied by Dietrich Lohrmann, Kirsten Springsfeld, Paul Dutton and Stephen Jaeger:[6] Lohrmann and Springsfeld illuminated the scientific thought, and Dutton and Jaeger, the cultural context and larger landscape of ideas, of Carolingian royal interest in the stars, peace-making and friendship. Our work here builds on their conclusions and suggests that Alcuin's various explanatory forays depend on a wider range of sources than has been recognised hitherto.

In the following section (2) we briefly review our current understanding of, and the historical explanations for, the perceived retrograde motion of Mars and the other outer planets. In (3) we discuss the Alcuin-Charlemagne correspondence, and in (4), we present a conspectus of accounts of retrograde motion and consider their relevance to Alcuin, motivating the discussion of section (5).

2 Alternative Models and Explanations for Retrograde Motion

It will be useful to begin by explaining the phenomenon of retrograde motion as we understand it today according to our heliocentric model of the solar system. Mars, Jupiter and Saturn attain their

3. We borrow the phrase from Dobcheva. Eastwood, *Ordering* 11, 14. The works of Immo Warntjes should be consulted for detailed accounts of aspects of the relationship between computus and astronomy.

4. Bede, *On the Nature of Things and On Times* Introduction 2–3 and 33–34, and *On The Nature of Things* cap. 8. *Bede, The Reckoning of Time*.

5. See Alcuin, *Epistulae* 237–41 and 249–53: *Ep.* 149 (implying a lost letter to which replies, which will be designated as 148* and *Ep.* 155, again implying and quoting from a lost letter sent by Charlemagne, designated as 155*).

6. The essential astronomical studies: Lorhmann and Springsfeld. For background: McCluskey, *Astronomies and Cultures* and Eastwood, *Ordering*. For illuminating study of the two letters in a broader cultural context: Dutton and Jaeger. Also Borst, "Alkuin und die Enzyklopädie" which focusses on the letters discussed here chiefly in relation to the *saltus lunae* rather than Mars.

maximum speeds of observed retrograde motion when in direct opposition to the sun from the point of view of the earth. We can review the heliocentric explanation of retrograde motion using, without loss of generality, the case of Mars as an example. Consider figure 1, representing the orbits of Earth and Mars from a modern understanding of the solar system, gravity and Newtonian/Keplerian orbital dynamics:

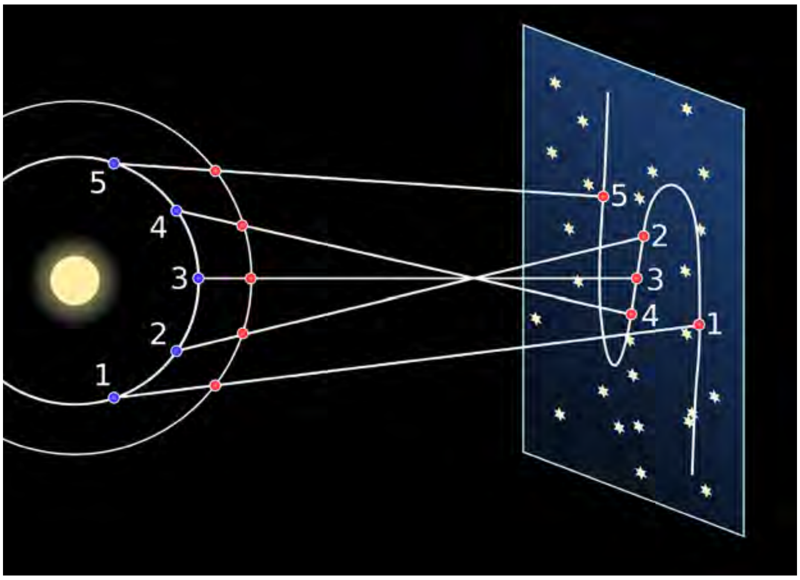


Figure 1. The motions that produce apparent retrograde motion. As Earth passes a superior planet, such as Mars, the superior planet will temporarily appear to reverse its motion across the sky. Image and caption credit Brian Brondel, reproduced under license CC BY-SA 3.0 from the web. The relative positions of the two planets are shown at five successive times.

The earth orbits within the orbit of Mars and at a higher angular velocity, both from west to east. The positions of the two planets are shown in the diagram above at five points in a segment of their orbits. Lines of sight projecting from the earth through Mars to the distant stars beyond indicate the apparent position of the planet relative to the stars, as seen from the earth. By construction, the retrograde loop occurs as the earth moves between the sun and Mars. In a geocentric system, relative to an Earth assumed stationary, Mars appears to slow down when the Sun is ahead of the planet in its normal motion along the ecliptic, then to become stationary before reversing. When the sun moves beyond opposition so that it trails Mars, the planet is observed to accelerate into its normal west-to-east motion once more. Such observations made from planet earth correlate readily with a geocentric cosmology. Yet heliocentric views were possible, for various ancient thinkers (whose works survive only in fragments, or secondary accounts) have been credited with advancing heliocentric cosmologies: the firmest claim is associated with Aristarchus of Samos, as attested by existing works from Archimedes, Plutarch and Simplicius.[7]

It is simple to see that observed retrograde motion is correlated

7. For a concise conspectus of ancient views, see Sargent; Archimedes, *Arenarius* 135: 8–19; Plutarch, *De facie* 923A; Simplicius, *On Aristotle's Physics*.

with the relative positions of Mars and the Sun. Within a notional geocentric cosmos, however, the correlation could logically be misconstrued as solar causation. Specifically, the apparent retrograde motion of Mars is correlatively consistent with the notion of propulsion from the sun's rays, which would at first assist, and then impede, the progress of Mars' orbit, depending on the relative positions of the planet and the Sun. Thus the sun *appears* to push Mars from whichever part of the sky it occupies: it slows Mars down from its natural orbital motion when its position in the sky seen from earth is in front of Mars; and it accelerates Mars once more when it is 'behind' the planet. This correlation gives rise to the theory, already current in the ancient world (see discussion of sources in section 4 below and, as we shall see, favoured by Alcuin) that the pressure of the sun's rays is responsible for the retrograde loop made by Mars in the sky when it is in opposition to the Sun. The theory is, moreover, consistent with the relative degrees of retrograde motion of all three of the outer planets (Saturn, Jupiter, and Mars), for the retrograde loop is smaller in the case of Jupiter relative to Mars, and is still smaller in the case of Saturn—the latter two being farther from the sun than Mars. Thus the observed retrogradation is consistent with a weaker motive power of the solar rays as they impinge on the more distant planets. Of course, the same diminishing of the retrograde loop can be understood from the geometry of relative distances of the planets in a heliocentric view as well.[8]

It will be important in our discussion of the Alcuin-Charlemagne correspondence to grasp the consequences of the orbital periods of Earth and Mars for the periodicity of Mars' apparent motion relative to the Sun. Because of the 365-day period of the Earth's orbit within the 687-day orbit of Mars, the interval between successive oppositions (when the Earth comes between the Sun and Mars) is approximately 779 days, about two years and two months. For about a year of this period, Mars will be in the same region of the ecliptic as the Sun. Although formally impossible to observe because of proximity to the Sun for as little as two months, Mars can be very difficult to spot for much longer than this, depending on how far to the south, or to the north, the Sun and Mars are at the times of disappearance and reappearance of the planet. This extended period of observational challenge will be relevant to understanding Charlemagne's queries.

In addition to the illusion of retrograde motion that is the explanation within the Hellenistic heliocentric model, and the posited real retrograde motion from the solar pressure theory that was adopted in some geocentric models, there were at least two other geocentric

8. For a comprehensive account of ancient theories of planetary motion see *e.g.* Gingerich.

explanations available from ancient astronomy. However, the slender channels of their transmission *via* late antique commentators mean that these notions were scarcely available in the Carolingian world. First, the model that was to become most prominent following the twelfth-century translation movement was of course that of the second-century Alexandrian astronomer Ptolemy. The Ptolemaic model transmitted in the *Almagest* (figure 2) produces actual, rather than apparent, retrograde motion within a geocentric cosmology by attaching the planets to secondary orbits (epicycles) whose centres themselves execute unidirectional motion along a circular path (the 'deferent') whose centre (its 'equant') is close to, but not actually identical with, the centre of the earth. This model thus gives the trajectory of the deferent a circular course even as the motion of the epicycle traces a series of petals along that circular path. Providing that the epicyclic orbital speed of the planet is greater than the orbital speed of the epicycle centre around the earth, there will periodically arise intervals during which the net motion of the planet is opposite to its mean motion (Gingerich).

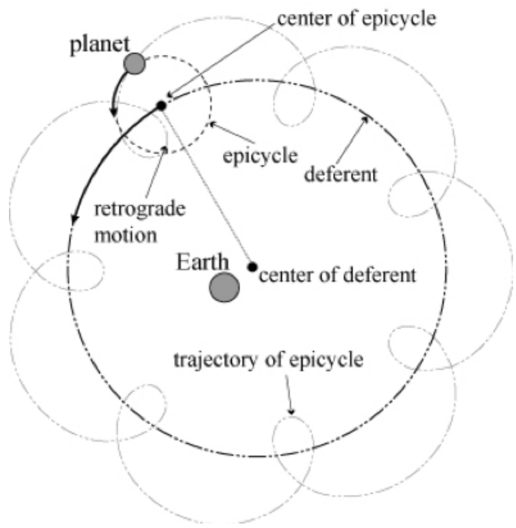


Figure 2. In the Ptolemaic model, an outer planet such as Mars orbits on an epicycle (small dashed circle) whose centre executes a circular orbit ('deferent') centred on a point close to, but not coincident with, the centre of the Earth. Image credit Guan-Ze Liao and Chun-Wang Sun. Web.

A second class of explanations, also geocentric but not invoking epicycles, refined and added complexity to the ancient cosmos of nested celestial spheres of Aristotle and his precursors. Aristotle himself had drawn upon the earlier scheme of Eudoxus (390–337 BCE) which proposed endowing each planet with four or five spheres, rather than one. If each sphere possessed its own axis and rotation relative to its neighbours, retrograde motions could be generated. Alpetragius, in twelfth-century Andalucia, was an exponent of this approach. Though he was a student of Ptolemy, Alpetragius objected on logical and aesthetic grounds to the fanciful epicycles and eccentrics. He accordingly developed his own extension of Aristotle's nested spheres, in which each planet's motion was a result of the compound rotation of a set of concentric spheres, a subset of which generated the apparent retrograde motion.[9] Ironically, the numerical predictions derived from this elegant refinement of the model were less accurate.

9. See Al-Biṭrūjī, *On the Principles of Astronomy,* vol. 1, 6.

Ancient ideas about retrogradation were primarily transmitted to the readers of the early medieval Latin West by the Latin commentators and encyclopedists of antiquity. Of these, the principal sources were Martianus Capella's *On the Marriage of Philology and Mercury*, Macrobius' *Commentary On the Dream of Scipio*, Pliny the Elder's *Natural History*, Calcidius' *Commentary on the Timaeus*, and later, works by Isidore and Bede (Eastwood, "The Revival"). We examine the relevant passages from these and other sources in section (4) below, but note here that not all of the work of the commentators was restricted to mere transmission. Martianus Capella, for example, explained the perpetual proximity of the inner planets Mercury and Venus to the sun by centering their epicycles on the sun itself.[10] This Capellan system, attested in many diagrams of astronomical texts from the ninth century onwards, sustains therefore an explicitly, if partially, heliocentric subsystem, in contrast to earlier Aristotelian and Ptolemaic accounts (Eastwood, *ibid.*). This complex background of unreconciled explanatory theories (some of which were largely obscured by minimal early medieval dissemination) constitutes the context of the Carolingian correspondence.

10. Martianus Capella; Eastwood, "Martianus Capella's Synopsis of Astronomy" in his *Ordering* 179–312.

3 The Charlemagne-Alcuin Correspondence

In 798, according to the nearly contemporary *Royal Frankish Annals*, the Nordliudi rebelled before Easter:

> [they] seized the royal legates who were there with them to do justice. Killing some of them straight away, they kept the rest for ransom; of these some escaped and others were ransomed. The King called the army together, advanced from Herstelle to the place called Minden and after holding a council took up arms against the defectors and ranged across the whole of Saxony between the Elbe and the Weser, laying waste as he went ...[11]

11. *Annales regni Francorum* s.a. 798, 102–06 (even pages). The unrevised Annals tell of the further humiliation that the Saxons took up arms against the Abodrites; also that 4000 Saxons were killed. Other minor annals record the hostage taking. Bohmer-Muchlbacher 152–54; Nelson 324–5.

The later revised version of the Annals supplies a fuller account with more distressing detail about the violence on both sides: a royal legate who was travelling through the region on unrelated business was also slain by the rebels; Charlemagne regarded his expedition as a mission of revenge and "laid waste with fire and sword" that part of Saxony from the Elbe to the Weser (*Annales* 103). That campaign, and Charlemagne's eventual victory later in the year, occurred between receptions of two major delegations: one from Alfonso of Galicia, which presented Charlemagne with an extraordinary tent, and another from Constantinople. In that same year, too, according to the Annals, Mars, which had not been visible since the previous July, returned to view.[12] This is the first notice of any an astronomical phenomenon in the Annals during Charlemagne's reign (Springsfeld 272; Dutton 97).

12. *Annales* s.a. 798, 104: *Hoc anno sidus, quod dicitur Martis, a superioris anni Iulio usque ad huius anni Iulium nusquam in toto caelo uideri potuit*.

It seems remarkable that Charlemagne found time to concern himself with the planet Mars during such an eventful year, and from the battlefield no less. Yet the disappearance of Mars and its apparently anomalous motion on its return appears to have been a matter of urgent concern. Indeed, he wrote to Alcuin not once, but twice, after having failed to persuade his old advisor to join him on the battlefield.[13] But of course, it is not the case that Mars' motion had suddenly become irregular, nor that it had actually 'disappeared' for an anomalously longer period than its usual conjunction with the sun that year, but rather, that those reporting these matters to the king were of limited experience in observing and predicting the course of that planet and apparently did not have records of previous observations. (Mars is particularly challenging to bare-eyed star-gazers because it becomes much fainter near conjunction than it is in opposition[14] and is therefore possible to misidentify through inexperience.) Here, then, we can observe the re-emergence of planetary astronomy in the dialogue between Alcuin and Charlemagne as a project inspired by fresh observation and informed by the reception of written authorities, some previously neglected.

13. Alcuin *Ep.* 149 and *Ep.* 155 refer to lost letters of inquiry from Charlemagne.

14. Pliny had noted this difficulty: *Naturalis Historia* ii. xiv.77. For diagrams of Mars in opposition, see Springsfeld 267–69 and Eastwood, "Diagrams." Alcuin's observations here were the ones included in the Annals and eventually in the Encyclopedia of 809 (Ramirez; Springsfeld).

We can also infer the existence of Charlemagne's two letters, which are now lost, from the contents of Alcuin's replies, his letters 149 and 155. Although the letters reveal that Charlemagne's interest in Mars was intertwined with a range of other learned preoccupations (arithmetic, music, the *saltus lunae*, the ecclesiastical calendar), we might still want to speculate about some of the reasons for Charlemagne's interest that were not made explicit. Certainly, Charlemagne and Alcuin both would have known that the planet Mars was named for the pagan god of war, who was associated with male warriors, and even, according to Isidore of Seville's *Etymologiae*, with death,[15] so regardless of one's views on the admissibility of prognostication based on the stars and planets,[16] the observation of apparent anomalies in the course of Mars might have provoked ominous questions about the orderly governance of the universe and even perhaps adverse planetary effects on human affairs especially, even, on wars. Both, too, might have remembered Julius Caesar's boast in Lucan's *De bello civili*. After his conquest of Egypt, at a banquet in Memphis, Caesar hoped to induce the local priest and seer to divulge what he knew of the secret knowledge of the origins of the Nile. Caesar declared:

> … In the midst of war
> I ever found time to study the world above us and the starry and celestial zones …

> … *media inter proelia semper*
> *Stellarum caelique plagis superisque uacaui* … (x.185–86, Duff 603)

Alcuin, who knew Lucan's poem, would surely have remembered that Caesar's civil war had been fought under the baleful sign of Mars. Indeed, in the first book of Lucan's *De bello civili*, questions about the links between Mars, human affairs, and cosmic order came to the fore. Caesar's poet-astronomer Nigidius Figulus read the strange occurrences in the heavens and declared that either there was no cosmic order at all, or if there was, the prognostics were sinister: Mars would hold the sky and drive other constellations away during the madness of war (Lucan, *De bello ciuili* i.660, 663, 669). The parallel between the astronomical interests and consultations of Caesar, and those of Charlemagne and his consultation with Alcuin, would not have escaped the latter. If the resonance between the correspondence between Charlemagne and Alcuin, and the exchange between Caesar and Nigidius, suggest the possibility of a long tradition of kings and their learned advisors discussing the movements of Mars and their meanings, then such a possibility is supported by an even more remarkable parallel text found on a neo-Assyrian (911–612 BCE) tablet from Nineveh. The tablet reads:

> Twice or thrice we watched for Mars today (but) we did not see (it), it has set. Maybe thinking my lord will say as follows: 'Is there any (ominous) sign in (the fact) that it set?' (I answer): 'There is not.'[17]

15. Isidore *Etymologiae* VIII.ii. 52–55; Barney 186.

16. On Isidore's distinction between *astrologia superstitiosa* and *naturalis*, *Etymologiae* iii.xxvii.1 and 2: natural astrology is concerned with the solar and lunar orbits and the changing positions of the stars; superstitious, with augury and attempts to link the signs of the zodiac to parts of the human body or soul; or to make predictions about nativity and character. See also Cassiodorus *Institutiones* II.vii.4; Eastwood *Ordering* 11, 15–16 and 140.

17. The tablet is in the British Museum accession number 1891-05-09 Bu, 0014, first edited as tablet 21 (obverse) in R. Campbell Thompson (1900), *The Reports Of Magicians And Astrologers Of Nineveh And Babylon Vol. 2*, London: Luzac and Co. xxxv. This translation is from Hermann Hunger, *Astrological Reports to Assyrian Kings* (State Archives of Assyria, 8) 1992. Lemmatised by Mikko Luukko 2016–17, as part of the research programme of the Alexander von Humboldt Chair in the Ancient History of the Near and Middle East at LMU Munich (Karen Radner, Humboldt Professorship 2015). The annotated edition is released under the Creative Commons Attribution Share-Alike license 3.0. Web. Accessed 1.9.2020.

Although there is of course no possibility that Alcuin knew of this Assyrian material, it suggests that the dependent parallel with the Roman example should be understood within a tantalising and far longer time-frame: royal concern over possible Martian portents met with scientific advice of natural regularity is an age-old recurrent phenomenon. Such recurrence (or intellectual convergent evolution) reminds us that there is no room for condescension towards the limitations of geocentric explanation and in sketching a narrative of the developments in astronomical knowledge; we should perhaps give credit to every ruler preoccupied enough with planetary observation to have asked the question.

If campaigns against the Saxons were a regular occurrence in the 790s (for Charlemagne had been with his army in Saxony in 796 and 797, as well), so, too, were letters about astronomy and time reckoning. However, Charlemagne's (lost) letter 149* to Alcuin written during summer 798 was exceptional, for Charlemagne had begun with the unusual demand that Alcuin prepare a musical composition that could be used on the campaign to calm his savage young warriors.[18] Arithmetic, too, emerged as a topic of acute interest in Alcuin's correspondence with Alcuin at this time. In other words, Charlemagne was pressuring his most learned courtier to satisfy his curiosity about questions related to almost the full range of quadrivial learning—mathematics (likely including both arithmetic and geometry),[19] music, and astronomy.[20]

18. Alcuin, *ep.* 149, 242 line 9 and following; Jaeger, Dutton.

19. Folkerts.

20. For the richest discussions of the cultural and ideological dimensions of the letter: Jaeger and Dutton.

Alcuin responded to Charlemagne's request by praising the king for asking so wisely and acknowledging Charlemagne's own royal and well-balanced temperament:

> [You] also admonished me to mix a sweet melody of versifying amidst the horrible din of clashing weapons and the raucous blare of trumpets, since a sweet and gentle musical refrain can mollify the savage impulses of the mind…
>
> This too you foresaw with wisest counsel, [namely] that wholesome counsel often has no effect on the mind rasped with anger, just as on the contrary, a persistent mental softness is wont to undermine fortitude. But amid these various afflictions, the prudent temperament holds to the middle path…[21]

21. Alcuin, *ep.* 149, 242, as translated by Jaeger 106–07.

To continue the account of the letters:

Of this exchange, two letters by Alcuin are now extant; each implies (and one quotes from) a lost letter from Charlemagne. This surviving pair, in turn, is part of remarkable group of eight letters by Alcuin and one from Charlemagne which treat diverse questions in astronomy, time reckoning and *computus* alongside other pressing and topical intellectual and theological concerns.[22]

22. *Epistulae* 126, 143, 144 (from Charles), 145, 148, 149, 155, 170, 171. On the group, Lohrmannn 93–96. Springsfeld 261–90.

Alcuin's astronomical correspondence with Charlemagne reveals much, not only about cosmological understanding, but also about the underlying assumptions about the nature, purpose and context of such learning, about learned dialogue and debate, and about patronage between a king and his most learned courtier. A closer look at the letters in question and a consideration of their background makes this clear. Here we précis their contents with especial regard to the question of planetary motion; translations are supplied in the appendix.

Letter 149 summarised

Alcuin replied to a lost letter from Charlemagne; he had composed the war-song, meant to pacify the young soldiers, and presented it with a courtier's flattering nod to Charlemagne's exemplary regal virtues of temperance, which encompassed self-control and mental stability. He reflected on the ancient historians' teachings on the use of strength, guile, and even peace, as measures to take against an enemy. He went through a stockpile of aphorisms about friendship to affirm his esteem for Charlemagne and his fear of losing the latter's favour. And then he treated the orbit of Mars, its long disappearance, and sudden return, not once, but twice, with reflections on other learned topics and debates interposed between the two treatments.

The first relevant paragraph contains a general account of planetary retrograde motion; Alcuin adopts the solar-ray theory of planetary irregularity: he observes that the sun and the moon are not wandering stars, yet the five planets seem to have an erratic course.[23]

23. *Ep.* 149, 243, line 9 and following.

This section implies that both Alcuin and Charlemagne had independently observed this phenomenon that year, and that the astronomical scholars now at court (since Alcuin's retirement) were attempting to explain the phenomenon as well.

In a final paragraph (after almost half a dozen other topics of learned deliberation—including a question from Charlemagne's wife and a lively defence against blaming Alcuin for the scribal error in his earlier exposition of the lunar *saltus*) Alcuin returned to Charlemagne's question about Mars.[24]

24. *Ep.* 149, 243, Mars from line 11.

Alcuin affirmed that the disappearance of the planets from view was in fact a regular occurrence according to the ancients, one which, he conjectured, they observed differently in their Southern and Eastern location, since, as Charlemagne knew, difference of place changed many things.

The letter ends with a benevolent analogy: the planets do in fact return regularly; so too may Charlemagne be returned safe from his campaign among the enemies. But what was the question that had elicited this affirmation that the planetary motion, specifically that of Mars, was in fact regular and had underlying *rationes*? We do not know, because the letter addressed to Alcuin that prompted *ep.* 149 does not survive; nor does Charlemagne's letter of reply to *ep.* 149. However, in Alcuin's second letter on the topic (*ep.* 155), part of that lost reply is quoted. Evidently Charlemagne and his advisors found the arguments of *ep.* 149 insufficient and so took up the matter again.

Letter 155 summarised

Charlemagne was evidently not satisfied with Alcuin's explanations for the retrograde motion and long disappearance of Mars, for he sent a further letter (145*) seeking a fuller account of the matter and putting other astronomical questions as well. That letter reached Alcuin while the latter was travelling without his books. Alcuin protested that he was not up to the question, insisting that erratic planetary motion exceeded his grasp. (It is important to separate Alcuin's conventional expressions of modesty and humility from his attempt to answer Charlemagne's questions. Gestures of modesty were an established convention, but we should not be fooled into thinking that Alcuin was not intending to exert himself fully in his reply.) Alcuin alluded to the works of both ancient and Christian authorities on the matter of Mars, singling out Pliny and Bede as the best authorities and suggesting that he could answer better if Charlemagne would send him the first books of Pliny's *Natural History*. Alcuin took up the challenge all the same, quoting Charlemagne's questions. The king wanted to know whether it was by force or as a portent (*prodigium*) that Mars had apparently accomplished its orbit of two years in a single year?[25] Was the cause its own course, or some effect of the sun? Did Mars remain in the sign of the crab even after the sun had moved on to the next sign, and if so, why was it not visible after the sun had progressed?[26] Or did Mars accompany the sun? Alcuin insisted that the phenomenon was no prodigy, but was part of the planet's natural course.[27] He contra-

25. *Ep.* 155, 252, line 3 and following.

26. Charlemagne is here suggesting that a conjunction obscured the planet: this is the best explanation, yet according to Springsfeld 277, Alcuin rejects it. We translate differently, with Lohrmann.

27. We here follow Lohrmann 95; cf. Springsfeld 277–78. Springsfeld 274 on the fact that Alcuin and Charlemagne each reported having seen Mars return at different times.

dicted Charlemagne's observation: he did not believe that Mars had remained in the sign of the crab for a full year. He then reiterated the theory of solar-ray impedance from his earlier letter, this time adorning the notion with the same quotation from Lucan that Isidore had used when treating the matter, but slightly mangled, implying faulty memory or scribal error.[28]

28. On the Lucan excerpt, see the notes in the translation in the appendix, p. 30 and 49 note 86 below.

There appear to be two problems associated with Mars for Charlemagne (and therefore for Alcuin). The first is the King's report of the lengthy absence of Mars from the sky (two years rather than for the normal two months, when the planet is too close to the sun for observation). The second is the general puzzle of retrograde motion. Alcuin (as do we) doubts the reality of the first, but not the second.

Replicating the course of Mars in 797–98 with a computational orrery reveals the accuracy of Charlemagne's report that Mars had not been clearly visible for as much as a year—although for some of this time, its apparent absence resulted from contingent conditions, rather than retrogradation.[29] Mars would have disappeared into the evening twilight in Sagittarius, in November of 797, but even before then, Mars would already have been very difficult to see in Europe for several months because of the extreme southerly location of this region of the zodiac, requiring very low and clear south-western horizons and even then appearing for under an hour, and faintly, in the low evening twilight, before setting.

29. Web (visualisation run 17.08.2021). See also Springsfeld 274–76, with tables contrasting the visibility of Mars in Tours and in Verden an der Aller in Saxony.

Conjunction with the Sun occurred around April 1 798 in the constellation of Aries. Mars would return to visibility, in theory, in the morning half-light of Taurus in July 798 but would probably still have been difficult or impossible to discern because of the early rising of the summer sun and would have remained thus as the summer progressed. By August 27 798, its conjunction with Saturn in Gemini would still be only just visible in the early morning. Finally, Mars would first leave twilight obscuration in the zodiacal constellation of Cancer by the middle of September 798 after effectively more than a year of invisibility to all but those with trained and experienced eyes.

In short, historical calculations of planetary positions reveal that the far southern position of Mars in 797 and its reappearance in summer 798 means that its invisibility period had been significantly longer than usual. Retrograde motion is a 'consistent inconsistency,' but an unprecedented disappearance of the planet for over a year would break all regularities identified from ancient times. As we noted above, Charlemagne's puzzlement and Alcuin's quest for an explanation that would protect his attachment to rule-governed planetary motion tell us more about the quality of astronomical observation and reporting in Charlemagne's retinue that they do about (observed) planetary orbits. It is intriguing that Alcuin himself deals with the two issues in a strongly differentiated way, emphasising an underlying regularity of planetary motion (which he can neither observe nor demonstrate), while reaching for material explanations for the apparent anomaly—solar impedance and the artefact of the northern viewing perspective—that exclude the possibility of a prodigious or portentous suspension of natural order.

Charlemagne's biographer, Einhard, who had been an eyewitness to Alcuin's last years at court, recalled that Alcuin was "the most learned man in the entire world" and that the great emperor had "invested a great deal of time and effort studying rhetoric, dialectic, and particularly astronomy with him;" indeed, Charlemagne devoted himself to arithmetic "and with deep purpose and great curiosity investigated the movement of the stars."[30] The learned monk Notker of Saint Gall, who purveyed stories of Alcuin, but wrote two generations later and without first-hand knowledge, recounted not only that Alcuin alone dared to disagree with Charlemagne, but also that the emperor "received Alcuin with great kindness and kept him close at his side as long as he lived, except on the frequent occasions when he set out with his armies on mighty wars. [He] went to far as to have himself called Alcuin's pupil, and to call Alcuin his master" (Notker, Thorpe, "Charlemagne" cap. 9, 102 and cap. 2, 94–95).

Our received picture of the court, derived from poems, letters, and annals, is of the royal family closely accompanied by a band of aristocratic warriors, courtiers, and officials, together itinerating from palace to palace in a life punctuated by banquets and embassies, with military campaigns almost every spring and summer, and during the winter months, extended sojourns at a small number of favoured residences. From 795, Charlemagne established the novelty of a fixed capital at Aachen and there we can add the spectacle of Charlemagne inviting his sons, nobles, friends, attendants, and body guards, up to the number of a hundred or more, bathing together in the thermal springs for which Aachen (*Aquis granensis*) is named (Einhard, *Vita Karoli* cap. 22, p. 77). Not conventionally included in the image of the court, nor even of Charlemagne's studies with Alcuin, is star-gazing, or observational astronomy, which has not usually been considered a significant court pursuit until the reign of Louis the Pious. These letters and other writings by Alcuin suggest, however, that stargazing had become, in the late 790s, a matter of regular

30. Einhard, *Life* trans. Dutton cap. 25, 32. Einhard, *Vita Karoli* cap. 25, 30: *In discenda grammatica Petrum Pisanum diaconem senem audivit, in ceteris disciplinis Albinum cognomento Alcoinum, item diaconem, de Brittania Saxonici generis hominem, virum undecumque doctissimum, praeceptorem habuit, apud quem et rethoricae et dialecticae, praecipue tamen astronomiae ediscendae plurimum et temporis et laboris inpertivit. Discebat artem conputandi et intentione sagaci siderum cursum curiosissime rimabatur.*

attention for Alcuin, Charlemagne and even some of the royal womenfolk (Alcuin *Carmina* 246, *carmen* 26, lines 41–44).

Alcuin had retired from the court in 796, when Charlemagne gave him the rich abbey of Tours. The grant of Tours was not just a reward, and not just compensation for wealth and opportunities he had forfeited by not returning to England,[31] it was also foreseen that he would continue to teach. In a letter to Charlemagne, Alcuin reported on the programme of instruction at Tours: he was nourishing his pupils in both the scriptures and the liberal arts. Yet he mentioned by name only the first and last subjects, grammar and astronomy, describing his teaching of the latter as: "rejoic[ing] to enlighten some about the order of the stars in the firmament, as if painted on the peak of a great man's residence."[32] Through that metaphor of the lay magnate's magnificent ceiling, Alcuin emphasised astronomy as an observational pursuit, hinting at how it stood apart from ecclesiastical computus.[33]

31. Hartmann.

32. Alcuin *Ep.* 121, p. 176 lines 32 ff., p. 177. Dutton, *Of Carolingian Kings* 93.

33. Alcuin *Ep.* 121, p. 176 lines 32 ff., p. 177.

4. Accounts of the retrograde motion of Mars

Until the translation of Ptolemy's *Almagest* into Latin (from the Greek in 1160, and from the Arabic in 1175)[34] scholars in the Latin West drew their picture of the cosmos chiefly from encyclopaedists, commentators, and other intermediate sources without direct access to Ptolemy's writings, although some of these authors (for example, Cassiodorus) had some limited awareness of the existence and contents of Ptolemy's works. In the following, we summarise the relevant writings on retrograde planetary motion and consider both their conceptual implications and their possible availability to Alcuin.

34. Springsfeld 265 note 645.

Aristotle (indirect)

Aristotle's *De Caelo* would only be known to the ninth-century Latin West through scant indications in intermediate sources, but this famous work, in any case, hardly refers to retrograde motion at all. We will find that later medieval scholars who follow Aristotle over Ptolemy (Grosseteste is an example)[35] likewise tend to downplay the treatment of retrograde motion. As we have seen, observed retrogradation would eventually be accommodated in the geocentric model via epicycles, but Aristotle held to Eudoxus's concept of planetary motion governed by multiple nested spheres with individual axes and rotational patterns. Observed retrograde motion can be satisfac-

35. Grosseteste's *De Sphera*, in contrast to the standard text of Sacrobosco, mentions epicycles only in regard to the Moon.

torily explained by epicycles and an eccentric centre of the universe, but is hard to accommodate within the Aristotelian model of nested spheres in motion around a single centre (as would later be developed by Alpetragius). Epicycles would therefore remain rebarbative to thinkers committed to the symmetry of exact orbital centres. While he spends great length explaining why the swifter planets are the nearer, not the most distant from us, in respect to their difference in rotational speed from the sphere of the stars, Aristotle's comment on the more complex motions of the planets is oblique at best. Indeed, he does not explicitly mention retrogradation:

> For this single first motion has to move many of the divine bodies, while the numerous other motions move only one each, since each single planet moves with a variety of motions. (Aristotle, *De Caelo* ii.12.292b.30)

When Aristotle summarised and evaluated the cosmological explanations of his predecessors in his *Metaphysic*s, he acknowledged that complex planetary motion derived from nested spheres (as had Eudoxus), while accepting and modifying Callipus's refinement of Eudoxus's model by adding additional impeding spheres to account for the observed motions. He explains this without stating which phenomena necessitated this explanatory effort. We can assume that retrogradation was one such phenomenon:

> Callippus assumed the same arrangement of the spheres as did Eudoxus (that is, with respect to the order of their intervals) but as regards their number, whereas he assigned to Jupiter and Saturn the same number of spheres as Eudoxus, he considered that two further spheres should be added both for the sun and for the moon, if the phenomena are to be accounted for, and one for each of the other planets.
>
> But if all the spheres in combination are to account for the phenomena, there must be for each of the other planets other spheres, one less in number than those already mentioned, which counteract these and restore to the same position the first sphere of the star which in each case is next in order below. In this way only can the combination of forces produce the motion of the planets. Therefore since the forces by which the planets themselves are moved are eight for Jupiter and Saturn, and twenty-five for the others, and since of these the only ones which do not need to be counter-

> acted are those by which the lowest planet is moved, the counteracting spheres for the first two planets will be six, and those of the remaining four will be sixteen; and the total number of spheres, both those which move the planets and those which counteract these, will be fifty-five. If we do not invest the moon and the sun with the additional motions which we have mentioned, there will be forty-seven spheres (?) in all.
>
> This, then, may be taken to be the number of the spheres; and thus it is reasonable to suppose that there are as many immovable substances and principles, the statement of logical necessity may be left to more competent thinkers. (Aristotle, *Metaphysics* xii.8.11-xii.8.14, 1073b–74a)

Lucan (available)

Lucan's *De bello ciuili* included a few memorable lines about the solar-ray impedance theory of retrogradation.

> The sun divides time into periods, and changes day for night; and the power of his rays forbids the planets to go forward, and delays their wanderings with stationary periods. (Lucan, *De bello ciuili* x. 201–03)

Isidore included these lines in his accounts of planetary motion in his *De natura rerum* and *Etymologiae*,[36] works known to Alcuin and Bede. Alcuin, too, quoted the same lines as Isidore and Bede, though with distinctive variants. Lucan's poem itself was also well known to Alcuin and would become increasingly popular from the ninth century on.[37] Thus Alcuin's reception of a theory of retrogradation transmitted in a complex literary work can invite wider reflections about the setting and cultural purposes of astronomical thought, issues that go beyond the scientific positions expounded (Glauthier). For now it will suffice to briefly supply a fuller context for the theory of retrogradation and the observations about Mars in Lucan's poem. The *De bello civili* recounts the civil war fought between Caesar and Pompey, who was leading the forces of the senate; the account is framed by two miniature cosmic didactic episodes in book i and book x. Both episodes include facts about the planet Mars which suggest sinister foreboding about that planet's possible connection to Caesar's civil war; in the second, in x, the final extant book, a supremely learned Egyptian priest, Acoreus, expounds the solar-ray impedance theory of retrogradation in the context of an affirmation of the sacred laws

36. Isidore, *Traité de la Nature* xxii.3 and xxiii; *Etymologiae* iii.lxvi.3.

37. Alcuin York Poem, 124, line 1554; Index of Quotations and Allusions, 150. Lapidge 66, 231. Tarrant, "Lucan;" Gotoff's work was not available.

which govern the diverse, yet still orderly, motions of the rapid wandering stars. In Book i, Lucan depicts the poet and renowned astronomer Nigidius Figulus holding forth after other augurers, evoking the sinister, mysterious, and baleful domination of Mars prevailing at that moment. According to Nigidius Figulus, the presence of Mars heralded a time of war and lawlessness when unspeakable wrongs would be 'called heroism' (i.660–63, 667–68). So the poem depicts astronomy as an imperial concern, and Mars as a subject of scientific, historical, and portentous significance.

We should also note that Alcuin's quotation of Lucan's *De bello ciuili* in his letter 155 to Charlemagne includes textual variants unique to the earliest manuscript copies of this letter.[38] Among other changes, Alcuin's letter substitutes *petentibus* (incorrectly intransitive) for *potentibus*, so that we should translate the passage as referring to the Sun's "assailing rays" in place of "powerful rays." The variant dramatises the solar impedance theory.[39]

38 Preliminary searches have not turned up instances of these variants in Lucan or in Isidore's quotation of the relevant lines.

39 Translation in the appendix to this article.

Seneca the younger (possibly direct)

Excerpts from Seneca's *Quaestiones Naturales* first appear in the Latin West in manuscripts linked to Alcuin (Hine, "Manuscript Tradition" 558–62; Marenbon 57; Garrison, "The Library" 654; Lapidge 68; Ineichen-Eder 196, 199). Seneca is much more expansive than Aristotle, and considerably less opaque than Pliny. He treats the topic of comets at very great length, even as a starting point for a discussion of the alternatives of a rotating Earth and a rotating heaven. The seventh chapter digresses into the motion of the planets (Seneca, *Quaestiones Naturales* 129–130, 7.25.1):

> These five stars force themselves on our attention, and, as they constantly appear in different places, make us inquisitive; but what their morning and evening risings are, what are their stations, when they move ahead, why they are driven backward – all this we have only just begun to understand. Whether Jupiter was rising or setting or retrograde – for they have applied this term to his retreating – we learned just a few years ago. (Seneca, *Quaestiones Naturales* 7.25.5, 130)

Seneca then quotes anonymous sources for the claim that celestial bodies cannot stand still or reverse their motion: "the movements of this eternal structure are unalterable" (7.25.6), so is forced to address a question:

> Why is it, then, that some of them look as though they are going backward? The approach of the sun gives them an appearance of slowness, as does the nature of their paths and their orbits, so positioned that at a particular time they mislead observers; thus ships, though they are moving at full sail, nevertheless look as though they are standing still. (Seneca, *Natural Questions* 7.25.7, 130)

The illustration is tantalizing, for ships look as though they are stationary from other ships maintaining the same course and speed. Is Seneca thinking of an observer on a moving Earth, or simply an observer on the shore at a very great distance from the ship? His reference to the role of the sun in retrograde motion is significant, however, as this is the principal cause invoked by Alcuin. The direct working out of this tradition seems to have its origins, not in Seneca, but in the older Lucan, and its transmission via Lucan to Isidore and Bede. We will take up the significance of Seneca's views again in section (5), below. For now it should be noted that the acquaintance with Seneca revealed by excerpts in the circle of Alcuin does not appear to include book 7 of the *Natural Questions*, although the absence of testimonies from that book in the relevant collection of excerpts need not preclude its availability.

The Elder Pliny (direct)[40]

Pliny's *Naturalis Historia* has been suggested as a source for Alcuin's solar theory of the retrograde motion of planets dangling participial clause, and indeed, Alcuin himself insisted to Charlemagne that a solution could be found there, but in the very long section of the book that is most relevant (Alcuin *Ep.* 155, Nat. hist. ii.6-20)[41] there is no succinct reference to the matter. Pliny's thought is more discernible in the briefer treatments of retrogradation by Isidore and Bede. The first mention of 'contrary' (*contrarius*) motions of the planets (ii.6) refers not to their retrograde motion, but rather to their normal west-to-east progression as being contrary to the east-to-west rotation of the stellar sphere. The lengthy discussion of planetary motions, especially in ii.13 and ii.14 is contorted and contradictory in places,[42] as analysed forensically by Jones.[43] Pliny's discussion of planetary motion is primarily exercised by the variation in the closest and furthest points (*apsides*) and by the inclinations of the planetary orbits to the ecliptic.

The closest Pliny comes to a discussion of retrograde motion is

40. Eastwood, *Ordering* 95–178.

41. *E.g.* McCluskey 17.

42. Eastwood, "The Revival;" *Ordering* 96–99.

43. Jones.

by implication in his treatment of the planets' 'stationary points.' As in Lucan, the propulsive effect of the solar rays, in opposite directions before and after planetary opposition, is invoked:

> When struck in the degree that we stated and by a triangular ray of the sun they are prevented from pursuing a straight course, and are lifted upward by the fiery force. This cannot be directly perceived by our sight, and therefore they are thought to be stationary, which has given rise to the term 'station.' Then the violent force of the same ray advances and compels them by the impact of the heat to retire. This occurs much more at their evening rising, when they are driven out to the top of their apsides by the full opposing force of the sun, and appear very small because they are at the distance of their greatest altitude and are moving with their smallest velocity—which is proportionately smaller when this occurs in the highest signs of their apsides. From their evening rise their altitude is descended with a velocity now decelerating less and less, but not accelerating before their second stations, when their altitude also is descended, the ray passing above them from the other side and pressing them down again to the earth with the same force as that with which it had raised them to the sky from the former triangle. So much difference does it make whether the rays come from below or from above, and the same things occur far more in the evening setting. (Pliny, *Naturalis historia* ii.13.69–71, translation: *Natural History* I, 210–211)

It is strange that the observational explanandum here is not the striking retrograde motion, but instead the more subtle variation of distance between Earth and Sun (deduced both through apparent brightness and apparent mean progressive velocity). Pliny does not comment on the contradiction between this passage's theory—namely, the placement of planetary *apsides* at opposition—and the theory expounded in his earlier identification of the *apsides* within fixed zodiacal signs for each planet separately. In any case, this general treatment of solar propulsion explains an earlier passage specifically on Mars (ii.12.59–60):

> The planet Mars being nearer feels the sun's rays even from its quadrature, at an angle of 90 degrees, which has given to his motion after each rising the name of 'first' or 'second ninety-degree'. At the same time Mars remains stationary in the signs

> of the zodiac for periods of six months (otherwise having a two-month period), whereas Jupiter and Saturn spend less than four months in each. (Pliny, *Naturalis Historiae* ii. xii.12.59–60, translation: *Natural History* I, 208–09)

Pliny's final discussion within his section on planetary motions concerns the inferior planets Mercury and Venus. He discusses at length two problems: (i) that these planets never wander more than specific limiting angles from the sun; (ii) that the variation in progressive rates along the ecliptic is opposite to that of the superior planets (ii.14). His geometrical language is hard to interpret without diagrams,[44] but supports both geocentric and heliocentric construction ("as much of their circle is below the earth [*sub terra*] as that of the planets mentioned before is above it") (*Naturalis Historia* II.14.72; Eastwood, "Diagrams" 200–06).

44. But see Tupikova.

Although consistent with the mechanism that Alcuin invokes with more clarity, the effect of 'fiery force' and 'feeling the sun's rays' on the part of the superior planets in general, and Mars in particular, is not clarified in Pliny other than by his assumption that it belongs to the planet's motion, and can be imagined as a triangular geometric construction. In addition to the reference to solar force, a further indication that Alcuin really did have Pliny's discussion at the back of his mind, even with some confusion and without the book at hand, might be inferred from his use of the exceedingly rare word *bime(n) stris*, recalling Pliny's phrasing,[45] and in the explicit mention of a maximum period of invisibility of each planet (in the case of Mars, Pliny states this to be 170 days, in ii.15.78).

45. Alcuin, *ep.* 149, p. 243, line 11; Pliny ii.15. (12).60, p. 146, line 6 (Jahn); p. 208 (Rackham).

Macrobius (not used by Alcuin)

Although Macrobius's *Commentary on the Dream of Scipio* was apparently not used by Alcuin (it is attested at the Carolingian court for the first time through the correspondence of Dungal in 811 and there is continental evidence for an earlier phase of Irish reception),[46] we include its brief reference to retrograde motion here for completeness. The final paragraph of chapter 19 reads:

46. Eastwood, "The astronomy of Macrobius," 121; Eastwood, *Ordering* 31–178; Barker-Benfield, "Macrobius" 224–32 and 228. Tours produced at least two copies of the work in the first half of the ninth century; only one is now extant: Paris, Bibliothèque nationale lat. 6370, on which Bischoff, *Katalog* iii, No. 4403, p. 117, with a later date than Barker-Benfield. Since other evidence of the ninth century reception of Macrobius is linked to Tours and to Alcuin's intellectual grandchild, Lupus, it is tantalizing to consider that may have paved the way for a revival of interest.

> Indeed, Plotinus declares in a treatise *Are the Stars Effective* that the power and influence of stars have no direct bearing upon the individual, but that his allotted fate is revealed to him by stations and direct and retrograde motions of the seven planets, just as birds in flight or at rest unwittingly indicate

> future events by their direction or cries. And so we have good reason to call this planet beneficial and that one baneful since we obtain premonitions of good or evil through them. (Macrobius, *Commentary on the Dream of Scipio* xix.27, p. 168)

Macrobius himself was highly ambivalent on the question of human planetary influence and portent. Indeed, he had sharply undercut the notion that planets had any relationship with the sources of their names in a discussion shortly before the quotation above.[47] The passage quoted above is the only discussion of retrograde motion in his astronomical work. Given the extreme length that Macrobius devoted to the question of the ordering of the spheres of Mercury, Venus and the Sun, as well as to the question of whether and how the planets and fixed stars differ from each other, it is intriguing to consider whether his brevity on retrogradation might arise from some unease with the matter, perhaps because of the troubling apparent irregularity. It is tantalizing to consider whether Charlemagne's persistent curiosity about the significance of Mars's seeming anomalous course might have derived from a member of his entourage who associated retrogradation with portents from reading Macrobius, or whether, instead, the momentous historical context of Lucan's account might have suggested that the topic was a proper concern for warriors with imperial aspirations.

47. Ibid. xix.18, p. 166.

Martianus Capella (possibly direct)

Book 8 of Martianus Capella's *The Marriage of Philology and Mercury* was of signal interest for Alcuin's intellectual heirs in the ninth century, and contains an extended section on astronomy with notions not available in other compendia (Eastwood, *Ordering* 179–87; 299–303). Among the distinctive views Martianus advances is his partially heliocentric scheme in which Mercury and Venus orbit the sun, rather than the earth (viii.857). Retrograde motions are correctly assigned to the opposition of the outer planets, with respect to the sun, and at the very end of the section attributed to the force of the sun:

> The powerful effect of the sun's rays is responsible for the anomalies in the orbits of all the aforementioned planets and for their stations, retrogradations and progressions. The rays strike the planets, causing them to rise aloft or to be depressed, or to deviate in latitude or to retrograde. (Martianus Capella viii.884, p. 343)[48]

48. For the Latin text: web.

Note that the solar rays are here not only ascribed responsibility for retrograde motion but also for the changes in elevation of the planets' orbits. Martianus's account of retrogradation is closely similar to Pliny's (*NH* 2.60) and both may depend on a lost manual by Varro (Stahl, Johnson and Burge , Martianus vol. 1, 199–200 and 200 note 96). Alcuin is not known to have quoted or named Martianus, and is assumed not to have known his work. Both Bede and Tatwine had read the *de Nuptiis* however and it would be intensely studied and annotated in the ninth century.[49]

49. Lapidge, *Anglo-Saxon Library* 44 (Tatwine) and 187, 200 (Bede and his use of Martianus in *De natura rerum* XVII.I).

Calcidius' translation and commentary on book 1 of Plato's Timaeus (possible direct source)

Calcidius did not become a major source for astronomical study until well into the ninth century, but the earliest extant witness dates from the reign of Charlemagne and is from North-West Francia.[50] Furthermore, a collection of excerpts associated with the circle of Alcuin's students transmits a direct quotation from Calcidius in a passage about the order of the world.[51] That passage, in turn, is closely followed by excerpts from Seneca (Marenbon 56–57; Ineichen-Eder 196, 199). Together this evidence bears witness to an early phase of reception and discussion of these sources before they were taken up into the mainstream astronomical tradition a few decades later. This passage offers a very strong affirmation of a rule-governed planetary order transcending apparent disorder and reads as follows (with the words from Calcidius II.304 in brackets):

50. Eastwood, *Ordering* 314 note 3 for the earliest witness, Paris, Bibliothèque nationale, lat. 2164; for its date and provenance: Bischoff, *Katalog* iii: 63, no. 4139: a centre close to the court, s. viii/ix or s. ix.

51. Munich, Bayerische Staatsbibliothek, clm. 18961; Latin text edited by Marenbon, *From the Circle of Alcuin* 167); see also Ineichen-Eder 169, 199.

> The universe is constructed in a superlatively ordered manner. [Order however cannot exist without harmony. Harmony at last is the companion of analogy. Analogy is the same with Ratio, and Ratio is the undivided companion of providence. There is no providence without intellect and no intellect without mind.] The mind of God therefore, since it is intelligence alone, is said to be provident…[52]

52. Marenbon 167; our translation; bracketed words from Calcidius, ii.304, pp. 602–03. See also Eastwood, *Ordering* 313.

Calcidius's Book 5, On the Fixed and Wandering Stars, refers to matters related to retrogradation a number of times (Calcidius 5.69, 70, 77, 79, 85 *inter alia*). Most of the discussion leans towards an illusory interpretation of planetary retrograde motion "giving the appearance of being contrary that that of the universal sphere" due only to our perspective from the inconstant Earth (there are other echoes of heliocentricity in Book 5.72 where the 'middle position' occupied by the Sun is likened to that of the human heart). Yet superficially the text is robustly geocentric. In contrast to the other encyclopaedists, Calcidius does present epicycles and eccentrics, even referring to detailed geometric diagrams, but his worked example is the Sun throughout most of the text, rather than the outer planets. He attributes to Aristotle the opinion that planets would not follow paths such as epicycles. Finally, however, and with some degree of apparent reluctance, a full epicyclic explanation of planetary retrograde motion is given in 5.85. That a full Carolingian reception of this work was delayed to after Alcuin's time is consistent with his apparent unawareness of epicyclic theories of retrograde motion.

Cassiodorus (direct)

Among the encyclopedists, Cassiodorus' *Institutiones* is a significant source for the transmission of ancient teaching about planetary motions and was certainly known to Alcuin.[53] Cassiodorus at least demonstrates some knowledge of Ptolemy: he alludes to his works, though not completely accurately, and appears to have known them to some extent, whether directly or by reputation. (On the question of Cassiodorus's acquaintance with Ptolemy, compare Eastwood, *Ordering* 3 and Courcelle 352–53.) His mention of retrograde motion is not structured by mechanism, but rather occurs in a list of nomenclature, as if a bare summary (Cassiodorus, *Institutiones* ii.7.2, Mynors 154–55; Halporn 226–27):

> The backward motion or regression of the stars is what the Greek call *hypopodismos* or *anapodismos*, *i.e.*, when the star in carrying out its motion seems to be moving backwards at the same time.
>
> The Greeks call the pause of the stars *stirigmos* because stars, although always in motion, yet [nevertheless] at certain places seem to stand still. Varro {in} the book that he wrote *On Astrology* says stars are named from standing still. (Cassiodorus, *Institutiones* trans. Halporn, ii.7.2, pp. 226–71)

It is also unclear whether the retrograde motion discussed here refers to the specific effect (relative to the planet's normal motion against the stars) or to the simple observation that the normal motion of planets is from West to East – *i.e.* 'retrograde' with respect to the sphere of the stars (see also on Aldhelm below). The loss of Varro's writing on astronomy is a grievous one; Varro seems to have taken some idiosyncratic views, such as maintaining the ovoid nature of the shape of the Earth. Cassio-

53. Alcuin, *De uera philosophia* PL 101, col. 833, recalling Cassiodorus, *Institutiones* ii praef.2.

dorus never quotes from Ptolemy's *Almagest* but he does refer to 'canons' of Ptolemy, which may refer to the 'handy tables' of celestial motions derived from the principal work.[54] Cassiodorus claimed not to have been able to obtain the work of Martianus Capella. However some scholars have suggested that Martianus's influence can be detected in the final version of book II of Cassiodorus's *Institutiones*.[55]

In sixth-century Italy, before his retirement to Vivarium, Cassiodorus, in the persona of King Theodoric, wrote a letter to Boethius, praising Boethius for his translations from the Greek which had enabled 'the musician Pythagoras' and the astronomer Ptolemy, among other writers, to become as well-known as if they had Italian in translations so elegant that a bilingual reader would prefer Boethius's versions to the original.[56] Neither translation survives (if it ever existed), but a letter of Gerbert of Aurillac in 983 appears to suggest that he may have known that translation of Ptolemy.[57] Cassiodorus's letter mentions much else, including a water clock, a sundial, understanding the heavens, and the practical application of knowledge, both in engineering and for curiosities such as a statue that appeared to speak. It appears to be a purple prose set piece about learning, astronomical, mathematical, and mechanical arts, about understanding nature, and about applying that understanding.

Isidore and Bede (both available to Alcuin)

The *De natura rerum* and the *Etymologiae* of Isidore contain more explicit references to the mechanism of retrograde motion:

> Stars impeded by the rays of the sun are made irregular or retrograde or stationary, according to what the poet recalls when he says (*cf*. Lucan, *Civil War* x.201): "The sun divides the seasons of time: it changes the day to night, and by its powerful rays prevents the stars from proceeding, and delays their unfixed courses with stationary episodes."[58]

Isidore is ambivalent, however, as was Seneca before him, on whether retrograde planetary motion is real or illusory. In the *Etymologiae*, just a few paragraphs beyond the quotation from Lucan he writes:

> Recession [*remotio*], or retrograde motion, of stars occurs when a star, although driving its own motion, at the same time seems to move backward. (Isidore, *Etymologiae* III.lxix.10, 158; *Etymologies* 104)

54. Halporn and Vessey, Cassiodorus notes to 227; web. Courcelle 352–53, Eastwood *Ordering* 3.

55. On Cassiodorus and Martianus, see Halporn and Vessey's introduction and apparatus, 27–28, 65, 72, 188 and 208. Eastwood, *Ordering* 3; Courcelle 335.

56. Cassiodorus, *Variae* 40, i.45, pp. 39–41 at 40; Barnish, *Variae* 20–24 at 21.

57. Berschin, *Greek Letters* 15; Cassiodorus, *Variae* i.45.

58. Isidore, *De natura rerum* xxii.3, lines 22 and following; Traité, pp. 254–256.

In his *De natura rerum*, Isidore had treated planetary motion at greater length (*De natura rerum* xxii.3 and xxiii), eventually deploying the same lines of reasoning as Lucan. He recognized that the motion of the wandering stars, or planets, contrasted with that of the other stars and occurred according to unfixed rules; the stars were placed at diverse heights, so that those farther appeared to repeat their courses more slowly, yet nonetheless all return at their time to complete their proper course (*De natura rerum* xxii.1–3, 254–55). In contrast, the planets subject to retrogradation are "*stars impeded by the rays of the sun made irregular or retrograde or stationary, according to what the poet recalls*," Isidore wrote and rounded off the brief definition with the authority of Lucan's words from *De Bello Civili* x.201–3 instead of any fuller explanation.[59] Isidore's commitment to an ultimate cosmic order despite his failure to adequately explain the apparently irregular course of the planets with retrograde motion emerges when he doubles back to the topic (*DNR* xxiii.3) insisting that the wandering stars do not derive their name only from their own wandering, but also because they cause us to err (xxiii.3, 258–59)—this, even as he affirms that retrogradation is an anomalous departure from a course. Isidore also implies that solar-ray induced retardation and retrogradation, though anomalous, is nonetheless a quantifiable deviation from a fixed course.

59. Isidore, *De natura rerum*, xxii.3, p. 155 lines 17 and 18.

> [The planets] undergo retrograde motion or are rendered anomalous, when they add or remove fractions [of their courses]; when they remove them only, they are tered retrograde; they are stationary when they stand still.[60]

60. *Op. cit.* xxiii.3, pp. 258–59, lines 24–27, following Fontaine's translation.

Bede is less equivocal, taking his cues mainly from Pliny but also from Isidore, chiefly from the latter's fuller account in *De Natura Rerum* (which he otherwise avoided) but also from the *Etymologiae*. In his own *On the Nature of things*, in a passage which, like much of the work, is a tissue of quotations, he wrote:

> Seven stars, which are called wanderers, hang between heaven and earth, separated by fixed intervals. They move in a course contrary to the world, that is, to the left, with the world always advancing to the right. And though they are borne along by it with a constant revolution of great speed and are precipitated toward the west, nevertheless they are observed to go with an opposite motion through their own several tracks, wandering now lower, now higher, on account of the obliquity of the zodiac. But, impeded by rays of the

> sun, they become irregular, or retrograde, or stationary. (Bede, *On the Nature of Things* 12, 80–81. The passage is a tissue of quotations.)

Aldhelm (known to Alcuin)

The pioneer of Latin verse in early medieval England, Aldhelm (†709) mentioned retrograde planetary motion twice in his *Letter to Acircius*, an eclectic opus which included, after an exordium to its royal dedicatee, an exposition of the significance of the number seven in biblical numerology, a treatise on hexameter verse composition and a hundred riddles. The allusions to retrogradation occur as learned digressions in the section on biblical numerology; they reveal acquaintance with Isidore's *Etymologiae* and *De natura rerum*.

> Nor is the supernal and celestial creation itself known to want a figure of the same sort of calculation, since the corporeal structure of the visible world is surrounded and girded by the seven orbs of the heavens that incline headlong with the swift impulse of the revolving sphere, although they are retarded by the retrograde courses of the planets.[61]

61. Aldhelm, *Ad Acircium*, Lapidge and Herren, 42; Ehwald, 72 line 5 and 73 lines 11–14.

This final example constitutes a warning, however, against the simplistic assumption that all classical uses of 'retrograde' (Latin *retrogradi* and cognates) refers to the planetary loops now termed 'retrograde motion'. For here (and also possibly in Cassiodorus and others, as discussed above), the term seems to apply to the normal West to East course of the planets, which is 'retrograde' to the diurnal motion of the sphere of fixed stars.

In summary, the sources available to Alcuin on the phenomenon of retrograde motion constitute a surprisingly rich, if equivocal and sometimes contradictory resource. Two contrasting theories predominated—first, there is the notion of some kind of illusion of motion, and second, there are theories that invoke the direct effect of the sun's rays on the planets. The themes of heliocentric models, on the one hand, and epicyclic, on the other, are not entirely silent in these sources, but are much more subdued. Alcuin works with this material alongside other considerations, such as the separation in time and space between his own observational viewpoint and those of the ancients. He also draws on a deeply held metaphysical and theological commitment to ordered motion which he articulates repeatedly alongside other explanations.

When Alcuin and Charlemagne were writing, Macrobius, Martianus Capella and the commentary on the Timaeus by Calcidius were not widely studied and are not generally thought to have been used as sources for astronomy. They would come into use, and greatly enrich humans' ability to discuss a wide range of topics from the 820s onward (Eastwood, *Ordering* 10–13; Dobcheva). Yet even the use of Pliny here marks a salient advance, for there is only the scantest evidence for any study of Pliny on the continent between Isidore and before the arrival of Alcuin. (Indeed, all, or all but one, of the five late antique witnesses had been palimpsested or reused for binding before 800 and there is no continental evidence comparable to the eighth-century Northumbrian Pliny excerpts that were eventually transmitted to the continent).[62] Pliny's books ii and xviii constituted the best pre-Ptolemaic account of the earth-centred universe.

798 can thus be seen as a turning point in the history of the reception of Pliny's *Natural History*, with the first full copies of the work being reassembled just before 800, at the Carolingian Court, or closely linked centres.[63] Bede's remarkable astronomical achievements relied chiefly on Pliny's information, with only a limited admixture of Isidore. Yet Bede, for all his remarkable learning, had directed his research and teaching to the monastic life, above all, to explaining the calculation of Easter while invoking a limited range of observational discoveries. As Faith Wallis has emphasised, Bede avoided using the names of the disciplines of the liberal arts, just as Augustine, too, had eschewed them in his work *On Christian Teaching*, which advocated a retreat from astronomy.[64] Historians of the field have characterized the pre-Carolingian eighth-century engagement with the skies as chiefly preoccupied with *computus*, and with the solar and lunar cycles, rather than the other planets.[65]

62. On the transmission of Pliny: Reynolds, "Elder Pliny" 307–16; Borst, *Das Buch der Naturgeschichte*; Reeve's ongoing studies qualify those accounts in important respects: see his "The Editing of Pliny's Natural History." Eastwood, *Ordering* 95–178. On the study of Pliny in Alcuin's York and contrast between Insular eighth-century reception and exiguous continental pre-Carolingian evidence, Garrison, "An Insular Copy" 67–68. For Irish study despite the lack of manuscript witnesses: Corrigan.

63. Reynolds, "The Elder Pliny" 307–316 but note the corrections of Reeve.

64. Augustine, *On Christian Teaching* 56–57, 2.112–114, pp. 56–7; Burton, "The Vocabulary"; Wallis and Kendall *Bede: On the Nature of Things*, 5, 7 and Wallis, *Bede: The Reckoning of Time* xxvi–xxix.

65. Stevens, "Astronomy in Carolingian Schools" 417–88; Eastwood, "The Revival" 109–11; Dobcheva; McCluskey, *Astronomies and Cultures* 131–64.

5. Discussion

In the light of the Alcuin-Charlemagne correspondence and the observations that provoked their discussion, the year 798 might be regarded as an inflection point in the history of Astronomy in the Latin West. We meet Alcuin as a thinker indebted chiefly to Plinian, Cassiodoran, Isidoran and Bedan concepts, doing what he can with perhaps some minimal reception of Macrobian and Calcidian ideas. Alcuin's thought was informed by his chief sources (Pliny, Bede, Cassiodorus, Isidore), yet his use of them seems also to be shaped tantalizingly by familiarity with the explanations of the more indirect sources—Seneca and Calcidius. In all, the correspondence demonstrates an unprecedented degree of interest in retrograde motion on the part of both Charlemagne and Alcuin; this interest is especially striking considering the limited attention to retrogradation in the earlier sources (such as Pliny and Macrobius) which otherwise treat planetary motion in some detail. If further evidence for his prioritising of this particular aspect is required, he is unique, as far as we can find, in ascribing the rationale for the epithet 'wanderers' to the planets to retrograde motion itself, rather than to the primary motion of the planets against the fixed stars. As Alcuin stated in letter 149:

> And on that account they are said to be wandering, since they are known not to have an ever-fixed course of a single type.[66]

66. Alcuin, *ep.* 149, 243, lines 15–17: *et ideo forte errantes dicuntur, quia certum semper et unius modi cursum non habere noscuntur*. Compare Isidore, *Etymologiae* iii.66.

In addition, as Springsfeld has observed, Alcuin breaks new ground, standing apart from Bede, for example, in distinguishing the sun and moon from the other planets (Springsfeld 270–71).

The sources we have quoted above, and other older Hellenistic astronomies (which are the first known to contemplate heliocentric cosmologies) provide four families of explanation of retrograde motion (principally of Mars, but to a lesser extent the other outer planets as well) that appear to some extent in all writings up to the early modern period:

Illusion of motion. In both Seneca and Isidore this seems to be a generalised but unspecific recollection that motion of bodies at a great distance can be deceptive and even appear contrary or stationary. The heliocentric (Aristarchan and Copernican) model belongs to this class, as there, retrograde motion is explained as an illusion of relative motion of the planet and the Earth.

Epicycles. This is the central feature of the Ptolemaic model (and in the Capellan, where the epicycles of Mercury and Venus are centred on the Sun), and produces retrograde motion within a geocentric cosmology directly by attaching the planets to secondary orbits (epicycles) whose centres themselves execute unidirectional motion along a circular path within the planet's celestial sphere.

Propulsive effect of solar rays. This is the explanation adopted by

Alcuin and derived from Pliny. It is physically motivated and compatible with observed correlations. It also dispenses with epicycles (although in the case of Alcuin, his second hand knowledge of Ptolemy via Cassiodorus's brief allusion would not have included their consideration in any case, and so he does not appear to have needed to reject them.)

Alpetragius' (development of Aristotle) nested spheres. Alpetragius, a scholar of twelfth-century Andalusia, was aware of Ptolemy and studied his system, but held aesthetic and logical objections to the fanciful epicycles. Instead, he proposed an extension of Aristotle's nested spheres, in which each planet's motion was a result of the movement of a larger set of spheres, a subset of which generated the apparent retrograde motion.

One of the most intriguing aspects of Alcuin's correspondence, his sources, and the picture that emerges when these are placed alongside each other, is a repeated distant echo of heliocentic ideas. The solar ray theory of retrograde motion, after all, places the sun in the causative centre of this most puzzling of planetary phenomena. So, in regard to the passage by Seneca, and echoed by Alcuin's attribution of the force of the sun to the retrograde motion of Mars, we have a possible source for the solar ray theory that connects the first and third families of the list of explanations. As pointed out by Russo (294 see also 178 and 293–95) the passage in *Naturales quaestiones* (already quoted) contains a very clear prohibition on actual, rather than apparent, retrograde motion:

> You are mistaken in thinking that any star stops on its track and turns backward. Heavenly bodies cannot be detained or turned back; they forever move forth; as they once were set on their way, so they continue; their path does not end but with their own end. (Russo 294, Seneca vii.25,6–7)

The key phrase in the following passage that attributes effect to the sun – *solis occursus* – explains the apparent backward motions "like ships appearing stationary." Although an apparently reversed motion arising from a combination of constant motion on multiple circles would, in principle, be consistent with Ptolemaic epicycles, there would in that case be no need for Seneca's explicit invocation of a specific role for the sun. (Thus, although he does not specifically disavow them, we can see that Seneca did not allow epicycles.) Furthermore, the comparison to moving ships strongly suggests that Seneca's naval observers might themselves have been aboard ship, so that the observation of reversed motion of another planet becomes simply a consequence of relative *forward* motion of the observer. A final piece of circumstantial evidence suggesting a heliocentric interpretation of the passage is provided by Seneca's explicit discussion of the rotational motion of the Earth as an explanation of the apparent diurnal rotation of the skies (Seneca, *Quaestiones Naturales* 7.2.3). While diurnal rotation of the Earth and its putative orbital motion around the sun are by no means the same thing, and are potentially independent causes of effects, they occur almost invariably together in discussions of alternative cosmologies from ancient to early modern texts.

Seneca's implied solar causation, in this interpretation, is therefore due to the sun's centrality in relation to the orbits of both Earth and Mars, rather than to the pressure of its rays. Without a putative central location for the sun, the relative motion from differential orbits of the two planets is not defined. However, the Seneca passage is far from clear; when other interpretations are equally present in the sources, and as we have noted, retrograde motion is always *correlated* in the same way not only with the current positions of a retrograde planet and the sun in the sky but also with the history of those positions, then a direct causal influence of solar rays becomes a possible interpretation (if only partial – for the prohibition on actual reversal must be forgotten). The geometric centrality of the sun is then lost and translated into a radiative centrality of cause and we arrive at the most memorable articulation of the model, Lucan's account of the reply of the Egyptian sage Acoreus to Julius Caesar, the lines adopted by Isidore and Alcuin (Lucan, *De bello ciuili* x.194–210):

> … the power of his rays forbids the planets to go forward, and delays their wanderings with stationary periods. (Lucan, *De bello civili* x.202–04)

Alcuin's written responses to his king echo perfectly those of an earlier sage philosopher to an earlier ruler. They may also represent similar translations, or faulty transmissions, of one notion of helio-centrality to another, one from early antiquity (Aristarchus of Samos) one from late (possibly Seneca), by which a geometric centrality of the sun is replaced by a causative centrality of its rays.

5. Conclusion

There are more questions raised than answers from this brief study of a remarkable Carolingian astronomical correspondence and a consideration of its possible sources. The most radical of our suggestions is that the solar-pressure account that Alcuin proposes to Charlemagne is actually an earlier innovation that arises through miscommunication and partially-understood reception of an originally heliocentric hypothesis.

By considering Alcuin's explanations of retrogradation in relation to earlier hypotheses we can see that his work also marks an inflection point. Alcuin was grappling with this question at the limits of what was possible at the time. His brave and eclectic yet ultimately unsatisfactory attempts appear to depend on a wider range of reading than Alcuin acknowledged, or had been previously recognised as well as on novel observational data. The correspondence about Mars was conducted before, or just as, some of those sources came back into circulation. And it heralds (but predates by some decades) the distinctive rebirth of planetary astronomy for non-computistical purposes; it is significant that this advance took place in the milieu of a king and an advisor who shared a deep commitment to the notion of celestial order: their shared curiosity about Mars may have been sharpened by the example of Caesar, or by a real, but unarticulated concern with prognostics, but certainly, they were intent on the pursuit of a better understanding of the cosmos.[67] And despite the difficulty of the question, which Alcuin acknowledged fully, as well as the disturbingly irregular observational data that he and Charlemagne had noted, Alcuin nonetheless concluded his exchange with Charlemagne by insisting that the motions of Mars, however puzzling, must have natural explanations, and that the king should not read into them any suspension of regular cosmic order and certainly not any portentous implications for current events. Alcuin's intellectual commitment was first and foremost to a universe of divinely instituted harmony and order even when the visible course of the planets seemed to defy it.

67. For the richest discussion of the larger intellectual themes raised by royal stargazing, see Dutton and Jaeger. For further discussion of Alcuin's poetic expressions of his conviction of divine harmony underlying even seemingly disorderly phenomena in the natural world and the universe, see Garrison, "Alcuin *carmen* ix."

Appendix – translations from Alcuin's Letters 149 and 155

Letters 149 and 155 are part of a larger corpus of letters between Alcuin and Charlemagne on learned questions.[68] Computus, astrono-

68. The letters are Alcuin, *Epistulae* 126, 143, 144, 145, 148, 149, 155, 170, 171.

my and the calendar are the central themes, but questions about other learned matters including grammar, exegesis, and worship are also considered. Astronomical matters other than planetary motion include the lunar saltation and the date of the new Easter cycle. The letters in this group are transmitted in various sub-groupings in over a dozen manuscripts of Alcuin's letters, not always in sequence; in some manuscripts only two or three of the letters occur. Thus these letters did not attain the status of a *libellus* and in this respect should be distinguished from various treatises on computistical matters attributed to Alcuin, some correctly, and others inaccurately.[69] In modern terms, we might regard the astronomical speculation here as having remained unpublished. A number of the individual letters have been summarised by Lorhmann, Springsfeld, Borst, and Alberi though never translated. We offer here the excerpts about the motion of Mars from *Ep.* 149 and 155.

Alcuin, Letter 149

MGH *Ep.* 4, 243, from line 9:

…Now therefore, the planet Mars (which we have long sought) flashed forth suddenly amidst the martial spears.[70] The sun held it back for a very long time, but let it go in terror of the Nemean lion [Leo], which is said to have been placed in the sky to commemorate the strength of Hercules.[71] [Mars] passed from [the sign of] Cancer[72] in two months.[73] And the sun, proceeding with a different course, will soon cause Mars to go backwards. Sirius also joins, radiant in appearance; it is very well-liked by doctors eager for payments.[74]

As to why the sun held [Mars] concealed for such a long time, the reason is, as the ancients would have it, the rays of the sun, which as is related, bring about the unequal courses of the planets. And on that account perhaps, [the planets] are said to be wandering, since they are known to not have an ever fixed course of a single type.[75]

Because if it is thus (as some reckoners would have it), then let the Egyptian boys tell why the sun and the moon be counted among them, seeing as they each have a course that is fixed in its years, months, days, hours, and minutes. For indeed they do not (actually) move erratically in [the heavens], as they say, even though they seem to go against the heaven, since they reach the turning points of their courses at precisely fixed times, just as the courses of the five planets are very often borne in an irregular way – whether by wandering or by standing or by going backwards – through the breadth of the circle of the zodiac. [Alcuin then moves on to other learned topics, including the adop-

69. All but 144 (sent by Charlemagne) occur in a large Tours collection represented by Troyes 1165 and other manuscripts transmitting larger assemblages of Alcuin letters; on T see Bullough 57–61. For the manuscript witnesses generally, see Dümmler's introduction and apparatus for each letter and the entry for each letter in Jullien.

70. With the *adnominatio* of *Mars* and *martius*, Alcuin calls attention to the etymological connection of war and the planet Mars, thus emphasising the fact that Mars reappeared during Charlemagne's campaign. Mars reappeared in mid-July in 798 according to the Lorsch Annals, which allows a dating of this letter and *ep.* 155 after mid-March. *Tela martis* here recalls Vergil *Ecl.* IX.12 and links this to the reminiscence of the *Georgics* at the start of the letter where Alcuin reflects on Charlemagne's request for a musical composition to calm the young warriors after battle. Vergilian framing of the two chief topics—the request for the song, and the explanation of Mars retrograde points to the element of display, literary ornament, and gratuitous revelling in learning that characterises the exchanges between Alcuin and Charlemagne across many years.

71. For the belief that the constellation Leo was the Nemean Lion slain by Hercules: Isidore, *Etymologiae* iii.lxxi.27.

72. Mars is in the sign of Cancer in April; in Leo, in June.

73. *bimenstris/bimestris* is an exceedingly rare word. It may be a lexical clue to Alcuin's memory of Pliny's discussion of Mars (*Naturalis historia* ii.19); Alcuin's use is the only example in the *Dictionary of Medieval Latin from British Sources*. The word was not used by Bede or Isidore.

74. Isidore, *Etymologiae* III.lxxi.15. *Canis autem uocatur propter quod corpora morbo afficiat.*

75. By making retrograde motion the reason the planets are called wandering, Alcuin elevates it from a glitch to a feature: an apparently disorderly event subsumed into a more inclusive order.

tionist heresy and questions about the psalms, the liturgy, and a grammatical matter].

p. 245 lines 11–23:
To conclude the letter, Alcuin returns to the topic of Mars' retrograde motion

What happened recently with the star of Mars alone, this is also accustomed to happen very often with all of the five wandering stars [planets] in these regions: that they be hidden for longer than the regular page of the ancients declares. And perhaps the rising and setting of these stars does not take place equally for us who are dwelling in these northerly climes as it did for those who reside in the oriental or meridional parts of the world;[76] for there, especially, were the masters who set out for us the rational principles and orbits (*rationes et cursus*) of heaven and of the stars. For many things vary on account of the difference of places, as your wisdom knows best. Now therefore, as we said before, we are making haste to faithfully accomplish our duty to you.[77]

Alcuin Letter 155, To Charlemagne, September 798
MGH *Ep.* IV, 249–53

Item, to the lord king on the course of the moon through the individual signs[78]

To King David, most noble in every kind of virtue and most resplendent in every ornament of wisdom, the veteran soldier Flaccus[79] [sends] greetings.

A traveller came flying, with an inquisitive letter in his hand from your authority, too brief in its number of syllables to have satisfied the eagerness of my mind, yet more profound in its questions than my humble wits could grasp, urging an old man with shaky understanding to explore celestial matters, when he has not yet learned the underlying principles of terrestrial things; (urging) one who can by no means recognise the natures of the plants growing upon the earth to expound the meandering courses of the wandering stars in heaven. And it would be a wonder how anyone might be able to reduce their erratic paths to a fixed order, since they are said to be 'wandering' precisely because they are thought to have unfixed (*incertos*) courses.

What new insight might our paltriness manage to discover in the daily travails of the moon, seeing as we have the regular principles

76. The hours that Mars is visible do depend on location; its place in the sky however does not depend on location. As Mars leaves the sun, if its ecliptic at star rise is vertically distant from the horizon, then you will notice it climbing in latitude. See Springsfeld 274–76 for tables comparing of the timing of Mars' rising and setting in Saxony and Tours at the relevant dates.

77. That is, the task imposed by messenger Megenfrid, the musical composition Charlemagne requested from Alcuin to pacify the fierce tempers of his young warriors after battle.

78. Lemma in manuscript T (Troyes, Mediathèque du grand Troyes 1165, fol. 10).

79. Alcuin uses a range of bynames or personae in these two letters to dramatise his relationship with Charlemagne: he is variously the Old Entellus of *Aeneid* v.362–464 (the old boxer who shows such sudden power when angered that the match against his much younger opponent is called off); Flaccus (*i.e.* Horace, a byname associated by Alcuin with satire and moral criticism), and a veteran soldier, an alter ego borrowed from Jerome. Further, see Alberi and Springsfeld 246.

(*rationes regulares*) investigated in the complex argumentation of the catholic teachers or of the ancient philosophers. For what can be said about the concord of the solar and lunar orbit through the signs of the zodiac that would be more lucid than what the investigator of such questions, the master Bede, has left for us in his writings? Or what could be discovered that is more insightful than what the most devoted discoverer of natural things, Plinius Secundus, expounded about the order of the heavenly bodies?

But since we are on a journey right now, we do not have at hand the books in which those things can be read. We do not dare to reply at all to the most profound questions of your wisdom; entreating your mercy, that you command to have sent to us the first books of the aforementioned expert Plinius Secundus, in which he strove to make intelligible the manifold and obscure arguments about the varying course of the stars; unless by chance, God willing, we may be able to dig out something here or there, which might seem worthy to be shown to your most holy presence.

However, – so that your letter would not find me thus unprepared or dumbstruck with sleepy inertia, – as if my memory had nothing laid by for itself in its private chamber, which it could offer to one inquiring, – I will say something on the spot, more seeking than expounding, which came to the attention of my discombobulated mind; reserving a fuller reply – if perhaps it will be required – for the aforementioned books of the learned men.

[The letter continues with a full discussion of other matters related to lunar and solar cycles and the calendar. Alcuin cites Bede and Pliny and alludes in detail to the positions advanced in Charlemagne's letter. He also alludes to a diagram or figure, not transmitted with the letters, which clarified the matter.][80]

80. Lohrmann 97; Springsfeld 252.

[Despite having informed and corrected Charlemagne, this section concludes with a courtier's deference: Alcuin writes:]

All of which things we know to be familiar to your wisdom.

[p. 251, line 29]

[Alcuin returns to the matter of Mars and continues:]

Wherefore we begin to say what is observed about the planet Mars. Investigating this was vexing our mind for a long time, so that even its appearance was not enough to satisfy our curiosity. Recently while the sun was tarrying in Leo, [Mars] appeared to us, we think approximately, at the same time as the likeness of Mars[81] appeared to

81. *Imago Martis* here: recalls a line in the *Aeneid*: 'it timor et maior Martis apparet imago,' *Aeneid* viii.557: this is the fear of the people of Latium while Æneas and Pallas prepare their attack, the reference is rather to the god Mars, as a metonymy forward, than the planet. Alcuin thus nods to the mythic and astrological associations of Mars as god of war, even while disavowing all thought of portents and prodigies.

you. We likewise tried to say something about this planet according to the capacity of our inquiry in our other letter to your venerable highness (*ep.* 149, p. 243), soon after [Mars] appeared to us.

But now in response to the urging of your letter we have delved into the matter more scrupulously.

For you posed the question thus: "And about Mars, which, while in the sign of Cancer last year, was cut off from human sight by the light of the sun, what would you conclude: was that by the natural order of its course or (was it by reason) of the sun? Was it brought about by force or as a prodigy that it accomplished the journey of two years in one? For recently, after the sun left Leo, [Mars] appeared to us in the sign of Cancer. If (Mars) accompanied the sun, how could it be as swift in its course as [the sun]? If it took its place for the whole year in Cancer, why, when the sun migrated into other signs, was Mars not able to be seen in Cancer?"

A sophisticated and most acute argumentation, that! Let me respond to it as concisely as God will enable me to.

What is said there [is] "that the planet Mars was cut off from human sight while it was in Cancer." I do not judge that for the entire past year the planet Mars was cut off by the light of the sun in Cancer, but rather, that Cancer (along with the planet Mars), at the proper time and in the natural order of its course, was intercepted from human sight its course by the interposition of the earth.[82] Therefore in the past year I do not recall having observed [Mars] in Cancer when Cancer was carrying out the order of its course beneath the earth by night.

Nor do I think it was an unnatural or portentous occurrence that [Mars] was not visible to us for so long, but rather, it was on account of the natural order of its course.

For if in the past year it did not appear in Cancer, and now appears in Cancer, then it is ascertained to traverse the extremity of its course not in one year but in the space of two years;[83] seeing as now in the second year it is switched to another sign [of the zodiac].

This indeed was added [in the letter]: "if it took its position in Cancer for the whole year, with the sun moving into other signs, why was it not able to be seen in Cancer?"

Truly since Cancer itself, in which it took its position, could not be seen. Soon indeed when Cancer was able to be seen, Mars was also seen with Cancer, which for the past year set according to its natural course by nights, under the lands.

In another letter I wrote about the force of the sun[84] causing unequal orbits for the wandering stars:

82. Alcuin repeats the words of Charlemagne's question three times in all: first as a verbatim quotation, then as a close paraphrase but omitting the phrase 'past year;' finally, to refute them, in a modified form with the words 'entire past year' inserted order to contradict them specifically while seeming to agree with the rest of Charlemagne's observations. It is striking that, in the course of his exposition, Alcuin repeats the words *naturalis cursus* three times, emphasising order beneath apparent disorder. Here our translation concurs with Lohrmann 95–96 and diverges from Springsfeld 274–77.

83. Because Mars has a twenty-six month cycle.

84. The phrase is *vi solis*, so this is harking back to the solar ray theory, and to the use of the term *vis* on its own earlier in this letter. See *ep.* 149, p. 245, line 15.

As the poet said:

The sun divides the seasons of the year;
He changes day to night and with his assailing[85] rays,
Himself hinders [the planets] and retards their
wandering courses with a standstill[86]

Which thing Saturn, Juliter and Mars are most often observed to undergo.[87]

May your venerable wisdom and most acute intelligence consider, whether in this [letter] or in that one, anything might seem worthy or plausible, or whether something different should be believed about such questions. For I have not at all considered that you asked the question on out of ignorance. Whatever you might judge from this I pray that you will not hesitate from letting us know with good will. For I am not a diehard advocate of my own opinion, but a devoted adherent of truth.

[the letter then returns to the notes about the appended figure and the calculation of hours when the individual signs rise or set or move from their place]

All these things I have gathered into one representation for the sake of convenience of knowing the course of the moon; may your most excellent wisdom ascertain whether the rationale is truly discovered.

85. Lucan's poem (and Isidore's) quotation in *Etymologiae* iii.65.3 read: *radiisque potentibus*; Alcuin or his assistant wrote *anni* for *aevi* and *radiisque petentibus*, a variant not attested as far as I know in Lucan or Isidore.

86. Lucan, *De bello ciuili* x.201–03; adduced by Isidore, *Etymologiae* iii.65.3.

87. Troyes 1165 fol. 12v has no punctuation between the quotation and this sentence, thus creating a demonstration from the poetry.

Bibliography

Alberi, Mary. "Jerome, Alcuin and Vergil's 'Old Entellus.'" *Journal of Medieval History*, 17.2 (1991), 103–113.

Al-Bitrūjī. *On the Principles of Astronomy.* Volume 1. Translated by Bernard R. Goldstein. New Haven: Yale University Press.

Alcuin. *Carmina. Poetae Latini Carolini Aevi* I. Edited by Ernst Dümmler. Monumenta Germaniae Historica. Berlin: Weidmann, 1881.

---. *Epistolae. Epistolae IV, Epistolae Karolini Aevi* II. Edited by Ernst Dümmler. Monumenta Germaniae Historica,. Berlin: Weidmann, 1895: 1–481.

---. *The Bishops, Kings, and Saints of York*. Edited and translated by Peter Godman. Oxford: Oxford University Press, 1982.

Alcuin. *De uera philosophia*. Edited by André Duchesne. Rpt. Patrologia Latina 101. Paris: J.P. Migne, 1863. 849–854.

Aldhelm. *Epistola ad Acircium. Opera Omnia*. Edited by Rudolf Ewald. Monumenta Germaniae Historica. Auctores Antiquissimi 15. Berlin, 1919.

Aldhelm. *The Prose Works*. Translated by Michael Lapidge and Michael Herren. Cambridge: D. S. Brewer, 1979.

Annales regni Francorum inde ab A. 741 usque ad A. 829, qui dicuntur Annales Laurissenses maiores et Einhardi. Monumenta Germaniae

Historica, Scriptores rerum Germanicarum in usum scholarum separatim editi, Monumenta Germaniae Historica. Edited by Georg H. Pertz and Friedrich Kurze. Hannover: Hahn, 1895.

Archimedes, Arenarius. *Archimède tome II: Des spirales, de l'équilibre des figures planes, l'arénaire, la quadrature de la parabole.* Edited and translated by Charles Mugler. Paris: Les Belles Lettres, 1971. 134–157.

Aristotle. *De Caelo.* Translated by John L. Stocks and Harry B. Wallace. Oxford: Oxford University Press, 1922.

---. *Metaphysics*. In *Metaphysics, volume II: Books 10-14. Oeconomica. Magna Moralia*. Translated by G. Cyril Armstrong and Hugh Tredennick. London: Harvard University Press, 1935.

Augustine. *On Christian Teaching.* Translated by R.P. H. Green. Oxford: Oxford University Press, 2008.

Barker-Benfield, Bruce. "Macrobius." *Texts and Transmissions: A Survey of the Latin Classics*. Edited by Leighton D. Reynolds, et al. Oxford: Clarendon Press, 1983: 222–234.

Barney, Stephen A., W. J. Lewis, J. A. Beach, and Oliver Berghof. *The Etymologies of Isidore of Seville.* Cambridge: Cambridge University Press, 2006.

Bede. *The Reckoning of Time.* Translated with introduction, notes and commentary by Faith Wallis. LTTH 29. Liverpool: Liverpool University Press, 1999.

---. *On the Nature of Things and On Times.* Translated by Faith Wallis and Calvin Kendall. LTTH 56. Liverpool: Liverpool University Press, 2010.

Berschin, Walter. *Greek Letters and the Latin Middle Ages: from Jerome to Nicholas of Cusa.* Translated by Jerold C. Frakes. Washington: Catholic University of America, 1988.

Bischoff, Bernhard. *Manuscripts and Libraries in the Age of Charlemagne.* Translated by Michael Gorman. Cambridge Studies in Palaeography and Codicology 1. Cambridge: Cambridge University Press, 2014.

---. *Katalog der festländischen Handschriften des neunten Jahrhunderts (mit Ausnahme der wisigotischen), vol. 3: Padua – Zwickau, aus dem Nachlaß.* Edited by Birgit Ebersperger. Wiesbaden: Harassowitz, 2014. Bayerische Akademie der Wissenschaften. Veröffentlichungen der Kommission für die Herausgabe der mittelalterlichen Bibliothekskataloge Deutschlands und der Schweiz.

Böhmer, Johann F., Engelbert Mühlbacher, Johann Lechner. *Regesta Imperii I. Die Regesten des Kaiserreichs unter den Karolingern 751-918* . 2nd edition. Innsbrück: Wagner, 1908.

Borst, Arno *Das Buch der Naturgeschichte: Plinius und seine Leser im Zeitalter des Pergaments.* 1994. 2nd improved edition, Heidelberg: Winter, 1995.

---. "Alkuin und die Enzyklopädie von 809." *Science and Western and Eastern Civilization.* Edited by Butzer and Lohrmann, 53–78.

Bullough, Donald. *Alcuin: Achievement and Reputation*, being part of the Ford Lectures delivered in Oxford in Hilary Term 1980. Leiden, Brill, 2004.

Burton, Philip. "The Vocabulary of the Liberal Arts in Augustine's *Confessions.*" *Augustine and the Disciplines: From Cassiciacum to Confessions*. Edited by Karla Pollmann and Mark Vessey. Oxford: Oxford University Press, 2009. 141–164.

Butzer, Paul Leo and Dietrich Lohrmann, editors. *Science in Western and Eastern Civilization in Carolingian Times.* Basel: Birkhäuser, 1993.

Cassiodorus. *Institutiones.* Ed. R.A.B. Mynors. Oxford: Clarendon, 1937.

---. *Institutions of Divine and Secular Learning and On the Soul.* Translated by James W. Halporn, introduction by Mark Vessey. LTTH 42. Liverpool: Liverpool University Press, 2004.

Cassiodorus Senatorus. *Variae.* Monumenta Germaniae Historica Auctores Antiquissimi XII. Edited by Theodorus Mommsen. Berlin: Weidmann, 1894.

---. *Cassiodorus: Variae, translated with notes and an introduction.* Translated by S.J.B. Barnish, TTH 12. Liverpool: Liverpool University Press, 1992.

Corrigan, Sarah. "Hisperic Enigma Machine: Sea creatures and sources in the Hisperica Famina." *Peritia* 24-15 (2013-2014): 59–79.

Courcelle, Pierre. *Late Latin Writers and their Greek Sources*. Translated by Harry Wedeck. Cambridge: Harvard University Press, 1969.

Dobcheva, Irene. "The Umbrella of Carolingian Computus." *La compilacíon del saber en la edad media/La compilation du savoir au moyen âge/The Compilation of knowledge in the Middle Ages.* Editado por María José Muñoz, Patricia Cañizares y Cristina Martín. Fédération Internationale des Instituts d'Études Médiévales. Textes et etudes du moyen âge 69. Porto: Fédération Internationale des Instituts d'Études Médiévales, Gabinete de Filosofia Medieval / Faculdade de Letras da Universidade do Porto, 2013. 211–230.

Dutton, Paul. "Of Carolingian Kings and their Stars." In his *Charlemagne's Moustache and Other Cultural Clusters of a Dark Age.*

New York: Palgrave McMillan, 2004. 93–128.

Eastwood, Bruce S. "The Revival of Planetary Astronomy in Carolingian and Post-Carolingian Europe." *Journal for the History of Astronomy*, 35 (2004): 109–111.

---."The astronomy of Macrobius in Carolingian Europe: Dungal's letter of 811 to Charles the Great." *Early Medieval Europe* 3 (1994): 117–134.

---. *Ordering the Heavens: Roman Astronomy and Cosmology in the Carolingian Renaissance.* Leiden: Brill, 2007.

---. "The Power of Diagrams: the Place of the Anonymous Commentary in the Development of Carolingian Astronomy and Cosmology." *Carolingian Scholarship and Martianus Capella: Ninth-Century Commentary Traditions on 'De nuptiis' in Context.* Edited by Mariken Teeuwen and Sinéad O'Sullivan. Turnhout: Brepols. 193–220.

Einhard. *Vita Karoli.* Edited by Georg Waitz and Georg H. Pertz. Monumenta Germaniae Historica Scriptores rerum germanicarum in usum scholarum. Hannover: Hahn, 1911.

Einhard. "The Life of Charlemagne." *Charlemagne's Courtier: The Complete Einhard.* Ed. Trans. Paul Dutton. Toronto: Broadview, 1998: 15–40.

Folkerts, Menso. *Euclid in Medieval Europe.* Questio II, de rerum natura. The Benjamin Catalogue for the History of Science. Winnipeg, 1989.

Fontaine, Jacques. *Isidore de Seville et la culture classique dans l'espagne wisigothique.* Paris: Études Augustiniennes, 1959. Tom. 2.

Garrison, Mary. "Alcuin, Carmen ix and Hrabanus Ad Bonosum: A Teacher and his Student write Consolation." *Poetry and Philosophy in the Middle Ages: A Festschrift for Peter Dronke.* Edited by John Marenbon. Leiden: Brill, 2000. 63–78.

---. "An Insular Copy of Pliny's Naturalis historia (Leiden VLF 4 fols 4–33)." In *Writing in context. Insular manuscript culture, 500–1200.* Edited by Erik Kwakkel. Leiden: Leiden University Press, 2013. 67–126.

---. "The Library of Alcuin's York." *The Cambridge History of the Book in Britain volume 1: ca. 400-1100.* Ed. Richard Gameson. Cambridge, 2011. 134–202.

Gingerich, Owen. *The Eye of Heaven: Ptolemy, Copernicus, Kepler.* Princeton: Princeton University Press, 1997.

Glauthier, Patrick. *Science and Poetry in Imperial Rome: Manilius, Lucan, and the Aetna, unpublished PhD dissertation.* Columbia University, New York, 2011.

Gotoff, Harold C. *The Transmission of Lucan in the Ninth Century.* Cambridge: Harvard University Press, 1971. [Not available to us at the time of writing].

Grant, Edward. *The Foundations of Modern Science in the Middle Ages.* Cambridge: Cambridge University Press, 1996.

Grosseteste, Robert. *De Sphera.* Edited by Cecilia Panti. *Moti, virtù e motori celesti nella cosmologia di Roberto Grossatesta. Studio ed edizione dei trattati «De sphera», «De cometis», «De motu supercelestium».* Florence: SISMEL Edizioni del Galluzzi, 2001. 285–319.

Hartmann, Martina. "Alcuin et la gestion matérielle de Saint-Martin de Tours." *Alcuin de York à Tours.* Edited by Philippe Depreux and Bruno Judic. *Annales de Bretagne.* vol. 111, 3 (2004): 91–102.

Hine, Harry M. "The Manuscript Tradition of Seneca's *Naturales quaestiones*: addenda." *Classical Quarterly* 42 (1992): 558–62.

Ineichen-Eder, Christine. "Theologisches und philosophisches Lerhmaterial aus dem Alcuin-Kreise". *Deutsches Archiv für Erforschung des Mittelalters* 34 (1978), 192–201.

Isidore of Seville. *Etymologiarum siue originum libri xx.* Ed. Wallace M. Lindsay. Oxford: Clarendon, 1911. Tomus I.

---. *Traité de la Nature suivi de l'épître en vers du roi Sisebut à Isidore.* Edited by. Jacques Fontaine. Paris: Etudes Augustiniennes, 2002.

Jaeger, Stephen. "Alcuin and the Music of Friendship." *Modern Language Notes* 127.5 (2012): 105–125.

Jones, Alexander. "Pliny on the Planetary Cycles." *Phoenix* 45.2 (1991): 148–161.

Jullien, Marie-Hélène and Françoise Perelman. *Clavis des Auteurs Latins du moyen âge, territoire français 735–987.* Turnhout: Brepols, 1999.

Lapidge, Michael. *The Anglo-Saxon Library*. Oxford: Oxford University Press, 2006.

Lohrmann, Dietrich. "Alcuins Korrespondenz mit Karl dem Großen über Kalendar und Astrononie." *Science in Eastern and Western Civilization in Carolingian Times.* Edited by Paul Leo Butzer and Dietrich Lohrmann. Basel: Birkhäuser, 1993: 79–114.

Lucan. *De bello ciuili*. Edited by William Heitland. *Corpus poetarum latinorum: a se aliisque denuo recognitorum et brevi lectionum varietate instructorum.* Vol. 2. Compiled by John Percival Postgate. London: Bell, 1905. 83–144.

---. *The Civil War, books I-X.* Translated by James D. Duff. London: Heinemann, 1928.

Macrobius. *Commentary on the Dream of Scipio.* Translation, introduction, notes by William Harris Stahl. New York: Columbia University Press, 1952.

Marenbon, John. *From the Circle of Alcuin to the School of Auxerre: Logic, Theology, and Philosophy in the Early Middle Ages.* Cambridge: Cambridge University Press, 1981.

Martianus Capella. *Carolingian Scholarship and Martianus Capella: The Oldest Commentary Tradition*. Mariken Teeuwen *et al.*, eds. Digital edition. 1st ed. November 2008. Online. Accessed 21 May 2020.

---. *Martianus Capella and the Seven Liberal Arts, volume 2: The Marriage of Philology and Mercury*. Translated by William H. Stahl and Richard Johnson. New York: Columbia University Press, 1977.

---. William H. Stahl, Richard Johnson and Evan L. Burge. *Martianus Capella and the Seven Liberal Arts, volume 1: The Quadrivium of Martianus Capella: Latin Traditions in the Mathematical Sciences 50 B.C. – A.D. 1250*. New York: Columbia University Press, 1971.

McLuskey, Stephen. *Astronomies and Cultures in Early Medieval Europe*. Cambridge: Cambridge University Press, 1998.

---. "Martianus and the Traditions of Early Medieval Astronomies." *Carolingian Scholarship and Martianus Capella: Ninth-Century Commentary Traditions on 'De nuptiis' in Context.* Edited by Mariken Teeuwen, and Sinéad O'Sullivan, Turnhout: Brepols, 2011 221–244. 221–2.

Nelson, Janet. *King and Emperor: A New Life of Charlemagne*. Harmondsworth, Penguin, 2019.

Notker the Stammerer. "Charlemagne." Translated by Lewis Thorpe in his *Einhard and Notker the Stammerer: Two Lives of Charlemagne*. Harmondsworth: Penguin, 1969. 93–172.

Pliny. *C. Plinii secundi, Naturalis Historiae libri xxxvii post Ludovici Iani obitum recognovit et scripturae discrepantia adiecta* ed. Carolus Mayhoff, vol. I, books I-VI. Stuttgart: Teubner, 1906.

---. *Natural History I: Books I –II.* Translated by Harris Rackham. London: Heinemann, 1949.

Plutarch. *De facie quae in orbe lunae apparet.* Translated by Harold Cherniss and William C. Helmbold. *Moralia, volume XII: Concerning the Face Which Appears in the Orb of the Moon. On the Principle of Cold. Whether Fire or Water Is More Useful. Whether Land or Sea Animals Are Cleverer. Beasts Are Rational. On the Eating of Flesh.* Edited by Jeffrey Henderson. London, Harvard University Press, 1954. 34–223.

Ramirez-Weaver, Eric. M. *A Saving Science. Capturing the Heavens in Carolingian Manuscripts*. University Park: Pennsylvania State University Press, 2017.

Reeve, Michael D. "The Editing of Pliny's Natural History." *Revue d'histoire des textes* n.s. II (2007) 107–179.

Reynolds, Leighton D. ed. *Texts and Transmissions: A Survey of the Latin Classics*. Oxford: Clarendon. 1983.

---. "The Elder Pliny." In his *Texts and Transmissions*. 307–316.

Russo, Lucio. *The Forgotten Revolution: How Science was Born in 300 BC and why it had to be reborn.* 1996. Translated by Silvio Levy. Milan: Springer, 2003.

Sargent, Noel. "The early history of the theory of eccentrics and epicycles." *Popular Astronomy* 25 (1917): 285–88.

Seneca, Lucius Annaeus. *Natural Questions.* Translated by Harry M. Hine. Chicago: University of Chicago, 2010.

---. L. Annaei Senecae. *Naturalium Quaestionum libri.* Edited by Harry M. Hine. Stuttgart: Teubner, 1996.

Simplicius. *On Aristotle Physics 2*. Translated by Barrie Fleet. London: Bloomsbury Academic, 2013. 9–160. Ancient Commentators on Aristotle. Bloomsbury Collections. Web. 21 May 2020.

Springsfeld, Kerstin. *Alkuins Einfluß auf die Komputistik zur Zeit Karls des Großen*. Sudhoffs Archiv 48. Stuttgart: Franz Steiner, 2002.

Stevens, Wesley. "Astronomy in Carolingian Schools." *Charlemagne and his Heritage: 1200 Years of Civilization and Science in Europe, volume I: Scholarship, Worldview, and Understanding.* Edited by Paul L. Butzer, Max Kerner and Walter Oberschelp. Turnhout: Brepols, 1997. 417–88.

William H. Stahl, Richard Johnson and Evan L. Burge. *Martianus Capella and the Seven Liberal Arts, volume 1: The Quadrivium of Martianus Capella: Latin Traditions in the Mathematical Sciences 50 B.C. – A.D. 1250.* New York: Columbia University Press, 1971.

Tarrant, Richard J. "*Lucan.*" *Texts and Transmission.* Edited by Leighton D. Reynolds. Oxford: Clarendon, 1983. 215–218.

Tupikova, Irena. "A Technical Note on Epicyclical Interpretations of Pliny's Planetary Theory." *Journal of Interdisciplinary History of Ideas* 3 (2014): 7b:1–7b:10.

Warntjes, Immo. *The Munich Computus: text and translation: Irish computistics between Isidore of Seville and the Venerable Bede and its reception in Carolingian Times.* Sudhoffs Archiv. Beihefte, Heft 59. Stuttgart: Franz Steiner, 2010.

DIVNA MANOLOVA

Figures and Mirrors in Demetrios Triklinios's *Selenography*

Abstract

This article* is about the interplay between diagrammatic representation, the mediation of mirrors, and visual cognition. It centres on Demetrios Triklinios (fl. ca. 1308–25/30) and his treatise on lunar theory. The latter includes, first, a discussion of the lunar phases and of the Moon's position in relation to the Sun, and second, a narrative and a pictorial description of the lunar surface. Demetrios Triklinios's *Selenography* is little-known (though edited in 1967 by Wasserstein) and not available in translation into a modern scholarly language. Therefore, one of the main goals of the present article is to introduce its context and contents and to lay down the foundations for their detailed study at a later stage. When discussing the *Selenography*, I refer to a *bricolage* consisting of the two earliest versions of the work preserved in Bayerische Staatsbibliothek, graecus 482, ff. 92r–95v (third quarter of the fourteenth century) and Paris, Bibliothèque nationale de France, graecus 2381, ff. 78r–79v (last quarter of the fourteenth century). I survey the available evidence concerning the role of Demetrios Triklinios (the author), John Astrapas (?) (the *grapheus* or scribe-painter), and Neophytos Prodromenos and Anonymus (the scribes-editors) in the production of the two manuscript copies. Next, I discuss the diagrams included in the *Selenography* and their functioning in relation to Triklinios's theory concerning the Moon as a mirror reflecting the geography of the Earth, on the one hand, and to the mirror experiment described by Triklinios, on the other. Finally, I demonstrate how, even though the *Selenography* is a work on lunar astronomy, it can also be read as a discussion focusing on the Mediterranean world and aiming at elevating its centrality and importance on a cosmic scale.

Prolegomena

The present article is about the interplay between diagrammatic representation, the mediation of mirrors, and visual cognition. Its discussion is centred on a late Byzantine text on lunar theory that includes, first, a discussion of the lunar phases and of the Moon's position in relation to the Sun, and second, a narrative and a pictorial de-

* Some of the ideas elaborated in this article were presented first at the workshop *Interstellar Skies: The Lunar Passage in Literature through the Ages* (Hven 2018). I am grateful to the organiser and editor of the present journal cluster Dale Kedwards for giving me the opportunity to rediscover Triklinios's fascinating *Selenography* and for his kindness and patience during the process of writing this piece. I would also like to thank the audiences at *Interstellar Skies*, the Institute for Research in the Humanities at the University of Bucharest (2018), the 51st Spring Symposium of Byzantine Studies (Edinburgh 2018) and the Summer School of Medieval Philosophy and Culture (Elena 2019) for their valuable feedback. Special thanks go to Tom McLeish who read and reread my translation of the *Selenography* and helped me understand the 'science concerning the Moon' and to Inmaculada Pérez Martín for her suggestions and continuous support. Similarly, I am grateful to the anonymous reviewers for their attentive reading and productive feedback. Finally, I could not have written this article without the generous support of the Centre for Medieval Literature (University of Southern Denmark and University of York). The initial research for this contribution was conducted as part of the project UMO-2015/19/P/HS2/02739, supported by the National Science Centre, Poland; this project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement nr. 665778.

scription of the lunar surface, thus classifying it as a work of selenology and selenography. As Demetrios Triklinios's *Selenography* is little-known (though edited in 1967 by Wasserstein) and not available in translation into a modern scholarly language, one of the main goals of the present exposition is to introduce its context and contents to the reader and to lay the foundations for their detailed study at a later stage. The present discussion will also continuously remind the reader of the richness and complexity of Triklinios's treatise. The *Selenography* introduces knowledge about Earth's oceans and relief (geography, oceanography), about the way the sunlight hits various earthly regions, thus impacting their climate and the skin colour of their inhabitants, about Alexander the Great's campaign in India, and about the properties of air and the casting of shadows. The abundance of topics and areas of knowledge the Byzantine author intertwined while explaining the movement and the appearance of the Moon raises questions about the disciplinary framework underlying his exposition. It also invites the modern reader to reflect on the discipline-specific frameworks and methodologies today's scholarship relies on when approaching Triklinios's *Selenography*. The present article does not aim to offer an exhaustive analysis of every aspect of Triklinios's treatise and, thus, it will indicate directions of further research whenever appropriate.

Students of Byzantine art have always been interested in the study of light, colour, sight and seeing. They have also inquired into the theories of perception that underpin Byzantine artistic production and the related discourses of vision and cognition based on the interpretation of visual data.[1] Most recently, historians of Byzantine art widened the scope of their research to include the experience and study of sound and soundscapes (Pentcheva, *Hagia Sophia*; Pentcheva, *Aural Architecture in Byzantium*; Gerstel *et al.*, "Soundscapes of Byzantium") and generally, there has been a renewed interest in understanding the sensory and the perceptible in Byzantium (*e.g.* Ashbrook Harvey and Mullett). In parallel, though rarely in dialogue across disciplines, historians of Byzantine philosophy have also offered accounts and analyses of the theories of perception Byzantium inherited and/or developed (Bydén, *Theodore Metochites'* Stoicheiosis astronomike 199–210; Bydén, "The Byzantine Fortuna;" Ierodiakonou). Scholars have used various ways of categorising the theories of vision available to the Byzantines and those expounded by them. Nelson, for instance, focused on the dichotomy of theories of extramission (the subject is active and drives the process of visual

1. I limit myself to two bibliographical examples that are in dialogue with each other. See Nelson; Betancourt, "Why Sight is Not Touch."

perception through the emission of effluences from the eyes) and intromission (the object is motivating the process of seeing as effluences emanating from it are transmitted to the eyes, directly or through a medium; Nelson). Similar categorisation is employed also by Ierodiakonou (Ierodiakonou). Along the same lines Betancourt points out that a number of the existing theories of vision, classical, late antique or medieval, are, in fact, interactionist to a significant degree (Betancourt, *Sight, Touch, and Imagination* 7–10). Betancourt's analysis aptly and carefully avoids a simplistic bipartition of the theories of vision and, rather than distinguishing extramissionists from intromissionists, speaks of two major groups of Byzantine thinkers influenced by either Plato/Aristotle or by Galen, that is "those who focused on the emission or reception of rays and fires and others who focused on the outpouring and operation of the optic *pneuma*" (Betancourt, *Sight, Touch, and Imagination* 9). To them he adds the geometrical accounts of vision offered by Euclid and Ptolemy, as well as the position of the atomists, without emphasising where they stand in relation to the intromission/extramission debate.

Further, ancient and Byzantine theories of vision have also been categorised according to a distinction drawn by the sources themselves, namely as explanations offered by the philosophers (natural philosophical theories, that is, pertaining to the realm of physics) and as theories proposed by the mathematicians (the understanding of sight and vision implicit to optics and catoptrics).[2] Modern scholarship has also interpreted the ancient and medieval theories of vision as specific to a discipline such as philosophy, optics or medicine (Betancourt, *Sight, Touch, and Imagination* 29–72). One important assertion Betancourt makes is that in all classical and Byzantine theories of vision discussed in his historical survey sight is mediated. Whether that happens through a transparent medium such as air and water or through effluences emitted from the eyes, the objects of sight or both, in the ancient and medieval physical universe sight happens over distance and it never involves a direct contact between the eye and its object (Betancourt, *Sight, Touch, and Imagination* 29).

Since the classical and Byzantine theories of vision conceive sight as mediated, it follows that, according to those theories, for sight to occur it is necessary that there is a direct contact between the eye and the medium, on the one hand, and the medium and the object of sight, on the other. In this sense, we should imagine an uninterrupted and clear 'line of sight,' as it were, from the eye through the medium to the object or vice versa. The ways in which one can see

2. For the role of Galen in connecting the philosophical theories of vision with the mathematical, see Ierodiakonou 166– 67. For an illuminating, for a Byzantinist at least, example of the relationship and interplay between contemporary optical and philosophical theories of vision, see the analysis in Jones. I do think that, in the spirit of Jones's piece, it is worth exploring whether Euclidean optics or optical theory in general was thought of by the Byzantine readers as akin to and compatible with physical theories of the visual rays, rather than as a geometrical abstraction detached from the explanations of the 'real life' experience of sight and seeing.

what falls out of a subject's field of vision are treated by catoptrics, the branch of optics dedicated to the study of mirrors and mirroring. Mirrors, then, add a second degree of mediation in ancient Greek and Byzantine thinking about vision. Mirrors, moreover, can produce images: different types of mirrors can magnify or diminish in scale in order to show a large and distant object entirely, within a much smaller surface, and as if it were much closer to the observer (Gerolemou 158). Mirrors and combinations of mirrors can show what is otherwise unseen, such as the back of the viewer's head. They can also redirect light and hence they can illuminate. Finally, it is the human observer, whether they look at their own reflection or the reflection of something else, and their investment in the process of reflection/creation of images that facilitates the generation of what Willard McCarty dubbed 'metaphorical catoptrics' in classical and medieval literature.[3] The theories of vision, both philosophical (physics) and mathematical (optics), together with the scientific study of mirrors and reflection (catoptrics) and the literary and metaphorical understanding of mirrors and mirroring will serve the reader in the following discussion of a late Byzantine text on lunar theory. Having positioned the *Selenography* in its historical and codicological context and having summarized its contents, I will introduce Demetrios Triklinios's theory about the Moon as a reflective surface, a celestial mirror which displays an image of the terrestrial relief and thus performs an important epistemological function, that is, it allows the observer to contemplate and study the inhabited world and its geography. Triklinios continues an ancient tradition concerning the Moon as a cartographical instrument which renders a wide-scoped albeit inverted image of the terrestrial landscape. At the same time, however, as I will argue towards the end of this article, Triklinios modifies the earlier tradition in significant ways which enable us to read the *Selenography* as an example of a political geography that argues for the centrality of the Mediterranean world.

3. See McCarty. On mentions of mirrors in middle Byzantine texts, see Papaioannou. For a rich survey and further bibliography on mirrors in medieval thought and art see Kessler. On mirrors and mirroring, not as objects or metaphors, but as a "figural dynamic," "a spatial phenomenon" and "a process for structuring a religious and poetic mode of being" in Byzantium, see Pentcheva, "Mirror, Inspiration and the Making of Art in Byzantium." For the most recent and comprehensive overview on mirrors and mirroring in European culture from antiquity to the early modern period, see the essay collection edited by Gerolemou and Diamantopoulou.

Whose Moon is it? The *Selenography* as a bricolage

Without entering into the intricate discussion of the nature of medieval authorship, I ought to clarify that, in the present article, what will be referred to as 'Demetrios Triklinios's *Selenography*' is a bricolage, a collation of several versions of the treatise of different date and including diverse, though complementary, diagrammatic material.[4] Further, in my interpretation of the *Selenography*, I will refrain from reading it as a text authored by Triklinios and accompanied by diagrams. Instead, I will argue for an alternative approach that treats it as a work whose title is a diagram and whose arrangement posits images and words on an equal footing.

Contemporary classicists, well-acquainted with Demetrios Triklinios (fl. ca. 1308–25/30)[5] and his 'editions' of Aeschylus, Sophocles, Euripides and Aristophanes, Pindar and Hesiod, have seen him as one of their own, a philologist[6] in the modern sense of the word and even more tellingly, a professional classicist. His interests beyond the realms of poetry and meter have also been documented, though not really discussed. The writing of the *Selenography*[7] and the notes found in copies of Maximos Planudes's (ca. 1255–1305)[8] recension of Aratus's *Phaenomena*, for instance, in its principal witness Edinburgh, National Library of Scotland [NLS], Adv. 18.7.15, f. 105r (ca. 1290),[9] are usually put forward as examples of Demetrios's astronomical inquiries. The manuscript evidence for Triklinios's interest in Aratus has been best documented by Jean Martin who, at the time, expressed his wish to study the extant bit of the 'Triklinian recension' more accurately at a later stage (Martin xxix–xxxiii). More recently, Jordi Pàmias Massana has argued that the excerpt preserved in Paris, Bibliothèque nationale de France [BnF], graecus 1310 comes from a Triklinian edition of Eratosthenes's *Catasterisms* (Pàmias Massana). Triklinios is also known to have revised two astrological poems attributed to Empedocles and entitled Ἐμπεδοκλέους ἀπλανῶν ἄστρων σφαῖρα and τοῦ αὐτοῦ Ἐμπεδοκλέους πλανήτων ἄστρων σφαῖρα. Finally, while Daniele Bianconi has persuasively challenged Nigel Wilson's attribution of a marginal note in the copy of Ptolemy's *Geography* preserved in Città del Vaticano, Biblioteca Apostolica Vaticana [BAV], Urbinas gr. 82 (Bianconi 114), Triklinios's autographical annotations of the *Geography* have been identified in Oxford, Bodleian Library, Arch. Selden. B. 46, thus demonstrating that he was acquainted with the work. Thus, the pattern emerging from this rather fragmentary evidence supports the idea that Triklinios sustained a systematic interest in the study of the sciences.

The edition of the *Selenography* in 1967 produced an immediate impact on two accounts; neither concerned the theories about the nature of the Moon. First, the text confirmed a pre-existing hypothesis, namely that Triklinios was a native of the city of Thessaloniki. Second, it mentioned a Thessalonian *grapheus* (γραφεύς, "scribe-painter")

4. On this point I found Boris and Nicholas Jardine's discussion of eclectic texts and the text as a *bricolage* especially useful even though the context of their inquiry is the early modern world of printed critical editions: "Another way of putting this is to say that each text is a *bricolage*, in the technical sense introduced by Claude Lévi-Strauss. That is, a text is not the work of an 'engineer,' produced *ex cathedra*, fully formed and without material or conceptual links to its historical circumstances; rather it is a piecemeal agglomeration of parts that were 'to hand' for its author, printer, compositors and engravers. This is precisely the history of *De revolutionibus*. Each text, almost down to the specific individual printed copies — certainly down to those of each penned manuscript — is a 'coming together' of disparate parts. It is therefore ironic that the modern parallel of *bricolage*, namely the eclectic edition, systematically undermines its object, namely the text as *bricolage*, destroying it by mirroring its means of construction." (Jardine and Jardine 407).

5. A good starting point for any biographical note on Triklinios is Trapp et al. *Prosopographisches Lexikon der Palaiologenzeit* (hereafter *PLP*), no. 29317. A comprehensive account of his life, scholarly and scribal activity with further bibliography is offered by Bianconi 91–118. On the relationship between Triklinios and Thomas Magistros, see Gaul, *The Twitching Shroud* 263–340 and Gaul, *Thomas Magistros*. On the relationship between Triklinios and Maximos Planudes, see Wilson 389–94; Reynolds and Wilson 66–68.

6. A reference to the label coined by Ulrich von Wilamowitz-Moellendorff in 1922 and used to designate Maximos Planudes, Manuel Moschopoulos, Demetrios Triklinios and Thomas Magistros as the four philologists of the Palaiologan period. On this point, see Smith 3; also, Gaul, *The Twitching Shroud* 265. The literature on Triklinios's literary criticism is immense.

7. Wasserstein 153–74.

8. *PLP* 23308.

9. For a manuscript description, see Cunningham 367–68. See also Pàmias Massana 19–25 and Caballero Sánchez 47–49.

"named after lightning" and possibly called John who seems to have assisted Demetrios in studying and depicting the black figure we see on the Moon.[10] The expression τὸν τῆς ἀστραπῆς ἐπώνυμον or "named after lightning" makes the identification of Triklinios's collaborator with someone surnamed Astrapas plausible. Further, it may even be hypothesized that the *grapheus* working with Triklinios belonged to the family (and workshop) of the prolific and prominent Thessalonian painters Eutychios and Michael Astrapas who decorated with frescoes a series of churches in the beginning of the fourteenth century, *e.g.*, the church of the Virgin *Peribleptos* in Ohrid (1295) and the church of Saint Niketas at Čučer (1321).[11] Thus, Triklinios's reference to a John Astrapas (?) added yet another facet to the study of one of the best-known Byzantine artistic workshops. Usually, scholars have also added to this catalogue the note found on f. 1r in the richly illustrated Venezia, Biblioteca Nazionale Marciana [BM], graecus Z. 516 (first half of the fourteenth century) which suggests that a certain *maïstor* Astrapas was the owner of this copy of Ptolemy's *Geography*.[12] The early fourteenth-century Thessaloniki and the artistic workshop of the Astrapades provide an important backdrop for Triklinios's *Selenography* and should not be dismissed.[13] Nonetheless, it is hardly possible to confirm that a John Astrapas (?) was indeed a member of the workshop. Moreover, a comparison of the two earliest manuscript witnesses preserving the *Selenography* reveals both diagrammatic and textual discrepancies which, in turn, make establishing the precise role of the scribe-painter in executing the illustrations particularly challenging as I will show in the final section of my analysis.

As stated earlier, when discussing the *Selenography*, I refer to a collation, a bricolage consisting of the versions of the work as found in its two earliest copies. The master copy of Triklinios is probably to be found somewhere at the intersection of both; at the same time, however, the differences in layout and elements of textual organisation (such as titles and subtitles) speak for the relevant autonomy behind the 'editorial' decisions of the main scribes who designed and executed both manuscripts. Therefore, next, I shall briefly introduce the manuscripts and the scribes.

BSB 482 and Neophytos Prodromenos

The manuscript containing the earliest extant copy of the *Selenography* – München, Bayerische Staatsbibliothek [BSB], graecus 482

10. See note 35.

11. On Eutychios and Michael Astrapas, see most recently Marković; Drpić 334–53; Kuyumdzhieva 496–525. I thank Ivan Drpić for his bibliographical suggestions on the Astrapades.

12. Lovino dates the codex to ca. 1320. See Lovino 385. The principal study of the manuscript and its connection to the Astrapades remains Furlan. Most recently, a doctoral dissertation dedicated to the *Marcianus* was defended at Harvard University; see Cantarella. I thank the author for sharing her work with me before its publication. The proposed association of Triklinios's collaborator with the Astrapas family has been summarized by Griebeler 85–103. Finally, it is worth bearing in mind a cautious, and rightly so, observation made by Drpić: "Since the word *grapheus* used by Triklinios can mean both 'scribe' and 'painter,' it is not clear whether this John Astrapas exercised his hand in the art of writing or in the art of painting, or perhaps in both. Although his role in Triklinios's project seems to have been primarily to provide scientific illustrations, the possibility that John was a renowned calligrapher must remain open." See Drpić 347.

13. On the study of the mathematical sciences in Thessaloniki in the thirteenth and fourteenth centuries, see most recently Acerbi and Pérez Martín 1–35.

(henceforth BSB 482)[14] – is composed of two codicological units of different date.[15] The posterior one (third quarter of the fourteenth century) contains Cleomedes's *The Heavens*, John Pothos Pediasimos's (ca. 1240–1310/14) commentary,[16] and Demetrios Triklinios's *Selenography* (ff. 92r–95v). The codex results from the scribal, editorial, and restoration activity of the scholar-scribe Neophytos Prodromenos (fl. 1329/1339–77).[17] Prodromenos collaborated with three other scribes on BSB 482 and Paula Caballero Sánchez has attributed to him also the execution of the diagrams associated with the works of Cleomedes and Pediasimos.[18] The BSB 482 layout, including the inclusion of a titular diagram, may have been derived from Triklinios's 'master copy', but there is no way of confirming or rejecting this hypothesis. What can be said, however, is that BSB 482 preserves the version resulting from the editorial efforts of Prodromenos and that it is quite probable that we owe the current arrangement to him. Thus, with a reference to the idea of the *Selenography* as a bricolage, the reader may wonder whether the *Selenography*, as found in the BSB 482, is the product of Triklinios's design or rather of that of Neophytos.

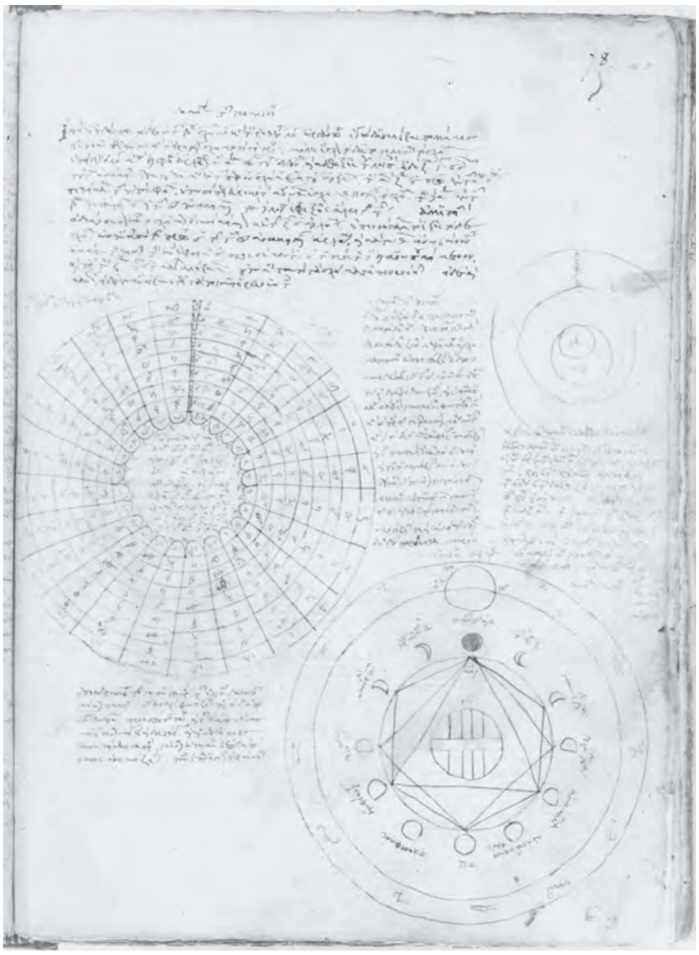


Figure 1. A circular diagram of the zodiac and the phases and aspects of the Moon, including a zonal world map. Paris, Bibliothèque nationale de France [BnF], graecus 2381, f. 78r. Photo courtesy of the Bibliothèque nationale de France, Paris.

14. A black and white digital reproduction is available here: web; accessed on 24 August 2021.

15. For a detailed description of BSB 482, see Caballero Sánchez 95–98. For the dating of the manuscript and for Prodromenos as a copyist of Aristotle, see Mondrain, "La constitution de corpus d'Aristote" 15, note 18. The oldest codicological unit (ff. 96r–172v) of BSB 482 dates to the third quarter of the thirteenth century and contains Nikomachos of Gerasa's *Introduction to Arithmetic*. This section, annotated by Prodromenos, was used to form the core to which new quires (and texts such as Cleomedes's *The Heavens*) were added in order to create what is now BSB 482.

16. *PLP* 22235. See also, Acerbi, "Byzantine Recensions" 183; and, most recently, Caballero Sánchez 21–34.

17. *PLP* 19254. On Neophytos, see, for instance Mondrain, "Copier et lire." On his scribal practices and editorial decisions in terms of layout, reference systems and decoration, see Cacouros. Finally, on another aspect of his diagrammatic program in BSB 482 illustrating Eratosthenes's procedure of measuring the Earth's circumference, see my forthcoming "Space, Place, Diagram." For the edition of the botanical lexicon attributed to Neophytos Prodromenos, see Lundström, and Mondrain, "Un lexique botanico-médical."

18. Caballero Sánchez 98.

BnF 2381 and the Anonymus

Paris, Bibliothèque nationale de France [BnF], graecus 2381, ff. 78r–79v (henceforth BnF 2381)[19] is important for the understanding of the *Selenography* on two grounds. First, it is the second earliest extant copy of the work; and second, it includes, unlike BSB 482, both the titular diagram of the lunar phases (f. 78r, figure 1) and a second diagram depicting the lunar surface and the 'dark shadow' we see on the Moon (f. 78v, figure 4). I will return to a discussion of the diagrams later on.

This paper codex was produced during the last quarter of the fourteenth century, and it is thus younger than BSB 482, but not by much. It preserves the hands of two main, contemporary scribes.[20] Eleuteri dates it to ca. 1371 based on the information contained in the astronomical tables on ff. 100r and 101r (Eleuteri 86). The analysis of the watermarks – spanning between ca. 1364–93 – also indicates a production date towards the end of the fourteenth century. The manuscript contains numerous texts, mostly on mathematics and astronomy, including Cleomedes's *The Heavens* and Triklinios's *Selenography* (ff. 78r–79v). The latter is copied by a single scribe, to whom I refer throughout this article as Anonymus. To him we owe the differences in comparison with BSB 482 in terms of layout, section titles in the body of the text and in the margins, as well as the selection of diagrams. Folio 78r (figure 1) includes the titular diagram from BSB 482, f. 92r (figure 3) and modifies it in some significant respects including its position in relation to the beginning of the *Selenography*.[21] Folio 78v, in turn, includes a diagram – possibly a version of the study of the lunar surface Triklinios and the Thessalonian *grapheus* worked on. This image (figure 4) invariably captures the imagination of scholars working on the *Selenography* today but it must be said that it is omitted from the earliest manuscript witness BSB 482. Further research is needed to answer the question as to why the diagram of the lunar surface was not copied in BSB 482 and in what ways its omission influenced the intelligibility of the related part of the text. In the meantime, it suffices to bear in mind the complexities of the preservation and transmission of the *Selenography*.[22]

In the present discussion I rely on BnF 2381 in three aspects. First, as it displays a different layout and textual organisation from BSB 482, BnF 2381 provides the necessary backdrop against which it becomes evident that the choices made by Prodromenos are deliberate and meaningful and that he could have made alternative editorial decisions. Second, BnF 2381 is the most important and earliest witness

19. A black and white digital reproduction is available here: web; accessed on 24 August 2021.

20. The most recent description of the codex is available in Caballero Sánchez 107–10. Eleuteri notes the interventions of two hands; Caballero Sánchez focuses on the hand of the scribe responsible for the copy of Cleomedes, Pediasimos and Triklinios. She associates him with the circle of the so-called 'anonymous digraphic scribe.' The latter was active in the 1380s and his hand has been recorded by Mondrain in eleven manuscripts. See, Mondrain, "Les écritures" 189–96. For the contents of BnF 2381, see Boudreaux *CCAG*, vol. VIII, 3, 43–59.

21. I provide a detailed comparative analysis of both diagrams in my forthcoming monograph.

22. At present, we know of more copies of Triklinios's treatise than those consulted by Wasserstein for the preparation of his critical edition. They are all later than the *Monacensis* and *Parisinus*, on which I rely for the present article. I have consulted those currently available through a digital reproduction and only one of them contains the second diagram depicting the lunar surface, namely the sixteenth-century Milano, Veneranda Biblioteca Ambrosiana [VBA], C 263 inf. A digital version in colour is available at Biblioteca Digitale della Veneranda Biblioteca Ambrosiana; accessed on 31 August 2021. This codex preserves both diagrams associated with the *Selenography* on ff. 302v and 304r respectively. In terms of their design, both follow the model of BnF 2381; I discuss them in my forthcoming monograph. For a comprehensive understanding of the transmission of the work (text and diagrams) and the variations in layout and textual organisation further work on the remaining manuscript witnesses is needed.

for John Astrapas's (?) study of the lunar surface which, in turn, is essential for any reading of the *Selenography*. Third, BnF 2381 provides further evidence to support the hypothesis that Triklinios was invested in equipping his texts with diagrams and illustrations. His often-mentioned autograph copy of Hesiod's *Work and Days* – Venezia, Biblioteca Nazionale Marciana [BM], gr. Z. 464 (coll. 762) dated to 1316–19 – boasts two high-quality illustrations of a young boy using mortar, and a ploughman, his cattle and tools on the opening of ff. 33v and 34r.[23] In addition to the *Selenography*, BnF 2381 also contains an excerpt from the *Hexaemeron* of Basil accompanied by a diagram (f. 66r, figure 2). Jean Martin attributed the latter to Triklinios because it is featured in the *syllogē* of Aratean material very probably compiled by the Thessalonian (Martin xxxii). The first line on the folio contains a note which refers to the diagram, its author and content: "This present diagram was conceived and its elements arranged by me in such a way that it displays the four elements."[24] Then follows the excerpt and the featured circular diagram of the four elements (clockwise: fire, air, water, and earth), each with their respective set of qualities (*e.g.*, fire is labelled as dry and hot).[25] Next on line 37 one finds the beginning of Triklinios's prolegomena to Aristophanes (f. 66r, ll. 37–58).[26]

23. A digital version in colour is available at Internet Culturale; accessed on 24 August 2021.

24. + τὸ παρὸν τοῦτο σχῆμα ἐπενοήθη καὶ διωργανώθη παρ' ἐμοῦ τοῦτον τὸν τρόπον, ἐμφαῖνον τὰ δ' στοιχεῖα.

25. A version of this diagram and accompanying note attributing it to Triklinios is preserved also on f. 311r of VBA, ms. C 263 inf.

26. περὶ σημείων τῆς κοινῆς συλλαβῆς τῶν ἐντὸς κειμένων Δημητρίου τοῦ Τρικλινίου. For an edition which, however, does not take into account the copy in the *Parisinus*, see Dindorf 43–44.

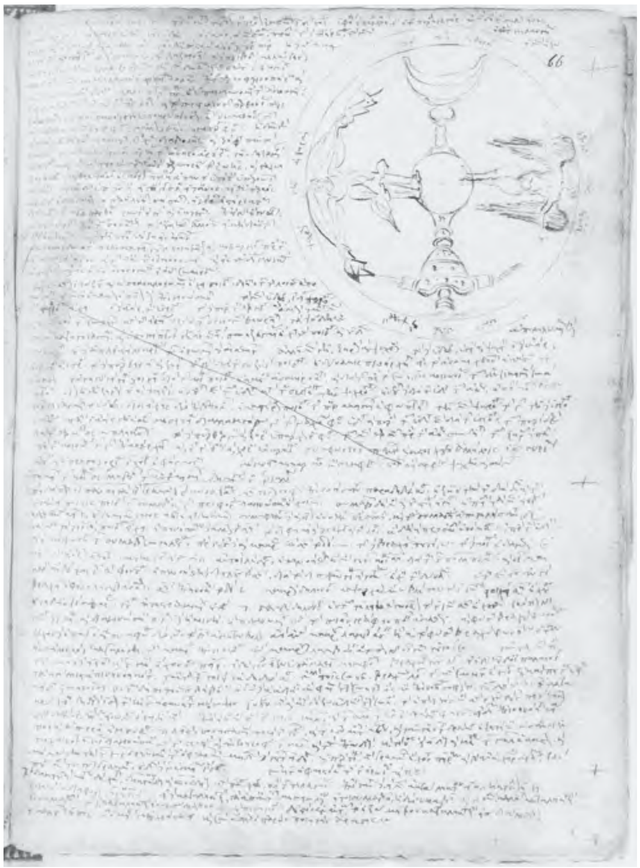


Figure 2. A circular diagram of the four elements and their physical properties. Paris, Bibliothèque nationale de France [BnF], graecus 2381, f. 66r. Photo courtesy of the Bibliothèque nationale de France, Paris.

The *Selenography*: Summary of content and diagrams

Having surveyed the available evidence concerning the role of Demetrios Triklinios (the author), John Astrapas (?) (the *grapheus* or scribe-painter), and Neophytos Prodromenos and Anonymus (the scribes-editors) in the production of BSB 482 and BnF 2381, in this section I proceed by summarising the contents of the *Selenography*.[27]

As found in its earliest copy, the BSB 482, the *Selenography* starts with a diagram of the zodiac and the lunar phases (figure 3). Just below the diagram, Neophytos Prodromenos has supplied the following subscription: "This figure was conceived and these [lines] written by *kyr* Demetrios Triklinios for the sake of explanation."[28] Next follows the main body of Triklinios's text. The first thematic unit (Wasserstein 162–63, ll. 1–50) introduces twelve lunar phases, the technical terms associated with them, and the notion of conjunction. The lunar phases are correlated with the twelve divisions of the zodiac and the passage of the Moon through it, that is, across the back-

27. At present, the most detailed summary and the most profound scholarly engagement with Triklinios's *Selenography* is still that by its editor Abraham Wasserstein, published in 1967. On Triklinios's *Selenography*, see most recently Acerbi and Pérez Martín, "Les études géométriques" 11–13 and Pérez Martín and Manolova, "Science Teaching" 102–03. The *Selenography* is briefly discussed also by Lazaris 69 and fig. 16.

28. ἐπινενόηται καὶ τοῦτο τὸ σχῆμα καὶ ταυτὶ πρὸς δήλωσιν γέγραπται παρὰ κυροῦ Δημητρίου τοῦ Τρικλινίου. On Prodromenos adding this phrase, see Acerbi and Pérez Martín, "Les études géométriques" 13.

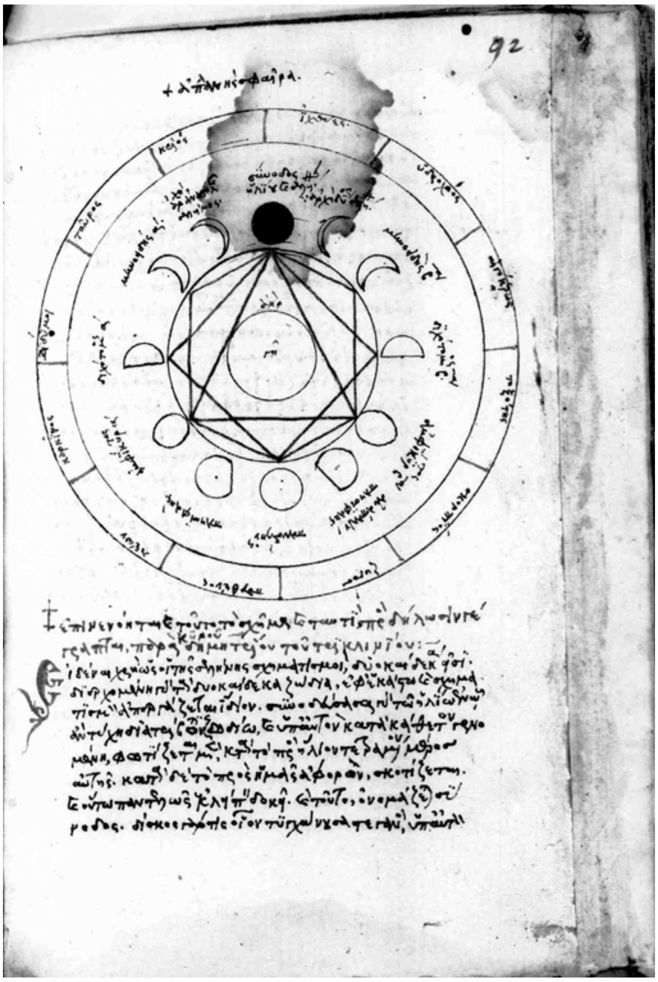


Figure 3. A circular diagram of the zodiac, the phases and aspects of the Moon. Bayerische Staatsbibliothek München, Cod. graec. 482, fol. 92r, urn:nbn:de:bvb:12-bsb00076120-5. Photo courtesy of the Bayerische Staatsbibliothek, Munich.

ground of the fixed stars. Then, Triklinios provides an explanation of the lunar aspects (ll. 51–60). Next, the Thessalonian postulates i) that the Moon lies between the elemental spheres of air and aether and is the junction of both (ll. 61–62); ii) that the Moon is a reflective and a mirroring surface (l. 62); iii) that it does receive the impressions of the Earth's relief and oceans (ll. 62–63) and iv) that we therefore see a black figure on its surface (ll. 63–64). After referring to the collaboration with the Thessalonian *grapheus* on rendering the lunar surface in a diagram, Triklinios goes on to explain that as the sea in the inhabited part of the Earth is shaped as a human figure, so too is its reflection on the Moon. Both figures have respective inverted east-west orientation as one is the reflection of the other. Further, Triklinios states that, thanks to Homer and some other geographers, we know that there is an ocean that encircles the entire Earth, whereas according to Ptolemy, there is an ocean located in the west. Their shadows are not to be seen on the Moon, as the lunar body is half the size of the Earth and therefore, its surface is not sufficiently large to display the full reflection of the terrestrial relief (ll. 64–82).

Having explained why we see a dark human shape on the lunar surface, Triklinios proceeds by describing the apparent rotation of the figure on the Moon as it traverses the sky (ll. 83–100).[29] According to him, during full moon, the figure appears standing upright at moonrise; outstretched sideways, as if lying down, at moonset; upside down, that is with feet towards the north pole, when below the horizon; and again upright and head towards the north at the next moonrise. The next section (ll. 101–35) commences with Triklinios explaining the correspondences between different parts of the black humanoid figure on the lunar surface and the known terrestrial seas, *e.g.* the sea around Cadiz corresponds to the head, the Ionian Sea is reflected by the figure's right hand, and so forth. Triklinios makes several observations about the geographical position of Cadiz and the Mediterranean, as well as of the lands inhabited by the Indians and the Ethiopians. The significance of this geo-ethnographical discussion is at least twofold. First, it testifies to the complementarity of the scientific fields of astronomy and geography in Byzantium. Second, it suggests that the rationale for Triklinios's observations of the lunar surface is geo- and therefore anthropocentric: understanding the dark figure on the Moon is meaningful as a scientific endeavour insofar as the figure is a reflection of the terrestrial oceans. Hence, by observing our (our sea's) reflection in the mirror of the Moon, we may learn about ourselves, or, in the case of Triklinios, about the position of his Mediterranean within the inhabited world.

29. Just as with the introduction of twelve lunar phases, Triklinios's observations on the apparent rotation of the markings on the lunar surface are fairly unusual and, to my knowledge, unique in the Byzantine tradition. They are closely paralleled, however, by the remarks made by Triklinios's rough contemporary the Parisian teaching master John Buridan (ca. 1300–after 1358). I explore both accounts in detail in my forthcoming monograph.

The following section (ll. 136–52) returns to the topic of the observational experiment Triklinios claims to have conducted with the help of a mirror. First, he acknowledges that he is not able to confirm whether the dark anthropomorphic figure remains on the lunar surface when the Moon is below the Earth and possibly in its shadow. Then, he details how his mirror observation might be repeated.[30] The final section (ll. 153–80) of the *Selenography* refutes the hypothesis that the dark figure on the lunar surface is a shadow cast by the air. Among the series of arguments, it is worth mentioning that here Triklinios remarks that the shapes we see on the lunar surface always remain the same and hence they cannot be shadows cast by the perpetually moving air.

The titular diagram

In the earliest extant copy of the *Selenography* – BSB 482 (third quarter of the fourteenth century), ff. 92r–95v – the treatise opens with a titular diagram (f. 92r, figure 3) rather than a heading or a sentence. The diagram depicts the twelve lunar phases defined and explained by Triklinios in the following exposition.

The titular diagram in BSB 482 (f. 92r) depicts twelve lunar phases which is by itself unusual as commonly only eight are depicted. It provides the appropriate name for each one and positions them within a spatial and temporal relationship within the zodiac and in terms of their position with respect to the Sun and the Earth. All elements of the diagram are functional in relation to the explanation provided hereafter and are easily unpacked, especially if one reads the codex in a linear fashion starting with Cleomedes's *The Heavens* and the accompanying scholia by John Pediasimos.[31] In fact, the manuscript presents several simpler diagrammatic representations of the lunar phases preceding Triklinios's text. Thus, f. 58r contains a depiction of the Moon and the Sun and two of the lunar phases accompanied by their technical labels, namely μηνοειδής ("crescent") and ἡμίτομος, the latter listed by Triklinios as διχότομος ("half full moon"). The back of the folio (f. 58v) includes a depiction of the full moon (πλήρης) as the final element in the series. Next, f. 61r lists another set of lunar phases, four this time, namely μηνοειδής ("crescent"), διχότομος ("half full"), ἀμφίκυρτος ("gibbous"), and πλήρης ("full"). Folio 62v lists four phases again, f. 63v depicts the circular path of the Moon as it revolves around the Earth, and finally, f. 64r illustrates the lunar eclipse,

30. I provide a detailed discussion of Triklinios's description of a mirror experiment in my forthcoming monograph. At this point, it suffices to draw the connection between the *Selenography* and Cleomedes's *The Heavens* II. 4.18 (I thank one of the anonymous reviewers for this suggestion!) which mentions that mirrors and bright silver objects have been used to show that the Moon is both illuminated by the Sun and illuminates the air by reflection. Cleomedes goes on to reject the possibility of the Moon illuminating by reflection, hence it is interesting to analyse the extent to which Triklinios takes his cue from *The Heavens* and the ways in which he departs from it.

31. BSB 482, like most medieval codices, does not require nor ensure a linear reading. At the same time, Prodromenos's editorial programme, including the design and placement of the diagrams across the Cleomedes-Triklinios section, suggests that the hypothesis for a continuous reading is plausible. The organization of the material in BnF 2381 is markedly different from that of BSB 482 and requires further research beyond the scope of the present article. It should be said, however, that the diagrams accompanying Cleomedes's text in the *Parisinus* (ff. 47r–62r) do not treat the lunar phases at all. A couple of cosmological diagrams (on ff. 48r and 49r), however, incorporate a zonal map of the Earth of the same type as the one featured in the *Selenography*'s titular diagram on f. 78r in BnF 2381. The later copy VBA, C 263 inf. also features a zonal map on f. 302v as part of the titular diagram. I provide a detailed analysis of the zonal maps in the *Parisinus* and the *Ambrosianus* and interpretation of their connection to Triklinios's treatise in my forthcoming monograph.

thus showing for the first time in this codex the relationship between the Earth, the Moon, and the Sun within the zodiac.[32]

This is the pre-existing visual material regarding the phases of the Moon that the reader could have been exposed to within the context of BSB 482 and before reading Triklinios's essay. As a result, the reader could have already been familiar with the shape of and the vocabulary regarding four of the lunar phases, and how each one is defined according to the Moon's position in relation to the Sun. In addition to this, Triklinios's diagram depicts twelve phases and positions them within the zodiac, thus depicting the Moon's complete movement around the Earth. The zodiac is represented in the diagram's outer register running counterclockwise. Each constellation's name is written in full, symbols and figurative depictions are not supplied. Aries (κριός) is positioned at the top thus indicating the beginning of the astronomical year. Further, Aries is aligned with the conjunction of the Moon and the Sun and the phase of the new moon in the middle register of the diagram, as well as with the labels identifying the elemental sphere of the air (ἀήρ) and the earth (γῆ) in the diagram's centre (figure 3).

One common way of reading cosmographical diagrams in Byzantine manuscripts depicting some or all of the planetary spheres involves moving from the first and outer sphere of the fixed stars (which coincides with the band of the zodiac and encompasses all other spheres) towards the innermost spheres of the Moon and the elements.[33] BSB 482, f. 92r follows the same logic which, in turn, is replicated in Triklinios's narrative. Namely, one should read the diagram starting from its outer register towards its centre. In the text, Triklinios defines first the lunar phases according to the movement of the Moon from zodiacal sign to zodiacal sign and only then moves to discuss three of the aspects of the Moon, namely sextile, quartile and trine, which are depicted as the respective geometrical shapes within the diagram's middle register. Finally, as he goes on to explain the black shadow visible on the lunar surface, the position of the Moon between the elements of air and aether plays a role in Triklinios's reasoning, as noted within the titular diagram by the indication of the sphere of air just above the Earth and below the sphere of the Moon.

In sum, the opening diagram in BSB 482 (figure 3) first builds on, synthesizes, and upgrades the knowledge concerning the lunar phases transmitted by simpler diagrammatic lists featured earlier in the manuscript. Second, it condenses the knowledge provided by the first part of Triklinios's essay dedicated to lunar phases and aspects. Third, the diagram reads from periphery to centre and thus prepares

32. See note 14 for a link to the digital reproduction of the BSB 482.

33. Such a reading proceeds from the general and all-encompassing outer sphere to the Earth positioned in the centre of the universe. The same can also be viewed as a progression from the outer and moving spheres towards the static and unmoveable Earth in the centre. The fifteenth-century codex Firenze, Biblioteca Medicea Laurenziana [BML], Plut. 86. 14, for instance, features on f. 137v a planetary diagram in which the sphere of Saturn is labelled as first and that of the Moon as seventh in order. A digital reproduction in colour is available at *Biblioteca Medicea Laurenziana*, Digital Repository; accessed on 24 August 2021. On the Laurentianus, see Caudano 1–25. Numbering and, by extension, reading a planetary diagram reversely, that is from the centre towards the periphery, is also attested, as for instance in BAV, *Vaticanus graecus* 211, f. 115v which features nine spheres. A black and white digital reproduction is available at *DigiVatLib*, The Vatican Library; accessed on 24 August 2021.

us for the second half of the *Selenography*. While discussing the black figure on the lunar surface, which mirrors and is a mirror image of the Earth's seas and oceans, Triklinios in fact directs the readers' gaze back towards the Earth, towards 'their' inhabited world and 'their' seas. Not coincidentally, this is also the part in which Triklinios describes his mirror experiment, thus narrowing his focus on the human subject, earthbound yet nevertheless able to replicate the Moon's reflective power through their art and artifice.

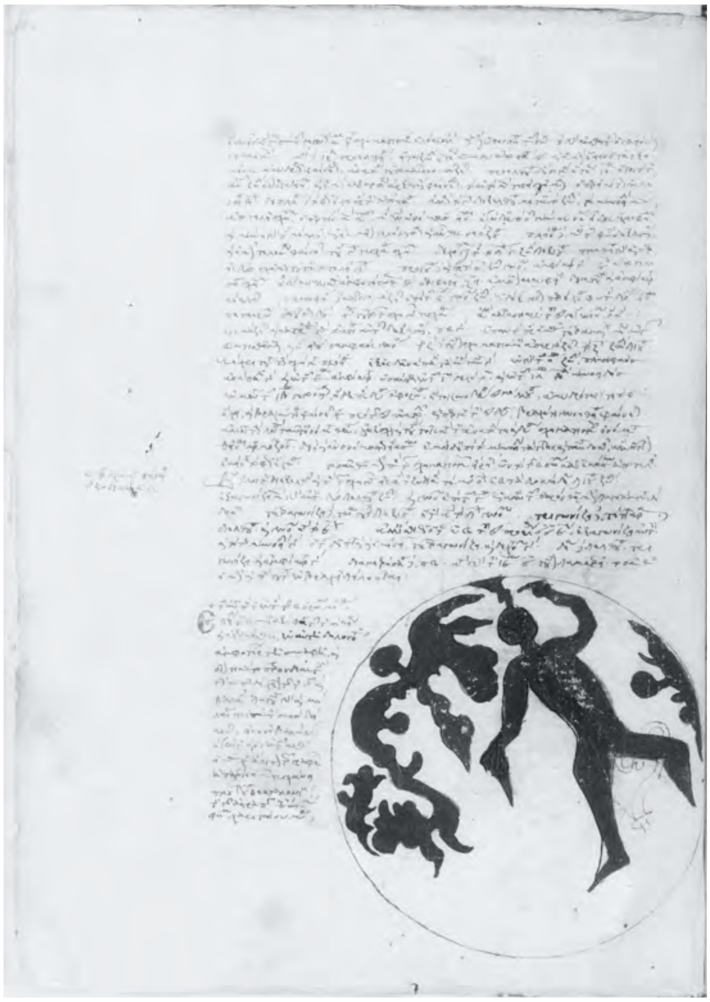


Figure 4. A diagram and a study of the dark figure on the lunar surface. Paris, Bibliothèque nationale de France [BnF], graecus 2381, f. 78v. Photo courtesy of the Bibliothèque nationale de France, Paris.

A Study of the lunar surface or 'The man on the Moon'

The initial diagram preserved in the *Monacensis* stops being functional with respect to the narrative when Triklinios moves on to describe the dark figure visible on the lunar surface:

> But they say that since the Moon lies between the aether and the air, as the evident junction of both and like a translucent mirror, it receives in itself the impressions of the Earth and the sea, for this very reason a certain dark shadow[34] manifests itself on it [the Moon]. As I have in mind the best among the scribes-painters of our time, [scribes-painters] our fatherland Thessaloniki happens to be rich in, I mean the one named after lightning and after grace,[35] what figure the dark [shape] on the Moon happens to assume sometimes, we have only just been able to discern when the air became highly transparent; so such is the dark [shape] configured on the Moon as, for instance, the form it surely assumes here in such black colour. For its [the Moon's] translucent part represents the land, whereas the dark part is an image of the sea. But while the sea in our inhabited world assumes, as you can see, the shape of a human figure and its western part extends, the other [the reflection on the Moon] is configured differently and its eastern part extends.[36]

In this passage, Triklinios introduces all elements that will play a role in the argumentation developed in the rest of the *Selenography*. First, following Aristotle and Ptolemy, he positions the Moon at the junction of the elemental spheres of air and aether. This will play a role at a later stage of his exposition when he discusses the properties of air and whether air can cast a shadow.[37] Second, Triklinios compares the Moon to a translucent mirror (οἷόν τι κάτοπτρον διαυγὲς);[38] as such, it is able to receive the impressions of the Earth and the sea, which, in turn, is the reason for the appearance of a dark figure onto the Moon.

Triklinios compares the Moon to a mirror and, in doing so, invokes a well-known tradition that is as much literary as it is scientific. In Greek literature and beyond, the image of the Moon as a mirror is among the most stable metaphoric constructs related to the Earth's heavenly companion. Its ubiquity is perhaps equalled only by the conceptualisation of the visible lunar surface as a human face, which is further characterised as bright and beautiful, thus becoming a frequent point of reference in descriptions of female beauty. Further, the idea that the Moon mirrors the relief of the Earth, and especially its outer ocean, is certainly not new in the early fourteenth century. It is already reported by Plutarch in his *Concerning the Face Which Appears in the Orb of the Moon* where the idea is ascribed to

34. Triklinios is being purposefully (?) ambiguous here as the primary meaning of σκιά denotes 'shadow' while a secondary meaning refers to 'a reflection, a mirror image.' In terms of its graphic properties and its depiction as in the second diagram in BnF 2381, f. 78v (figure 4), the anthropomorphic figure is certainly represented as a shadow rather than a reflection. The latter, traditionally, is rendered geometrically as a subject of catoptrics, rather than in pictorial and figurative terms. At the same time, one ought to bear in mind that shadows are significant in an astronomical context (consider the discussion of lunar and solar eclipses) and this is certainly the context of the *Selenography*. Triklinios's argument, however, clearly invokes and relies upon the secondary meaning of σκιά, namely that of a reflection.

35. I translate this passage with caution so as not to impose the interpretation that "the one named after lightning" (τὸν τῆς ἀστραπῆς ἐπώνυμον) is necessarily a member of the Astrapas family or that the epithet χαριτώνυμος points unequivocally to someone named John. Nevertheless, I should note that I consider this interpretation of the wordplay employed by Triklinios plausible. The interested reader may find an explanation of the name Ἰωάννης as a rendering of the Hebrew for 'grace' in John Tzetzes's *Chiliades*. According to the *Lexikon zur byzantinischen Gräzität*, the use of χαριτώνυμος and its cognates denoting "someone named John" is attested from the twelfth century onwards in Byzantine authors such as Tzetzes, Theodore Prodromos, Manganeios Prodromos and Niketas Eugenianos. At the same time, I have not been able to find the expression τὸν τῆς ἀστραπῆς ἐπώνυμον anywhere but in Triklinios's *Selenography*.

36. Wasserstein, "An Unpublished Treatise" 163–64, lines 61–73: ἀλλ' ἐπειδὴ τὴν σελήνην μεταξύ φασι τοῦ τ' αἰθέρος κεῖσθαι καὶ τοῦ ἀέρος, ἐν αὐτῇ δηλονότι ἀμφοτέρων τῇ συναφῇ καὶ οἷόν τι κάτοπτρον διαυγὲς τοὺς τύπους δέχεσθαι τῆς τε γῆς καὶ θαλάττης, διὰ τοῦτο γὰρ καὶ μέλαινά τις ἐπ' αὐτῇ σκιὰ δείκνυται. εἰς νοῦν βαλὼν ἐγώ τε καὶ ὃν ἐν τῷ καθ' ἡμᾶς χρόνῳ ἄριστον τῶν γραφέων ἡ πατρὶς ἡμῶν τυγχάνει πλουτοῦσα Θεσσαλονίκη, τὸν τῆς ἀστραπῆς ἐπώνυμόν φημι χαριτώνυμον, τί δῆποτε σχῆμα τυγχάνει τὸ ἐν τῇ σελήνῃ μέλαν, μόλις ἔσχομεν διαγνῶναι, διαφανοῦς μάλα τοῦ ἀέρος γεγενημένου, ὡς τοιοῦτό τι τὸ ἐν αὐτῇ ἐσχηματισμένον μέλαν ἐστὶν οἷον ἐνταυθοῖ τῷ μέλανι τούτῳ χρώματι αὕτη δήπουθεν ἐσχημάτισται. τὸ μὲν γὰρ διαυγὲς αὐτῆς εἰκονίζει τὴν γῆν, τὸ δέ γε μέλαν τὴν θάλατταν. ἀλλ' ἡ μὲν ἐν τῇ καθ' ἡμᾶς οἰκουμένῃ θάλαττα ἀνδρὸς ὡς ὁρᾷς ἀποτελεῖ σχῆμα, καὶ τὸ πρὸς δύσιν ταύτης ἐπέχει μέρος, ἡ δέ γ' ἑτέρα ἄλλον ἐσχημάτισται τρόπον καὶ τὸ ἑῷον ἐπέχει μέρος.

37. Postulating that the Moon is surrounded by the elemental sphere of

Clearchus (Plutarch, "De Facie" 921B).[39] An important difference between Clearchus's hypothesis and that elaborated upon by Triklinios is the identification of the water basins whose reflections are seen as dark spots on the lunar surface. According to Plutarch's account, Clearchus thought that what is seen on the Moon is the reflection of the great outer ocean. The continuity of the latter and the discontinuity of the dark patches on the lunar surface, however, form the basis for one of the arguments against Clearchus's theory listed by Plutarch. Triklinios avoids this criticism by stating that the dark anthropomorphic figure is a reflection of the Mediterranean and its adjacent seas, whereas some of the other dark spots visible on the lunar surface would correspond to water basins located further beyond. Therefore, the discontinuities between the dark lunar spots, in Triklinios's rendering of the reflection hypothesis, correspond to the land masses separating the Mediterranean from other oceans and seas (such as the world ocean in the west or the Indian ocean to the east).

It is worth noting another two major differences between the accounts of mirroring we find in Plutarch and in Triklinios. First, Triklinios's exposition describes the dark spots on the lunar surface appearing not as a human face, but as an anthropomorphic figure. The rationale behind this change is the supposed anthropomorphic shape of the Mediterranean.[40] The focus on the latter is the second notable difference between the two accounts. It could be argued that through his explanation of the dark lunar spots, Triklinios assigns to the Mediterranean a central position within the inhabited world – after all, according to the Thessalonian, its reflection is visible on the lunar surface for humankind to see. Thus, on the one hand, Triklinios elevates the status of the Mediterranean on the cosmic scale. On the other, the hypothesis expounded in the *Selenography* locks down the earthbound and Mediterranean-based (Byzantine) observer in a continuously replicating process of reflection and self-reflection. Directing their gaze upward results in seeing a reflection of themselves, as it were, the lunar mirror redirecting their gaze back upon themselves.[41]

The study of the lunar surface in BnF 2381 does indeed resemble the face of the Moon as observed from the Earth. Understanding, therefore, the function of the diagram as a mirror image of terrestrial geography (real or imagined) and also as an effect of Triklinios's theory of vision is of paramount importance to the interpretation of the *Selenography*. Further, reconstructing Triklinios's knowledge of reflection, as well as of the casting of shadows, is significant when an-

the air offers Triklinios the opportunity to discuss the phenomenon of atmospheric refraction, which, however, he does not seize.

38. For the use of the same expression in the preface to the *Book of Ceremonies*, see Papaioannou 82–83.

39. On the relationship between Plutarch's *Concerning the Face Which Appears in the Orb of the Moon* and Triklinios's *Selenography*, see ní Mheallaigh 199–200. On the doxographer Aëtius (first century CE) who also reports a theory, according to which the markings on the lunar surface are a reflection of the sea that lies beyond the torrid zone of the *oikoumene*, see ní Mheallaigh 147–49.

40. Further research is needed to trace Triklinios's source.

41. On the ancient tradition of treating the Moon as a "cartographical instrument […] mirroring back to us parts of our world that were as yet unexplored," see ní Mheallaigh 148–49 with further bibliography. The process of mirroring terrestrially bound subjectivity in Triklinios's *Selenography*, whether individual or imperial, is further complicated by Triklinios's mirror experiment which I discuss in my forthcoming monograph.

alysing the observational experiment involving the use of a large mirror he describes:

> […] when (the Moon) is below the Earth and is traversing the parts below, the head of this figure is downwards, whereas the feet appear to be looking upwards towards the pole, thus we know that this happens so with the help of a mirror, until when the Moon would arrive again above the horizon, this human-like figure stands upright as before […][42]

The analysis of Triklinios's experiment and its possible sources requires a separate detailed examination. Thus, in concluding the present article, I will discuss one final element related to the study of the lunar surface on BnF 2381, f. 78v (figure 4). The question as to how to interpret the omission of the second diagram in Neophytos Prodromenos's copy of the treatise in BSB 482 is further illuminated by a second omission in the text itself. It is worth reminding the reader that contemporary scholarship has underlined the importance of the *Selenography* as the source that, first, confirmed that Triklinios was a native of Thessaloniki and, second, provided additional evidence for the artistic activity of the Astrapades beyond the decoration of churches in the illumination of scientific manuscripts. It is therefore surprising that, with the exception of Wasserstein and his edition, no contemporary scholar has noted that this precise portion of the text, namely that which refers to the second diagram and mentions Thessaloniki and a collaborator possibly named John Astrapas (ll. 64–66), is omitted by Prodromenos in BSB 482, f. 93v. Moreover, as it does not refer to a scribe-painter, BSB 482 maintains the first person singular of the narrative (εἰς νοῦν βαλὼν ἐγώ and ἔσχον γνῶναι), whereas BnF 2381, ff. 78v–79r switches from singular to plural after introducing the scribe-painter (εἰς νοῦν βαλὼν ἐγώ and ἔσχομεν διαγνῶναι).[43] This is not to say that Triklinios's master copy did not refer to Thessaloniki or to a scribe-painter John Astrapas (?) or a second diagram depicting the lunar surface. The issue certainly merits a detailed analysis, but at present it suffices to suggest that there is a correlation between the mention of the scribe-painter in the narrative and the inclusion of the second diagram, allegedly a product of his artistry.

42. Wasserstein 164, lines 87–91: ὑπὸ γῆν δὲ γινομένης καὶ τὰ κάτω μέρη διερχομένης, ἡ μὲν κεφαλὴ τοῦ τοιούτου σχήματος κάτω, οἱ δέ γε πόδες ἄνω πρὸς τὸν πόλον ὁρῶντες δείκνυνται, ὡς ἡμεῖς διά τινος κατόπτρου τοῦθ' οὑτωσὶ γινόμενον ἔγνωμεν, μέχρις ἂν εἰς ἀνατολὰς πάλιν ἀφιγμένης ὄρθιον ὡς πρότερον τουτὶ τὸ ἀνδρῶδες γένηται σχῆμα […].

43. We find the same omission on f. 67r of the copy of the *Selenography* in BAV, *Barberinianus graecus* 16, dating to the third quarter of the sixteenth century and following the model of BSB 482. A digital reproduction in colour is available at *DigiVatLib*, The Vatican Library; accessed on 31 August 2021.

Conclusions

Demetrios Triklinios's *Selenography* showcases how intricately playful Palaiologan scientific literature could be. In it a familiar literary *topos* is conflated with ancient theory about the reflective surface of the Moon in order to bring forward the figure of the human observer equipped with their own artificial mirrors. The structure of this short treatise leads the reader from lunar theory to lunar observation. Its diagrammatic content demonstrates Triklinios's commitment to the visualisation of both visible (observable) and invisible (conceptual) cosmological principles. Mirroring is the leitmotif of the *Selenography*, and it is meaningful beyond the explanations of a mirror experiment in its second half. It is through reflection that the study of the lunar surface becomes contemplation of the terrestrial relief, and of the Mediterranean in particular. As the main premise of Triklinios's discussion is that the lunar surface mirrors that of the Earth, the text reveals not only the desire to observe a celestial object and understand its properties and movement, but also the ambition to perceive the entire world, and, by extension, Byzantium mapped out on a cosmic scale: centrally positioned and perpetually significant.

Bibliography

Acerbi, Fabio. "Byzantine Recensions of Greek Mathematical and Astronomical Texts: A Survey." *Estudios bizantinos* 4 (2016): 133–213.

Acerbi, Fabio and Inmaculada Pérez Martín. "Les études géométriques et astronomiques à Thessalonique d'après le témoignage des manuscrits: De Jean Pédiasimos à Démétrios Kydônès." *Byzantion* 89 (2019): 1–35.

Ashbrook Harvey, Susan and Margaret Mullett, ed. *Knowing Bodies, Passionate Souls: Sense Perceptions in Byzantium*. Washington, DC: Dumbarton Oaks Research Library and Collection, 2017.

Betancourt, Roland. *Sight, Touch, and Imagination in Byzantium*. Cambridge: Cambridge University Press, 2018.

---. "Why Sight is Not Touch: Reconsidering the Tactility of Vision in Byzantium." *Dumbarton Oaks Papers* 70 (2016): 1–24.

Bianconi, Daniele. *Tessalonica nell'età dei paleologi: le pratiche intellettuali nel riflesso della cultura scritta*. Paris: EHESS Centre d'études byzantines néo-helléniques et sud-est européennes, 2005.

Boudreaux, Pierre, ed. *Catalogus codicum astrologorum graecorum*, vol. VIII.3. Brussels: Lamertin, 1912.

Bydén, Börje. "The Byzantine Fortuna of Alexander of Aphrodisias' Commentary on Aristotle's *De sensu et sensibilibus*." *Jahrbuch der Österreichischen Byzantinistik* 68 (2018): 93–109.

---. *Theodore Metochites'* Stoicheiosis astronomike *and the Study of Natural Philosophy and Mathematics in Early Palaiologan Byzantium*. Göteborg: Acta Universitatis Gothoburgensis, 2003.

Caballero Sánchez, Paula, ed. *El* Comentario *de Juan Pediásimo a los "Cuerpos celestes" de Cleomedes. Edición crítica, traducción y estudio de la transmisión*. Madrid: Consejo Superior de Investigaciones Científicas, 2018.

Cacouros, Michel. "Néophytos Prodromènos copiste et responsable (?) de l'édition quadrivium–corpus aristotelicum du 14e siècle." *Revue des études byzantines* 56 (1998): 193–212.

Cantarella, Merih Danalı. *Art, Science, and Neoplatonic Cosmology in Fourteenth-Century Byzantium: The Illustrations of Marcianus Graecus 516 (=904)*. Doctoral dissertation, Harvard University, Graduate School of Arts & Sciences 2019.

Caudano, Anne-Laurence. "Cosmologies et cosmographies variées dans les manuscrits byzantins tardifs." *Byzantion* 85 (2015): 1–25.

Cunningham, Ian C. "Greek manuscripts in the National Library of Scotland." *Scriptorium* 24.2 (1970): 360–71.

Dindorf, Wilhelm, ed. *Aristophanis Comœdiæ*. Vol. IV. Oxford 1838.

Drpić, Ivan. "Painter as Scribe: Artistic Identity and the Arts of *graphē* in Late Byzantium." *Word & Image* 29.3 (2013): 334–53.

Eleuteri, Paolo. "*I manoscritti dell'opera pseudo-aristotelica* De virtute." *Scripta* 9 (2016): 73–88.

Furlan, Italo. "Il libro enciclopedico di maestro Astrapas." *L'arte di Bisanzio e l'Italia al tempo dei Paleologi 1261–1453*. Ed. Antonio Iacobini and Mauro Della Valle. Rome: Argos, 1999. 113–23.

Gaul, Niels. "The Twitching Shroud: Collective Construction of *Paideia* in the Circle of Thomas Magistros." *Segno e testo* 5 (2007): 263–340.

---. *Thomas Magistros und die spätbyzantinische Sophistik*. Wiesbaden: Harrassowitz, 2011.

Gerolemou, Maria and Lilia Diamantopoulou, ed. *Mirrors and Mirroring from Antiquity to the Early Modern Period*. London: Bloomsbury Academic, 2020.

Gerolemou, Maria. "Plane and Curved Mirrors in Classical Antiquity." *Mirrors and Mirroring from Antiquity to the Early Modern Period*. Ed. Maria Gerolemou and Lilia Diamantopoulou. London: Bloomsbury Academic, 2020. 157–64.

Gerstel, Sharon E. J., Chris Kyriakakis, Konstantinos T. Raptis, Spyridon Antonopoulos, and James Donahue. "Soundscapes of Byzantium: The Acheiropoietos Basilica and the Cathedral of Hagia Sophia in Thessaloniki." *Hesperia: The Journal of the American School of Classical Studies at Athens* 87.1 (2018): 177–213.

Griebeler, Andrew. "How to Illustrate a Scientific Treatise in the Palaiologan Period." *Late Byzantium Reconsidered: The Arts of the Palaiologan Era in the Mediterranean*. Ed. Andrea Mattiello and Maria A. Rossi. London: Routledge, 2019. 85–103.

Ierodiakonou, Katerina. "Byzantine Theories of Vision." *A Companion to Byzantine Science*. Ed. Stavros Lazaris. Leiden: Brill, 2020. 160–76.

Jardine, Boris and Nicholas Jardine. "Critical Editing of Early-modern Astronomical Diagrams." *Journal for the History of Astronomy* 41 (2010): 393–414.

Jones, Alexander. "Peripatetic and Euclidean Theories of the Visual Ray." *Physis* 31 (1994): 47–76.

Kessler, Herbert L. "Speculum." *Speculum* 86 (2011): 1–41.

Kuyumdzhieva, Margarita. "Триликият ангел и триликият Христос [Trilikiyat angel i trilikiyat Hristos; The Three-headed Angel and the Three-headed Christ]." *Laudator temporis acti. Studia in memoriam Ioannis A. Božilov. Vol II: Ius, imperium, potestas, litterae, ars et archaeologia*. Ed. Ivan A. Biliarsky. Sofia: Izdatelska kăshta "Gutenberg", 2018. 496–525.

Lazaris, Stavros. "Scientific, Medical and Technical Manuscripts." *A Companion to Byzantine Illustrated Manuscripts*. Ed. Vasiliki Tsamakda. Leiden: Brill, 2017.

Lovino, Francesco. "Un miniatore nella bottega degli Astrapas? Alcune osservazioni attorno alle immagini del Tolomeo Marciano Gr. Z. 516 (904)." *Hortus Artium Medievalium* 22 (2016): 384–98.

Lundström, Vilhelm. "Neophytos Prodromenos' botaniska namnförteckning." *Eranos* 5 (1903–04): 129–55.

Manolova, Divna. "Space, Place, Diagram: Cleomedes and the Visual Program of Munich, Bayerische Staatsbibliothek, Graecus 482." *The Diagram Paradigm: Cross-Cultural Approaches*. Ed. Jeffrey F. Hamburger, David Roxburgh, and Linda Safran. Dumbarton Oaks Byzantine Symposia and Colloquia. Cambridge, MA: Harvard University Press, forthcoming.

Marković, Miodrag. "The Painter Eutychios – Father of Michael Astrapas and protomaster of the Frescoes in the Church of the Virgin Peribleptos in Ohrid." *Zbornik Matice srpske za likovne umetnosti* 38 (2010): 9–34.

Martin, Jean, ed. *Scholia in Aratum vetera*. Stuttgart: B.G. Teubner, 1974.

McCarty, Willard. "The Shape of the Mirror: Metaphorical Catoptrics in Classical Literature." *Arethusa* 22 (1989): 161–95.

ní Mheallaigh, Karen. *The Moon in the Greek and Roman Imagination: Myth, Literature, Science and Philosophy*. Cambridge: Cambridge University Press, 2020.

Mondrain, Brigitte. "Copier et lire des manuscrits théologiques et philosophiques à Byzance." *Byzantine Theology and Its Philosophical Background*. Ed. Antonio Rigo. Turnhout: Brepols, 2011. 87–107.

---. "La constitution de corpus d'Aristote et de ses commentateurs aux XIII[e]–XIV[e] siècles." *Codices manuscripti* 29 (2000): 11–33.

---. "Les écritures dans les manuscrits byzantins du XIVe siècles. Quelques problématiques." *Rivista di studi bizantini e neoellenici* 44 (2007): 157–96.

---. "Un lexique botanico-médical « bilingue » dans le *Parisinus gr.* 2510." *Lexiques bilingues dans les domaines philosophique et scientifique (Moyen Âge – Renaissance)*. Ed. Jacqueline Hamesse and Danielle Jacquart. Turnhout: Brepols, 2001. 123–60.

Nelson, Robert S. "To Say and to See: Ekphrasis and Vision in Byzantium." *Visuality Before and Beyond the Renaissance: Seeing as Others Saw*. Ed. Robert S. Nelson. Cambridge: Cambridge University Press, 2000. 143–68.

Pàmias Massana, Jordi. "El manuscrito *Edimburgensis* Adv. 18.7.15 y los *Catasterismos* de Eratóstenes." *Faventia* 26.1 (2004): 19–25.

Papaioannou, Stratis. "Byzantine Mirrors: Self-Reflection in Medieval Greek Writing." *Dumbarton Oaks Papers* 64 (2010): 81–101.

Pentcheva, Bissera V., ed. *Aural Architecture in Byzantium: Music, Acoustics, and Ritual*. London: Routledge, 2017.

---. *Hagia Sophia: Sound, Space, and Spirit in Byzantium*. University Park, PA: Pennsylvania State Press, 2017.

---. "Mirror, Inspiration and the Making of Art in Byzantium." *Convivium* 1.2 (2014): 10–39.

Plutarch. *Moralia, Volume XII: Concerning the Face Which Appears in the Orb of the Moon. On the Principle of Cold. Whether Fire or Water Is More Useful. Whether Land or Sea Animals Are Cleverer. Beasts Are Rational. On the Eating of Flesh.* Translated by Harold Cherniss, W. C. Helmbold. Loeb Classical Library 406. Cambridge, MA: Harvard University Press, 1957. 34–223.

Pérez Martín, Inmaculada and Divna Manolova. "Science Teaching and Learning Methods in Byzantium." *A Companion to Byzantine Science*. Ed. Stavros Lazaris. Leiden: Brill, 2020. 53–104.

Reynolds, Leighton D. and Nigel G. Wilson. *Scribes and Scholars: A Guide to the Transmission of Greek and Latin Literature*. Second and revised edition. Oxford: Clarendon Press, 1975.

Smith, Ole Langwitz. *Studies in the Scholia on Aeschylus. I: The Recensions of Demetrius Triclinius*. Leiden: Brill, 1975.

Trapp, Erich, Rainer Walther, Hans-Veit Beyer and Christian Gastgeber, ed. *Prosopographisches Lexikon der Palaiologenzeit*. Vienna: Verlag der Österreichische Akademie der Wissenschaften, 2001.

Wasserstein, Abraham. "An Unpublished Treatise by Demetrios Triklinios on Lunar Theory." *Jahrbuch der Österreichischen Byzantinistik* 16 (1967): 153–74.

Wilson, Nigel G. "Planudes and Triclinius." *Greek, Roman and Byzantine Studies* 19.4 (1978): 389–94.

VICTORIA FLOOD

Johannes Kepler's *Somnium* and the Witches' Night-Flight[1]

Abstract

This article explores the uses of the witches' night-flight in Johannes Kelper's *Somnium* (1634). It situates Kepler's engagement with the motif in the broader context of debates on the reality of the night-flight among early modern witch theorists, including Kepler's contemporary and friend, Georg Gödelmann. It proposes that Kepler understood the night-flight as a phenomenon with a disputed reality status and, as such, an appropriate imaginative space through which to pursue the thought experiment of lunar travel. Consequently, it suggests that we ought not to dismiss Kepler's engagements with the figure of the witch as a vestigial medieval superstition (itself a problematic contention), but rather an interest characteristic of his age, and that we might find in the speculations of witch-theory the very beginnings of science fiction.

1. With thanks to the intellectual generosity of Dale Kedwards, and the anonymous reviewers of this article – needless to say, any errors that remain are my own.

Johannes Kepler's *Somnium* is a short thought experiment, originally conceived as a student dissertation at Tübingen in 1593, reworked with the addition of a narrative frame in 1609, with extensive notes added by 1630, and published posthumously by Kepler's son-in-law in 1634. It transports an observer to the moon from where the motions of the earth are visible to the inhabitants of this strange new world. A humorous demonstration of Copernicanism, the *Somnium* is presented by Kepler in his notes as in part a scholarly joke – to any observer, the world on which they stand appears to be the centre of the universe. The work is centred also on the impossibility of direct experiential proof of Copernicus's thesis (the astronomer, after all, does not live among the stars), and explores Copernican principles through a flight of the imagination. This is literalised through a frame which recounts the flight of a daemon from the earth to the moon.

Kepler's juxtaposition of the scientific and the d(a)emonic has sat curiously with twentieth and twenty-first-century commentators, and the *Somnium* has often been located in a broader narrative of scientific progress, a point of rupture with the pre-rational superstitions of pre-modernity. In the introduction to his English translation of the *Somnium,* Edward Rosen locates Kepler in just such a transitional moment:

> The *Dream* was not the only book in which Kepler covered his contributions to science with unconventional wrappings repulsive to many readers. But the greatest minds of the succeeding generations tore those wrappings apart and benefited from Kepler's discoveries. In those days acknowledgement of such indebtedness was not the universal practice. To track down the influence of Kepler's *Dream* on the soaring scientific advances of the later seventeenth century would throw added light on the tortuous process by which the modern mind came into being. (Rosen, *Kepler's Somnium* xxii; hereafter *Dream*)

Rosen's 'unconventional wrappings,' which obscure Kepler's contribution to, and yet are part of the painful formation of, 'the modern mind', are the narrative frame of the *Somnium*. Kepler recounts his dream of an old book which tells the story of Duracotus, the son of the Icelandic witch, Fiolxhilde. In childhood, Duracotus is sold by his mother to a trader in a fit of rage, following his destruction of her magical herbs. Duracotus travels across Scandinavia and spends a time with Tycho Brahe at his observatory on Hven (like Kepler himself), prior to his return to Iceland and reunion with his mother. In Iceland Fiolxhilde tells Duracotus of her own travels with a daemon who can rapidly traverse great distances and take a human devotee anywhere on earth, and even as far as the moon. The two summon Fiolxhilde's daemon and an account of the lunar flight follows, preceding a description of the moon and the motions of the earth. In his notes Kepler clarifies the allegorical function of the work: that the daemon is to be interpreted as the spirit of astronomy and the twenty-one occult symbols by which Fiolxhilde summons him are "astronomia Copernicana" (Copernican astronomy) (Kepler, *Somnium* 36; *Dream* 51).

Although in subtler terms than those proposed by Rosen, discussion of the framing narrative of the *Somnium* has for the most part similarly situated the author at a historical interstice. The supernatural frame of the *Somnium* is often read in relation to its apparent tension with Kepler's use of scientific discourses more recognisable to modern eyes.[2] Most influentially, we might note Dean Swinford's study of Kepler's engagement with medieval supernatural elements (most notably, the Neoplatonic or mystical dream vision), which Swinford understands as a productive point of tension; a tool for thought

2. Lambert 66–105 (with a brief discussion of Kepler's folkloric engagements 79–80); Swinford, *Daemon's Gate*. The distinction made between Kepler's scientific and folkloric interests finds one of its earliest articulations in Nicolson, *Science and Imagination* 74, 77; Nicolson, *Voyages* 67–70.

and point of origin for the scientific *fabula*, that is, early science fiction.[3] Yet Kepler's daemon and the narrative possibilities it traces appear to me to be the product of another discourse altogether – one which was by no means at odds with the scientific interests of Kepler's age. I refer to what Sydney Anglo calls "the literature of witchcraft", material which although it certainly has its precursors in medieval demonology and theology is not medieval *per se* (Anglo, 1–31, esp. 2). The age of the witch-theory (and witch hunting), after all, is situated most fully not in the medieval but in the early modern period.

The central conceit of Kepler's allegory rests on the witches' night-flight, a feature of early modern witch treatises, which attracted considerable attention in the late sixteenth and early seventeenth centuries from both witch-sceptics and proponents of orthodox witch-theory, both Protestant and Catholic. Discussion of witchcraft, as it related to the workings of demons, was situated within the study of natural philosophy as a mainstream component of early modern European intellectual culture.[4] A surfeit of demonological and witch treatises were written, published, and circulated in Germany and the Empire in the period in which Kepler was active, and the following article does not aim to be exhaustive. Rather, it touches on those works and authors which are cited in the *Somnium*, were produced within Kepler's circle, or are known to have been particularly influential in early modern Europe. Sources and analogues proposed are for the most part intended as initial points of exploration. Although distinct from the flying machines that we find in other early modern imaginings of the lunar passage, such as those by Frances Goodwin or Cyrano de Bergerac, we might similarly understand Kepler's engagement with the witches' night-flight as the use of available analogies and metaphors that Ladina Bezzola Lambert has suggested were fundamental to early modern astronomical imaginings.[5] Yet the *Somnium* rests not on a literary metaphor but on a live subject of debate in contemporary legal and theological culture, explicitly associated with the boundaries of fact and fiction.

Kepler's engagement with witch-material has been most fully treated on the biographical level. His explanation of his representation of Fiolxhilde in his notes is often read in relation to the charges faced by his mother Katharina Kepler, between 1615 and 1622, for *maleficium*.[6] A quick-tempered woman, who appears to have made powerful enemies, and who, what is more, spent her childhood in the care of an aunt prosecuted for witchcraft, Katharina's case was a difficult one, and Kepler was heavily involved in her defence. He makes a num-

3. Swinford, *Daemon's Gate* 105. See further, on the intellectual contexts of Kepler's work, including his engagement with Plutarch and Lucian, Christianson 79–90. Christianson's is notable as an account which situates Kepler's mother's trial in relation to the author's intellectual life without the distinction between science and superstition that we find elsewhere, although this account is not concerned with witch-theory as such.

4. The fullest discussion of the relationship between witchcraft and science in the long period 1450–1700 is in Clark, *Thinking with Demons* 151–311. See also Clark, "Scientific Status" 351–74.

5. Lambert. See further, Nicolson, *Voyages* 69–70, which notes that Kepler's *Somnium* was written in a different tradition than, for example, Frances Goodwin's *The Man in the Moone* (1638), in which the protagonist travels to the moon in a flying machine pulled by wild swans, and Francis's article in this issue.

6. The fullest account of the trial of Katharina Kepler in relation to Johannes Kepler's biographical and intellectual contexts is Rublack. For a brief assessment of Kepler's allusions to witchcraft in the *Somnium* see Rosen, "Kepler and Witchcraft Trials." While Rosen understands Kepler's engagement with witch-theory as minimal, my analysis suggests that this interest is a far more pervasive, indeed structuring, presence throughout the work.

ber of direct allusions to his mother's trial, and certainly appears to have understood his construction of Fiolxhilde to have influenced the charges met by Katharina. He writes that her case, and his thesis, set the barbershops of Tübingen (a notable site of gossip) alight with rumour (Kepler, *Somnium* 32; *Dream* 40). However, there is more of interest as regards Kepler's demonological engagements than biographical parity alone. This article explores the cultural meanings that underpin Kepler's representation of Fiolxhilde and her daemon, and the central role of the witches' night-flight in Kepler's imagining of the lunar passage. It suggests that if we seek to read Kepler in relation to the genre tropes and contexts of early science fiction, we find this most illuminatingly in his negotiation of official and unofficial cultures – not simply in relation to the Copernican controversy but the witch and her d(a)emon as they appear in contemporary witch-theory.[7]

7. For this tension in relation to early science fiction see Suvin 103. Suvin aligns Kepler with a broader movement after Copernicus, by which science fiction, as we find throughout its history, was predicated on expulsion from "official" culture, specifically in terms of its interest in inter-planetary travel in an intellectual context which broadly rejected the full implications of Copernicanism. See further Swinford, "The Lunar Setting" 36; Evans 165–66.

1

Although this approach runs the risk of writing a footnote to a footnote, it is within Kepler's own endnotes to his *Somnium* that analysis of his engagement with witch-theory must begin, for it is here that he makes explicit notice of his use of the witches' night-flight. In note 60 Kepler makes an overt reference to transvection, the demonic movement of a body or object from one place to another, as a feature of contemporary witchcraft cases, employed as an analogy for the flight to the moon with which the *Somnium* is concerned:

> Si verum est, inquam, quod de Sagis tradunt pleraque tribunalia, quod illæ transportentur per aerem: erit forte & hoc possibile, vt corpus aliquod terris divulsum importetur in Lunam.
>
> (If it is true, as most courts hold with regard to witches, that they are transported through the air, I say that maybe it will be possible, also, for some body to be violently removed from the earth and carried to the moon) (Kepler *Somnium* 40, early modern orthography retained; *Dream* 65)

The reality status of the night-flight occupies a prominent place in what Stuart Clark has termed the "methodological doubts" about the evidence mobilised in support of witch-prosecutions, which coloured the witch-scepticism that emerged with particular force in Germany in the late sixteenth century. The broad timeframe of Kepler's work on the *Somnium* sits particularly interestingly in relation to this movement. The narrative frame of the project was added in 1609 when the influence of the sceptical work of Johann Weyer (*De Praestigiis Daemonon*, 1563) was still relatively strong; with notes added in the period of Weyer's waning influence, when sceptical authors were less concerned with the classification of witch-phenomena than the legality of the trials themselves.[8] I suggest that throughout the development of his work Kepler was alert to the controversies surrounding the night-flight, in relation to which his caveat "si verum est" (if it is true), sits suggestively, as does his location of the phenomenon, and its uncertainty, in the broader context of the contemporary legal system.

8. For an account of German scepticism during this period see Clark, *Thinking with Demons* 203–10; Clark, 'Glaube und Skepsis'.

As an analogue to his dream of lunar travel, and indeed, a conceptual aid to the reader, it need not necessarily have mattered for Kepler whether the phenomenon was understood to be real or imaginary: demonic transvection was part of the broader cultural vocabulary available to him for representing flight. Yet he may very well, I suggest, have been thinking with the controversy itself. Within Kepler's circle was the Protestant jurist Georg Gödelmann, who in the third book of his *Tractatus de Magis, Veneficis et Lamiis* (1601) situated the more apparently fantastical dealings of witches with demons beyond the purview of the law.[9] Among this, he included the flight of the witch (the *lamia*). Critiquing the orthodox position concerning the reality of the witches' night-flight, he writes:

9. For an account of Gödelmann's position, see Lorenz; further, Clark, "Protestant Demonology" 75.

> cum autem haec de corporali volatu & baiulatione Lamiarum in aere, & comessationibus cum suis Dæmonibus, nocturnisque tripudiis, nullis critiriis, sive normis certitudinum, notitiis videlicet communibus, universali experientia, Syllogismi bona consequutione, vel verbo Dei expresso [...] sint confirmata.
>
> ('Moreover, these [accounts] of bodily flight and carrying of witches through the air, and feasting with their demons and nocturnal dances, might be proven by no criteria, or standard of certainties, common notices, universal experience, honest investigation of syllogism, or plain word of God.) (Gödelmann, *Tractatus* Lib. II, Cap. IV, § 14, early modern orthography retained)

For Gödelmann the reality of the night-flight is discredited by its association with classical precedents invoked elsewhere by orthodox witch-theorists, the fauns and nymphs of Virgil, and by its apparent affinities with medieval romance content, such as the flight of the serpentine fairy, Mélusine (Gödelmann, *Tractatus* Lib. II, Cap. IV, § 15, 17). Of those who believe in the reality of such encounters, Gödelmann writes, "eas in profundum somnum incidere, & a Diabolo forti quadam imaginatione phantasiis eiusmodi occupari" (they fall into a deep sleep, and by the power of the devil certain people are overcome by imagination and fantasy of this sort, Gödelmann, *Tractatus* Lib. II, Cap. IV, § 15). The delusions of old women deceived by demons, Gödelmann suggested that these cases might be a matter for medical treatment or religious counsel rather than legal prosecution.

Gödelmann was indebted to an influential vein of scepticism put forward in Weyer's *De Praestigiis*.[10] The witches' night-flight is presented by Weyer as a prime example of a demonic trick practiced upon old women:

> uti fere omnes illarum praeter naturam actiones, imaginariæ saltem uidentur: & propterea questionibus adactæ, flammisquæ propinquæ, sua aperte confitentur flagitia, per somnum uel simulachrum illis solummodo cognita. Idipsum confirmatur in Decretis, ad hunc modum. Quædam mulierculæ inseruientes satanæ, dæmonum illusionibus seductæ, credunt se alia nefanda quoque agere, puta paruulos a lacte matris auellere, assare & comedere: domi per caminos seu fenestras intrare, & habitantes uarijs modis inquietare.
>
> (Almost every one of those deeds contrary to nature seems to be imaginary, so that when questioned and close to the flames they openly confess faults they know only through dream or apparition. The same thing is confirmed by the Decretals. Certain weak foolish women, servants of Satan, seduced by the devil's illusions, think they can perform many other wicked acts, like tearing babies from their mother's breasts, roasting them and eating them; or entering houses by chimneys or windows in order to harass the inhabitants in various ways). (Weyer, *De Praestigiis Demonum* 219–20, early modern orthography retained; translation modified from Monter, *European Witchcraft* 44)

In his critique of the reality of the flight, Weyer draws on an important piece of medieval canon law: the *Canon Episcopi*, which denounces the belief of certain wicked women, seduced by the illusions of demons and by phantoms ("demonum illusionibus et fantasmatibus seduc-

10. For a brief discussion of Gödelmann's debt to Weyer, see Clark, *Thinking with Demons* 203–04.

tae"), that they had ridden (or flown) by night on beasts in a hunt with Diana or Herodias, traversing great distances.[11] This first appears in Regino of Prüm's *Libri de synodalibus causis* (c. 906 CE), and in the twelfth century was integrated in Burchard of Worms's *Corrector*, and subsequently Gratian's *Decretum* – the standard textbook for canon law across medieval Europe. It is this body of canon law to which Weyer refers, "confirmatur in Decretis". The *Canon* was influential among proponents of the sceptical position: Gödelmann quotes it similarly as a point of confirmation (*Tractatus* Lib. II, Cap. IV, § 26).

As is conventional across works of European witch-theory, Weyer's representation of the night-flight combines Diana's hunt with the violent domestic disruptions of the classical *strigae*.[12] This is in keeping with Weyer's immediate source (and named point of critique), the *Malleus Maleficarum* (1486), the witch-hunting manual of Heinrich Kramer, also known as Henricus Institoris (Heinrich the inquisitor), co-written with another Dominican inquisitor, Jacob Sprenger.[13] Perhaps the single most influential codification of orthodox witch-theory, the *Malleus* represents an important vehicle for the concept of the night-flight in early modern Europe. Thirteen editions were published between 1487 and 1520, and sixteen between 1547 and 1669, and while the print runs were not large, editions circulated in the major cities of Germany, France, and Italy (Peters, "The Medieval Church" 238–41). Although the rampant misogyny of the work has been understood as the stuff of paranoid fantasy, the *Malleus* (although certainly representative of a paranoid antifeminism) was concerned with what its authors understood to be material realities. The worldview of the *Malleus* is rooted in the Thomist natural philosophy of its age, concerned with the limits of demonic causation within nature and the distinction between demonic illusions and demonic effects.

The challenge of the *Canon Episcopi* is pre-empted in the very first *quaestio* of the *Malleus* (written in scholastic form, the work details oppositions prior to constructing propositions). Of Diana's company, Institoris argues that "et quia sepe fantastice et imaginarie talia solummodo fiunt, ideo et illi errantes de omnibus aliis effectibus ita fieri iudicant" (adherents of the error think that because it is stated that such things happen only fantastically in the imagination, that is the case with all other effects) (*Malleus,* i, 219; ii, 45). Although the flight of the *Canon Episcopi* is a demonic imagining, this does not impugn the reality of the witches' night-flight. Within the worldview of the *Malleus* the night-flight is a material effect achieved through the activities of demons acting within the bounds of nature. Institoris poses

11. *Corpus Juris Canonici* 1030. My translation. See also, MacNeill and Gamer 331; Kors and Peters 189. The meaning of the second name given in the *Canon,* Herodias, remains obscure – it has been suggested, variously, that it is a reference to a Germanic deity, or the biblical wife of King Herod. See further, Peters, *The Magician* 71–78.

12. We find an early example of this combining in John of Salisbury's treatment of the *Canon Episcopi* in his *Policraticus.* This appears in the context of a warning against the political interpretation of dreams, and the *Canon Episcopi* is invoked as a demonstration of the foolhardiness of belief in their revelatory power. John of Salisbury, *Policraticus* 87. Although John of Salisbury's engagement with the potentially deceptive power of dreams has been discussed as a precedent for Kepler, as far as I am aware, the common engagement of both with material related to the *Canon Episcopi* has not been noted. For the former, see Swinford, *Daemon's Gate* 69–90.

13. Throughout this article, I refer to the primary author of the work as Institoris. For an overview of controversies, and evidence, concerning the work's authorship, see *Malleus* i, 103-21.

that the seemingly supernatural movement of objects is a result of the local application of the demon's powers with God's permission: "potest deo permittente res localiter mouere et ex rebus coniunctis dolerem vel aliquam qualitatem producere" (with God's permission he has the power to move objects in location or to bring about some quality) (*Malleus* i, 228; *Malleus* ii, 56).[14] Demons act within natural laws but while they can extend them, they cannot break those laws. This rests on a familiar early modern distinction between *miracula,* which suspend natural laws, and *mira,* wonders which only appear to do so (Clark, *Thinking with Demons* 154). Demons can act on, or move, objects, but they cannot change their underlying composition: animal transformation, for example, is understood in the *Malleus* as a demonic illusion, conceptualised as the demonic movement of images in the imagination rather than material change (*Malleus*, i, 434–38; *Malleus*, ii, 282–88).

As Clark has observed, witch-belief and witch-scepticism were by no means two discrete intellectual positions: both were concerned with the question of what is, and is not, possible in terms of demonic effect within nature. Individual theorists engaged with a process of deliberation underpinned by a common rationale: the differentiation between demonic and non-demonic illusions, and demonic and non-demonic material effects. In the writings of different theorists, we encounter different limits – perhaps with the exception of Jean Bodin, who in his response to Weyer deemed that nothing is impossible for demons; and the sceptic, Reginald Scot, for whom everything was (Clark, *Thinking with Demons* 195–213). Indeed, Weyer's critique of the reality of the night-flight does not appear to be a critique of transvection in and of itself, but rather the mechanism of flight as represented in the *Malleus*: the application of an ointment made from unbaptised infants. Weyer notes that such a natural property cannot be sensibly ascribed to the flesh of dead children (*De Praestigiis Demonum* 219; an argument used by Gödelmann also, in *De Tractatus*). Notably, Kepler's understanding of transvection (although expressed in the conditional) depends on the same natural philosophy put forward in the *Malleus*: the witch does not achieve flight through her own powers but through the powers of a demon exercised within natural limits.

There is no evidence of Kepler's overt witch-scepticism in the *Somnium* or indeed elsewhere in his writings.[15] Although in his earliest letter treating the accusations against his mother Kepler expresses the possibility that confessions concerning the demonic pact may be delusions produced under fear of torture, he does not appear to reject the phenomenon altogether; and (as far as I am aware) he leaves us no ac-

14. This phrasing is rooted in a scholastic adaptation of Aristotle's views on matter, where changes in category are referred to as 'motion'. As Makay notes, "This leads to the frequent use in the *Malleus* of the (now) odd-sounding expression 'move in location' (*movere localiter* or 'loco-motion') to specify change in the category of 'position'." *Malleus* i, 30.

15. John Lear suggests that the *Somnium* "made amply clear [Kepler's] disbelief in the existence of witches". *Kepler's Dream* 36, n. 71. This perception, articulated in a footnote, is not borne out in Lear's analysis itself, and, as Lear notes, Kepler does not question the reality of the crime in his letters (Lear understands this to be a "politic" position). For a critique of Lear, see Rosen, "Kepler and Witchcraft Trials".

count of his thoughts on the night-flight beyond the *Somnium.*[16] However, Kepler did seem to be familiar with the controversy surrounding the night-flight and its association with dreams: of course, Kepler's use of the witches' night-flight, and the closely analogous lunar passage, is in the context of a dream. He writes of the preferences of Fiolxhilde's daemon in terms strikingly similar to Weyer's and Gödelmann's victims of demonic dreams (the success of the Weyerian position lives or dies depending on the profile of the witch as an elderly woman, a perception in keeping with the stereotypical witch of the *Malleus*):

> inprimis nobis aptæ sunt vetulæ exsuccæ, quibus inde a pueritia trita est ratio, hircos nocturnos, aut furcas, aut trita pallia inequitandi, trajiciendique per immania terrarrum spacia.
>
> (We especially like dried-up old women, experienced from an early age in riding he-goats at night or forked sticks or threadbare cloaks, and in traversing immense expanses of the earth.) (Kepler, *Somnium* 5; *Dream* 15)

Although this description is largely conventional (indeed, so conventional by this period that we might understand it to be unsourced), Kepler's description of the night-flight comes very close to that found in Gödelmann. In *De Tractatus* we read of a popular belief in the night-flight of witches on the Calends of May to the Blocksberg, also known as Hexberg (Witch Mountain), with demons in the form of goats and other animals:

> lamias totius Germaniæ certis unguentis illitas, noctu Calendar Maii in montem Bructerorum, vulgo Blocksberg & Hexberg partim a familiaribus suis dæmonibus & amasiis qui præstigiosam formam hirci, porci, vituli & similis animalis induunt, brevissimo temporis spacio baiulari, partim furca, baculo, aliove instrumento vehi, & deinde noctem totam ludis, jocis, comessationibus & choreis, cum amasiis suis consumere.
>
> (The witches of all Germany are anointed with a certain ointment, by night on the Calends of May on Mount Bructerorum, commonly called Blocksberg and Hexberg, some carried in the shortest space of time by their familiar demons and lovers who are magically disguised in the form of he-goats, pigs, calves and similar animals, others conveyed by fork, broomstick, or other tools, afterwards to spend all night with

16. Like the night-flight the demonic pact of the witch was an object of scepticism for Weyer, who held it to be a material reality only in association with clerical, male, practitioners of magic, but otherwise, a demonic delusion. In his letters, Kepler suggests that the pact may be delusory in confessions made under the conditions of torture, but there is no evidence of his rejection of the construction as a whole. Weyer, *De Praestigiis Demonum* 219; Kepler, *Gesammelte Werke* xvii, 154.

their lovers, with games, sports, revelry and dancing.) (Gödelmann, *Tractatus* Lib. II, Cap. IV, § 2)[17]

Kepler appears to have understood the connotations of his allusion to the night-flight in relation to the contexts of *maleficium* noted by Gödelmann, which centre on the witch's demonic pact. In his notes Kepler observes of this passage: "en Aulida, & fœdus, quod Trojam perdidit. Mihi vero tantum jocari, erat animus; & jocose argumentari" (here is Aulis and the covenant which ruined Troy. Yet it was my intention merely to joke and to reason jocularly) – an allusion to the later use of his engagement with witch-content by his mother's detractors (Kepler, *Somnium* 40; *Dream* 65). Kepler's classical reference to the covenant reads as wordplay, a recollection of the pact between the demon and witch of the hard-line witch-theorist – play that verges on humour, despite the personal anxieties this note betrays. Indeed, it is probably the omission of features like the sabbath, the demon-lover, and *maleficium* (when compared to Gödelmann's fuller account, if we take this as source or at least demonstrative of a source tradition) that allows Kepler to use the night-flight as a type of joke. Further, we might note that in the final instance the joke is not on the figure of the elderly witch but Kepler's tutor at Tübingen, Mästlin, whose bones, Kepler notes, were not as light as his mind (Kepler, *Dream* 64–65).

17. This description also shares common features with one of Kepler's stated sources in the *Somnium,* Martín del Rio, who – writing against Weyer, in defence of the reality of the witches' night-flight – included the he-goat and the pitchfork among the witches' means of flight, although del Rio's list is more extensive than that of Kepler and Gödelmann. Maxwell-Stuart 92. Notably, del Rio cites Gödelmann directly (as a point of refutation) throughout his work, and there may be a direct debt here. For one of a number of examples, see Maxwell-Stuart 16.

2

Although Kepler's use of the night-flight in the context of a joke and a dream may suggest an engagement with the sceptical position, at certain points in the *Somnium* he is very clearly thinking with the (shifting) natural laws of the witch-theory (as indeed, were the sceptics themselves). His account of transvection and its perils, as set out by the daemon, may owe a debt to material of a type with James VI/I's *Daemonologie* (1597), a work which was written in explicit response to Weyer and Reginald Scot, and incorporates a defence of the reality of the night-flight (within certain limits). Kepler and James appear to have written in relation to the same broader conversation about witches, and Kepler was certainly familiar with *Daemonologie*: in a 1607 letter of introduction from the astronomer to James VI/I Kepler notes his surprise at James's account of the utility of water in detecting witches.[18] Most immediately, for our purposes, James's text contains a suggestive association of the witch with astral phenomena. James writes of divinely aided flight, such as that of

18. Kepler, *Gesammelte Werke* xvi, 103–04. The letter is discussed by Rublack 244. The water ordeal was a particular and prevalent point of early scepticism concerning the procedures adopted in witch trials. See further, Clark, *Thinking with Demons* 204.

Habakkuk to Daniel in the lion's den, as a counterpart to the flight of the witch to the sabbath, through the power of the Devil:

> the Deuill will be reddie to imitate God, as well in that as in other thinges: which is much more possible to him to doe, being a Spirite, then to a mighty winde, being but a naturall meteore, to transporte from one place to an other a solide bodie, as is commonlie and dailie seene in practise: But in this violent forme they [witches] cannot be carryed, but a shorte boundes, agreeing with the space that they may reteine their breath: for if it were longer, their breath could not remaine vnextinguished, their bodie being carryed in such a violent & forceable maner." (James VI/I *Daemonologie* 38–39)

This interest in Satan's flight is not surprising; alongside the flight of the prophet Elias (and Habakkuk), Satan's flight with Christ to the mountain was a common analogy for the transvection of the witch (Stephens, *Demon-Lovers* 149–54). However, the passage is notable for its meteorological interests – in the uses of wind in transvection – of a similar type to those that we find in Kepler's *Somnium* and its analogues (discussed further below).[19] There is a common interest across this period in the mechanics of the witch's flight. There may also be an astronomical dimension to James's use of the word 'meteor'; in this period used not only in reference to weather phenomena, as we find from the first attested use of the term in English, c. 1500, but comets also; although the primary meaning here is meteorological.[20] Early-modern astronomy was not the only field in which analogies were sought for imagining flight, and James's analogical thought is essentially the reverse of Kepler's: the meteorological is an analogy for the demonic in *Daemonologie*, as the demonic is for the astronomical in *Somnium*.

Beyond this correspondence (and, I have suggested, a similar imaginative framework), we might note that like James, Kepler is concerned with the physical limits of d(a)emonic travel. He writes of the hazards of the lengthy journey to the moon: "prima quæque molitio durissima ipsi accidit. Nec enim aliter torquetur ac si pulvere Bombardico excussus, montes & maria tranaret" (in every instance the take-off hits him as a severe shock for he is hurled just as though he has been shot aloft by gun-powder to sail over mountains and seas). We read similarly of impediments to breathing on the journey, eased by the application of damp sponges (Kepler, *Somnium* 6; *Dream* 16). We might note that for James, transvection over a great distance, such as between countries, is a physical impossibility, and occurs as a movement in spirit only:

19. See below, p. 91.

20. We might note, for example, Shakespeare's use of the term in *Richard III* ii.iv.9: "And Meteors fright the fixed stares of heauen". The term "metheours" (plural) first appears in late Middle English translations of Aristotle's *Meterologica* (c. 1500). It is a loanword into English from French, ultimately from Greek. Here it refers to a treatise on astral (including meteorological) phenomena, as we find into this slightly later period also, but it was subsequently used as a singular form to refer to an astral body. 'Metheours', in *Middle English Compendium* [accessed 13th February 2021]; 'Meteor(s)' in Oxford English Dictionary [accessed 13th February 2021].

> and some sayeth, that their bodies lying stil as in an extasy, their spirits wil be rauished out of their bodies, & caried to such places […] for this forme of journeing, they affirme to vse most, when they are transported from one Countrie to another. (James VI/I, *Daemonologie* 39–40)

Again, we see different degrees of scepticism in different works – and Kepler's notion of the witch's bodily flight to the moon would appear to be an engagement with the most extreme impression of transvection (beyond the mechanics of the night-flight as it is understood by James), although, of course, Kepler invokes it as analogy only.

Nonetheless, Kepler's witch analogy is so close that on occasion it collapses altogether. In his notes, Kepler explains the etymological inspiration of his conflation of astronomy with the figure of the daemon: "admonuit me huius allegoriæ vox Græca Dæmon, quæ a daiein deducitur, quod est Scire" (this allegory was suggested to me by the Greek word *Daemon,* which is derived from *daiein,* meaning "to know") (Kepler, *Somnium* 35; *Dream* 50). The association between knowledge and the demonic is a prevalent feature of witch-theory throughout the long period 1450–1700, and we find a number of representations of the devil as a scientist roughly contemporary with Kepler. We might note, for example, the writings of the mid-sixteenth-century "angelographer" Otto Casmann, on the "sublime" knowledge of the devil as concerns "natural forms and the physical properties of things" (Clark, *Thinking with Demons* 162–63). The Greek etymology of the word *daemon,* as it related to knowledge, was a feature of orthodox witch-theory also. This appears, for example, in the (false) etymologies of the *Malleus* – although demonic knowledge is here, of course, suspect:

> nominatur etiam 'demon', id est, 'sapiens super sanguinem' vel 'sanguineus', scilicet super peccata que sitit et procurat triplici scientia qua viget, scilicet subtilitate natur, experientia temporum et reuelatione bonorum spitituum."
>
> (He is also named "demon", that is "knowledgeable about blood", or "bloody", namely with reference to the sins that he thirsts after and causes with the three sorts of knowledge in which he is proficient (the subtlety of his nature, his experience of different times and the revelation of good spirits.).) (*Malleus* i, 259; *Malleus* ii, 89)

Given this, Kepler necessarily assures his reader that even within the frame of the allegory, Fiolxhilde's spirit is a gentle daemon rather than an aid to *maleficium*:

> "eoque non spiritus illi apostatæ & nequam, quibus est cum Magis & Sagis commercium, qui suæ crudelitatis & noxarum testimonium habent irrefutabile, a proprio suo patrono Porphyrio."
>
> (they are not those vile and apostate spirits who have dealings with magicians and witches, whose cruel crimes are irrefutably proved by their own defender, Porphyry). (Kepler, *Somnium* 35-36; modification of *Dream* 51)

It is presumably the clerical nature of the allusion (the reference to Porphyry) that prompted Rosen to translate 'sagae' as "wizards" (from which I depart in my translation above). The noun is, however, feminine and 'sagae' is the term Kepler uses for witches in his allusion to the evidential status of the witches' night-flight in note 60. The distinction between 'magi' and 'sagae' (between clerical necromancers and witches) is common throughout the period, although on occasion the clerical necromancer and the witch were collapsed within "a single system" (Anglo 4). Kepler's inclusion of (seemingly) magical symbols within the occult repertoire of Fiolxhilde may well owe a debt to the occasional association of the practices of the witch with those of the necromancer, as in *Daemonologie*, where we read of the uses of circle casting and charms by the learned and unlearned alike, the cumbersome business of which is in time superseded by the demonic pact:

> Epi. Fra they bee come once vnto this perfection in euill, in hauing any knowledge (*whether learned or vnlearned*) of this black art: they then beginne to be wearie of the raising of their Maister, by conjured circkles; being both so difficile and perilous, and so commeth plainelie to a contract with him, wherein is speciallie conteined formes and effectes. (James VI/I, *Daemonologie* 16, my italics)

Kepler's witch is in part a figure of learned culture. Kepler writes in his notes that the means by which Fiolxhilde summons her daemon is of a type with the occult theatre in which he dressed his astronomical practices for the entertainment of the Prague court (Kepler, *Somnium* 37; *Dream* 57–58). These ceremonies were regarded by Kepler as something of a joke, and certainly, Kepler draws a strong association throughout the

Somnium between magic and the ludic. In his note to Fiolxhilde's demand for silence with a raised palm, following her invocation of the daemon, Kepler observes that he engaged in similar "ludi" in his own public astronomical performances, which were received as such by those present (Kepler, *Somnium* 38; *Dream* 58).

Quasi or pseudo necromantic practices appear to have presented a key point of intersection between astronomy and witchcraft in Kepler's thinking, and indeed in early modern astronomical imaginings more broadly. We might compare the account of Cyrano de Bergerac's alter ego Dyrcona in *Les états et empires du Soleil,* who writes that following the publication of his adventures on the moon (recounted in de Bergerac's previous work, *L'Autre monde ou les états et empires de la Lune*), he is accused of being the greatest magician in Europe. *Les états* contains a direct allusion to the witches' night-flight: a pair of superstitious rustics, who grab Dyrcona's horse, fear "que c'est le Diable en personne qui t'emporte au Sabat" (this it is the devil in person carrying you away to a witches' sabbath) (Cyrano, *Les Oeuvres Libertines* i, 108). This fear is compounded when Dyrcona's pack falls open to reveal books of astronomy. As we find in Kepler, the circles of the astronomer are associated with those of the necromancer, and the flight of the space traveller with that of the witch. It may be that de Bergerac's work is in this respect a response to Kepler's *Somnium* – after all, Dyrcona's imaginary detractors accuse him of being deposited on the moon by the "démon de Socrate" (Cyrano, *Les Oeuvres Libertines* i, 102). A direct debt or not, the analogy between the lunar passage and the witches' night-flight appears to have been an obvious one – although for de Bergerac, it is less a tool for thought than an opportunity to deride a sphere of popular superstition, against which he writes elsewhere in his essays.[21]

3

Fundamental to Kepler's allegory is the association of the witch not simply with clerical necromancy or the necromantic trappings of astronomy, but with practices and beliefs within popular culture. It remains controversial to what extent the representation of the night-flight in witch-theory reflects genuinely popular or folkloric beliefs or elite constructions.[22] It is difficult – if not indeed impossible – to insist on a sharp division between the learned and popular in premodern magical understanding and practice, which in many respects

21. For de Bergerac's rejection of witch-beliefs as a point of "undisguised class contempt for the rustic peasantry" see Monter 113; extract from de Bergerac's 1654 "Letter against Witches" printed 113–21, which rejects the night-flight as the delusion of credulous peasants (117).

22. For a discussion of the interaction and interpenetration of learned and popular attitudes towards magic and witchcraft see Kieckhefer, *European Witch Trials*. The most famous argument for the relationship of inquisitorial records to the world of popular belief is that of Ginzburg, who positioned the night-flight as a component of a long-enduring vein of trans-Eurasian shamanism, which informed the inquisitorial construction of witchcraft. This position is carefully and convincingly critiqued by Bailey 424–46. For an overview of Ginzburg's findings, see Ginzburg, "Deciphering the Sabbath".

cut across social strata. To this, we might add the particular difficulty of dealing with content in common with, and read in relation to, the night-flight of the *Canon Episcopi*: as Kieckhefer notes of earlier literary sources, authors that claim to communicate aspects of folklore often rework material from canon law (Kieckhefer, *European Witch Trials* 27). Yet the incorporation of ostensibly non-learned cultural beliefs or practices were a particular component of the ideological and philosophical strategies of witch-theorists, and for the sceptics the vulgar nature of testimonies of the flight provided grounds for disbelief. After all, from the *Canon Episcopi* onwards these were associated with the most unreliable class of reporters, women, and in witch-writings, old women. Yet common report was also fundamental to the earliest inquisitorial formulators of witch-orthodoxy (concerned with rooting out popular error), and it is invoked in the *Malleus Maleficarum* as proof of the materiality of witchcraft itself.

As Hans Peter Broedel has observed, Institoris draws on the "epistemological optimism" of Aquinas regarding sensory experience, and by extension understood common report of sensory experience "to be a reliable indicator of the state of the world"; an early argument for the reliability of "common sense" (Broedel 94–95; similarly, Anglo 25). This was particularly important in Institoris's defence of the reality of the night-flight, vulnerable as it was to the charge of illusion. Evidence relevant to transvection is martialled in the second part of the *Malleus*, the third chapter of which is explicitly concerned with proof of the materiality of the flight, largely in the form of common report. After all, Institoris notes "cum hoc genus superstitionis non libris aut a doctis sed omnino ab imperitis practicatur" (the present kind of superstition is not performed with books or by the learned but the altogether ignorant) (*Malleus* i, 387; *Malleus* ii, 225). Whether we understand popular content to be genuinely present in the common reports of the *Malleus* remains in many respects uncertain, although a case has been made for Institoris's engagement with, and on occasion mis-readings of, pre-existing popular narrative types.[23] A number of these draw on the (imagined) details of village life, and potentially owe something to the fabliau – most notably, the much-discussed episode which appears in Part 2, Chapter 7 of the *Malleus*, which tells of a man who understands his penis to have been spirited away by a witch and discovers it in a nest in a tree with other *phalloi*, the largest of which belongs to the village priest (Stephens, "Witches Who Steal Penises;" Smith). A similar, although certainly less bawdy, imagining of village life appears in In-

23. Broedel 158. See further O'Neil.

stitoris's account of the diurnal flight of a witch of Waldshut, a *res gesta* (historical event):

> res gesta de visibili et diurna transuectione in oppido Waltzhut super flumen Reni Constantiensis diocesis. Malefica quedam oppidanis cum esset plurimum odiosa et ad quasdam celebrandas nuptias non fuisset inuitata, cum tamen pene omnes oppidani illis interessent, ipsa indignata vindicare se estimans demonem aduocat et sue tristitie causam aperuit, et vt grandinem excitare vellet et cunctos de chorea dispergere petiit. Quo annuente ipsam subleuauit et per aera ad montem prope oppidum videntibus certis pastoribus transuexit…
>
> (An event concerning visible transportation during the day took place in the town of Waldshut above the River Rhine in the diocese of Constance. A certain sorceress who was hated by the townsmen was not invited to the celebration of a wedding, but almost all the townsmen did attend. She was outraged, and thinking that she would avenge herself, she summoned a demon. She revealed the reason for her sadness and asked him to stir up a hail storm and to scatter everyone from the ring dance. When he agreed he lifted her up and transported her through the air to a mountain near the town, in the sight of certain shepherds…). (*Malleus* i, 409; *Malleus* ii, 251)

From the top of the mountain, the witch performs a weather spell, and her demon sends a violent hail storm upon the town, scattering the dancers. This narrative carries heavy evidential weight for Institoris: the flight occurs during the day (and so is visible), in the presence of a large company of witnesses, both in the town and on the mountain. Its evidential status is also, however, tied to the very familiarity of the tale type: the vengeful witch seeks demonic aid and punishes the townsfolk. The logic of the tale is social, concerned with social exclusion and socially disruptive *maleficium*. Institoris presents the quotidian nature of the narrative type as an answer to the challenge of the *Canon Episcopi*:

> "et quia publica fama de huiusmodi transuectionibus etiam apud vulgares continue volat, non expedit plura ad hoc probandum de his hic inserere. Tantummodo hec sufficiant aduersus illos qui huiusmodi corporales transuectiones aut omnino negant aut quod solummodo imaginarie et fantastice fiant affirmare conantur."

> (Because general reports about transportations of this kind are constantly flying about among the common people, it would not be useful to insert more illustrations about them here to prove this. Let these alone suffice against those who either altogether deny bodily transportations of this kind or endeavour to assert that they happen only in the imagination or fantasy). (*Malleus* i, 409; *Malleus* ii, 251)

In a logic that goes beyond mere verbal play, the constant flight of the narrative type is presented as proof of the reality of demonic transvection. It might be noted, however, that although the anecdote appears to be clothed in the trappings of the popular, it comes very close to a work of earlier witch-theory – the *Errores Gaziorum* (*c.* 1437), which similarly associates the witch's flight with the ascent of a mountain and weather magic, causing hail.[24] Thus, we cannot rule out the possibility of historical textual influence on this example of common report.

24. For discussion of these features within early representations of the night-flight, as relates to the witches' sabbath, see Bailey 434.

We might similarly note Institoris's debt to Nider's *Formicarius* (c. 1436; printed 1475), an early work of witch-theory, passages of which are transplanted wholesale into the *Malleus.* In a passage lifted from Nider, Institoris writes of people transported through the air while sleeping (a bodily reformulation of the dream of the *Canon Episcopi*), understood vulgarly to be the work of a lesser order of demons. Notably, as we find in Kepler, this is associated explicitly with Scandinavia:

> nam nonnullos eorum quos etiam paganos vulgus appellat, nos vero trollen (et habundant in regno Norweye) aut schretl, ita seductores et ioculatores esse manifestum est, vt certa queque loca, vias iugiter obsidentes, nequaquam tormentis pretereuntes ledere possunt, derisu tantummodo et illusione contenti fatigare eos potius studeant quam nocere.
>
> (For some of them, who the common people call *paganos* but we call trolls (these are plentiful in the kingdom of Norway) and fairies, are misleading tricksters with the restriction that while they constantly haunt certain places and roads, they cannot harm passers-by in any way. Instead they are content with derisions and deception and strive to harass rather than harm them). (*Malleus* i, 406; *Malleus* ii, 248)[25]

25. Mackay notes that *paganos* is an error introduced by Nider – Nider's own immediate source, John Cassian, reads fauns.

This passage retains from the *Canon* the matter of demonic deception, although the flight itself is still understood to take place in the realm of bodily experience. In Kepler's representation of Fiolxhilde's daemon, who is not only the subject of a joke but the maker of one, we might wonder whether we see something of the (reconstructed) folk demonology, the jesting demons and fairies, of a type with the *Malleus,* and indeed Gödelmann's account of the imagined festivities at Witch Mountain. While there is nothing to militate against Kepler's acquaintance with material of the type that may have reached Institoris (or Nider) a century previously, or perhaps the folkloric content known to Gödelmann, he may also have encountered this allusion textually.

The jesting demons of the night-flight appear in the Swedish scholar Olaus Magnus's *A Description of the Northern Peoples* (1555), a key source for Kepler's imagining of supernatural Iceland.[26] Olaus writes of the demons "in Septentrionalibus siue Aquilonaribus locis (vbi literali sensu sedes est Satanæ)" (in the regions under the Seven Stars, in other words the North (where in a quite literal sense the abode of Satan lies)) (Olaus Magnus, *Historia* Lib. III, Cap. 21; *Description* I, 182; early modern orthography retained) – who assume a variety of forms and injure the local inhabitants, destroy fields, kill cattle, and overturn houses. It is almost certainly Olaus Magnus of whom Kepler writes when he observes in his notes: "et Septentrionalibus populis magiam familiarem tradunt scriptores, & credibile est spiritus illos tenebrarum insidiari longis illis noctibus" (Writers say that magic is common among the people of the north, and it is credible that those spirits of darkness lie in wait for those long nights) (Kepler, *Somnium* 34–35; *Dream* 48–49). Both Olaus and Kepler are interested in the ways in which the conditions of the polar night are germane to spirits, and to flight.[27] Kepler directly refers to Olaus's work in his note on Fiolxhilde's admission regarding her daemon – "cuius ope non raro momento temporis in alias oras, quas ipsi dixero, transportor" (by its help, I am not infrequently whisked in an instant to other shores, whichever I mention to him) (Kepler, *Somnium* 4; *Dream* 14) – the note associates movement of this type with the transvection of the Finns and Lapps described by "Olaus & alii" (Kepler, *Somnium* 36; *Dream* 52).[28] This allusion has been read by Rosen as an oblique recollection of the legend Olaus Magnus repeats concerning the bottling of winds for rapid travel across the sea in his account of Finnish sorcerers, rendered deliberately vague as the correspondence is by no means precise (although this is an allusion Kepler does make elsewhere in his work, far more directly).[29] Kepler's observation here is most plausibly a reference to Olaus

26. For the most recent discussion of Kepler's construction of the supernatural north, including his debt to Olaus Magnus, see Donecker. For an account of the influence of Olaus Magnus on European perceptions of the far north see Willumsen 359–60. As Willumsen notes, Olaus Magnus wrote from a perspective outside the subjects described – he had never visited the far north and his sources were textual. I suggest that these may have included the *Malleus Maleficarum.* Olaus has been noted also for his engagement with companies of werewolves, an interest in human-animal metamorphosis which we find also in near-contemporary *maleficium* cases (although this is comparatively rare). See further, Ginzburg and Lincoln 34–37. Kepler does not appear to associate his witch material with human-animal metamorphosis, presumably because this is not a subject that attracted the same amount of attention as the night-flight in the sceptical debate, nor indeed was especially relevant to imaginings of flight. Even in the *Malleus*, human-animal metamorphosis is understood to be purely illusory, an issue distinct from transvection although both appear (and are rejected as illusory) in the *Canon Episcopi*. See further, *Malleus* i, 321–30; *Malleus* ii, 153–62. This is distinct from the illusion by which demons appear as animals, which does appear in Kepler. See above, p. 89.

27. Kepler notes the phenomenon of the polar nights directly in n. 13. Kepler, *Dream* 43.

28. Kepler's brief reference to Mount Hekla as a gateway to Purgatory is also very feasibly derived from Magnus. See Kepler, *Dream,* 48–49 n. 76.

29. Kepler, *Dream* 52 n. 85. For Kepler's discussion of the wind bags used by Icelandic pilots see Kepler, *Dream* 44 n. 15. This appears to be an activity in which Fiolxhilde herself is engaged, see Kepler, *Dream* 12. The notion of bottling a lighter property and using it to achieve flight is found also in Cyrano de Bergerac, where Dyrcona's journey to the moon is facilitated by bottles of dew that attract the heat of the sun and function as clouds propelling him upwards. *Les Oeuvres Libertines* i, 9. With thanks to the anonymous reviewer for noting this correspondence.

Magnus's description of the northern night-flight, a subject that one might safely ascribe to multiple authorities ("& alii"). In his discussion of northern demons Olaus touches on the matter of fauns and satyrs, in a passage which concludes with a reworking of the *Canon Episcopi*:

> hunc nocturnum monstrorum ludum vocant incolæ Choream Eluarum: de quibus eam habent opinionem, quod animi eorum hominum qui se corporeis voluptatibus dedunt, earumque, quasi ministros præbent, impulsuique libidinum obediunt, ac diuina & humana iura violant, corporibus illapsi circum terram ipsam volutantur.
>
> (This nocturnal play of supernatural beings the natives call 'the dance of the elves', and this is their belief about them: that the souls of people who devote themselves to bodily pleasures (becoming as it were their servants), giving way to the incitement of their lusts and profaning the laws of God and man, assume corporeal form and are whirled about the earth.) (Olaus Magnus, *Historia* Lib. III, Cap. X; *Description* 165)

In terms closely modelled on the *Canon*, we read of the rapid travel around the earth by night by the souls of humans who act as the servants of demons. The association of the flight with fauns and other orders of demons conceived by witch-theorists as broadly folkloric may find a precedent in Institoris's (and Nider's) treatment of the popular beliefs concerning the night-flights of Germany and the trolls of Norway. The lustful proclivities of the participants in the northern flight may also owe a debt to the particular interest in the relationship between the witches' night-flight and congress with incubi as formulated in the *Malleus.* Certainly, while Olaus Magnus's night-flight is presented as an ethnographical observation of northern folklore, and accommodates linguistically and culturally specific references (notably, the presence of elves), it bears the distinct influence of the *Malleus* or related works.

In his allusion to unnamed corroborating sources, Kepler very plausibly had in mind a direct citation of this passage in one of his other named sources, Martín del Rio's *Disquisitiones Magicae*, an influential reworking of material from the *Malleus,* first published by its Dutch-Spanish author in Mainz in 1595 (Maxwell-Stuart, 8). Del Rio writes of the ecstasies of *sagae* and *magi* who believe they travel far and wide in their sleep, deceived by Satan, as recounted by Olaus Magnus – implicitly, the witches of the far north (Maxwell-Stuart, 108). This correspondence sits suggestively in relation to Kepler's use of witch-themes in the construction of what Stefan Donecker has observed as two opposing conceptual and geographical zones: on the one hand, Iceland, held in association with popular modes of knowledge; and on the other, an educated southern sphere, Denmark and Germany (Donecker 113). This dichotomy is crucial to Kepler's schema, and he also appears to have drawn on a broader vein of European witch-writing, in large part influenced by Olaus Magnus.[30] We might, for example, compare Kepler's description of Iceland as "patria semibarbarus" ("a half savage country") to James VI/I's identification of the activities of incubi and succubi with "such wild partes of the worlde, as *Lap-land*, and *Fin-land* […] where the Deuill findes greatest ignorance and barbaritie" (Kepler, *Somnium* 3; *Dream* 13; James VI/I, *Daemonologie* 69). Yet in order to write his witch of Iceland, Kepler – as indeed did Olaus Magnus – drew on the witch of *Malleus* and related traditions, by this period conceived as part of a pan-European witch-discourse.

30. *E.g.* Jean Bodin's notice of the many witches of Norway, Livona and the northern regions, as reported by 'Olaus le grand.' Bodin 90.

4

Fiolxhilde is rooted in a familiar model of the witch, associated with conceptualisations of popular culture in early modern witch-theory. This appears to have been essential to Kepler's understanding of the allegorical function of Fiolxhilde, as articulated in his notes:

> imperita experientia, seu medicorum vsu loquendi, Empirica exercitatione genitrices, nasci prolem Scientiam: atque illi non tutum esse, quamdiu superest inter homines mater Ignorantia, rerum causas occultissimas in vulgus propalare; quin potius parcendum verecundiæ antiquitatis, expectandam annorum maturitatem, qua veluti senio confecta Ignorantia, tandem emoriatur. Cum igitur Somnii mei scopus sit, argumentum pro motu Terræ, seu solutionem potius objectionum ab universali contradictione gentis humanæ desumptarum, moliri exemplo Lunae: iam tunc extinctam satis arbitrabar exque; memoria ingeniosorum hominum eradicatam veterem hanc Ignorantiam; etsi quidem luctatur etiamnum Anima in nexu artuum tam multorum, tot sæculis firmissime coalito; superestque in Academiis annosa mater; sed ita vivit, vt mors ei vita fęlicior æstimanda videatur.

> (untutored experience or, to use medical terminology, empirical practice is the mother who gives birth to Science as her offspring. For him it is not safe, so long as his mother, Ignorance, survives among men, to reveal to the public the deeply hidden causes of things. He must rather forebear to injure the venerable beldam, while waiting for the fullness of years which will finally bring about the death of Ignorance, decrepit with old age. The purpose of my *Dream* is to use the example of the moon to build up an argument in favour of motion of the earth, or rather to overcome objections taken from the universal opposition of mankind. This ancient Ignorance was then, I thought, already dead enough and erased from the memory of intelligent men. Yet the creature still struggles on in a tangle of so many knots tied tightly together through so many centuries. The aged mother continues to exist in the universities, but such is her existence that seemingly she ought to look upon death as more desirable than life.) (Kepler, *Somnium* 30–31; *Dream* 36)

This passage has been most fully discussed by previous scholars as an example of the "expulsion" (to use Darko's term) from the mainstream of scientific and social ideas, which underscores the production of science fiction. Certainly, it has been read (as indeed Kepler invites us to read it) as presenting "the dangers of scientific enquiry in the face of religious persecution."[31] While this is certainly so, we must note the utility of the figure of the witch in Kepler's presentation of outdated scientific orthodoxies, dressed as ignorance and superstition. In Kepler's use of the witch as an object of ancient ignorance, we might remember the stereotype of the witch from the *Malleus* to Weyer: old and foolish in both, although the extent of her delusion is of course greater in the latter.

The fundamental joke of the *Somnium* is that experiential proof of Copernicus's thesis is an impossibility. It is as impossible as a flight to the moon, and, in Weyerian logic, as impossible as the witches' night-flight. Interestingly, Kepler's terminology concerning the credulity of *vulgus* (the public, with all its implications of the unlearned) is in keeping with the denunciations of *vulgares* belief in the night-flight in Weyer, who draws on the common report of the *Canon Episcopi*. This very commonality was also used by Institoris and subsequent orthodox witch theorists to endorse the reality of the night-flight as a standard of proof (for Institoris "imperita experientia"

31. Evans 165–66; similarly, Parrett 44–45.

might have evidential value), a type of vulgar empiricism that Kepler here rejects. Although, given that we are lacking a fuller treatment of the subject by Kepler, and that he clearly accepted the plausibility of some aspects of witch-theory (at least, its demonology), we might wonder whether for Kepler (or at least, the Kepler who penned his extensive notes in 1630), orthodox witch-theory – embodied in the figure of the witch – represents empiricism at its worst. It is perhaps no coincidence that the "imperita experientia" Kepler locates in the figure of the witch is the same term that he applies elsewhere in his notes to the accusers of his mother, motivated by "imperitia & superstitione" (ignorance and superstition).[32]

However, as Clark has observed, although the historian often breathes a sigh of relief when encountering signs of doubt within early modern engagements with witch-belief, we might remember that scepticism can be understood by degrees (Clark, *Thinking with Demons* 182–83). A fundamental recognition of the workings of demons within the natural order was an intellectual mainstay of the period. Like his contemporaries, and however we might orient him in relation to witch-scepticism, I suggest that Kepler was aware of the renegotiation of the plausible and the implausible at the centre of contemporary and long-standing witch-debates, which crystallised around the night-flight. Lest we be tempted to impose the triumph of rationality over magic (and indeed, to ignore the "specific rationality" of the latter), we must remain aware that witch-theory and d(a)emons were vital conceptual tools for Kepler.[33] The wider cultural uncertainty surrounding the night-flight appears to have been the basis of its utility in the *Somnium*, not least in terms of its place within competing notions of the plausible, the implausible, and the porous boundary between the two. For Kepler, it presented a space in which the boundaries of knowledge might be destabilised, and imaginatively expanded, as a site of intellectual play.

32. Kepler, *Somnium* 32; *Dream* 40; Caspar and Von Dyke, *Johannes Kepler*, XVII 207. *Superstitio* carries a greater charge in its early modern context than its modern one, suggestive not just of credulity but impiety.

33. This caution is taken from Kieckhefer, "The Specific Rationality of Medieval Magic."

Bibliography

Anglo, Sydney. "Evident Authority and Authoritative Evidence: The *Malleus Maleficarum*." *The Damned Arts: Essays in the Literature of Witchcraft.* Ed. Sydney Anglo. London: Kegan and Paul, 1977, repr. 2016. 1–31.

Bailey, Michael. "Medieval Concept of the Witches' Sabbath." *Exemplaria* 8.2 (1996): 419–39.

Bodin, Jean. *De la demonomanie des sorciers.* Paris: 1580.

Broedel, Hans Peter. *The Malleus Maleficarum and the Construction of Witchcraft: Theology and Popular Belief.* Manchester: Manchester University Press, 2003.

Christianson, Gale E. "Kepler's *Somnium*: Science Fiction and the Renaissance Scientist." *Science Fiction Studies* 3.1 (1976): 79–90.

Clark, Stuart. *Thinking with Demons: The Idea of Witchcraft in Early Modern Europe.* Oxford: Oxford University Press, 1997.

---. "The Scientific Status of Demonology." *Occult and Scientific Mentalities in the Renaissance.* Ed. Brian Vickers. Cambridge: Cambridge University Press: 1984. 351–74.

---. "Protestant Demonology: Sin, Superstition, and Society (c. 1520- c. 1630)." *Early Modern Witchcraft: Centres and Peripheries*. Ed. Bengt Ankarloo and Gustav Henningsen. Oxford: Clarendon Press, 1993. 45–82.

---. "Glaube und Skepsis in der deutschen Hexenliteratur von Johann Weyer bis Friedrich von Spee." *Vom Unfug des Hexen-Processes: Gegner der Hexenverfolgung von Johann Weyer bis Friedrich von Spee.* Wiesbaden: Otto Harrassowitz,1992. 15–33.

Corpus Juris Canonici, I: Decretum Magistri Gratiani, ed. Aemilius Friedberg. Leipzig: Tauchnitz, 1979.

Cyrano de Bergerac, *Les Oeuvres Libertines de Cyrano de Bergerac* 8 vols, ed. Frédéric Lachèvre. Paris: Eduoard Champion, 1921.

Donecker, Stefan. "The Supernatural Image of Iceland in Kepler's *Somnium* (1634)." *Imagining the Supernatural North,* ed. Eleanor Rosamund Baraclough, Danielle Marie Cudmore, and Stefan Donecker. Edmonton: University of Alberta Press, 2016, 109-30.

Evans, Arthur B. "The Origins of Science Fiction Criticism: From Kepler to Wells." *Science Fiction Studies* 26. 2 (1999): 163–86.

Ginzburg, Carlo. "Deciphering the Sabbath." *Early Modern European Witchcraft: Centres and Peripheries*. Ed. Bengt Ankarloo and Gustav Henningsen. Oxford: Clarendon Press, 1993. 121–37.

Ginzburg, Carlo and Bruce Lincoln. *Old Thiess, A Livonian Werewolf: A Classic Case in Comparative Perspective.* Chicago: University of Chicago Press, 2020.

Gödelmann, Johann Georg. *Tractatus de magis, veneficis et lamiis deque his recte cognoscendis et puniendis*. Nuremburg: 1676; first printed Hanau and Frankfurt: 1591.

James VI/I. *Daemonologie.* Edinburgh: 1597.

John of Salisbury. *Policraticus: Frivolities of Courtiers and Footprints of Philosophers.* Ed. and transl. Joseph B. Pike. New York: Octagon Books, 1972.

Kepler, Johannes. *Somnium seu Opus Posthumus de Astronomia Lunari.* Frankfurt: 1634.

---. *Johannes Kepler: Gesammelte Werke,* 22 vols. Ed. Max Caspar and Walther von Dyke. Munich: C. H. Beck, 1938.

---. *Kepler's Somnium: The Dream of Posthumous Work on Lunar Astronomy*. Ed. and trans. Edward Rosen. Madison: University of Wisconsin Press, 1967.

Kieckhefer, Richard. *European Witch Trials: Their Foundations in Popular and Learned Culture, 1300-1500.* London: Routledge, 1976, repr. 2016.

---. "The Specific Rationality of Medieval Magic." *American Historical Review* 99.3 (1994): 813–36.

Kors, Alan Charles and Edward Peters. *Witchcraft in Europe, 400-1700: A Documentary History.* Philadelphia: University of Pennsylvania Press, 2000.

Lambert, Ladina Bezzola. *Imagining the Unimaginable: The Poetics of Early Modern Astronomy.* Amsterdam: Rodopi, 2002.

Lorenz, Sönke. 'Johann Georg Godelmann: "Gegner des Hexenwahns." *Beitrage zu pommerschen und mecklenburgischen Geschichte*. Ed. Roderich Schmidt. Marburg: J. G. Herder-Institut, 1981.

MacNeill, John T. and Helena M. Gamer. *Medieval Handbooks of Penance: A Translation of the Principal Libri Poentientiales.* New York: Columbia University Press, 1991.

Malleus Maleficarum. 2 vols. Ed. and transl. Christopher S. Mackay. Cambridge: Cambridge University Press, 2006.

Maxwell-Stuart, P. G., ed. and transl., *Martín del Rio: Investigations into Magic.* Manchester: Manchester University Press, 2000.

Monter, E. William, *European Witchcraft.* New York: John Wiley & Sons, 1969.

Nicolson, Marjorie Hope. *Science and Imagination.* New York: Cornell University Press, 1956.

---. *Voyages to the Moon.* New York: Macmillan, 1960.

Olaus Magnus. *Historia de gentibus septentrionalibus, authore Olao Magno, Gotho, archiepiscopo Vpsalensi, Suetiae & Gothiae primate.* Antwerp: 1562; first printed Rome: 1555.

---. *A Description of the Northern Peoples, 1555: Volume I*. Ed. and transl. Peter G. Foote. London: Hakluyt Society, 1996.

O'Neil, Mary R. "Tall Tales and Sober Truths: Storytellers before the Inquisition." *Aestel* 3 (1995): 1–18.

Parrett, Aaron. *The Translunar Narrative in the Western Tradition.* Burlington, Vt.: Ashgate, 2004.

Peters, Edward. *The Magician, the Witch and the Law.* Philadelphia: University of Pennsylvania Press, 1978.

---. "The Medieval Church and State on Superstition, Magic, and Witchcraft." *Witchcraft and Magic in Europe: The Middle Ages.* Ed. Karen Jolly, Catharina Raudvere, and Edward Peters. London: Athlone Press, 2002, 173–245.

Rosen, Edward. "Kepler and Witchcraft Trials." *The Historian* 28 (1996): 447–50.

Rublack, Ulinka. *The Astronomer and the Witch: Johannes Kepler's Fight for his Mother.* Oxford: Oxford University Press, 2015.

Smith, Moira. "The Flying Phallus and the Laughing Inquisitor: Penis Theft in the *Malleus Maleficarum*." *Journal of Folklore Research* 39.1 (2002): 85–117.

Stephens, Walter. *Demon-Lovers: Witchcraft, Sex, and the Crisis of Belief.* Chicago: University of Chicago Press, 2002.

---. "Witches Who Steal Penises: Impotence and Illusion in *Malleus Maleficarum*." *Journal of Medieval and Early Modern Studies* 28.3 (1998): 495–529.

Suvin, Darko. *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre*. New Haven: Yale University Press, 1979.

Swinford, Dean. *Through the Daemon's Gate: Kepler's* Somnium, *Medieval Dream Narratives, and the Polysemy of Allegorical Motifs.* London: Routledge, 2006.

---. "The Lunar Setting of Johannes Kepler's *Somnium*: Science Fiction's Missing Link." *Classical Traditions in Science Fiction.* Ed. Brett M. Rogers and Benjamin Eldon Stevens. Oxford: Oxford University Press, 2005, 27–45

Weyer, Johann. *De Praestigiis Demonum, et Incantationibus ac ueneficiis.* Basel: 1566.

Willumsen, L.H. *Witches of the North: Scotland and Finnmark.* Leiden: Brill, 2013.

MATTHEW FRANCIS

Towards Goosepunk: A Contemporary Poetic Treatment of Francis Godwin's *The Man in the Moone*

Abstract

This article proposes a retro-futurist mode of science fiction based on seventeenth-century technology and culture. After a brief account of retro-futurist subgenres, named for the technology they are based on with the suffix -punk, I introduce my own poetic reworking of Francis Godwin's 1638 novel *The Man in the Moone*, one of a group of texts inspired by early modern New Astronomy. The novel's hero flies to the moon in a craft of his own invention drawn by a flock of migrating birds (swans in the original). Godwin's narrative is enjoyable for modern readers for its combination of vivid imagination, accurate speculation and, with hindsight, intriguing counter-factuality. My treatment aims to emphasise these aspects, eliminating other parts of the text such as the picaresque adventures that open the novel. Treated in this way, the story offers similar pleasures to more established modes such as steampunk. Godwin and his contemporaries were heavily dependent on animals for their power: to reflect this, the article proposes the term 'goosepunk' for its early modern retro-futurist subgenre.

The literary process of thinking ourselves back into the past and then looking forward again through the eyes of our forebears to a possible version of modernity is known as retro-futurism (Guffey and Lemay 434). Its best-known example is the science-fiction subgenre of steampunk, a term invented by the American author K.W. Jeter to describe a mode of fiction which he, together with James P. Blaylock and Tim Powers, began to explore in the 1990s (Nicholls and Langford, "Steampunk"). The word is formed on the analogy of cyberpunk, then the latest fashion in science fiction, and implies a form of SF (science fiction) in which the dominant technology is steam. Steampunk looks back nostalgically to the pioneering work of Jules Verne and H.G. Wells, imagining a world simultaneously modern and Victorian. A classic example is *The Difference*

Engine by William Gibson and Bruce Sterling (1990), which depicts the Victorian era as it might have been if Charles Babbage and Ada Lovelace had succeeded in building their prototype computer, leading to the emergence of IT before industrial electric power and the internal combustion engine. Steampunk is a form of alternative history with the emphasis on technology. The -punk suffix of its name derives from cyberpunk, the 1980s SF genre pioneered by Gibson, Sterling and others, whose portrayal of an often shabby near-future society and emphasis on youth culture and an underworld of criminal hackers suggested parallels with the punk rock movement of a few years earlier (Nicholls, "Cyberpunk;" Roberts 500). Steampunk, despite the involvement of Gibson and Sterling, seems more remote from punk rock, but the suffix had by now become a marker of the new fashion in SF, and was soon attached to other subgenres, some of them at this stage existing mostly as ideas rather than bodies of work. Perhaps surprisingly, it was steampunk rather than cyberpunk which provided the template for these. Its successful combination of history and science fiction has inspired the coinage of clockpunk for a pre-steam SF driven by clockwork (Lake, *Mainspring*, is a successful example), dieselpunk and atompunk for mid-twentieth-century versions, stonepunk for the Stone Age, while the historian Minsoo Kang has suggested catapunk for a medieval equivalent in which the dominant technology is the catapult siege engine (Kang 246).

Retro-futurist fiction attempts to inhabit the speculations of the historic past, and, of course, those speculations are not pure invention. People in the past did indeed imagine alternative technologies and societies and write down their ideas. This is obvious in the relationship I have already noted between steampunk and the fiction of Verne and Wells, which are often considered, together with the work of Mary Shelley and Edgar Allan Poe, as the first science fiction (Roberts 19). But there was speculative fiction before the nineteenth century, and writers interested in developing the possibilities of the other -punk genres, would do well to explore it. The term proto-science-fiction is sometimes used for this literary genre, and it takes in many of the themes we are accustomed to in later science fiction. The theme of the voyage to the moon, which is to be the focus of this essay, was explored as long ago as the second century CE by the Greek author Lucian in *A True History*, which describes how the narrator's ship is struck by a violent whirlwind, which causes it to be carried to a remote shining land that turns out to be the moon (Lucian). Lucian's treatment is essentially satirical rather than speculative, lampooning the fantastic voyage narratives of other ancient authors by carrying them to absurd lengths; for him, the voyage to the moon is attractive, not as a possibility, but as an impossibility (Roberts 34). While writers in post-classical times continued to speculate about the cosmos, science fiction as a genre 'fell into abeyance' until the mid-seventeenth-century, when the New Astronomy of Galileo, Copernicus and others opened up a very different view of the moon, and initiated a flurry of proto-science-fiction texts (Roberts 34). Three of them were Johannes Kepler's *Somnium* (first published in 1634), John Wilkins's *The Discovery of a World in the Moone* (first published in 1638) and Cyrano de Bergerac's *The Other World* (first published in 1657). The one I wish to concentrate on here, however, is Francis Godwin's *The Man in the Moone* (first published in 1638), which I have used as the inspiration for a narrative poem that offers a possible precedent for writers wishing to draw on proto-science-fiction for their own retro-futurist experiments. I shall begin with a description of *The Man in the Moone* and its author, then discuss my own creative treatment of it, and conclude by sketching out the use that might be made of this and similar texts by contemporary writers.

Francis Godwin (1562–1633) was bishop first of Llandaff in Wales, then of Hereford. As a writer, he was best-known by his contemporaries for his *Catalogue of the Bishops of England* (1601), which lists all the bishops from the beginning of Christianity in England till his own time. *The Man in the Moone* was not published till five years after his death, which suggests that he did not set much store by it, or, more probably, considered it the kind of frivolous, perhaps even dangerous, material that could harm his reputation. We do not know for certain exactly when he wrote it, but William Poole demonstrates, using internal evidence, that it must be a product of the last decade of his life, and probably of the year 1628. It is a novella in the Spanish picaresque style, influenced by such works as *Lazarillo de Tormes* (1554); like Lazarillo, Godwin's protagonist, Domingo Gonsales, is a Spaniard who prospers through a series of adventures by a mixture of intelligence and unscrupulousness (Poole 11–12, 26–28).

There is a slight mismatch between Godwin's picaresque form and his science-fiction theme. While the title makes it clear that the voyage to the moon is his main concern, this merely forms the central episode in a story that takes Gonsales from the Low Countries to China (Hutton). For the purposes of my poem, I put aside these early and late parts of the story, and concentrated on Gonsales's moon voyage as narrated by Godwin, the only part of the narrative containing features modern readers would recognise from their reading of science fiction.

Gonsales tells us that he fell sick on a voyage back from the East Indies, where he had made himself rich trading in pearls and precious stones. The captain of the ship he was returning on put him ashore on the island of Saint Helena, then uninhabited, with a black servant named Diego to attend him. *The Man in the Moone* is thus in part a desert-island story, a predecessor of *Robinson Crusoe* as well as of Verne and Wells, though, as Saint Helena was a known stopping-place for ships, Gonsales has the advantage of a house to live in. On the island, he discovers a species of bird which he calls *gansas*, a name derived from the Spanish for a goose, though he refers to them as "a certain kinde of wild *Swan*.." These fabulous birds, with one foot clawed and one webbed, feeding on fish and other birds as well as the more normal vegetable diet of geese and swans, appear to have been Godwin's own invention. The resourceful Gonsales trains the birds to fly to him when he signals with a white sheet, and to carry burdens, using them to communicate with Diego, who lives in a cave some distance away. Later, he devises a harness to yoke them together so that they can carry a larger burden. By this means he is able to make them carry a lamb (Godwin 74–79).

Gonsales's unusually small size has been repeatedly emphasised in his story, and it now enables him to turn his gansas into a flying machine:

> At last after divers tryalls I was surprized with a great longing, to cause myself to be carried in the like sorte. *Diego*, my Moore was likewise possessed with the same desire, and but that otherwise I loved him well, and had need of his helpe, I should have taken that his ambitious affection in very evill part: for I hold it farre more honour to have been the first flying man, then to bee another *Neptune* that first adventured to sayle upon the Sea […] I placed my selfe with all my trinckets, upon the top of a rocke at the Rivers mouth, and putting my selfe […] upon an Engine […] I caused *Diego* to advance his Signall: whereupon my Birds presently arose, 25 in number, and carried me over lustily to the other rocke on the other side, being about a Quarter of a league. (Godwin 79–81)

While this invention is a necessary pre-condition for the New-Astronomy-inspired lunar expedition, it is itself the latest in a long tradition of literary and mythic flying machines, from Daedalus onwards. A manuscript from the fourteenth century shows Alexander the Great in a flying machine powered by griffins (London, British Library, Royal 20 B. xx, f. 76v).

Gonsales is not exactly marooned on his island, since he knows he will be able to leave when the next ship arrives; he has invented his flying machine, not to escape but from a mixture of curiosity and the desire for fame and glory. A small fleet eventually puts into the harbour, and he embarks with his contraption, swearing the captain to secrecy about its purpose. However, the fleet is attacked by the English, and the ship with Gonsales aboard strikes a rock, off the coast of the Canary Islands. He uses his flying machine to escape, and lands safely on the coast of Tenerife, close to the slope of Pico del Teide, the highest mountain in the Canaries, which, according to Poole's note, was proverbial at the time for its awe-inspiring height (Godwin 82 note). He congratulates himself on having arrived in Spanish territory, but, instead of being welcomed by his fellow-countrymen, he is soon attacked by the indigenous inhabitants, "a Savage kinde of people" who are at "continuall warre" with the Spaniards. As they run down the slope towards him, brandishing "[l]ong Staves, besides other weapons, which because of their distance from mee I might not discern," he takes off again in his machine. His goal is a nearby cliff, but instead the gansas fly him to the inaccessible top of Pico del Teide, whose height he tells us is "in all estimation at least 15 leagues" – or forty-five miles – above sea level (Godwin 81–86).

Even now, his journey is not finished. It is the time of year when the gansas migrate, and they are soon ready to take off again. Godwin, having already probed the limits of knowledge with his speculative account of a flying machine, now explores another theme that baffled his contemporaries: the mystery of bird migration. The idea that some birds might fly to the moon seemed plausible enough at the time, though it is not clear whether the idea was first advanced in Godwin's novel (Godwin 87 note). At any rate, he gives us a convincing account of their journey there. As they fly they are surrounded by "divers kinds of *flyes* and *Birdes*, as especially *Swallows*, and *Cuckoes*, whereof there were multitudes, as Motes in the sunne." The two species of birds here mentioned are both migrants, whose wintering grounds were then unknown (Godwin 87).

Godwin's account of the journey to the moon is vivid and detailed, drawing on the insights and speculations of the New Astronomy, while enriching it with his own imagination. As Gonsales leaves the zone of Earth's influence, the reins of his machine grow slack, and he sees that the birds are no longer flapping their wings. In our terms, they have escaped its gravitational field, but his own explanation is vaguer, suggesting an analogy with magnetism:

> I found then by this Experience that which no Philosopher ever dreamed of, to wit, that those things which wee call heavie, do not sinke toward the Center of the Earth, as their naturall place, but as drawen by a secret property of the Globe of the Earth [...] in like sort as the Loadstone draweth Iron [...] [I]t is not possible to imagine with what swiftnesse and celeritie they were carried, and whether it were upward, downward, or sidelong, all was one (Godwin 88).

Space is depicted as neither cold nor hot, and filled with perpetual daylight. Gonsales feels no hunger or thirst there, and no sensation of wind or motion. From his vantage point, he is able to see the Earth, which, in accordance with the Copernican system, is turning on its axis from west to east. He sees Africa, "a spot like unto a Peare that had a morsell bitten out upon the one side of him," and America as shown on current maps "almost of an Ovall form." The stars are clearly visible, but do not shine as they do in our night sky because of the daylight background: "of a whitish Colour, like that of the Moone in the daytime" (Godwin 92–93). The only feature of this intensely imaginative description that evokes an older universe of supernatural forces rather than the new one of science is the plague of devils that inhabit this liminal space and pester Gonsales with temptations in many languages:

> An other thinge there was exceeding, and more then exceeding, troublesome unto mee, and that was the Illusions of Devills and wicked spirits, who, the first day of my arrivall, came about mee in great numbers, carrying the shapes and likenesse of men and women, wondring at mee like so many Birds about an Owle, and, speaking divers kindes of Languages which I understood not, till at last I light upon them that spake very good *Spanish*, some *Dutch*, and othersome *Italian* (Godwin 88–89).

The devils tempt him with promises to take him back to Spain if he will join their 'fraternity', an offer which he refuses, though he willingly takes the delicious-seeming food and drink they ply him with as provisions for his journey, which later turn out, predictably enough, to be fiendish deceptions (Godwin 98–99). It seems that Godwin, like his character, is subject to the pull of conflicting forces: as a scholar, he feels the tug of the New Astronomy, while as a clergyman he still feels compelled to depict the universe in moral and spiritual terms.

As he draws closer to the moon, Gonsales is able to make out its features more clearly:

> Then, I perceived also, that it was covered for the most part with a huge and mighty Sea, those parts only being drie Land, which shew unto us somewhat darker than the rest of her body (Godwin 96).

In this, Poole tells us (Godwin 96 note), he contradicts the opinion of Plutarch, who thought that the darker parts of the surface were water – indeed, they are still known as seas or *maria* – and the lighter parts, land. It is another good example of the acuteness of Godwin's imaginative vision, since it makes perfect sense that any water on the moon would reflect light and thus show up brighter. After a journey of twelve days, the gansas land on a hill on the moon's surface, just as they had taken off from one on Earth. This new world has trees and fauna, as our own does, though because of low gravity, or its pre-Newtonian equivalent, everything is much larger, apart from the migratory birds which have arrived from Earth with the gansas. Seeing that the birds are eating the leaves of a local plant, he tries some himself, and finds them delectable (Godwin 99).

The native Lunarians Godwin now introduces share the gigantism of other features of their world; while their stature varies, it is "for the most part, twice the height of ours." He goes on to discuss their clothing, mostly in negative terms:

> For neither did I see any kind of *Cloth*, *Silke*, or other stuffe to resemble the matter of that whereof their Clothes were made; neither (which is most strange, of all other) can I devise how to describe the colour of them, being in a manner all clothed alike.
>
> It was neither blacke, nor white, yellow, nor redd, greene nor blew, nor any colour composed of these. (Godwin 99–100)

Godwin's imagination, so impressive in his account of the lunar passage, is stretched to its limit here. The Lunarians, representing as they do a contrast to humanity, cause language itself to fail. Nevertheless, there is one clear link between their world and our own: God's rule, being universal, must extend here also, and the Lunarians, as rational and, in some respects, ideal beings, acknowledge it. When Gonsales, in his astonishment, crosses himself and calls out "*Iesus Maria*," the Lunarians fall on their knees and, presumably, pray, "holding up both their hands on high, and repeating all certain words, which I understood not" (Godwin 100).

The next few pages are devoted to an account of the lunar society. The Lunarians are strongly hierarchical: the tallest members have the highest social status and are also the longest-lived, with a lifespan of up to "30000 Moones, which amounteth unto 1000 Yeares and Upwards." Their prince, called Pylonas, is the tallest of all. They communicate in a language based on musical tones, an idea adapted from European reports of the pitch-based phonetics of Chinese (Godwin 100–09). Their mode of transport is perhaps Godwin's most ingenious invention; they take advantage of the low lunar gravity to propel themselves with fans of feathers. His description is a beautiful example of the combination of accurate and inaccurate speculation that makes his book so appealing:

> [T]he *Globe* of the *Moone* is not altogether destitute of an attractive Power: but it is so farre weaker than that of the Earth, as if a man do but spring upward with all his force (as Dancers do when they shew their activity by capering) he shall be able to mount 50 or 60 foote high, and then he is beyond all attraction of the Moones Earth, falling down no more, so as by the helpe of these Fans, as with wings, they conveigh themselves in the Ayre in a short space (although not with the swiftnesse that Birds doe) even whither they list. (Godwin 103–04)

One can see Neil Armstrong and his moonwalking colleagues here, but the fans would have been no help to them in the moon's airless environment.

Like Kepler in his *Somnium*, Godwin speculates about the influence of the length of the lunar day: exposure to the rays of the sun for fourteen days at a time might be too much for the Earthling Gonsales, and for some of the Lunarians themselves (Kepler 20–21). He therefore proposes a sort of hibernation, with the main lunar activity taking place in their night-time, illuminated by the reflective light of the Earth, while Gonsales and the weaker Lunarians must sleep for the duration of the fourteen-day lunar night. Recognising that what we call the dark side of the moon (actually the side that is perpetually turned away from the Earth) would not enjoy the benefit of earthlight during the lunar night, Godwin thinks through the implications of this fact, and comes up with a solution that would make life possible there, too:

> [T]hey have notwithstandinge a kinde of light (not unlike by their description to our Moon light) which it seemeth the propinquities of the starres and other Planets (so much neerer unto them than us) affordeth. (Godwin 107)

It would seem from his reference to a "second booke" that Godwin planned a sequel in which he would have given us more details of lunar life and described the trip of "200 leagues" that Gonsales made to see Pylonas's liege lord, the king Irdonozur, who talked to him through a window (Godwin 110). We can only guess why he did not complete it. But he abbreviates his account of the seven months residency on the moon and tells how Gonsales returned with his geese, which had already outstayed the normal term of their migration (Godwin 116).

As a creative writer, I have long been interested in both narrative poetry and the adaptation of historic texts. I am not alone in this interest; such books as Seamus Heaney's *Beowulf* (1999) and interpretations of Homer by Christopher Logue (2001), Simon Armitage (2010) and Alice Oswald (2011) suggest an increasing tendency by poets to re-explore classic texts. This appears to represent a rejection of, or, at least, a counterbalance to, the personal themes of much modern poetry; some poets at any rate are no longer happy to devote their entire oeuvre to dissecting their own experiences and emotions. And mythic and premodern themes, as I argue in the introduction to my version of *The Mabinogi* (Francis, "Introduction" xii) are arguably better suited to retellings in verse, with its armoury of symbols and metaphors, than the traditionally more literal-minded novel.

My poetry collection *Mandeville* (2008) is an adaptation of *The Travels of Sir John Mandeville*, which first appeared in manuscript in the fourteenth century. The original *Travels* is a work of reference rather than a narrative, describing the world as it appeared from the perspective of western Europeans in the Middle Ages. The author tells us he is an English knight and furnishes a few autobiographical details, but these appear to be fictitious, and there is no record of a real Sir John Mandeville in England at the time. His book, which draws heavily on both contemporary and classical sources, combines fairly accurate descriptions of geographical features which would have been known to some of the readers of the time, especially pilgrims to the Holy Land, such as the pyramids and Dead Sea, with legends like the phoenix, and confused attempts to explain realities familiar to us but strange to the narrator and his audience: to Mandeville, bananas are "long apples […] sweet and delicious to taste," while crocodiles are "a sort of long serpent" (Bale 6, 29, 50, 114). Mandeville has continued to be an inspiration to later works of speculative fiction, from Swift's *Gulliver's Travels* to C.S. Lewis's *The Voyage of the Dawn Treader*. Godwin's narrative interested me in the same way as Mandeville's *Travels*, as an insight into the historical imagination. Looking through the eyes of their narrators, we see facts that have grown familiar to us as they appeared when newly discovered. We eat bananas with our breakfast cereal and watch crocodiles in wildlife documentaries and on YouTube, while the moon has been revealed by modern science and exploration to be devoid of life and rather dull, but through these historical texts we can gain access to a time when the revelation of these things was still fresh and exciting.

In adapting this material, my first problem was the parts of the book before and after the voyage to the moon. I decided simply to cut them, and, since I was writing a first-person narrative like the original, I did this in a dramatic way, making the text into a fragment with the use of ellipses, as if the beginning and end of Gonsales's account had somehow gone missing. The poem opens in mid sentence:

> ...my only companions a flock of wild geese,
> that disputed the grass near my hut,
> eyeing me when I approached
> (Francis, *Muscovy* 3)

Economy is vital in a poem, so I was concerned to eliminate all unnecessary complications. Instead of the two stays on islands with a sea voyage and battle in between, I implied that Gonsales was a true castaway in the Robinson-Crusoe mould, deprived even of his Man Friday, Diego: this has become such an archetype for us that it needs little explaining, leaving me free to get on with the story. While the hero's motivation in the original, in keeping with his character, is fame and glory, here we assume it is escape. Nevertheless, I show Gonsales (who lacks name, nationality and backstory in my version) as something of a dreamer as he contemplates both the moon and his new flock of companions:

> The moon rested on the mountain, rock on rock –
> you might step from one to the other.
> My geese snored, oval cushions
> in the goose-white light.
>
> With much time for thought, I brooded on
> that icy noctiluca:
> might one live in it?
>
> Had geese reason? What haven
> did they fly off to?
> (Francis, *Muscovy* 3)

The word *noctiluca*, Latin for nightlight, incidentally, was used by another seventeenth-century thinker, Robert Boyle, for phosphorus. His account of his experiments with this element forms the basis of another of the poems in *Muscovy*, so the reference here creates a link between the two (Francis, *Muscovy* 10–11).

The gansas, also, have been simplified in my version: I refer to them as geese, despite the fact that Gonsales (Godwin 77) describes them as swans: I am no longer sure why I made this decision, but it may have been because swans, to British readers, usually suggest the mute swan, which is less associated with migration, whereas V-shaped migrating flocks of geese are a familiar sight in our skies. One difference between prose narrative and poetry is the latter's dependence on metaphor and symbolism, and I found the white geese a fertile source of imagery in this respect: the "goose-white light" of the moon in the quotation above, the "goose-dropping foam" of the waves Gonsales later sees from the mountain-top, the adverb "goose-softly" to describe the experience of alighting from a leap in the low lunar gravity. It is as if the white geese permeate every area of the text (Francis, *Muscovy* 3, 5, 8).

The second section of my poem describes Gonsales's experiments with his new flying machine, first of all with the lamb, as described in the original:

> I tied him to the frame. The geese flapped.
> The rag-doll face showed nothing.
> A bleat blew away,
>
> and for the space of two fields
> he treadled the air.
> (Francis, *Muscovy* 5; cf. Godwin 79)

He now goes on to try the machine himself, interspersing his monologue with muttered Latin prayers:

> Myself weighting no more than a dozen lambs,
> *Sancta Maria*, twenty-five geese
> (all I have) might, at a stretch
> *ora pro nobis*.
>
> The grass raced between my hanging feet,
> tilted and fell. I saw waves
> swing past my elbow,
>
> my shadow kicking at them,
> *in hora mortis*.
> (Francis, *Muscovy* 5)

The third section is central to my poem and faithful to Godwin's original account, which I find the most interesting part of his book. The temperate weather, the perpetual daylight, the "milk and water" dimness of the stars, the migrating swarms of cuckoos and swallows sparkling round about, and the increasingly clear landscape of the moon with its trees, grass and oceans are all included. The only significant omission is that of Godwin's devils, those vestiges of an unscientific world-view that sit so uncomfortably with the more materialist elements of his tale (Godwin 87–98; Francis, *Muscovy* 6–7).

Because I saw the two flights, the one that stays close to Earth and the one through space, as central to *The Man in the Moone*, I compressed Godwin's account of the Lunarians and their society to a few lines of the last section of my poem. Like my use of ellipses, this was an exercise in economy. We have grown used to depictions of aliens in the last couple of centuries, and there is nothing much a tyro SF-novelist like Godwin can do to surprise us in this respect. I restricted the description to a few telling details, such as the height of the aliens, and their strange means of locomotion:

> […] the inhabitants of the place
> looked down at me when they came
> from heads like rooks' nests.
>
> Each carried two fans of curled feathers
> with which to flurry the air
> and so leap further.
> (Francis, *Muscovy* 8)

Godwin makes much of three jewels with magical properties which Pylonas presents to Gonsales. He also mentions that the Lunarians are fond of tobacco (itself then a comparatively new and exotic commodity), and suggests that this links them to the Native Americans, who may be their descendants (Godwin 110–11). All this I compress, borrowing Gonsales's own device of promising to tell the reader in full detail later:

> How I was taken before their king and queen,
> learned the notes of their singing language,
> tasted moon food, smoked the sweet blue
> of moon tobacco;
>
> of three gems, a topaz whose yellow
> could light up a church, a jet
> whose black scorched the hand
>
> and one of no known colour –
> all this you shall read.
> (Francis, *Muscovy* 9)

In a poem, suggestion is more effective than exhaustive delineation. Mine ends with Gonsales taken away for his fortnight's hibernation. When he wakes, the full experience of lunar life will be made available to him, but the reader can only guess what this will be like:

> I woke from my fortnight's sleep,
> the full moon waiting…
> (Francis, *Muscovy* 9)

Part of the pleasure of early science fiction lies in its failures of accurate prediction. Nineteenth-century examples, the kind of texts we may consider as providing precedents for the already thriving genre of steampunk, include Poe's Hans Pfall, who travelled to the moon by hot-air balloon, ignoring the difficulty posed by the lack of air, and Verne's use of a giant gun, raising the question of how it would be possible to return. One anthology of early SF epitomises this in the evocative title *Astronauts by Gaslight* (Tucker et al.). Francis Godwin was writing in an age still very dependent on animals for much of its power, so it is not surprising that he drew on them both for his invention of a flying machine and for space travel. In reading his book we have to imagine our way back to an age when humans and animals lived in closer proximity than they generally do in the West today and when a projected future without their aid was unthinkable. Godwin's proto-science-fiction allows us to glimpse a potential retrofuturist mode, with which, in a very small way, I experimented with in my poem. Perhaps poetry, which requires a less rigorous and detailed approach to the delineation of the material world than the novel, is the proper place for such experiments, and certainly science fiction poetry is an exciting new genre in its own right (Jones). But the prospect of a fully-fledged fictional subgenre based on proto-science-fiction is an enticing one. If this should come to pass, I propose, by way of a tribute to Godwin's extraordinary novel, that it should be named goosepunk.

Bibliography

Armitage, Simon. *Homer's Odyssey*. London: Faber and Faber, 2006.

Bale, Anthony, ed. and trans. *Sir John Mandeville: The Book of Marvels and Travels*. Oxford: Oxford University Press, 2012.

Francis, Matthew. *Mandeville*. London: Faber and Faber, 2008.

---. *Muscovy*. London: Faber and Faber, 2013.

---. "Introduction." *The Mabinogi*. London: Faber and Faber, 2017. ix–xiii.

Gibson, William, and Bruce Sterling. *The Difference Engine*. London: Victor Gollancz, 1990.

Godwin, Francis. *The Man in the Moone*, edited by William Poole. Peterborough: Broadview Editions, 2009.

Guffey, Elizabeth, and Kate C. Lemay. "Retrofuturism and Steampunk." *The Oxford Handbook of Science Fiction*. Ed. Rob Latham. Oxford: Oxford University Press, 2014. 434–47.

Heaney, Seamus. *Beowulf: A New Translation*. London: Faber and Faber, 1999.

Hutton, Sarah. "The Man in the Moone and the New Astronomy: Godwin, Gilbert, Kepler." *Études Épistémè* 7 (2005): Web. Updated 1 May 2005, accessed 25 April 2019.

Jones, Russell, ed. *Where Rockets Burn Through: Contemporary Science Fiction Poems for the UK*. London: Penned in the Margins, 2012.

Kang, Minsoo. "Catapunk: Toward a Medieval Aesthetic of Science Fiction." *Medieval Science Fiction*, edited by James Paz and Carl Kears. London: King's College Centre for Late Antique and Medieval Studies, 2014. 245–64.

Kepler, Johannes. *Somnium*: *The Dream, or Posthumous Work on Lunar Astronomy*, translated by Edward Rosen. Mineola: Dover Publications, 2003.

Langford, David. "Steampunk." *The Encyclopedia of Science Fiction*. Ed. John Clute, David Langford, Peter Nicholls and Graham Sleight. London: Gollancz, (updated 31 August 2018.) Web. Accessed 27 February 2020.

Lake, Jay. *Mainspring*. New York: Tor Books, 2007.

Logue, Christopher. *War Music: an Account of Books 1–4 and 16–19 of Homer's Iliad*. London: Faber and Faber, 2001.

Lucian of Samosata. "A True History." *Selected Dialogues*, edited by C.D.N. Costa. Oxford: Oxford University Press, 2005. 203–33.

Nicholls, Peter. "Cyberpunk." *The Encyclopedia of Science Fiction*. Ed. John Clute, David Langford, Peter Nicholls and Graham Sleight. London: Gollancz, updated 10 April 2015. Web. Accessed 27 February 2020.

Oswald, Alice. *Memorial*. London: Faber and Faber, 2011.

Poole, William. "Introduction." Francis Godwin. *The Man in the Moone*. Ed. William Poole. Peterborough: Broadview Editions, 2009. 11–60.

Roberts, Adam. *The History of Science Fiction*, Second Edition. London: Palgrave Macmillan, 2016.

Tucker, George, Richard Adams Locke, Edgar Allan Poe, Edward Everett Hale and George Griffith. *Astronauts by Gaslight*. Edmonton. Black Cat Press, 2006.

Wilkins, John. *The Discovery of a World in the Moone*. New York: Sagwan Press, 2015.

JEROEN DEPLOIGE AND JEROEN DE GUSSEM*

Medieval Authorship and Canonicity in the Digital Age – an Introduction**

1 Two 'Once New' Philologies

More than three decades ago, in 1990, two different fields in medieval studies, literature and computational linguistics, witnessed the proclamation of a 'New Philology.' The launch of the first variant of such a New Philology, in a special issue of the American journal *Speculum*, is by now one of the most frequently recalled success stories in the recent history of literary studies (Bloch *et al.*). Under the impetus of Stephen G. Nichols, the issue's contributors — all specialised in the study of vernacular literatures and historiography — argued in favour of a philology that, in the study of medieval texts, acknowledges the particularity of medieval manuscript culture (Nichols, "The New Philology"). Whereas traditional philology and literary history had always put forward the published edition of the text as the basis for any further analysis — according to either the 'text-genealogical' principles associated with Karl Lachmann (1793–1851) or the 'best possible manuscript' principle of Joseph Bédier (1864–1934) — the contributors to the *Speculum* issue argued that it was time for medievalists to privilege the dynamics of the 'manuscript matrix' as the object of study. This implied an awareness of the fact that medieval texts were constantly being rewritten in the age before the printing press, that a multitude of actors was involved in their redaction and transmission, and that the materiality of manuscripts and their paratexts were important indicators of how texts were compiled, read and appropriated in new contexts. The new orientation did not, however, come out of the blue. It was strongly inspired by insights from francophone scholarship and showed a clear affinity with Paul Zumthor's (1915–95) recognition of the 'mouvance' in the medieval textual tradition (1972) and with Bernard Cerquiglini's provocative essay *Éloge de la variante* (1989). The influence of this

* Ghent University, and Ghent University and Research Foundation Flanders (FWO).

** This special cluster contains a selection of contributions that grew out of the conference "The Medieval Literary Canon in the Digital Age," held at Ghent University on 17–18 September 2018. The conference was organised by Mike Kestemont, Wim Verbaal and the authors of this introduction, in collaboration with the Henri Pirenne Institute for Medieval Studies at Ghent University, the international research network RELICS (Researchers of European Literary Identities, Cosmopolitanism and the Schools), and the research community "Digital Humanities Flanders" (DHu.f). We thank all participants at the conference for their generous exchange of ideas, as well as the editorial board of *Interfaces* for kindly welcoming this collection in its e-journal.

new approach to medieval textuality, which is known today under the label of 'material philology', came to be particularly strong.

Less well known is that in the same year, 1990, the Italian Jesuit Roberto Busa (1913–2011) also announced a New Philology (Busa, "Informatics;" see also "Half a Century Ago"). This godfather of twentieth-century computational linguistics had already been convinced of the possibilities of informatics since the late 1940s. It was his seemingly utopian plan to develop a lexical analysis of the entire oeuvre of Thomas Aquinas (1225–74) that led him to embrace computer science when it was still in its infancy. The most often recalled stage in Busa's career is the moment when, in 1949, he managed to convince IBM's founder, Thomas J. Watson (1874–1956), to join him in his project (Birnbaum *et al.* S1–S2). His *Index Thomisticus* resulted in fifty-six printed volumes, but was also launched on CD-ROM exactly forty years after his deal with Watson. This digital collection of about 180 texts and 11 million lemmatised words, which allowed concordances to be generated digitally, constituted the first machine-readable corpus of such a size. It was also this achievement that led Busa to argue for a new philology in which the main challenge was to advance artificial intelligence in the semantic processing and syntactic analysis of large quantities of texts. Busa's new philology did not seek to reject traditional approaches (Busa, "Informatics" 343). It implied above all an awareness among philologists of the potential of computational research and a research agenda that aimed to help the further development of that potential. For Busa, this new philology was, in sum, about "a quality-leap and new dimensions" (Busa, "Informatics" 339).

Thanks to the further development and effective application of machine learning, computational text analysis has indeed made great qualitative progress since the early 1990s. The "new dimensions" promised by Busa have also manifestly unfolded. In the past few decades an increasing mass of texts from different times and regions and in multiple languages has become machine-readable and therefore suitable for large-scale analyses. This accessibility also, it is argued, finally offered unprecedented opportunity for studying authors and texts that had never made their way into the established literary canons. When in 2000 Franco Moretti presented for the first time his well-known concept of 'distant reading,' advocating the exposure of textual connections within enormous bodies of digitised texts, he explicitly stated that, contrary to traditional 'close reading,' his method allowed one to "look beyond the canon" ("Conjectures on World Literature" 57). In the same vein, Matthew Jockers, in his computationally-driven macro-analysis of nineteenth-century novels, reflected on how his new methodology had shown that the "the canonical greats" appeared to be "not even outliers; they are books that are similar to other books, similar to the many orphans of literary history that have been long forgotten in a continuum of stylistic and thematic change" (Jockers 168).

In presenting their respective views on what contemporary philology ought to do, both Stephen G. Nichols and Franco Moretti took a critical stance toward Ernst Robert Curtius's (1886–1956) *Europäische Literatur und lateinisches Mittelalter* (1948) as an iconic expression of traditional philology. Nichols argued that Curtius's classic, in its somewhat restrictive focus on the European 'unity' of poetic form in the Latin Middle Ages, had failed to take into account that the exact opposite is in fact far more characteristic of medieval literary production, namely its multiplicity and variance (Nichols, "The New Philology" 2). For Moretti, Curtius's Latin Middle Ages and its *topoi*, which the latter presented as "die verwitterte Römerstraße von der antiken zur modernen Welt" (Curtius 29), offered too static a model to understand European literature (Moretti, "Modern European Literature" 86–88, 91, 98–99). However, if we compare the ways in which the two 'once new' philologies born in 1990 impact on today's medieval studies, then a number of differences or at least apparent contradictions stand out as well.

First of all, it is evident that material philology succeeded early on in making its mark on the traditional field of research. The fact that Nichols's first manifesto immediately appeared in *Speculum* certainly contributed to this rapid success. It is fair to say that within material philology interest in the digital humanities has grown rapidly; in particular in the digitisation of manuscripts and in new digital edition techniques that, in contrast to traditional printed critical editions, value the uniqueness of single manuscripts while making comparisons between manuscripts possible.[1] Yet it was not until 2017 that *Speculum* also devoted an (exclusively online) special issue to "The Digital Middle Ages," offering fascinating samples of the most cutting-edge research in this field.

Secondly, one may wonder if the methods and principles of material and computational philology do not contradict each other. The fact that many computational analyses start from digital corpora based on editions, in which orthographic variation is often even filtered out in order to better reveal recurrent linguistic patterns in

1. For an excellent example, see the Online Froissart Project (Ainsworth and Croenen).

texts, is in a certain sense at odds with the appreciation of 'variance' in material philology.

Finally, the overtly post-structuralist agenda from which material philology emerged seems to have few obvious affinities with the research questions often found in computational linguistics. This is perhaps most apparent in the case of stylometry, or the study of style based on quantitative analysis, which also forms the central approach in the four case studies presented in this themed cluster of *Interfaces*. Indeed, much stylometric research is concerned with authorial attributions of disputed or anonymous texts. Such questions of attribution, of course, have little in common with the denial, within material philology, of the romantic concept of the 'author' as the unique and identifiable creative force that is supposed to have been at the basis of every 'new' text. Moreover, one can rightly ask whether their ultimately traditional fixation on authorship is not also canon-confirming, in spite of Moretti's and Jockers's ambition to break open canons via computational distant reading. In what follows we will dwell on these considerations by surveying stylometry's origins and early history. Whereas this history is undeniably closely entwined with positivistic and romantic notions of individual authorship typical of nineteenth-century philology, the technical advancements and new scholarly insights of the past few decades are increasingly telling a much more nuanced story.

2 Stylometry and Authorship

Although 'stylometry' as a term was coined in the nineteenth century, it has become commonplace to associate the method with earlier philological approaches dating back to at least the Italian humanists of the fifteenth century. Often considered as one of its forefathers is Lorenzo Valla (1407–57), whose unmasking of the controversial *Donatio Constantini* as a Carolingian forgery was primarily based on stylistic arguments (Eder 63–64). Although Valla's approach was indeed formalistic and focused on matters of style, he did not, however, apply statistical analysis. In that regard, it was rather his contemporary Leon Battista Alberti (1404–72) who was in the vanguard (Ycart). In 1466, Alberti composed a mathematical treatise on cryptography called *De componendis cyfris*. One could argue that by finding out statistically informed characteristics of language, namely the frequency patterns of vowels in Latin, Alberti was already practicing an early kind of 'adversarial stylometry.'[2] He explored ways to obfuscate the style and content of a text through encryption with the aim of concealing an author's identity or message.

Regardless of the intriguing parallels with such distant ancestors, the cradle of stylometry is clearly to be found in the positivist spirit, formalism and empiricism of the late nineteenth and early twentieth century. It is telling that one of the earliest scholarly articles for computational approaches to style appeared in *Science*. It was written not by a philologist but by the American physicist and meteorologist Thomas Corwin Mendenhall (1841–1924). Mendenhall took up the novels of Charles Dickens (1812–70) to verify if frequency distributions apply to style as well. He manually counted word lengths for small segments of text, and by plotting these lengths he stumbled upon what he called 'characteristic curves' that appeared to be consistently the same for texts of the same authorship (Mendenhall). Another notable figure active in these same decades was the Polish philosopher and philologist Wincenty Lutosławski (1863–1954), who wrote *Principes de stylométrie* in 1890, thereby establishing the eponymous method (Lutosławski). Lutosławski was able to establish the chronology of Plato's writings by focusing on what he himself called 'stylèmes,' which he understood to comprise rare words used in a conspicuously high number, word frequencies, word position in the sentence, and proportional frequency of the parts of speech. Around the same time, the British statistician (George) Udny Yule (1871–1951) introduced vocabulary richness as a stylometric feature, a technique which is still used today. Armed with this and other methods, Yule verified suspicions that the *De imitatione Christi*, the influential and intensively translated devotional treatise of the Modern Devotion movement, was written by the Augustinian canon Thomas of Kempen (1380–1471) (Yule). A final figure of achievement in the early field of stylometry is the American linguist and philologist George Kingsley Zipf (1902–50), especially known for his controversial and still much-debated 'Zipf's law.' Zipf pointed out that about half the words human beings use in writing and conversation correspond to the 150 most frequent words, a phenomenon which he explained in his 'principle of least effort' (Zipf). He argued that human beings tend to minimise the number of letters — or words — necessary to bring a message across, which is why (generally) half of any language consists of the same words over and over. These are grammatical or syntactical words which despite their omnipresence are often overlooked, such as conjunctions, pronouns, prepositions, adverbs and particles.

2. A manual or computer-assisted way (e.g. through machine-driven retranslation or paraphrasing) to obfuscate the writing style of a text and circumvent stylometry's potential to recognise authorship.

The breakthrough of stylometry came in the early 1960s, when the revolutionary advent of early computing advanced the evidence that these 'function words' — whose 'silent' omnipresence Zipf had already pointed out — convey significant information about the writer using them. The book *Inference and Disputed Authorship: The Federalist*, published in 1964 by the two American statisticians Frederick Mosteller (1916–2006) and David Lee Wallace (1928–2017), intended to formulate an answer to the long-standing authorship controversy around the pseudonymous late eighteenth-century Federalist papers. Mosteller and Wallace were able to show that the statistical analysis of function words was extremely efficient for distinguishing works of different authorship, and their book became the foundational scholarly work of non-traditional authorship attribution. All the contributions in the current cluster of *Interfaces* discuss function words in much detail and with further evidence to prove their effectiveness, which demonstrates the lasting significance of Mosteller and Wallace's revolutionary discovery of a 'stylistic DNA' or 'stylistic fingerprint' sixty years on.

This last observation, however, should not give the false impression that the progress of stylometry has stagnated since Mosteller and Wallace. The tide in technical advancements since the 1960s announced the arrival of the digital age and has brought methodological improvement and progress to Mosteller and Wallace's initial discovery, whose computer, after all, was still approximately the size of a car. Especially since the 1980s, the field of stylometry has been able to benefit from the improvements in computing performance. Worthy of note in this regard is John Burrows's (1928–2019) introduction of multivariate analysis of style with Principal Components Analysis or PCA (Burrows), which had by 2000 become "the standard first port-of-call for attributional problems in stylometry" (Holmes 114).

Around the turn of the millennium, the field gradually witnessed the impact, as we noted above, of artificial intelligence and machine learning, combined with a larger arsenal of stylistic techniques and feature types (Stamatatos 539). The advancement of these techniques allowed stylometrists to work not only with the traditional bag-of-words approach,[3] but also with *n*-grams,[4] rhythmic and auditive aspects of style, lemmatised, grammatical and syntactic features, and even word embeddings for capturing words' semantics through context (Mikolov *et al.*). The simultaneous arrival of machine-learning frameworks has moreover allowed for a better-informed assessment of the accuracy and reliability of this variety of stylometric

3. The bag-of-words approach represents a document as a 'bag' or 'multiset' of words. It exclusively takes into account word frequencies, disregarding context, word order or any other orderly principle of grammar or syntax.

4. *N*-grams are sequences of *n* (variable number of) characters/words/parts-of-speech from a given sample of text or speech.

methods. Stylometry is also increasingly being made more accessible to non-experts in user-friendly packages with graphical user interfaces such as the Lexomics group's 'Lexos' (Kleinman and LeBlanc) or the Computational Stylistics Group's 'Stylo with *R*' (Eder, Rybicki and Kestemont), and has gradually become more transparent in its mode of operation.

This increase in the precision and accuracy of stylometric methods is not merely promising from a computer-scientific point of view, but also from a literary-historical one. Thanks to its technical advancements, stylometry is becoming increasingly attuned to challenging simplistic notions of individual authorship and can help scholars sharpen their understanding of literary writings as the result of layered, complex authorial roles. Stylometry's focus has in the past years been able to shift beyond attribution for the sake of attribution. We find stylometric scholarship exploring the implications of multi-authored or collaborative contexts, posterior redaction and editorial amendments of texts, stylistic influence and apprenticeship, intertextuality and shared linguistic communities, cross-linguistic authorship or authorship filtered through translation, stylistic development within authors' texts or entire oeuvres, or of different style registers for characters in works of fiction. The realisation and exploration of such complex models of authorship instantly draws attention to the contributions of the anonymous, marginal or suppressed voices of literary history that we have lost track of or forgotten. In other words, stylometry is becoming better equipped to explore (and even confirm) those aspects of textual instability which Nichols had presented as an essential characteristic of medieval literary production. As such, digital methods have developed at least one significant way of questioning the medieval canon, precisely at a juncture where the interests of the two 'once new' philologies of 1990 converge.

3 Questioning Canonicity in the Digital Age

A repeated promise in the wake of the 'digital turn' in literary scholarship is, as we have seen, that the growing availability and accessibility of digitised historical texts will enable scholars to transcend the limitations of traditional literary canons. However, much of the digital scholarship within medieval studies still seems to hinge primarily on well-conserved texts and often studied authors that continue to attract academic interest (*Roman de la Rose*, Christin de Pisan etc.

— see *e.g.* Nichols, *From Parchment*; *Digital Library*). It may be relevant, therefore, to question the criteria that define our textual canons and the ways in which the rise of digital analyses may impact on them.

In a thoughtful article on this subject, Lars Boje Mortensen recently proposed a fine-grained model to assess medieval literary canons by analysing the forces that hold them in place ("The Canons"). The model distinguishes between four levels of canonicity. It draws its inspiration from Aleida Assmann's conceptual distinction between 'Canon' and 'Archive' in the construction and maintenance of cultural memories. In Assmann's theory, the Canon designates the 'working memory' that supports collective identities and that is built on a selective number of normative and formative texts and other cultural products, while the Archive denotes the cultural 'reference memory' that is passively maintained and stockpiled for potential future reframing and reinterpretation (Assmann; see also McGann 47–48). The first level in Mortensen's four-tiered approach is that of the High Canon, encompassing texts and authors that are globally appreciated. They enjoy a multimedial presence in popular culture and dominate scholarship. The names belonging to the second level, the Broad Canon, are well-known within medieval studies but hardly visible in popular culture. Here we find both representatives of the learned culture of the Middle Ages, that are of transnational significance, and texts and authors that can be considered as foundational within national cultures and historiographies. All are often studied, edited, anthologised, translated etc. The third level, that of the Open Archive, contains texts that are generally well accessible in decent editions and listed in repertories and literary histories, but that are the object of only limited and specialised study. Finally, the Closed Archive comprises all kinds of texts hidden in manuscripts that are less known or studied, remain poorly or even unedited or are only known through reconstruction on the basis of other texts.

The four case studies collected in this cluster of *Interfaces* fit in with, and flesh out, Mortensen's four-tiered model in a particularly appropriate way. While each individual article addresses and questions issues of authorship and scribal roles from its own specific angle, they collectively offer an original perspective on how computational methods in dialogue with traditional hermeneutics can also lead to new approaches to the four different levels of medieval canonicity.

Jeroen De Gussem's article hones in on the joint authorship of the *Vita* of the twelfth-century visionary Hildegard of Bingen (1098–1179), an author who by now may be said to have secured her place in the High Canon of medieval literature (Mortensen 58). However, her *Vita* contains rare and disputed autobiographical fragments which have often raised suspicions that these were heavily revised by consecutive hagiographers. Armed with computational stylistics, De Gussem establishes in considerable detail the layered character of the text, thereby bringing to light its collaborative authorship. By illustrating the involvement of Hildegard and a team of biographers in the *Vita*, De Gussem highlights the importance the visionary and her community attached to her constructed *persona*, her remembrance by posterity and her possible 'canonicity,' or even saintly 'canonisation.'

Mary Dockray-Miller, Michael D.C. Drout, Sarah Kinkade and Jillian Valerio continue on De Gussem's trail of hagiography and composite authorship, but in relation to a text that can be considered as one of the eleventh-century classics from the Broad Canon of England's literary history. By making use of Lexomic technology developed at Wheaton College (Massachusetts), their piece explores the authorship of the contested prosimetric *Vita* of Edward the Confessor (1003–66) written around the time of the Norman Conquest of 1066. The candidates conventionally proposed in this authorship debate are the itinerant continental monks Goscelin (d. after 1107) and Folcard (fl. 1060s) of Saint-Bertin, who were from the mid-eleventh century onward recruited by a number of notable monastic houses in England for their hagiographical skill. In making a case for a composite authorship of the *Vita Ædwardi*, Dockray-Miller *et al.* break new ground by challenging the 'individual attribution' of the text to a single author. In taking us through the complex and composite stylistic fabric of the *Vita*, they not only shift the focus from a single individual author to an entire school of writing, but also attach central importance to Queen Edith of Wessex (1029–75), King Edward's widow who commissioned the work. They finally argue that if there is one authorial voice that may have overseen the composition of the *vita* in its entirety, it must be that of the well-educated Edith.

With the article of Eveline Leclercq and Mike Kestemont, we temporarily leave the realm of purely literary texts to further widen Mortensen's idea of the Open Archive to documentary sources. With acknowledgements to the literally 'open archives' in the form of open-access databases such as *Diplomata Belgica* and *Chartae Galliae*, the authors pair distant reading with conventional diplomatic approaches to the formulaic language of charters. They present their double method as 'distant diplomatics,' and engage in disentangling the multiple authorial strata (issuer, dictator, scribe, etc.) in charters and in detecting traces of the local preferences and compositional habits of the chanceries which the charters' scribes depended on. Leclercq and Kestemont present a thorough analysis of the development of a specific *dictamen* in a corpus of twelfth-century Latin charters from the Cambrai episcopal chancery. But more importantly, their article offers a promising methodological exploration of the potential of stylometry in the field of diplomatics.

As the only contributor in this cluster focusing on vernacular medieval texts, Gustavo Riva statistically analyses the rubrics to a corpus of short *Reimpaargedichte* in miscellany manuscripts from the twelfth to the sixteenth century. In doing so he draws attention to what is commonly called the 'paratext,' denoting the structural and marginal components of texts that until now remain hidden in the stratum of what Mortensen designates as the Closed Archive. It is in rubrics, Riva argues, that one can find the traces of the anonymous scribes responsible for preserving, copying and transmitting medieval texts, who by their rubrication "named and renamed" them, and who both literally and figuratively coloured these texts' reception for posterity. By statistically aggregating information about their lengths, their lexical variability, their most common lexical properties and their authorship, Riva's distant reading of rubrics permits the conclusion that they are rarely uniform and are dependent upon time- and place-bound conventions.

One final thought, before letting the articles speak for themselves: it is clear that the individual case studies presented here, despite focusing on different levels of canonicity, do not really question this hierarchy as such. Does this mean that the influence of the digital turn in medieval studies leaves traditional canons untouched? That is doubtful. As Mortensen has also noticed, the canons of medieval literature looked completely different in the past, especially in the centuries before the rise of romanticism and nation-states. To understand the "ups and downs in the long afterlife of medieval texts," Mortensen argues, it is not enough to look only at the influence of "ideology, political and educational context or shifts in literary taste" (Mortensen 47). Since the early Middle Ages, the accessibility of texts, dependent as it was on means of material transmission and the milieus in which these texts were collected and read, has also been an essential parameter in determining their popularity. It is therefore inevitable that the growing digital availability of texts and manuscripts, the facilitation of new research questions and the increasing globalisation of education and learning will lead again to rearrangements of the scales of canonicity.

Bibliography

Ainsworth, Peter and Godfried Croenen. The Online Froissart (2013). Accessed 19 November 2021.

Assmann, Aleida. "Canon and Archive." *Cultural Memory Studies: An International and Interdisciplinary Handbook*. Ed. Astrid Erll and Ansgar Nünning. Berlin: De Gruyter, 2008. 97–107.

Birnbaum, David J., Sheila Bonde and Mike Kestemont. "The Digital Middle Ages: An Introduction." *Speculum* 92.S1 (2017): S1–S38. Accessed 19 November 2021.

Bloch, R. Howard, Alison Calhoun, Jacqueline Cerquiglini-Toulet, Joachim Küpper, and Jeanette Patterson (eds.). *Rethinking the New Medievalism*. Baltimore: Johns Hopkins University Press, 2014.

Burrows, John F. *Computation into Criticism: A Study of Jane Austen's Novels and an Experiment in Method.* Oxford, UK: Clarendon Press, 1987.

Busa, Roberto. "Informatics and New Philology." *Computers and the Humanities* 24.5 (1990): 339–43.

---. "Half a Century of Literary Computing: Towards A 'New' Philology." *Historical Social Research* 17.2 (1992): 124–33.

Busa, Roberto *et al. Index Thomisticus*. Web edition by Eduardo Bernot and Enrique Alarcón (2005). Accessed 19 November 2021.

Cerquiglini, Bernard. *Éloge de la variante: Histoire critique de la philologie. Paris: Seuil, 1989.*

Curtius, Ernst Robert. *Europäische Literatur und lateinisches Mittelalter*. Bern: A. Francke AG, 1948.

Digital Library of Medieval Manuscripts. Baltimore, MD: Johns Hopkins Sheridan Libraries. Accessed 19 November 2021.

Eder, Maciej. "A Bird's Eye View of Early Modern Latin: Distant Reading, Network Analysis and Style Variation." *Early Modern Studies after the Digital Turn*. Ed. Laura Estill, Diane K. Jakacki and Michael Ullyot. Medieval and Renaissance Texts and Studies 502. New Technologies in Medieval and Renaissance Studies 6. Toronto: Iter Press, 2016. 61–88.

Eder, Maciej, Jan Rybicki and Mike Kestemont. "Stylometry with R: A Package for Computational Text Analysis." *R Journal* 8.1 (2016): 107–21.

Holmes, David I. "The Evolution of Stylometry in Humanities Scholarship." *Literary and linguistic computing* 13.3 (1998): 111–17.

Jockers, Matthew Lee. *Macroanalysis. Digital Methods and Literary History.* Champaign, IL: University of Illinois Press, 2013.

Kleinman, Scott and Marc LeBlanc. "Lexos: An Integrated Lexomics Workflow." *Digital Humanities 2017: Conference Abstracts* (McGill University & Université de Montréal, August 2017): 734–35.

Lutosławski, Wincenty. *Principes de stylométrie*. Paris: Ernets Leroux, 1890.

McGann, Jerome. *A New Republic of Letters. Memory and Scholarship in the Age of Digital Reproduction*. Cambridge, MA: Harvard University Press, 2014.

Mendenhall, Thomas Corwin. "The Characteristic Curves of Composition." *Science* 9.214 (1887): 237–49.

Mikolov, Thomas, Ilya Sutskever, Kai Chen, Gregory S. Corrado, and Dean Jeffrey. “Distributed Representations of Words and Phrases and their Compositionality.” *Advances in Neural Information Processing Systems 26: 27th Annual Conference on Neural Information Processing Systems 2013*. *Proceedings of a meeting held December 5-8, 2013, Lake Tahoe, Nevada, United States*. 2013. 3111–19.

Moretti, Franco. “Modern European Literature: A Geographical Sketch.” *New Left Review* 206 (1994): 86–109.

---. “Conjectures on World Literature.” *New Left Review* 1 (2000): 54–68.

Mortensen, Lars Boje. “The Canons of Medieval Literature from the Middle Ages to the Twenty-First Century.” *Analecta Romana Instituti Danici* 42 (2017): 47–63.

Mosteller, Frederick and David L. Wallace. *Applied Bayesian and Classical Inference: The Case of the Federalist Papers*. Springer Series in Statistics. New York: Springer Verlag, 1984. 2nd ed. of *Inference and Disputed Authorship: The Federalist*. Reading, Mass.: Addison-Wesley, 1964.

Nichols, Stephen G. “Introduction: Philology in a Manuscript Culture.” *Speculum* 65.1 (1990): 1–10.

---. *From Parchment to Cyberspace. Medieval Literature in the Digital Age*. Medieval Interventions. New Light on Traditional Thinking 2. New York: Peter Lang, 2016.

Stamatatos, Efstathios. “A Survey of Modern Authorship Attribution Methods.” *Journal of the American Society for Information Science and Technology* 60.3 (2009): 538–56.

Ycart, Bernard. “Alberti’s Letter Counts.” *Literary and Linguistic Computing* 29.2 (2014): 255–65.

Yule, George Udny. “On Sentence-Length as a Statistical Characteristic of Style in Prose: With Application to Two Cases of Disputed Authorship.” *Biometrika* 30.3/4 (1939) 363–90.

Zipf, George Kingsley. *Human Behavior and the Principle of Least Effort. An Introduction to Human Ecology*. Cambridge, MA: Addison-Wesley Press, Inc., 1949.

Zumthor, Paul. *Essai de poétique médiévale*. Paris: Éditions du Seuil, 1972.

JEROEN DE GUSSEM

Larger than Life?

A Stylometric Analysis of the Multi-Authored *Vita* of Hildegard of Bingen

Abstract

This article explores by aid of stylometric methods the collaborative authorship of the *Vita Hildegardis*, Hildegard of Bingen's (auto-?)biography. Both Hildegard and her biographers gradually contributed to the text in the course of the last years of Hildegard's life, and it was posthumously completed in the mid-1180s by end redactor Theoderic of Echternach. In between these *termini a quo* and *ante quem* the work was allegedly taken up but left unfinished by secretaries Godfrey of Disibodenberg and Guibert of Gembloux. In light of the fact that the *Vita* is an indispensable source in gaining historical knowledge on Hildegard's life, the question has often been raised whether the *Life of Hildegard* is – by dint of contributions by multiple stakeholders – a larger-than-life depiction of the visionary's life course. Specifically the 'autobiographical' passages included in the *Vita*, in which Hildegard is allegedly cited directly and is taken to recount biographical information in the first-person singular, have been approached with suspicion. By applying state-of-the-art computional methods for the automatic detection of writing style (stylometry), the delicate questions of authenticity and collaborative authorship of this (auto?)hagiographical text are addressed.*

* Ghent University and Research Foundation Flanders (FWO).
This article is a revision of a chapter that was originally part of my doctoral thesis titled *Collaborative Authorship in Twelfth-Century Latin Literature: A Stylometric Approach to Gender, Synergy and Authority* (defended at Ghent University in November 2019). The project was funded by the Ghent University Special Research Fund (BOF). Its execution rested on a close collaboration between the Henri Pirenne Institute for Medieval Studies (HPIMS) at Ghent University, the CLiPS Computational Linguistics Group at the University of Antwerp, and the Centre Traditio Litterarum Occidentalium division for computer-assisted research into Latin language and literature housed in the Corpus Christianorum Library and Knowledge Centre of Brepols Publishers in Turnhout (Belgium). My gratitude and indebtedness goes out to the guidance of Jeroen Deploige, Wim Verbaal and Mike Kestemont, the founders and intellectual inspirers of the aforementioned project which I had the honour of bringing to completion. I also owe plenty to the stimulating research presented at the conference "The Medieval Literary Canon in the Digital Age" (17–18 September 2018), which has found its way –to my great delight, haplessly – to the pages of *Interfaces*. Finally, I would like to thank the two anonymous peer reviewers for their invaluable feedback on this article, and Catherine Rosbrook for her careful revisions of my English.

1 Authorship and Canonization of Hildegard

From the late twelfth century onward, the documentation and bundling of testimonies and/or medieval authors' saintly biographies and miracles into a sort of dossier was increasingly instrumental for achieving canonization, the elevation to sainthood (Vauchez). The procedures leading towards canonization became more and more systematised and bureaucratic, meaning that the papal See's official decision rather than popular veneration through cults or local, diocesan approval was the deciding factor (Katajala-Peltomaa). Correspondingly, the need for such a dossier in a regulated process for the endowment of sainthood, and an awareness of its having to compete with similar-looking dossiers, justified its redaction and contribution by multiple supporters and witnesses,[1] and in some cases required the recruitment of professional hagiographers to respond to the sensitivities of the See's procedures. The multi-authored *Vita* of the Benedictine visionary Hildegard of Bingen (1098–79), a (auto-?)hagiographical account of her life and miracles, can be taken as an example of such a project. Forming part of a dossier containing the *Acta inquisitionis*,[2] a charter concerning Hildegard's virtues and miracles petitioning her canonization, and some fragments of her visionary treatises, the *Vita* was proffered to the Curia multiple times, to Popes Gregory IX (1237), Innocent IV (1243) and John XXII (1317). Only in 2012 the canonization process was completed, which makes it the longest of its kind in the history of the Church (Ferzoco; Newman, "St Hildegard").

Hildegard's literary legacy was intensely prepared in the final years of her life, the period from which most contemporary Rupertsberg manuscripts survive. Amongst other indications, this demonstrates that her life and authorship was a project in whose success her community in the Rupertsberg cloister had stakes long after their abbess had gone. The Wiesbaden Riesencodex,[3] a monumental codex containing Hildegard's *opera omnia* of all authorised versions of her visionary writings (except for her *Liber subtilitatum diversarum naturarum creaturarum*, or *Physica* and *Cause et Cure*), has been argued to have been issued under Hildegard's command, but was completed after her death (Embach 36–65). It was Hildegard's persona rather than her historical person that was documented and 'constructed' in the Riesencodex. As will be discussed below, Hildegard's entourage, especially her secretaries, played an indispensable role in composing, conserving and 'canonizing' the image of Hildegard for posterity which they hoped future generations would keep track of. The *Vita* has been a source of fascination to scholars not only because it gives an account of Hildegard's life, but also because it contains direct citations of 'autobiographical' fragments allegedly written by the visionary herself. However, the editor of the *Vita*, Monika Klaes, was unconvinced – as opposed to others (Schrader and Führkötter 14; Dronke 144) – that these autobiographical passages contain no interpolations and are authentically of Hildegard's doing (Klaes 113*–14*). Quite recently, Van Engen confessed doubts concerning their authenticity as well: "To what degree they, even if of authentic origin, underwent redaction lies beyond our ken" ("Authorship" 339). Taking into consideration that the *Vita* was interpolated in Hildegard's Riesencodex posthumously (Klaes 157*ff.; Derolez, "Manuscript" 23), that it went through the hands of at least three biogra-

1. Abbot Bernard of Clairvaux's (1090–53) entourage, and most notably his secretary Geoffrey of Auxerre († after 1200), may be another example of this. Bernard's multi-authored *Vita prima* may have also been part of his canonization dossier (Bredero, *Études* 147–61; Dutton).

2. Alternatively also the *Canonizatio*, sent to Pope Gregory IX in 1233 to Rome by three clerics in Mainz for approval of Hildegard's canonization (edited in the late nineteenth century by Petro Bruder). Included was Theoderic's *Vita Hildegardis* and exemplars of her work (Ferzoco 306).

3. Wiesbaden, Hessische Landesbibliothek, 2. The end redaction of Hildegard's *Opera omnia* is now generally accredited to Guibert of Gembloux, a Brabantine monk who, as we will discuss further below, played an important role in the collecting and completing of Hildegard's oeuvre near the end of her life.

phers, and that it had the intention of promulgating Hildegard's persona with lasting impact, due concern is warranted. Is this indeed Hildegard's *Life*, or is this a larger-than-life literary construction, and how did she participate in its composition?

In order to analyse the multi-layered authorship of Hildegard's *Vita*, this article will make use of computational stylistics or stylometry, a subfield of the digital humanities (DH), based on techniques from computational linguistics and natural language processing (NLP), in which statistical methods are applied to segregate writing styles, and used as a basis for assigning anonymous documents to their authors (Daelemans; Juola; Koppel *et al.*; Stamatatos).

2 Hildegard's Collaborators

It is well known that Hildegard of Bingen's authorship has not always been regarded with the same scholarly esteem it is presently granted. Partly this is related to the fact that she composed her works in collaboration with male secretaries such as her provost and lifelong confidant Volmar of Disibodenberg († 1173), or her last secretary Guibert of Gembloux (1124–1214), and female scribes, amongst whom was her close companion Richardis of Stade (Herwegen 1904). Hildegard presented these collaborations to her readership as necessary due to her limited schooling and deficiency in speaking and writing Latin. In the nineteenth century, Wilhelm Preger took the presence of her male secretaries and self-devaluations as evidence that her entire epistolarium (both outgoing as incoming letters) was a *falsum*, and that only a man could have been capable of the intellectual accomplishments that emerge from the remaining of Hildegard's works (*Geschichte*). Consequently, her entire oeuvre was ascribed to Theoderic of Echternach, ironically enough a monk who may never even have met Hildegard in real life. That Preger believed the cards were stacked in favour of Theoderic as male forger was probably not coincidental. Theoderic is, after all, the end redactor of Hildegard's *Life*, the *Vita Hildegardis*. In Preger's eyes the orchestrator of Hildegard's 'life' was most likely to be its overall fabricator.

Having for some time been denied authorship of her works, Hildegard has slowly but surely been regaining recognition for her work since Preger. Her revaluation was gradually set in motion with the pioneering work of Herwegen ("Les collaborateurs") and Liebeschütz (*Allegorische Weltbild*) in the early twentieth century. The seminal work of the two Eibingen nuns Schrader and Führkötter (*Echtheit*) confirmed the authenticity of Hildegard's visionary trilogy consisting of *Scivias*, *Liber vitae meritorum* (*LVM*) and *Liber divinorum operum (LDO*). The second half of that same century also saw the arrival of critical editions by Führkötter and Carlevaris (*Scivias*), Carlevaris (*LVM*), Dronke and Derolez (*LDO*), Van Acker and Klaes (*Epistolarium*), and a series of scholarly publications by Dronke (*Women Writers*), Newman (*Sister of Wisdom*) and Deploige (*In nomine femineo indocta*) that have been able to help us understand the 'Sibyl of the Rhine' as a unique author with an impressive breadth of intellectual accomplishments. She was not only a visionary writer, but also a musical composer, a playwright, a healer, a scientist, a writer of letters, an inventor of languages, and a theological thinker in her own right.

Hildegard's self-deprecations of her weaker sex (*paupercula forma*) and lack of education (*indocta*) are now taken to be of a topical nature, with the aim of asserting her humility, or in some cases to stress that her utterings are not her own but divinely inspired (Powell). Even though she never directly cites any of her main sources, one must not underestimate the extent to which her illiteracy and lack of learning are exaggerations with a strategic purpose (Dronke, "Allegorical" 14). In being prohibited to teach doctrine, Hildegard had to find a delicate balance between self-devaluation and self-authorization, between proclaiming her insufficiency whilst asserting her divinely inspired authority. The condition of male supervision – her closest secretary Volmar was the Rupertsberg's provost – undoubtedly shielded her against criticism from outside, and also kept suspicion from within the institution of the contemporaneous church at bay.

Even though Hildegard's intellectual contribution to her own works is no longer contested, it is through an interest in the historical reality of medieval authorship and collective creativity for the Middle Ages in general that the contribution of her secretaries remains a matter of debate. Despite the fact that Hildegard issued warnings that her secretaries were not to change the sense of her visions, and were to focus on formal aspects of the language such as grammar and spelling alone (Ferrante 103), scholars have emphasised by means of palaeographical, codicological and computational evidence that the influence of these secretaries (still) is a fickle point of Hildegard scholarship (Herwegen; Derolez, "Deux notes;" Kestemont, Moens and Deploige). The extensive corrections by secretaries in the Ghent apograph of the *Liber divinorum operum*,[4] for instance, may make one wonder to what extent the redaction and revision process by Hildegard's secretaries profoundly changed the final outlook of the visionary's works (Derolez, *LDO* lxxxix–xcvii). Recent stylometric evidence has confirmed Guibert of Gembloux's stylistic influence on two suspect visions, *Visio ad Guibertum missa* and *De excellentia Sancti Martini*, and a somewhat more subtle yet noticeable stylistic presence in Hildegard's letters written after Volmar's death in 1173, likely to have been revised by Guibert (Kestemont, Moens and Deploige).

4. Ghent, Universiteitsbibliotheek, 241.

In this article, we mean to emphasize that Hildegard's secretaries played a vital role in shaping her image and authority, both during her life and after her death. It posits that the aspect of collective creativity is fundamental in understanding both Hildegard as figure and as author, without seeking to undermine Hildegard as figure and author. Hildegard's collaboration with secretaries does not unilaterally constitute her fabrication (as Preger argued), neither did it unambiguously signify her suppression by a male patriarchy (i.e. the willful alteration of her words by male secretaries). Neither of these poles give a satisfactory explanation of the dynamics at play, but bypass a much more complex field of constant tension and negotiation in which mutual interests are at stake. As Johnson has noted, one should not forget that Hildegard's authority as writer benefitted from the endorsement and encirclement by male clerics, an effect which she cannot but have been aware of, and therefore incorporated into her texts (Johnson 823). This kind of subtle interplay between asserting her authority and having her authority asserted through involvement of others is always present. For instance, Hildegard grants Volmar a central role in having launched her writing career at the age of forty-two, but on the other hand fails to ever mention his name (Deploige and Moens 141). Hildegard –and/or her entourage – perceptibly sought for mechanisms by which to authorize her visionary writings by involving onlookers and alliances that recognized the divine origins of her extraordinary gift. Such attestations, however, are better not always accredited at face value. Volmar is known to have concocted a false letter from Pope Eugene III, which was presented as a prestigious first letter heading her epistolarium (Van Engen, "Letters" 380).[5]

5. The spurious letter is edited by Van Acker in the edited volume of Hildegard of Bingen's *Epistolarium Pars Tertia CCLI–CCCXC*, Ep. 1, at 173.

3 Composition History: The Life of a *Life*

When speaking of Hildegard's *Vita*, we are hardly speaking of a 'single' text. Multiple *Vitae Hildegardis* have circulated and co-existed. A few of them are finished works and still extant, others are fragmentary or partially recovered, and there are versions irrecoverably lost. We currently have two more or less 'final' versions of what is officially known as the *Vita Hildegardis* at our disposal.[6] The first version, widely regarded as 'canonical,' is the integral text taken up in Monika Klaes's edition. The second version is a revision of this text by Guibert of Gembloux, recoverable through Klaes' critical apparatus and an appendix in the aforementioned edition. The complex textual history of Hildegard's *Vita*, which is elaborately discussed in Klaes's lengthy introduction with a number of pages twice as long as the actual text, teaches us that its composition was accompanied by many difficulties. Despite best intentions, the project was on the verge of deferral due to a chain of unfortunate circumstances and unexpected deaths before the *Vita*'s completion, not least Hildegard's own death in 1179. Consequently, as will be further discussed below, the text has an intricate timeline, and presents an archetypal example of collaborative authorship. Five authors were (at least partially) involved, the first of which was allegedly Hildegard herself. The *Vita* contains so-called autobiographical fragments and snippets of visionary material, apparently dictated in the first person by Hildegard herself, and not repeated elsewhere in Hildegard's oeuvre. The remaining (co-)authors are her secretaries and biographers, in more or less chronological order of contribution: Volmar of Disibodenberg, Godfrey of Disibodenberg, Guibert of Gembloux and finally Theoderic of Echternach.

The academic consensus on the *Vita Hildegardis*'s composition history (treated in more detail below) makes it reasonable to suspect that the collecting of materials and the drafting of early versions of the *Vita* had already begun under Hildegard's direction (Newman, "Three-Part Invention;" "Hildegard").[7] In this she was assisted by her secretaries, probably Volmar first and – after the latter's death in 1173 – by Godfrey of Disibodenberg, who arrived in the Rupertsberg shortly after in 1174. Around 1175/6, only a year and a half later, Godfrey would also come to die (Derolez, *Epistolae* vi–vii). By the time of Godfrey's death, a partial *Vita* for Hildegard had been composed by him, a 'booklet' or *libellus*, which is believed to have been transmitted as the first book of the complete *Vita Hildegardis*. Whether or not the accounts collected in the first book of the *Vita* are indeed an in-

6. I leave aside for now the anonymous *Octo lectiones in festo Sanctae Hildegardis legendae* and the abbreviated *Vita* (*abbreviata Traiectensis*) by Guibert of Gembloux, both of which are derivations from the 'official' *Vita* that will be discussed here (texts edited in *Vita* 75–80; 83–88). I also pass over the *Acta inquisitionis* mentioned earlier in this article.

7. Amongst other reasons given further down this article, the writing of a *Vita* by Godfrey as reported by Theoderic (between 1174–75/6) and the *Vita*'s integration in Hildegard's Riesencodex (likely to have begun before her death in 1179) strengthens that hypothesis.

tegral copy of Godfrey's original booklet is unknown: other secretaries of Hildegard and her succeeding biographers will have had ample opportunity to revise the text (Klaes 91*; Newman, "Hildegard" 17).

The first of Godfrey's successors was Hildegard's last secretary Guibert of Gembloux (c. 1124–1214), a Brabantine monk who came to her aid from 1177 onwards and would assist Hildegard until she passed away two years later. During his time at the Rupertsberg, the Colognian archbishop Philip I of Heinsberg appears to have sparked in Guibert the intention to write a *Vita Hildegardis* of his own.[8] Guibert hesitated to obey Philip's request during Hildegard's lifetime, fearful of being found sycophantic by Hildegard, and it was only after her death in September 1179 –during his research for materials – that he fell upon useful sources to facilitate the task. From his description of these findings, one can suspect that Guibert had come across autobiographical memoirs of Hildegard and Volmar, and a *libellus* that might well correspond to Godfrey's first *Vita*.[9] Therefore, some time between Hildegard's death and Guibert's departure from the Rupertsberg, progress for a new *Vita* appears to have been well under way. These plans were disturbed when –after Easter 1180 – Guibert was forced to return from the Rupertsberg on appeal of the abbot of Gembloux (Moens 74). It appears that this event left Guibert unable to finish the work he had started on his *Vita*, although a fragment of his efforts at the time is presumed to have survived as an attachment to a letter addressed to his fellow monk Bovo of Gembloux.[10]

What should be emphasized here, is that Guibert's last year in Bingen (1179–80), which revolved entirely around the collecting of the prime sources of the *Vita*, left ample occasion to rework and revise Hildegard's materials –particularly the 'autobiographical' fragments –, and additionally (potential) preparatory versions by Volmar and Godfrey, of which we do not entirely know which parts were incorporated and, if so, if they were considerably amended or preserved in their original state (Klaes 58*). Former research has already indicated that the large role Guibert played in compiling and editing Hildegard's works cannot be underestimated, an activity which set out after his arrival in 1177, in the last two years of the visionary's life. Guibert supervised the scriptorium's activities at a time when Hildegard's epistolarium and the Riesencodex were in the final stages of completion (Van Acker, "Briefwechsel" 129–34). As recent research has pointed out, Guibert appears to have been granted –or appears to have taken – unprecedented liberties in editing and revising Hildegard's works, as is asserted in a letter from Hildegard which bears

8. This becomes clear from Guibert's letter to Philip I, edited as Ep. 15 in Derolez's 1988–89 edition of the *Epistolae* 210–15. The letter is difficult to date, but its contents suggest the year 1180, at which time Guibert was still in Bingen, and had just caught news of his being recalled to Gembloux (Klaes 30*–31*).

9. All of which is also described in Ep. 15 (see previous footnote). Because the *termini post* and *ante quem* for the dating of the letter lie in between Hildegard's death in 1179 and that of Philip I in 1191, the text(s) which correspond(s) to this *libellus* cannot be securely reconstructed. Either the mentioned *libellus* is exclusively Godfrey's first book of the *Vita*, or else it is the redacted version by Theoderic. The strong evidence that Guibert wrote Ep. 15 in 1180, when Theoderic of Echternach was yet to arrive in Bingen, makes the former hypothesis more likely (Klaes 30*).

10. Ep. 38 in Derolez, *Epistolae* 367–79. Guibert's *Vita* breaks off mid-sentence in the best-conserved manuscript of the letter collection (Brussels, Royal Library, 5527–34); it is presumed to have originally been longer (Klaes 42*–43*). The letter itself purports to have been composed in 1177, but in reality it must have been finished by the end of 1179 and in the beginning of 1180, when Guibert was still in Bingen.

Guibert's style completely (Kestemont, Moens and Deploige 202–4). When taking into consideration how Guibert left his stylistic mark on Hildegard's works in the final stages of her life and how he did not hesitate to alter the visionary's wordings, one may become wary concerning the monk's early involvement in the composition of the *Vita* as well (Klaes 113*).

Volmar's and Godfrey's deaths, and Guibert's commitment to new priorities on his path, left the late Hildegard still without a *Vita*. At the instigation of abbots Ludwig and Godfrey of Saint-Eucharius, the task consequently fell to Theoderic of Echternach, an unlikely candidate, as the latter may never have even met Hildegard in person (Klaes 60*–61*, 77*). Interestingly, at such a decisive moment for the project, when Theoderic followed up on a task left unfinished by Guibert, the odd fact that the monks did not cross paths and, even stranger, somehow neglected or missed out on each other's work, remains difficult to explain. Theoderic shows no familiarity with Guibert's extant fragment, and Guibert appears to have lost track of Theoderic's progress on the *Vita*. Still, there are parallels between both writers' *Vitae*, which indicate their dependence on the same pool of consulted source materials probably first collected by Guibert.[11] From the listing of sources in his preface, Theoderic indeed appears to have consulted the same sources for his *Vita* as Guibert, namely Godfrey's unfinished *libellus* and snippets of Hildegard's visions.[12] This means, as was suggested earlier, that Theoderic might have used source materials heavily revised by Guibert. Theoderic's role then, was that of editor-in-chief, a role corresponding to a kind of narrator or commentator, tying together the seemingly unrelated bits and pieces that had coincidentally fallen into his hands. The general structure of the *Vita*, then, and the purported authors of its constituents, is the following:

Table 1. Structure of the *Vita Hildegardis*

Author	Title (or *incipit*)	Ed. (Klaes,
Theoderic of Echternach	*Prologus in vitam*	3–4
	—capitula—	5
Godfrey of Disibodenberg	*I. Liber primus* (*libellus*)	6–16
	Prologus in librum secundum	17–18
	—capitula—	19
Theoderic of Echternach	II. *Liber secundus*	20–45
	Prologus in librum tercium	46
	—capitula—	47–48
	III. *Liber tercius* (*De miraculis*)	49–71

11. This is most clear from both *Vitae's* usage of a fragment from Hildegard's letter to Guibert, the *De modo visionis sue* (Klaes 48*). The complete letter is edited as Ep. 103 (Van Acker 2:258–65; compare with *Vita* 54–75, 260–61).

12. As can be deduced from the *Vita*'s prologue: "[...] Accepi, ut post Godefridum, uirum ingenio clarum, uitam sancte ac Deo dilecte Hildegardis uirginis, quam illo honesto stilo inchoauit, sed non perfecit, in ordinem colligerem et quasi odoriferis floribus serta contexens uisiones eius gestis suis insertas sub diuisione librorum in unius corporis formam redigerem" (*Vita* 5–10, 3).

That Silvas translates *textus*, which is the word Theoderic uses in his prologue when referring to the *Vita*, as "tapestry" instead of simply "text," is significant (Silvas 135). The *Vita* truly is an interwoven assembly of impressions, gathered from different sources. Theoderic combined 1. Godfrey's *libellus*, 2. a number of 'autobiographical,' memoir-like visions, and 3. a number of performed miracles, again interspersed with Hildegard's visions. In assembling the *Vita* according to this schema, the monk asserted to have changed very little to their contents,[13] although we can hardly take his word on this. Klaes, basing herself on a study of his style in his chronicle of Echternach, raised suspicions that some passages in the first book (Godfrey's *libellus*) betray his interventions and additions (Klaes, 92*–97*). Those passages that are intact from Theoderic's adjustments generally exhibit a more sober character, and a simpler syntax, features that might have been typical for Godfrey's writing, but of whom we know very little and possess no written documents. Klaes is somewhat more hesitant as to the possibility of Theoderic's alterations to Hildegard's texts. Theoderic seemed too intimidated by the density of her visions to dare make any profound changes to them (Klaes 111*).

13. Especially for Hildegard's autobiographical fragments in books 2 and 3, Theoderic insists that he has left them unaltered: "in descriptione uisionum eius nullatenus mutilaretur" (*Vita* 31–2, 18). He argues the same for Godfrey's *libellus*: "nullam sue dispositionis patiatur iacturam" (*Vita* 16–17, 3).

Only in 1208/9, near the end of his life and some thirty years after Hildegard's death, Guibert of Gembloux acquaints himself with the *Vita* as redacted by Theoderic. Retired, at that particular time, to his former monastery of Florennes (Moens 77–79), he asks for Hildegard's parents' names in a letter exchange with Godfrey of Saint-Eucharius, because he is writing a "little something" on the *magistra's* life.[14] The need for refreshing his memory on Hildegard's biographical details hints at Guibert's renewed intentions of finishing the *Vita* left incomplete when he left Bingen, and which, indeed, makes no mention of Hildegard's parents' names. In response to Guibert's request, abbot Godfrey sends back Theoderic's *Vita*, and simultaneously solicits the former's corrections and additions, because still much is missing in Theoderic's impersonal account of the prophetess. Guibert answered Godfrey's request by stating that he found no fault in the work sent to him, and that his own fragmentary *Vita* could not possibly surpass a work of such great accomplishment. As far as we know, Guibert kept his word, and never completed a *Vita* of his own. But his reluctance to contribute to Theoderic's version, which features so strongly in his letter to Godfrey, appears to have been false modesty. A heavily stylistically altered version of Theoderic's *Vita* survives in both manuscripts of Guibert's letter collection. Guibert's interferences extend well into Hildegard's autobiographi-

14. "Scripsi enim de illa aliquid, ubi libenter ea inseruissem, si recolere potuissem," in Ep. 40 (*Epistolae* 20–2, 385).

cal fragments in book 2 and 3, which warrants concerns over the monk's general habit to revise Hildegard's texts. Especially small function words were Guibert's favourite target, pronouns such as *hic*, *ille* and *iste*, or comparative conjunctions such as *quemadmodum* and *uelut*, and so on (Klaes 155*). Meanwhile, Guibert also appears to have been sensitive to Theoderic's interventions in Godfrey's *libellus*, as becomes clear from his restructuring of the first chapter (Klaes 95*).

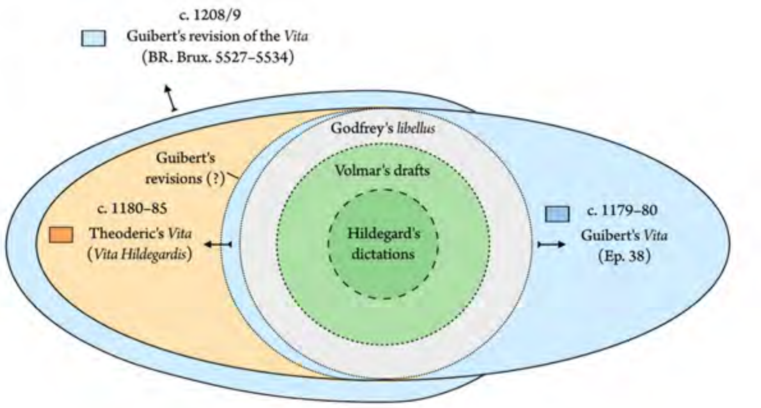


Figure 1. Schema of the composition stages of the *Vita Hildegardis*, visualizing its layered character and composite authorship. Full lines indicate extant works, dotted lines indicate lost works. Yellow indicates redaction by Theoderic of Echternach, blue by Guibert of Gembloux. The concentric circles at the core represent the original source material of the *Vita*, used by both Guibert of Gembloux in 1179/80 and Theoderic up until the mid-80s. These are supposedly Hildegard's 'original' memoirs, drafted or perhaps once transcribed by Volmar and/or Godfrey in a *libellus*. In the peripheries we see the two *Vitae* by Theoderic and by Guibert, reliant on the central sources yet independently composed. The blue layer separating the source material from Theoderic's *Vita* indicates the potential interferences made by Guibert, who collected the source material. Correspondingly, the blue layer wrapped around Theoderic's *Vita* on the outer edges indicates the revisions which are transmitted in MSS 5527–5534, and appended to Klaes's edition.

Figure 1 roughly sketches the composition history of the *Vita* as outlined in the previous section, and summarizes the (potential) zones of overlap between the different text versions. The autobiographical passages as contained within the *Vita* have especially drawn a great deal of interest in Hildegard scholarship. Their existence prior to Theoderic's integration raises a few compelling questions as to their intended form and aim. Do they indicate, for instance, that already during her life, Hildegard was consciously constructing her self-image for posterity?[15] In relation to this question, one can wonder what could have been the original connection between the individual fragments transmitted in the *Vita* as we have it, and whether or not they derive from an originally integral 'autobiographical' *Vita*. Interestingly, even Godfrey's *libellus*, a third-person account of Hildegard's life, has been hypothesized by Newman to originally have been a first-person attestation by Hildegard, a true memoir, which Godfrey then rewrote from a different focalization point (Newman, "Hildegard" 17–18). The question is if that would mean that Hildegard's original style is to a certain extent recoverable from Godfrey's transcription. On the other hand, we have the interference of a considerable number of male co-writers that had ample opportunity to rewrite and overwrite Hildegard's original text. Godfrey and Volmar present the first filters through which her signal passed. Guibert of Gembloux, then, who we know was capable of altering Hildegard's style and did not flinch from doing so

15. Newman found Hildegard's role in the early composition of the *Vita* very likely ("Three-Part Invention;" "Hildegard"). Whether or not the aim was to strive for Hildegard's canonization and the *Vita* as crowning piece of the *opera omnia* in the Riesencodex, is difficult to ascertain, and Klaes was rather hesitant about the idea (*Vita* 78*).

(Kestemont, Moens and Deploige), could have revised the material whilst collecting it, after which Theoderic of Echternach selected portions from it and possibly again revised all materials according to his own principles. The aim of the subsequent paragraphs is to shed more light on the extent to which these collaborators' treatment of Hildegard's text could have included the compromising of her language. More generally, our findings consequently invite reflection on Hildegard's authorship, and on the extent to which her involvement in the *Vita*'s composition is reflected stylistically in the text.

4 Computational Stylistics

The core idea of computational stylistics, as elaborately developed in the introduction to this special cluster of *Interfaces*, is that authors betray individual writing patterns which largely escape their conscious control and are therefore not easily imitated. Often these patterns lurk in the frequencies of 'stylistic features,' such as short marker words, particles, or parts of words (*n*-grams). By implication, this means that every author has a so-called 'stylome,' (van Halteren) or attests to a stylistic DNA which can be harvested with statistical analysis. That the method works well for Latin, and for medieval Latin specifically, has been demonstrated by an increasing number of scholars in the past years (Kestemont, Moens and Deploige; Eder, "*Chronica Polonorum*;" Vainio *et al.*; Downey *et al.*; De Gussem). Particularly popular are function words, grammatical or syntactical markers which are used frequently in natural languages but do not have a strong semantic meaning to their users, such as conjunctions, pronouns, prepositions, adverbs and particles. From a practical point of view, function words are useful thanks to their high frequency, which offers a distribution which can be analysed and harvested on a statistical basis. From a theoretical point of view they provide alluring prospects because they are argued to be applied unconsciously and escape the attention of both writer and reader. They are like stylistic fingerprints that are difficult to imitate, and are taken to be relatively constant in frequency across different genres of texts written by one and the same author.[16]

Computational stylisticians often emphasize the advantages of 'distant reading' as opposed to 'close reading' (Moretti) when it comes to scope –analysing texts by the dozens – and circumventing researchers' subjectivity. It is argued that in doing so stylometrists offer an objective and uncompromised viewpoint on which autho-

16. Recent scholarship on computational authorship attribution has shown that a text's topic or genre has a far less explicit impact on frequency of function words than individual authorship. The latter could be argued to be the predominant, primary signal it captures, and the secondary signal of genre or topic does not necessarily jeopardise the validity of that other signal or vice versa. For the 'genre effect,' see Jockers 63–104 (especially 80–81); for a kind of 'genre effect' at work in Hildegard of Bingen's oeuvre specifically, arguably demonstrating her diachronic, intellectual development, see De Gussem and Wouters, 31–60.

rial profile provides the best match for an anonymous or falsely ascribed text. The objections one may raise to objectivity claims such as these are numerous, and I will not repeat all of them here. For now it serves to emphasise that computational stylistics offers an additional tool –aside from those traditionally familiar to medievalists, such as palaeography, stemmatology, stylistics, etc. – for attempting to identify the provenance of historical documents and formulate assessments as to their authorship on the basis of statistical observations.

Before the computational analysis of style can take place, a document's word order and symbolic appearance are abandoned, as the text is encoded into a representation of its contents in terms of numbers. These lists of numbers –called 'vectors' in data analysis – summarize relevant information of the text's lexical properties, disregarding its former orderly principle or linguistic logic. Consider this intuitive example:

Table 2. Intuition of bag of words and vectorisation — 1.

vocabulary	*sua*	*nos*	*honestum*	*est*	*quod*	*vi*	*trahit*	*et*	*dignitate*	*allicit*
frequencies	2	2	1	1	1	1	1	1	1	1

Honestum est quod sua vi nos trahit et sua dignitate nos allicit.

The array of numbers in row 2 of this table would constitute a vector, a series of frequencies of encountered words or 'tokens' that summarises the contents of a short sentence such as the one above. Note that the tokens *sua* and *nos*, which are our so-called 'features,' occur twice in the sentence but only once in the vocabulary (row 1). In practice, computational stylistics performs exactly the same routine for documents that are much longer than a single sentence, wherefore the vocabulary and frequencies will considerably expand, returning arrays such as the following:

Table 3. Intuition of bag of words and vectorization — 2.

	est	*et*	*in*	*enim*	*non*	*autem*	*quod*	*que*	*cum*	*ad*	...
text A	30	29	13	9	8	7	11	10	3	4	...
text B	35	23	22	14	15	11	6	7	14	8	...

Once documents are translated to vector representations, such as A and B in the example above, they become comparable on a numerical basis, where their 'difference' or 'distance' can be measured quite intuitively. Especially the top frequency strata of the texts' vectors are significant. Aside from a number of recurrent keywords, this top stratum contains function words such as *et*, *in*, *enim*, *non* and *autem*, mentioned above, which have, ever since Mosteller and Wallace's fundamental study of 1964 (Mosteller and Wallace), been shown to be extremely effective for establishing a text's authorship. If so desired, one may opt to leave out all semantically charged content words and analyse texts by the function word only.

Once texts have been converted into numerical data, and are no longer human-readable, there are different kinds of statistical techniques by which to analyse the gathered frequencies and look for authorial patterns on a very large –or distant – scale. To this end I will apply a number of state-of-the-art methods for computational analysis of style in this article, such as Principal Components Analysis (PCA), Support Vector Machine (SVM) and the *impostors* method, which I will explain in more detail throughout.

5 Candidates, Corpus and Preprocessing

Assessing the authorship(s) of the *Vita* is a complex matter, because not all of the candidates have left independent writings of their own which facilitate a direct basis of comparison with a sample from the *Vita*. This is true for secretaries Volmar and Godfrey of Disibodenberg, or other potentially involved assistants whose contributions we lack evidence of. As for the remaining authors for whom we do have the ability to assemble a background corpus – Hildegard, Guibert and Theoderic –, issues of reliability and incompatibility with the *Vita*'s genre and style are at stake. The background corpus is therefore small and comes with its own insecurities. Guibert of Gembloux's *Epistolae* (± 124,500 words) and his very short *De combustione* (± 1,000 words) were included (Derolez; Pertz), as were Theoderic of Echternach's chronicles (Weiland). For Hildegard of Bingen, her *Vitae* of Saint Disibod (± 7,500 words) and Saint Rupert (± 4,200 words) were integrated in the corpus (edited by Evans), which only seemed reasonable considering that these works best represent her handling of the hagio- and biographical genre to which the *Vita Hildegardis* belongs. Nevertheless, these texts' brevity required the involvement of her visionary treatises as well: *Scivias*, *Liber vitae meritorum* and *Liber divinorum operum*. It is on the basis of these works that a training corpus was assembled that could best represent the stylistic profiles of these three important candidates. Hildegard's texts, which should provide the 'gold standard' of her style, can obviously not be strictly separated from the potential influences of Volmar. Theoderic's chronicles, the *Chronicon Epternacense* and the *Libellus de libertate Epternacensi propugnata*, contain genre-specific qualities that might destabilize a firm basis for comparison. The texts and the Python programming code[17] that derive from the analysis in this article are openly accessible on GitHub,[18] but some of the texts in the repository have been camouflaged so as to respect the copyright laws protecting the editions.[19]

17. Python is a programming language popularly used for Natural Language Processing-related tasks such as stylometry. Naturally, it is also possible to replicate the experiments in this article with more user-friendly stylometric toolkits, such as Stylometry with R (Eder, Rybicki and Kestemont).

18. GitHub is a collaborative platform specifically designed for developers, programmers and researchers to share, replicate and contribute to data in online repositories.

19. GitHub. Only function words – which are highly successful for distinguishing writing styles – were retained in their original position and form. All the remaining, content-loaded tokens were substituted by asterisks, rendering the text illegible. This means that some experiments in the current article which relied on content words in addition to function words will not be replicable by relying solely on the text data as available on GitHub. To replicate these experiments as well, one may request access to the electronic versions of the editions referred to by contacting the publishers in charge.

Before handling medieval Latin texts, stylometrists need to ascertain that the data is comparable. Prior to analysis the Latin texts have to be transformed to adopt the same formatting norms so as to allow a reliable basis for comparison. This entails some minor interventions in the texts which commonly fall under the header of 'preprocessing,' where irrelevant material is removed and the divergent orthographical forms due to various manuscript witnesses or editorial practices are normalized, such as such as <j>'s to <i>'s, <v>'s to <u>'s, <ae>'s to <e>'s, etc. For the *Vita Hildegardis* specifically, it should be noted that the *Capitula* after each prologue were removed.

6 Experimental Set-Up: Rolling SVM-*Impostors*

Having taken into consideration the training corpus at our disposal and this case's particular challenges, the authorship problem of the *Vita Hildegardis* does not, strictly speaking, allow for a traditional, 'closed' attribution set-up, in which the most suitable author is chosen from among a set of candidates. Two challenges arise.

1. The authorship(s) of the *Vita Hildegardis* presents a layered and complex attribution problem of dual and/or mixed authorship, which requires a fine-grained means to assess style changes over short passages that distinguish between Hildegard and her biographers, but also indicates transitional stages in the text or passages that are the result of collaborations of multiple authors.
2. Not all potential contributors to the text (Volmar and Godfrey, to name but two) have a reference corpus. In some cases, we will want to assess if the stylistic profile of a particular passage in the *Vita* can even be matched to one of our candidates at all. In stylometric practice, assessing if the latter condition holds true or false is called 'authorship verification': we want to know if our candidate is simply not included in our corpus.

When it comes to the first challenge, the concept of sampling briefly needs to be addressed. In computational stylistics it is considered good practice to slice up the text into smaller segments or 'text samples.' Such samples need to be short enough in word count so as to allow for a fine-grained comparative analysis with segments from both other- and same-authored works, but simultaneously lengthy enough so that a passage's stylistic composition can be captured reliably. The current state of the art for computational stylistics in Latin has come to a consensus that the minimal working length for samples is 2,500 to 3,000 word tokens (Kestemont, Moens and Deploige; Eder, "Does Size Matter"). Any experiment carried out on document segments beneath that length are considered less secure, although some methods have been demonstrated to be sufficiently accurate at sample lengths as short as only 500 words (Koppel and Winter 178). There are, however, two kinds of sampling: 'discrete' and 'rolling' sampling (illustrated in Figure 2). 'Discrete' sampling entails all the steps explained in the previous paragraph, where the text is sampled in discrete chunks according to the analyst's preset ranges. Rolling sampling methods, on the other hand, have the original text sequentially sliced up into non-identical, partially overlapping windows according to a step size. The advantage is that the original sample size can be retained, that more information is gathered as to how the text develops sequentially, and that higher peaks of 'unexpected' stylistic patterns can be localized. One can think of this as taking up a magnifying glass, scanning the text linearly, and registering how it changes from the very first to the very last word. In the experiments below, we will slide over the text by processing it 500 words at a time, and gradually proceeding onto the next sample by a step size of 100 words.

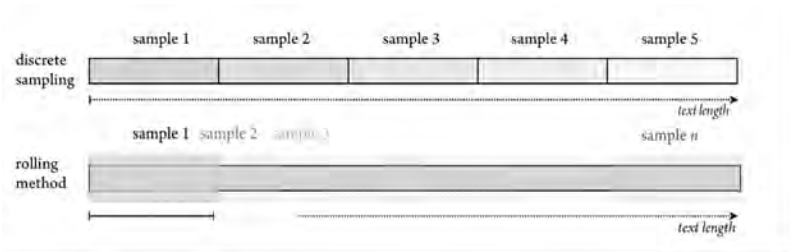


Figure 2. Intuition of discrete sampling vs. a rolling sampling method. The original text is sequentially sliced up into overlapping windows according to a step size.

To tackle the second challenge, an 'open' authorship verification technique ("is the candidate author amongst the candidates – yes or no?") called the *impostors* method (Koppel and Winter) is used in tandem with a 'closed' attribution technique called SVM classification (Diederich *et al.*): "amongst a closed set of candidates – which candidate yields the best match?"

Both SVM and the *impostors* method are derived from state-of-the-art text classification techniques that are heavily indebted to the (still ongoing) rise of machine learning (ML) in computer science. ML here corresponds to a set of smart computer algorithms that are better equipped to exhaustively search many different parameters and evaluate each of these combinations' efficiency for detecting stylistic similarities or solving a particular text classification problem such as attribution.

The difference between classification and verification is the following. A classifier such as SVM is a learning algorithm that takes securely attributed texts as 'training data,' learns to tell apart the stylistic patterns particular to each of the involved authors (Hildegard, Guibert and Theoderic), and departs from this basis to make predictions on insecurely attributed texts or 'test data,' here: the *Vita Hildegardis*. Verification methods, on the other hand, such as the *impostors* method, defend themselves from coincidental attributions by maintaining that even though two documents might well attain a degree of similarity in some representation or another, security can only be established if the match is validated for *k* iterations (usually *k*=100). During these iterations, the algorithm changes the documents' vector representations by randomly selecting 50% of the original feature set, and by introducing so-called 'impostors' from a large background dataset of texts (listed in the Appendix, Table 7). The proportion of times that some candidate is the top match is consequently tested against a benchmark threshold σ*, which, if not surpassed, lets the impostors algorithm output the category label 'None of the above.' Anything below that threshold outputs 'Uncertain.'

An advantage of both SVM and the *impostors* method is that they have a learning phase, in which their effectiveness in segregating authorial styles can be evaluated and expressed in percentages. This entails that different parameters are trained, tested and evaluated, and that the best-scoring model, considered most apt for segregating 'classes' (here: our authors), is applied to the problem.

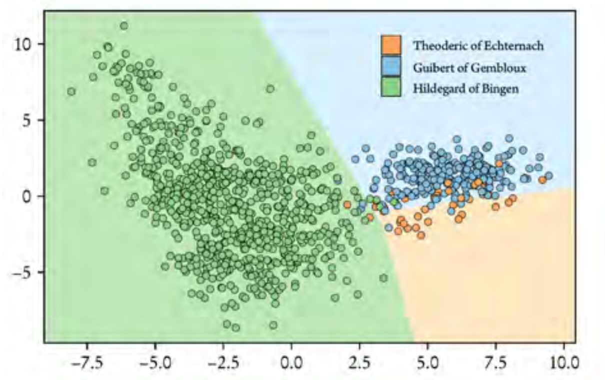


Figure 3. PCA plot giving a two-dimensional intuition of the decision boundaries drawn between Theoderic, Guibert and Hildegard by the best-scoring SVM classifier. Each of the coloured dots in the plot is a simplified representation of the vector information of an author's text segment projected in a two-dimensional space, where the PCs demonstrate the greatest variance in the data and help to inspect the most conspicuous distances (or differences) between the candidates' respective samples. When samples cluster together, they contain resembling writing patterns. Settings: 500 most-frequent words. Sample length: 500 word tokens. Standard-scaled tfidf-weighted[20] raw frequencies. Explained variance is 5.20%.

20. Tfidf stands for 'term frequency inverse document frequency.' It divides all feature values by the number of documents that respective feature appears in. As a consequence, less common features receive a higher weight, which prevents them from sinking away (and losing statistical significance) amidst more common features.

Figure 3 shows, in an intuitive PCA plot (Binongo and Smith), how an SVM classifier learns to demarcate the clusters of pre-labelled text samples, and draws a decision boundary that reflects which regions ('vector spaces') associate with the stylistic behaviour of candidate authors Hildegard, Theoderic and Guibert. Once the model has learned these boundaries, it can make predictions on a test sample of unknown authorship, for instance a passage in the *Vita Hildegardis*. Note that Theoderic and Guibert's works appear somewhat tricky to distinguish. Bringing in an additional, third component, as we will see in PCA plots further down this article (figure 6), helped to make more nuanced distinctions between both authors, who apparently have quite a few stylistic aspects in common.

Similarly, the *impostors* method goes through a learning phase, in which the threshold σ* is established on the basis of a pre-labelled training corpus. The *impostors* method relies on learned instances of known labelled pairs of <*same-author*> or <*different-author*> as training data. For both types of classes we ultimately collect percentages indicating how many times out of *k*=100 times correct and false attributions were made. This mean percentage can consequently function as a learned threshold. The *impostors* method can be a very powerful and meticulous method when it trains well on the authors under scrutiny. If a well-balanced σ* can be established, this grants great confidence to any test attribution following it, especially if this attribution has a firm and high confidence score. On the other hand, authorship verification remains an extremely difficult and unsolved problem, exploring the limits of what is feasible in the current-day landscape of computational stylistics.

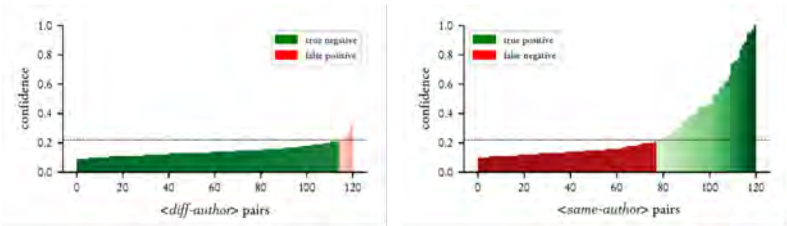


Figure 4. Intuition of *impostors* method thresholding. The y-axis indicates the confidence by which the attribution was made, whereas the x-axis indicates the sample index number (there were 120 samples in total). Note that the number of paired samples per class (<*same-author*> and <*diff-author*>) is equal. The trained threshold σ* (= 0.22) is visualised by the horizontal, dotted line. Its purpose is to avoid as many false decisions as possible (red) in favour of correct ones (green).

The σ* threshold of 0.22 was in fact quite stable for distinguishing between Hildegard, Guibert and Theoderic, yielding quite promising figures despite the short sample length (table 3).

Table 4. Evaluation metrics (accuracy, precision, recall and f1) after training the *impostors* method on Theoderic of Echternach, Guibert of Gembloux and Hildegard of Bingen, at the best-performing threshold of 0.22. Typically, *impostors* method thresholds have a high precision and low recall (fewer acceptances and fewer mistakes).

	dev set	test set
accuracy	0.66	0.62
precision	0.88	0.89
recall	0.39	0.27
f1	0.54	0.41

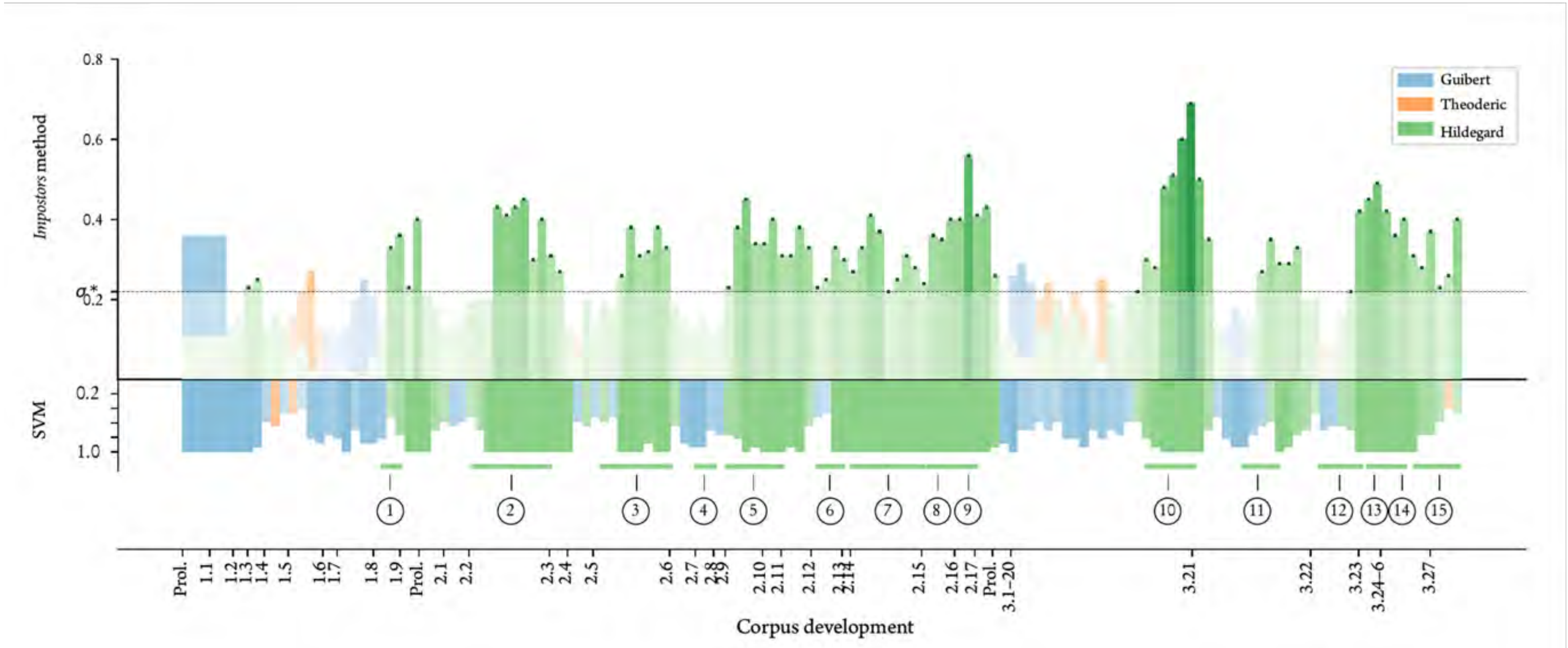


Figure 5. Rolling SVM-impostors method for the *Vita Hildegardis*. The x-axis shows the progression of the sliding windows throughout the *Vita* by taking a step of 100 words at a time. The corpus development line at the very bottom of the figure indicates by the chapter numbers in Klaes's edition which part of the *Vita* is treated. In total, attributions were made for 140 partially overlapping text samples consisting of 500 words. Bars above the x-axis indicate the prediction of the impostors method, bars below the x-axis indicate the prediction of the majority of SVM classifiers. The y-axis (the height of the bars) indicates the confidence score (between 0 and 1) for both the impostors method and the SVM classifiers (longer bars with higher colour intensity indicating more confident attributions). The indexes 1–15 given below the figure are referenced in table 4.

7 Results

The results of performing the rolling SVM-*impostors* method on the *Vita* are given in figure 5. The x-axis shows the gradual progression of the sliding windows throughout the *Vita* by taking a step of 100 words at a time. The 'Corpus development' line at the very bottom of the figure indicates by chapter number in Klaes's edition which part of the *Vita* is treated per sample. Bars above the x-axis indicate the prediction of the *impostors* method, bars below the x-axis indicate the prediction of the majority of SVM classifiers. The y-axis (the height of the bars) indicates the confidence score (between 0 and 1) for both the *impostors* method and the SVM classifiers (longer bars with higher colour intensity indicating more confident attributions).

The indexes 1–15 indicated below the figure are referenced in table 4. They mainly correspond (with a few exceptions discussed below) to Hildegard's autobiographical fragments, of special interest to us here. Immediately, it appears that despite the short sample length the combined method (*impostors*-SVM) recognizes the eight visions and other passages in which Theoderic cites Hildegard as strongly Hildegardian. The *impostors* method is –as was to be expected –

Table 5. Contents of fragments of the *Vita Hildegardis* indexed in figure 5, complete with a description of their contents, incipit, and reference to the edition.

Index	Fragment	Incipit	Ed. (Klaes, *Vita*)
1	Letter to Guibert	"Deus inquit ubi ..."	§1.8–9, 14–15.
2	*Prima visio*	"In mystica inquit ..."	§2.2, 21–24.
3	*Secunda visio*	"Quodam inquit tempore ..."	§2.5, 27–30.
4	*Visio tertia*	"Vidi in visione ..."	§2.7, 31–32.
5	*Visio quarta*	"In lectum egritudinis ..."	§2.9, 33–35.
6	The philosopher	"Quidam phylosofus de ..."	§2.12, 37–38.
7	*Visio quinta*	"In vera inquit ..."	§2.14, 38–41.
8	*Visio sexta*	"Tres turres in ..."	§2.15, 42–43.
9	*Visio septima*	"Subsequenti demum tempore"	§2.16, 43–44.
10	Sigewize	"Posteaquam me visio ..."	§3.20, 56–57.
11	Letter to Gedolphus	"G. ecclesie Brunwilarensis ..."	§3.21, 60–62.
12	Possessed woman in the Rupertsberg	"De adventu inquit ..."	§3.22, 64–65.
13	Account of her illness	"Post hec inquit ..."	§3.23, 66.
14	*Visio octava*	"Pulcherrimus inquit et ..."	§3.24, 67–68.
15	*Mulierem inquiunt* and *Cum beata*	"Mulierem inquiunt" | "Cum beata"	§3.26–27, 68–70.

somewhat more severe in its prediction. When thrown in an 'open setting' (*impostors* method) the autobiographical samples are struggling far more to beat the competition by authors from the benchmark corpus. In a 'closed setting' (SVM classifier) they univocally adhere to Hildegard's style. 78 out of 140 samples assign Hildegard as a candidate for the *Vita*'s authorship. This is an extensive and convincing contribution to the text as a whole, and may counter scepticism on the authenticity of these passages because of their similarity to Hildegard's canonical works, which we presume to be the most reliable specimen of what constitutes Hildegard's style. In other words, the *Vita* may rightfully be designated 'autobiographical,' and Guibert's and Theoderic's influences –to which we will return below – remain limited. A fascinating instance of an extremely small (!) portion of the *Vita* similar to Hildegard's style appears at the close of book 3's series of *miracula*. It concerns two letters, indexed as 14 and 15 in figure 5, written by Hildegard's sisters:

> His - prout possibilitas ingenioli suppetebat - a nobis digestis calamum ad uerba sanctarum filiarum eius uertamus, et que de ipsa memoratu digna scripserunt, maxime de beato transitu eius, sicut uiderunt et audierunt et manibus suis tractauerunt, adiuuante Domino fideliter et ueraciter huic operi annectamus. (*Vita* §3.26, 10–4, 68)
>
> Now that we have edited everything as far as the capacity of our limited talent allows, let us turn our pen to the words of her holy daughters, who have written worthily of her memory. With the help of the Lord let us append to this work faithfully and truthfully what they saw and heard, especially concerning her blessed passage from this life, which they have written down with their own hands. (*Life of Hildegard* 208)

The first account of the sisters is an anecdotal and concise summary of miraculous deeds performed by Hildegard (*Mulierem inquiunt*). The second is referenced in Table 4 as *Cum beata*, and is preoccupied with Hildegard's illness and her death at the age of eighty-two, which is portended by the apparition of a glowing red cross at the firmament. After these two passages, at the very ending of the *Vita*, an additional, short, unintroduced passage on Hildegard's burial occurs, for which Theoderic mentions no source in the text. It recounts the miraculous benefits that visitors had gathered from venerating Hildegard's grave. In the course of these final passages, the rolling SVM-*impostors* algorithm signalizes a lot of 'Hildegardian' material in the language. Evidently this poses a problem, as the passages include a description of events not only before but also after the author's death. Also on closer inspection of *Mulierem inquiunt* and *Cum beata*, one gains a strong impression that Hildegardian language is present. In the majority of turns of phrase one finds her preferred syntactic constructions and (occasionally biblical and patristic) imagery, especially of *Scivias* and the *Liber divinorum operum*. I have appended a more detailed study of corresponding passages in tables 5 and 6 in the Appendix, which were automatically searched by using Levenshtein distance.[21] A large number of sentences has parallels with passages in Hildegard's writings, especially the description of Hildegard's death in *Cum beata*, in which the red cross illuminates the sky into a colourful and dizzying spectacle.[22]

We might want to pause briefly at what is happening here. One should not forget that Hildegard's *Vita* is classified as an autohagiography, a genre heavily based upon literary precedents. This text, which can be held to inflate or even distort factual reality from a modern point of view, would be considered 'true' by virtue of its ethical-exemplary function by a medieval audience (Greenspan). Hildegard's death, – and the events leading up to it – would have, to a large extent, been pre-written according to the rules of the genre. The depiction of a saint's death was a literary *topos*, invoked with a specific purpose: the ultimate authentication of the saint's holiness. The conventional nature of death passages in female saints' hagiographical literature is an important point emphasized by Garay and Jeay in their recent piece exploring the "stages and staging of holy women's death" ("Sanctification" 139) By discussing the death passages of female mystics such as Elisabeth of Schönau, Douceline of Digne († 1274), Marie of Oignies († 1213) and Lutgard of Aywiéres († 1246), they stress that "death is the moment which epitomizes the heroic life of women who have been chosen for the vocation of sainthood" (ibid.). Many of the aspects Garay and Jeay attend to in order to expose the constructed nature of these death passages may well be shown to apply to Hildegard's *Mulierem inquiunt* and *Cum beata* as well. One is, for instance, the divine endorsement crucial to legitimating the saintly status: "Deus uero, cuius meriti apud se esset in transitu suo euidenter declarauit" (*Vita* §3.27, 16–17, 70).[23] Another is Hildegard's performance of "posthumous appearances and miracles" (Garay and Jean 139): "Nam duo homines, qui sanctum corpus eius spe bona tangere presumpserunt, a graui infirmitate conualuerunt" (*Vita* §3.27, 37–39, 70).[24] Thirdly, the ending of the *Vita* allocates a large role to the participation of Hildegard's community. The posthumous miracles lead up to her enshrinement "in a venerable place," which draws pilgrims for its "many benefits [...] available to all who come seeking them with devout heart."[25] All of

21. Levenshtein distance is a very simple operation for measuring the difference between two string sequences. A low Levenshtein distance means a close match between two word groups or sentences.

22. As one perceptive (but regrettably anonymous) peer reviewer has remarked, some of the matches are strictly speaking not 'Hildegardian,' but rely on an authoritative corpus of biblical-patristic tradition. I consent to this, and in fact I am inclined to extend the same argument to Hildegard's larger oeuvre and to the majority of medieval authors operating in similar contexts. Nevertheless, the preliminary experiments in this paper have clearly indicated that medieval authors' engagement with a reservoir of Latin *auctoritates* does not jeopardise the observation that they dispose of an individual style as well. I am therefore inclined to add that Hildegard's proper selection of *topoi* available to her –if I may call them such – is exactly part of the fabric of her style. Indeed, the decisions she makes as to what she includes and excludes is part of her stylistic profile as well. However, I admit that the field of stylometry would be better off if the impact of intertextuality on medieval Latin literary style was more systematically assessed — a considerable task and challenge.

23. "But God showed clearly in her passing what standing she had before him" (*Life* 209).

24. "Two men who made bold to touch her holy body recovered from a severe illness" (*Life* 210).

25. "Exequiis igitur uenerabiliter a reuerendis uiris celebratis in uenerando loco est sepulta, ubi meritis eius omnibus pio corde querentibus prestantur beneficia multa" (*Vita*, §3.27, 39–41, 70–71).

these elements make the depiction of Hildegard's death symbolically coincide with a wider involvement of the members of her community, for whom the cultivation of her person and the tradition she had founded becomes paramount. The death passage was, in other words, the apogee of the narrative, with a lasting importance for Hildegard's remembrance and perhaps even for the economical survival of the Rupertsberg. It was, in Dalarun's interpretation of Max Weber, "the transition of her personal charisma to a durable institution" ("La mort" 194).[26]

Taking this all into account, there is evidently more than one hypothesis which could account for why Hildegardian language appears here. The boldest one is to believe that Hildegard described the miracles in *Mulierem inquiunt* herself, and prophesied on the events of her death in *Cum beata* and ultimately arranged for the texts to be incorporated in her autohagiographical *Vita*, all of which occurred under her own authority and by her own hand. One may invoke one or two reasons in this hypothesis's defence. The *Vita* portrays Hildegard as prescient of the conditions by which she was to die, and, most importantly, as portending this course of events to her fellow sisters – to whom Theoderic emphatically attributes the authorship of the current passages.[27] The 'fabricating' of death stories has precedents in the twelfth century. One could think, for instance, of Geoffrey of Auxerre's death letter of Bernard of Clairvaux, composed in order to recuperate the saint's authority and authorize Arnaud of Bonneval's contribution to Bernard's *Vita* (Bredero, "Der Brief").

However, it is a curious theory, and without proved precedent in the hagiographical genre, to believe that Hildegard deliberately sat down to write about her own death (amongst other matters), with her secretaries as accomplices to what can arguably be called a very bizarre undertaking indeed. A more acceptable hypothesis is that the algorithm picks up on the fact that Hildegard's fellow sisters were trained extensively to imitate their *magistra*, and made an express effort to conjure up her style and tone in a passage with such great symbolic significance. Hildegard's words reverberate almost literally (again, I refer the reader to the Appendix where tables 5 and 6 show the correspondences). Another hypothesis could be that the passage is a revision of authentic Hildegardian materials, recycled to an extent sufficient enough to fool the *impostors* method. By principles similar to those of end redactor Theoderic of Echternach, her sisters loosely collected some of Hildegard's remaining

26. "Ce qui se joue en effet au moment précis du transitus du saint fondateur, c'est non seulement le passage attendu de l'ici-bas à l'au-delà, c'est aussi le passage périlleux d'un charisme personnel à une institution faite pour durer, d'un ideal toujours et oujours plus idéalisé par l'hagiographie à une pratique quotidienne, à une nécessaire insertion dans l'Église et dans la société" (Dalarun 194).

27. The Saint's prescience on his or her death is, however, an often encountered hagiographical trope (Boglioni 189). The original passage in Latin says "spiritu prophetie ei reuelauit, quem et sororibus predixit (*Vita* §3.27, 7–8, 69). Theoderic's abridged version states "Hec obitum suum longe ante presciens et sororibus predicens," (*Octo lectiones* §8, 15–16, 79); and Guibert's revised version – with his words indicated between angle brackets – says: "Cum beata inquiunt mater <regi et dominatori omnium> multis laborum <et dolorum> certaminibus deuote militasset, presentis uite tedio affecta <ad gaudia summe beatitudinis anhelans> dissolui et esse cum Christo cottidie cupiebat. <Quapropter> Deus <hanc dilectam suam a bono desiderio suo fraudari nolens diutius> finem <mortalis uite, quem ad ipsum suspirando optauerat,> spiritu prophetie ei reuelauit, quem et <filiabus suis in breui futurum esse sepe dixit>" (*Vita retractata* §3.26, 1–8, 106).

writings after her death in the Rupertsberg scriptorium and cobbled them together. Considering how the *Vita*'s composition process was one of recuperating materials that coincidentally happened to be at the composers' disposal, this may well be feasible.

In the spirit of gradually moving from one inference to the next, we may make the assumption – based on the rolling SVM-*impostors* method above – that the autobiographical passages are genuinely Hildegard's. This is further confirmed in the PCA plot in figure 6, where the original *Vita Hildegardis* was divided into two distinct batches: Hildegard's visions versus all non-Hildegardian fragments of the text. The division into batches also allowed this additional verification to work with 1,000-word instead of 500-word samples. Again, Hildegard's autobiographical passages can patently be shown to be Hildegard's (red triangles), and are clearly distinguishable from remaining samples of the *Vita*, namely Theoderic's commentaries (dark gray) and Godfrey's *libellus* (purple). The behaviour of these remaining samples of the *Vita*, traditionally believed to have been the work of Godfrey of Disibodenberg and Theoderic of Echternach, prove far more difficult to categorize. If we revisit the predictions of the rolling SVM-*impostors* method earlier (figure 5), and combine them with the PCA plot in figure 6, the following indications are given:

1. The PCA plot in figure 6 has Theoderic's commentaries (gray) and Godfrey's *libellus* cluster predominantly on the right end of the figure, alongside the works of Guibert of Gembloux (coloured blue).
2. In a closed setting (SVM in figure 5), these samples – be it hesitantly – sympathize with Guibert as well.
3. The *impostors* method (figure 5), on the other hand, refuses to become very confident, and makes few to almost no attributions to either Theoderic or Guibert which surpasses the σ^* threshold.

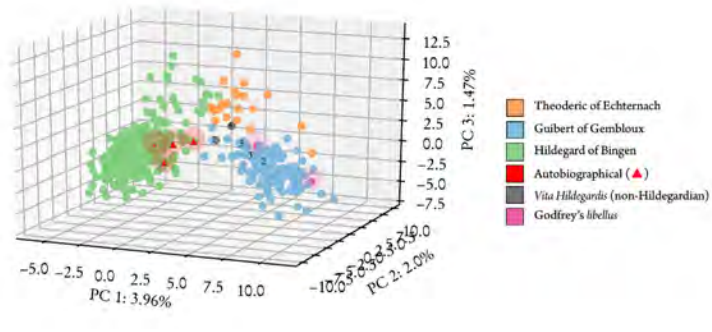


Figure 6. PCA plot containing Hildegard's, Theoderic's and Guibert's training texts (green, orange, blue). Theoderic's commentaries in the *Vita* are coloured gray, and come annotated with sample indices indicating a rough order of appearance (1–5). Also included in separate colouring are Godfrey of Disibodenberg's *libellus* or book 1 of the *Vita* (purple), and the autobiographical passages of Hildegard (red triangles), giving further evidence in support of figure 5 that Hildegard's visions are fully Hildegardian. Settings: 500 most-frequent function words. Sample length: 1,000 word tokens. Standard-scaled tfidf-weighted[28] raw frequencies. Explained variance is 7.43%.

28. See above, p. 140.

That Theoderic's commentaries fail to cluster with any of his chronicles is particular, and calls for some additional analysis. The three PCA plots given in figure 6 leave out Hildegard's works, and benchmark test documents Godfrey's libellus and Theoderic's commentaries against exclusively Theoderic's and Guibert's training texts (both individually and together). Here again, one gains the impression that the remaining samples of the *Vita* are inbetweeners, with a more explicit preference to side with Guibert, be it never quite convincing. Klaes's suspicions that chapters §1.8–9 of the *Vita* (containing the letter to Guibert) testify more to Theoderic's style, is not confirmed.[29]

29. These chapters are collected under sample 2 (purple). For Klaes's suggestions of Theoderic's authorship, see her introduction to the *Vita* at 92*–94*.

Neither of these candidate authors are very convincing, and it turns out that Guibert is systematically the best guess, if guessing is at all allowed in this scenario. Even Theoderic's first prologue, in which he explicitly announces his presence and informs his readers which source materials were used (without mentioning Guibert), turns out to be more like Guibert than like Theoderic. Guibert's (quite extensive?) stylistic influence on the *Vita* as we have it is problematic, for it does not appear compatible with the commonly accepted timeline of the *Vita*'s composition.

The prologues are important in establishing the chronology, for they give firm evidence of the current *Vita*'s completion by Theoderic, at a time definitely after Hildegard's death († 1179). It has commonly been assumed that Theoderic and Guibert just missed each other at the Rupertsberg. Theoderic arrived in the early 1180s shortly after Guibert departed for Gembloux. Consequently the two biographers are thought to have been unaware of each others' *Vitae* until Guibert coincidentally discovered Theoderic's in corresponding with Godfrey of Saint-Eucharius (all of which was already explained above at 8), after which he revised it c. 1208/9 before including it in his own epistolarium. In their current form it must stand beyond doubt that the *Vita*'s prologues' *terminus a quo* is 1181, when Godfrey became abbot of Saint-Eucharius, and their *terminus ante quem* before Ludwig of Saint-Eucharius passed away, in 1187.[30]

In other words, that Guibert's presence is suggested even in those passages of the text which have always been thought to have been exclusively Theoderic's additions is problematic. I see two (maybe three) plausible hypotheses for explaining it, but hard historical evidence for either of them is lacking. Either the last redactor of the *Vita* was Guibert instead of Theoderic, or else Theoderic's reliance upon Guibert's source materials is far more extensive than has hitherto been presumed. Before discussing the pros and cons of either of them somewhat more extensively, it should be noted that both hypotheses are weakened by Guibert's seemingly genuine surprise upon learning in 1208/9 from abbot Godfrey that there was an extant *Vita* of Hildegard. If the *Vita* sent to him by Godfrey had been a work largely reliant upon his own text, then Guibert shows no sign of indignation or familiarity, no reaction at all really. Instead, Guibert responds to Godfrey's request for corrections by remarking that "I have nothing in memory to infer or add, nor can I find anything superfluous which I would remove, nor anything ineptly placed that I would correct."[31] It is peculiar to believe Guibert is talking about a *Vita* he had at hand himself, unless we assume that these lines are intended to be tongue-in-cheek or slightly smug, or that he no longer recognized his work after some thirty years, or that there were reasons for him to conceal his former contribution to this older *Vita*.

30. The prologues testify of Godfrey and Ludwig's simultaneous abbacy (Silvas 121).

31. "[…] Non habens pre memoria quid inferrem uel adderem, nec inueniens in ea quicquam superfluum quod demerem, neque aliquid inepte positum quod corrigerem […]" (*Ep.* 42, 117–19, 394). My translation.

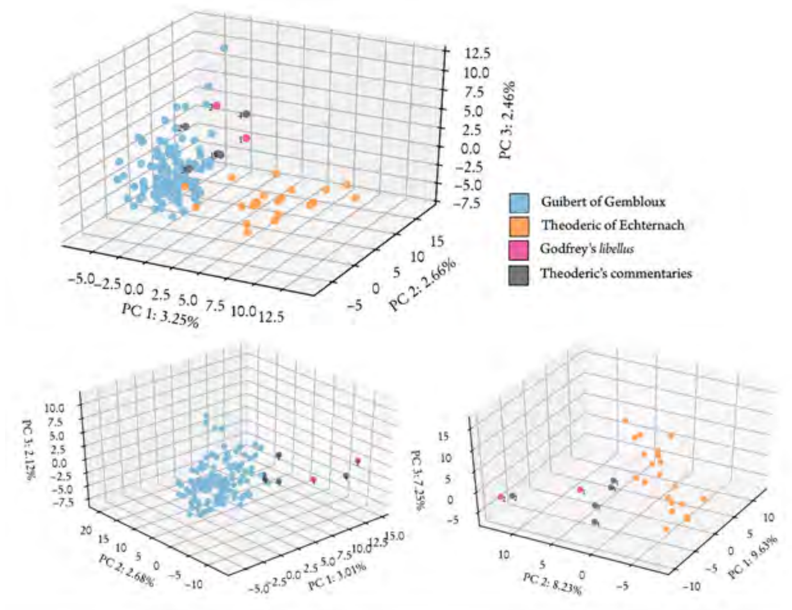


Figure 7. PCA plots of Theoderic's commentaries (gray) and Godfrey of Disibodenberg's *libellus* or book 1 of the *Vita* (purple). Theoderic's commentaries and the *libellus* are annotated with sample indices (1–5 and 1–2), indicating a rough order of appearance. Settings: 500 most-frequent function words. Sample length: 1,000 word tokens. Standard-scaled tfidf-weighted raw frequencies. Explained variances given alongside axes of subplots.

Let us explore the first hypothesis' presumptions and its merits. It presupposes that some time after Theoderic's completion, Guibert saw a chance to extensively revise an earlier version of the *Vita* by the former's hand, which is now lost. This poses numerous problems. Firstly, the manuscript on which Klaes's edition is based has firmly been retraced to Echternach, and has on palaeographical grounds been shown to contain handwriting similar to that of Theoderic. In other words, our best manuscript of the *Vita* is an autograph by Theoderic.[32] One could always assume that Guibert visited the Rupertsberg while Theoderic was working on the *Vita* in the early 1180s, but this seems unlikely considering Guibert's recent departure and busy schedule, including a pilgrimage to Tours (Moens 76). In his letter to abbess Ida, written around 1185, Guibert seems to be apologising for his longstanding silence toward the Rupertsberg community after his departure, which he defends by stating that he had been victim of false accusations and jealousy toward him after his stay there.[33] Considering Guibert's close involvement in collecting the source materials, one might wonder why neither Ida nor any other Rupertsberg sister felt it necessary to inform Guibert on a new *Vita* in the works, or send it to him if it happened to be finished around that

32. Wien, ÖNB, 624. "Die eigentliche Provenienz des Kodex ist aber das Kloster Echternach, wo er vom Autor der *Vita S. Hildegardis*, dem Echternacher Mönch Theoderich, selbst aufgezeichnet wurde" (Klaes 158*).

33. See Guibert's Ep. 32 (100–113, 336), the first of a longer letter exchange with the Rupertsberg (Epp. 32–37, 333–65).

time. Aside from these problems, the hypothesis that the *Vita* as we have it has known revisions by Guibert that postdate Theoderic's version becomes difficult in light of the fact that we already have a revision by Guibert, the *Vita sanctae Hildegardis retractata*. This would lead to the conclusion that Theoderic's *Vita* contains Guibert's first revision, and that Guibert's *Vita retractata* is the revision of the revision.

The second hypothesis holds that we have underestimated the degree to which also Theoderic's interbeddings are heavily indebted to the text prepared by Guibert between Hildegard's death and the latter's arrival at the Rupertsberg (1179/8). Guibert had been in close contact with Hildegard from 1175 onward and had become her closest secretary in 1177. Being closely involved in the composition of her epistolarium and the completion of the Riesencodex, the *Vita* which Theoderic found upon arrival might have looked very similar to the one lying before us today. After all, who else would have found it more necessary to extend Godfrey's *libellus* with Hildegard's letter to Guibert, the *De modo visionis sue*, than Guibert himself (indexed as 1 in figure 5)? Also in his fragmentary *Vita* sent to Bovo (Ep. 38 of his letter collection), Guibert included this letter from Hildegard, which shows the importance he attached to it. Following this train of thought, we may assume that Theoderic made subtle stylistic amendments, perhaps inserted references to Echternach's well-known abbot Thiofrid (Klaes 84*), but in reality heavily relied –including even large parts of the three prologues to the individual books – on an architecture formerly constructed by Guibert (and, perhaps, also Hildegard). Theoderic but had to score out Guibert's name, insert the necessary realia, and assemble the entire work under his name so as to finish the task. That Theoderic did not name Guibert as his predecessor is reminiscent of how Guibert had himself erased the existence of his predecessor Godfrey, so as to enhance his position as direct successor of Volmar (Schrader and Führkötter 147–50).

From what the sources tell us when it comes to Theoderic's final redaction, which was to assemble the pre-existent material, this second hypothesis wins my personal favour, although substantial weaknesses remain. The question arises why Guibert would have left Theoderic a *Vita* in such an advanced stage of completion, although 'completion,' of course, is a relative term in the Middle Ages. To him, whatever work he left behind in the Rupertsberg had been unfinished.[34] Here again, it has always been assumed that whatever work Guibert had started on a *Vita* during his time at the Rupertsberg is contained within the fragment sent to Bovo (Ep. 38). Why are The-

34. So much becomes clear from his letter to abbot Godfrey: "opus ceptum imperfectum reliquisse" (Ep. 42, 144, 394).

oderic's *Vita* and Guibert's fragmentary *Vita* so dissimilar, if we suspect that Guibert was at the origin of both of them? And finally: if Guibert's influence on the whole was as extensive as I am insinuating, then why does he appear – as the current experiments have shown – to have remained loyal to Hildegard's source material instead of extensively revising it?

These questions are bound to remain open for now. One might be excused for asking how far one is willing to go in speculation, if these results do not provide a better timeline than that of Klaes, or if they might simply be confronting us with the limits of what is methodologically feasible. Perhaps we are handling a collaborative style so far advanced that stylometry abandons us. The *impostors* method's suggestion is better taken seriously: there are simply no favourite candidates amongst all the authors included in the benchmark corpus. The involvement of many hands in a *Vita* undoubtedly important for many of Hildegard's close followers might defy the detection of single-author stylistic elements.

8 Conclusion

Whereas we have begun this article by questioning Hildegard's autobiographical fragments in the *Vita*, we have instead ended with new questions concerning Theoderic's and Guibert's respective contributions to the interbedding commentaries, where much remains unclear. It turns out that Hildegard's autobiographical fragments appear uncorrupted despite their transmittal through the hands of multiple biographers. This is the only result in this article that I believe can stand as conclusive. The experiments' remaining results, however, mainly give indications toward further investigation.

One of them is the observation that the two letters by Hildegard's sisters reporting on her death and appended to the *Vita's* third and final book, *Mulierem inquiunt* and *Cum beata*, are heavily indebted to Hildegard's wording and imagery. Either the sisters of the Rupertsberg meant to resuscitate Hildegard's tone and authority at the very end of her *Vita*, and perhaps even drew on Hildegard's materials so as to literally invoke her style, or perhaps Hildegard may even have had a hand in them herself. Undoubtedly, Hildegard's style was imitated at the Rupertsberg, where multiple of her assistants had been in the front row in learning to imitate and conjure up the visionary's style. Then again, that Hildegard was somehow involved herself is not impossible per se. She is known to have participated in collecting and revising her *opera omnia* during the last years of her life, which had the aim of representing her image for posterity, and the saint's death is a crucial culmination point if a canonization project was envisioned, in which Hildegard was meant to be depicted in a larger-than-life, hagiographical fashion. For what it is worth, the *Vita* itself also reported on how Hildegard dictated the events surrounding her death to her sisters.

Paradoxically, whereas Hildegard's authority was not undermined in the autobiographical fragments, the largest tussle for stylistic dominance appears to have taken place in the commentaries guiding them. These have commonly been taken to have been written by end redactor Theoderic of Echternach. However, Guibert of Gembloux's style appears present in a few of them, which might lead one to suspect that either Guibert had opportunity to revise the *Vita* at a time when Theoderic was (near to) completing it, or else that Theoderic largely relied on preparations carrying Guibert's mark. The first argument is hardly sustainable when based on Guibert's whereabouts during the time of Theoderic's ending of the *Vita*, but there is something to be said for the latter hypothesis. Then again, to my knowledge there is no additional evidence to support it aside from the statistical suggestions in this article, wherefore the question remains open and no conclusive answer is possible yet.

Bibliography

Binongo, José Nilo G., and M. Wilfrid A. Smith. "The Application of Principal Components Analysis to Stylometry." *Literary and Linguistic Computing* 14.4 (1999): 446–66.

Boglioni, Pierre. "La mort dans les premières hagiographies latines." *Le sentiment de la mort au moyen âge*. Ed. Claude Sutto. Montreal: L'aurore, 1979. 185–210.

Bredero, Adriaan Hendrik. "Der Brief des heiligen Bernhard auf dem Sterbebett: eine authentische Fälschung." *Fälschungen im Mittelalter. Internationaler Kongreß der Monumenta Germaniae Historica. München, 16.–19. September 1986*. Vol. 5. MGH Schriften 33. Hannover: Hahnsche Buchhandlung, 1988. 201–24.

---. *Études sur la "Vita prima" de saint Bernard*. Rome: Editiones Cistercienses, 1960.

Bruder, Petro. *Acta inquisitionis de virtutibus et miraculis S. Hildegardis. Analecta Bollandiana* 2 (1883): 116–29.

Daelemans, Walter. "Explanation in Computational Stylometry." *Computational Linguistics and Intelligent Text Processing* 7817. Ed. Alexander Gelbukh. Berlin, 2013. 451–62.

Dalarun, Jacques. "La mort des saints fondateurs. De Martin à François." *Les fonctions des saints dans le monde occidental (IIIe-XIIIe* *siècle). Actes du colloque de Rome (27–29 octobre 1988)*. Rome: École Française de Rome, 1991. 193–215.

De Gussem, Jeroen. "Bernard of Clairvaux and Nicholas of Montiéramey: Tracing the Secretarial Trail with Computational Stylistics." *Speculum* 92.S1 (2017): S190–S225.

De Gussem, Jeroen and Dinah Wouters. "Language and Thought in Hildegard of Bingen's Visionary Trilogy: Close and Distant Readings of a Thinker's Development." *Parergon* 36.1 (2019): 31–60.

Deploige, Jeroen. *In nomine femineo indocta: Kennisprofiel en ideologie van Hildegard van Bingen (1098-1179)*. Hilversum: Verloren, 1998.

Derolez, Albert. "Deux notes concernant Hildegarde de Bingen." *Scriptorium* 27 (1973): 291–99.

---. "The Manuscript Transmission of Hildegard of Bingen's Writings: The State of the Problem." *Hildegard of Bingen: The Context of Her Thought and Art*. Ed. Charles S.F. Burnett and Peter Dronke. Warburg Institute Colloquia 4. London: Warburg Institute, 1998. 17–27.

Diederich, Joachim, Jörg Kindermann, Edda Leopold and Gerhard Paass. "Authorship Attribution with Support Vector Machines." *Applied Intelligence* 19 (2003): 109–23.

Downey, Sarah, Michael D.C. Drout, Veronica E. Kerekes and Douglas C. Raffle. "Lexomic Analysis of Medieval Latin Texts." *The Journal of Medieval Latin* 24 (2014): 225–75.

Dronke, Peter. "The Allegorical World-Picture of Hildegard of Bingen: Revaluations and New Problems." *Hildegard of Bingen: The Context of Her Thought and Art*. Ed. Charles S.F. Burnett and Peter Dronke. Warburg Institute Colloquia 4. London: Warburg Institute, 1998. 1–16.

---. *Women Writers of the Middle Ages: A Critical Study of Texts from Perpetua († 203) to Marguerite Porete († 1310)*. Cambridge, UK: Cambridge University Press, 1984.

Dutton, Marsha L. "A Case for Canonization: The Argument of the *Vita Prima Sancti Bernardi*." *Cistercian Studies Quarterly* 52.2 (2017): 131–60.

Eder, Maciej. "Does Size Matter? Authorship Attribution, Small Samples, Big Problem." *Digital Scholarship in the Humanities* 30.2 (2013): 167–82.

---. "In Search of the Author of the *Chronica Polonorum* Ascribed to Gallus Anonymus: A Stylometric Reconnaissance." *Acta Poloniae Historica* 112 (2015): 5–23.

---. "Visualization in Stylometry: Cluster Analysis Using Networks." *Digital Scholarship in the Humanities* 32.1 (2017): 50–64.

Eder Maciej, Jan Rybicki and Mike Kestemont. "Stylometry with R: A Package for Computational Text Analysis." *The R Journal* 8 (2016): 107–21.

Embach, Michael. *Die Schriften Hildegards von Bingen: Studien zu ihrer Überlieferung und Rezeption im Mittelalter und in der Frühen Neuzeit*. Erudiri sapientia: Studien zum Mittelalter und zu seiner Rezeptionsgeschichte 4. Berlin: Akademie Verlag, 2003.

Ferrante, Joan. "*Scribe quae vides et audis*. Hildegard, Her Language, and Her Secretaries." *The Tongue of the Fathers: Gender and Ideology in Twelfth-Century Latin*. Ed. David Townsend, Taylor Andrew and Ruth Mazo Karras. The Middle Ages Series. Philadelphia: University of Pennsylvania Press, 1998. 102–35.

Ferzoco, George. "The Canonization and Doctorization of Hildegard of Bingen." *A Companion to Hildegard of Bingen*. Ed. Beverly Mayne Kienzle, Debra L. Stoudt and George Ferzoco. Leiden: Brill, 2014. 305–16.

Flanagan, Sabina. "*Spiritualis amicitia* in a Twelfth-Century Convent? Hildegard of Bingen and Richardis of Stade." *Parergon* 29 (1981): 15–21.

Garay, Kathleen and Madeleine Jeay. "Sanctification of the Body: The Stages and Staging of Holy Women's Death in High Medieval Europe." *Heroes and Saints: The Moment of Death in Cross-Cultural Perspectives*. Ed. Phyllis Granoff and Koichi Shinohara. Newcastle-upon-Tyne: Cambridge Scholars, 2007. 136–58.

Godfrey of Saint-Disibodenberg and Theoderic of Echternach. *The Life of Hildegard*. In *Jutta and Hildegard: The Biographical Sources*. Ed. and transl. Anna Silvas. Medieval Women: Texts and Contexts 1. Turnhout: Brepols, 1998. 118–210.

---. *Vita sanctae Hildegardis virginis*. Ed. Monika Klaes. *CC CM* 126. Turnhout: Brepols, 1993.

Greenspan, Kate. "Autohagiography and Medieval Women's Spiritual Autobiography." *Gender and Text in the Later Middle Ages*. Ed. Jane Chance. Gainesville: University Press of Florida, 1996. 216–36.

Guibert of Gembloux. *De combustione monasterii Gemblacensis*. Ed. Georg Heinrich Pertz. MGH Scriptores 8. Hannover, 1848. 563–64.

---. *Epistolae quae in codice B.R. BRUX. 5527–5534 inueniuntur*. Ed. Albert Derolez. *CC CM* 66–66A. Turnhout: Brepols, 1988–89.

---. *Vita sanctae Hildegardis retractata*. Ed. Monika Klaes. *CC CM* 126. Turnhout: Brepols, 1993. 93–106.
Herwegen, Hildephonse. "Les collaborateurs de sainte Hildegarde." *Revue Bénédictine* 21.1 (1904): 192–204; 302–16 (*Suite*); 381–403 (*Fin*).
Hildegard of Bingen. *Epistolarium Pars Prima I–XC*. Ed. Lieven Van Acker. *CC CM* 91. Turnhout: Brepols, 1991.
---. *Epistolarium Pars Secunda XCI–CCL*^{R}. Ed. Lieven Van Acker. *CC CM* 91A. Turnhout: Brepols, 1993.
---. *Epistolarium Pars Tertia CCLI–CCCXC*. Ed. Lieven Van Acker and Monika Klaes-Hachmöller. *CC CM* 91B. Turnhout: Brepols, 2001.
---. *Liber divinorum operum*. Ed. Albert Derolez and Peter Dronke. *CC CM* 92. Turnhout: Brepols, 1996.
---. *Liber vite meritorum*. Ed. Angela Carlevaris. *CC CM* 90. Turnhout: Brepols, 1995.
---. *Scivias*. Ed. Adelgundis Führkötter and Angela Carlevaris. *CC CM* 43. Turnhout: Brepols, 1978.
---. *Visiones Hildegardis a Guiberto Gemblacensi exaratae*. Ed. Jeroen Deploige and Sara Moens. *Hildegardis Bingensis opera minora* II. Ed. Jeroen Deploige, Michael Embach, Christopher P. Evans, Kurt Gärtner and Sara Moens. *CC CM* 226A. Turnhout: Brepols, 2016. 135–236.
---. *Vita Sancti Disibodi episcopi*. Ed. Christopher P. Evans. *Hildegardis Bingensis opera minora* II. Ed. Jeroen Deploige, Michael Embach, Christopher P. Evans, Kurt Gärtner and Sara Moens. *CC CM* 226A. Turnhout: Brepols, 2016. 59–87.
---. *Vita Sancti Ruperti confessoris*. Ed. Christopher P. Evans. *Hildegardis Bingensis opera minora* II. Ed. Jeroen Deploige, Michael Embach, Christopher P. Evans, Kurt Gärtner and Sara Moens. *CC CM* 226A. Turnhout: Brepols, 2016. 91–108.
Jockers, Matthew Lee. *Macroanalysis: Digital Methods and Literary History*. Champaign, IL: University of Illinois Press, 2013.
Johnson, Lynn Staley. "The Trope of the Scribe and the Question of Literary Authority in the Works of Julian of Norwich and Margery Kempe." *Speculum* 66.4 (1991): 820–38.
Juola, Patrick. "Authorship Attribution." *Foundations and Trends in Information Retrieval* 1.3 (2006): 233–334.
Katajala-Peltomaa, Sari. "Recent Trends in the Study of Medieval Canonizations." *History Compass* 8.9 (2010): 1083–92.
Kestemont, Mike, Sara Moens and Jeroen Deploige. "Collaborative Authorship in the Twelfth Century: A Stylometric Study of Hildegard of Bingen and Guibert of Gembloux." *Digital Scholarship in the Humanities* 30. 2 (2013): 199–224.
Koppel, Moshe and Yaron Winter. "Determining If Two Documents Are Written by the Same Author." *Journal of the Association for Information Science and Technology* 65.1 (2014): 178–87.
Liebeschütz, Hans. *Das allegorische Weltbild der Heiligen Hildegard von Bingen*. Leipzig: Teubner, 1930.
Moens, Sara. "De horizonten van Guibertus van Gembloers (ca. 1124–1214). De wereld van een benedictijns briefschrijver in tijden van een verschuivend religieus landschap." Ph.D. Dissertation, Ghent University, 2014.
Moretti, Franco. *Distant Reading*. London: Verso, 2013.
Mosteller, Frederick and David L. Wallace. *Applied Bayesian and Classical Inference: The Case of the Federalist Papers*. 2nd ed. Springer Series in Statistics. New York: Springer Verlag, 1984 (1964).
Newman, Barbara. "Hildegard and Her Hagiographers. The Remaking of Female Sainthood." *Gendered Voices. Medieval Saints and Their Interpreters*. Ed. Catherine M. Mooney. The Middle Ages Series. Philadelphia: University of Pennsylvania Press, 1999. 16–34.
---. *Sister of Wisdom. St Hildegard's Theology of the Feminine*. Berkeley and Los Angeles: University of California Press, 1987.
Powell, Morgan. "*Vox ex negativo*. Hildegard of Bingen, Rupert of Deutz and Authorial Identity in the Twelfth Century." *Unverwechselbarkeit. Persönliche Identität und Identifikation in der vormodernen Gesellschaft*. Ed. Peter von Moos. Norm und Struktur 23. Cologne: Böhlau, 2004. 267–95.
Preger, Wilhelm. *Geschichte der deutschen Mystik im Mittelalter*. Leipzig: Dörffling und Franke, 1874.
Schrader, Marianna and Adelgundis Führkötter. *Die Echtheit des Schrifttums der Heiligen Hildegard von Bingen*. Cologne / Graz: Böhlau Verlag, 1956.
Stamatatos, Efstathios. "A Survey of Modern Authorship Attribution Methods." *Journal of the American Society for Information Science and Technology* 60.3 (2009): 538–56.
Theoderic of Echternach. *Chronicon Epternacense*. Ed. Ludwig Weiland. MGH Scriptores 23. Hannover, 1874. 38–64.
---. *Libellus de libertate Epternacensi propugnata*. Ed. Ludwig Weiland.

MGH Scriptores 23. Hannover, 1874. 64–72.
---. *Octo lectiones in festo sancte Hildegardis legende*. Ed. Monika Klaes. *CC CM* 126. Turnhout: Brepols, 1993. 75–80.
Van Acker, Lieven. "Der Briefwechsel der heiligen Hildegard von Bingen Vorbemerkungen zu einer kritischen Edition (*Fortsetzung*)." *Revue Bénédictine* 99.1–2 (1989): 129–34.
Van Engen, John. "Authorship, Authority, and Authorization: The Cases of Abbot Bernard of Clairvaux and Abbess Hildegard of Bingen." *Shaping Authority: How Did a Person Become an Authority in Antiquity, the Middle Ages and the Renaissance?* Ed. Shari Boodts, Johan Leemans, and Brigitte Meijns. Lectio 4. Turnhout: Brepols Publishers, 2016. 325–62.
---. "Letters and the Public Persona of Hildegard." *Hildegard von Bingen in ihrem historischen Umfeld. Internationaler wissenschaftlicher Kongreß zum 900jährigen Jubiläum, 13.–19. September 1998, Bingen am Rhein*. Ed. Alfred Haverkamp and Alexander Reverchon. Mainz: Verlag Philipp von Zabern, 2000. 375–418.
van Halteren, Hans *et al.* "New Machine Learning Methods Demonstrate the Existence of a Human Stylome." *Journal of Quantitative Linguistics* 12.1 (2005): 65–77.
Vainio, Raija *et al.* "Reconsidering Authorship in the Ciceronian Corpus Through Computational Authorship Attribution." *Ciceroniana On Line* 3.1 (2019).
Vauchez, André. *La sainteté en Occident aux derniers siècles du Moyen Age: d'après les procès de canonization et les documents hagiographiques*. Rome: École française de Rome, 1981.

Appendix

Table 5 (Appendix). Word correspondences between *Mulierem inquiunt* (*Vita* §3.26, 15–38, 68–69) and Hildegard's canonical works, corresponding passages automatically searched by using Levenshtein distance. Latin text of the *Vita* in left column edited by Monika Klaes.

Mulierem inquiunt	Matches with passages in Hildegard's oeuvre
Mulierem inquiunt quandam acriter a	
demonio muto uexatam, **super quam**	... ut sol rem aliquam calefacit **super quam...**
et fratres de Lacu plurimum	(*Scivias*, *Protestificatio* 29)
laborauerant,	
cum ad se **magno** labore uirorum in	... **cum magno** sacramento incarnationis sue (*Scivias*, II.3.34, 737) ...
lecto deportata esset, pia mater	
audacie et presumptioni demonis	
[...]	... **audatie et presumptionis** temeritatem ...
benedictionibus **non cessauit**, **quousque**	(*LDO*, I.3.14, 1)
per gratiam	... **nec** in hoc **cessabit**, **quousque** numerus ...
[...]	(LDO, III.4.9, 10)
que propter furorem insanie diris	... Homo autem, **qui propter** timorem ... (*LDO*, I.2.35, 24)
[...]	
orationes, **uigilias** et **ieiunia**,	
	... que **cum uigiliis et ieiuniis** ac **orationibus** ...
ad perceptionem quoque	(*LDO*, II.1.39).
sacramentorum	... **ad percipiendum** idem
[...]	**sacramentum** ... (*Scivias*, II.6, 243) ...
Inter **que etiam ita** eam	
	ager fructum proferens **qui etiam ita**
	Deo est consecratus ... (*Scivias*, II. 5.48, 1494)
afflixit, **quod** nomina et	
	... in tantum **affligitur**, **quod** ... (*LDO*, I.4.64, 27)
aspectum **quorundam hominum** et	
animalium **in tantum** abhorrebat, **quod**	... cerebrum **quorundam hominum**
ipsis uisis	igneum et siccum est ... (LDO, I. 2.32, 166)
	... **in tantum** affligitur, **quod** ... (*LDO*, I.4.64,
uel auditis horribili uoce per	27).
longam horam perstrepebat.	
Hec a priore et conuentu	**confortare** is an often used word in
cum litteris ad sanctam uirginem	Hildegard's oeuvre.
missa ab ea et **confortata** et a	
[...]	
cum esset **paupercula** et **ceca**,	
	... Ego igitur **paupercula** et inbecillis ...
in elemosinam eius recepta in spirituali	(*LDO*, *Prologus*, 27)
habitu uitam **feliciter consummauit**	… sed tamen ea bono fine **feliciter**
	consummauit … (*Vita sancti D.*, 10, 136, 63)

Table 6 (Appendix). Word correspondences between *Cum beata* (*Vita* §3.27, 4–35, 69–70) and Hildegard's canonical works. Latin text of the *Vita* in left column edited by Monika Klaes.

Cum beata	Matches with passages in Hildegard's oeuvre
Cum beata inquiunt mater Domino multis laborum certaminibus deuote militasset,	
uite presentis **tedio affecta**	... labore et **tedio affectum** ... (*LDO*, I.2.35, 12)
dissolui et esse cum Christo cottidie **cupiebat**. Cuius **desiderium** Deus exaudiens finem suum,	... in candore tantum celestis **desiderii querit dissolui et esse cum Christo** ... (*Scivias*, III. 10.22 648)
sicut ipsa preoptauerat, **spiritu prophetie**	... in **spiritu prophetiae** cognouerunt ... (*LVM*, 2.30, 545)
ei reuelauit, quem et sororibus predixit. Aliquamdiu	
itaque infirmitate laborans octogesimo secundo **etatis sue** anno	**itaque** ... **infirmitate laborasset**, uicesimo **etatis sue** anno ... (*Vita Sancti Ruperti*, 11, 358, 103.)
[...]	
conferendis non dubitarent,	
propter discessionem tamen eius,	... **propter** sanguinem agni, **per quem** ...(*LDO*, III.5.37, 25)
per quam semper consolabantur,	... pugna, **per quam** semper ... (*Scivias*, III.6.30, 750)
[...]	
lucidissimi et **diuersi coloris** arcus	... et **diuerso colore** depicta ... (*Scivias*, III.10.9, 433)
in firmamento apparuerunt, qui ad	... magna **in firmamento** discurrunt, sic ...(*LDO*, I.4.51, 14)
magnitudinem magne platee **se dilatauerunt**	... **se dilatauerant**, in hac palude ... (*LVM*, I.121, 1852)
in quatuor partes terre se **extendentes**,	... **in quattuor partes** se diuiserunt... (*Scivias*, II.7, 84) ... **ad quattuor** plagas orbis **extendentem**, ... (*Scivias*, I.4.9, 398) ... super **quatuor partes terrae** ... (*LDO* II.1.8, 65)
quorum alter ab **aquilone ad austrum**,	... ad **austrum** et altera **ad aquilonem** ... (*LDO*, I.4.49, 66)
alter ab **oriente** ad occidentem **procedebant**.	... ad **orientem procedebant** rami a ... (*Scivias*, III.4, 59) ... **procedebant**, se in altitudine ... (*Scivias*, III.6.35, 1010)
At **in summitate**, ubi hi	... **in** cuius **summitate**, ubi locus ... (*LDO*, III.4.1, 10)
[...]	
se protendens **tenebras noctis** ab habitaculo	... **tenebras noctis** cum mala ... (*LVM*, III.28, 527)
depellere **uidebatur**. **In** hac	... excellere **uideretur**; **in** quo ... (*LDO*, III.1.1, 5)
[...]	
quam innumerabiles uarii	... **qui innumerabiles in numero** ... (*LVM*, I.49, 777)
coloris circuli, **in quibus** singulis singule rutilantes crucicule oriebantur, cum	... **uarii coloris** induta est, ... (*LVM*, 2.47, 935) ... circuli, **in quo** similitudo ... (*LDO*, I.2.1, 160)

circulis suis crescentes priore tamen minores conspiciebantur.	... se **in firmamento** distantes signati ... (*LDO*, I.4.22, l.1)
Et cum he **in firmamento** se	... **latitudinem** multam habentem, ac ... (*LVM*, IV.50, 1090)
dilatassent, **latitudine** sua	... et **ad orientem uersam** ... (*LDO*, III.5.2, l.19)
ad orientem magis pertingebant et ad terram **uersus** domum in	
qua sancta uirgo transierat, declinare uise	... **totum mundum illuminaret** ... (*LDO*, III.5.9, 100)
totum montem clarificabant.	... **signis** se **ostendunt**; quoniam ... (*LDO*, III.1.5, 4)
Et credendum quod **hoc signo** Deus	... **tanta claritate** fulgebat, ut ... (*LDO*, III.3.1, 7)
ostendit, **quanta claritate** dilectam suam in celestibus illustrauerit.	

Table 7 (Appendix). Authors contained in the benchmark corpus. More detailed information (word count and document titles) is provided on GitHub.

Alan of Lille	Hugh of Saint-Victor
Anselm of Canterbury	Ivo of Chartres
Anselm of Laon	John of Salisbury
Bernard of Clairvaux	Odo of Deuil
Bruno of Cologne	Peter Abelard
Gerhoh of Reichersberg	Peter of Celle
Walter of Châtillon	Peter Damian
William of Conches	Peter Lombard
William of Saint-Thierry	Peter the Venerable
Hildebert of Lavardin	Rupert of Deutz
Honorius of Regensburg (Autun)	Suger of Saint-Denis

MARY DOCKRAY-MILLER AND MICHAEL D.C. DROUT WITH SARAH KINKADE, JILLIAN VALERIO

The Author and the Authors of the *Vita Ædwardi Regis*: Women's Literary Culture and Digital Humanities

Abstract

Commissioned by Queen Edith in the 1060s, the *Vita Ædwardi Regis* (hereafter *VER*) has recently received substantial scholarly attention, including focus on identification of the author of this putatively anonymous text; the quest for authorial identification has until now proceeded with the assumption of sole authorship of the text. Lexomics, an open-access vocabulary analysis tool, adds digital strategies to more traditional literary and historical analyses; the Lexomic evidence indicates that the *VER* is a composite text built by multiple contributors under the direction of the queen. Not only did Edith's patronage cause the *VER* to be written, but her knowledge, and her personal and political interests, shaped the *Life*'s content. Hers was the active, guiding intellect behind the entire text, and in two passages the *VER* appears not only to communicate the queen's intentions but also to preserve her voice. If any one person is to be identified as the 'author' of the VER, therefore, it is Edith, guiding a team of writers and scribes to tell her story.*

Preface by Diane Watt

This collaborative research by Mary Dockray-Miller and Michael Drout and their team of undergraduates began at about the same time as the work of the Women's Literary Culture and the Medieval Canon international network, funded by the Leverhulme Trust from 2015–17.[1] At the second network meeting, held at Boston University in July 2016, Mary, in collaboration with Jillian Valerio, a student in historical linguistics, introduced our members to the methods of Lexomics developed by Michael, his team at Wheaton College, and other colleagues, methods which offer new ways of analyzing and understanding authorship and which is thus particularly relevant to the study of medieval women's engagement with literary culture.

The main aim of the Women's Literary Culture and the Medieval Canon network project was to consider to what extent and in what ways research into women's literary culture might enhance our understanding of late medieval

* Diane Watt: University of Surrey; Mary Dockray-Miller: Lesley University (MA); Michael D.C. Drout: Wheaton College (MA); Sarah Kinkade: Lesley University (MA); Jillian Valerio: Wheaton College (MA).

1. Project reference IN-2014-038; see full conclusions in McAvoy and Watt, Special Issue and Miles and Watt, "Colloquium."

English literature as a whole. The phrases 'women's literary culture' and 'women's writing' encompass many possible forms of women's relationships with textuality – women as subjects, authors, audience, patrons, scribes, editors, and archivists of various written expressions. They thus make visible the diverse contributions of women to what we now think of as the literary canon.

Network members adopted a range of methodologies in the course of this project, including empirical research; close comparative readings of literary texts by male and female authors to examine the significance of gender in relation to issues such as genre and influence, the construction of readers and reading, the influence of patrons, and textual anonymity; and archival research, such as analysis of manuscripts, focused specifically on evidence of female ownership, production, readership and reception. Particular attention was paid to the collaborative literariness of medieval women, who often worked alongside other women or men in the production of texts.

The work of the network has informed my own recent research project, also funded by the Leverhulme Trust, which addressed Women's Literary Culture before the Conquest (2017–19).[2] This project explored women's texts in early medieval England, from the seventh to the eleventh centuries. One aim was to demonstrate that late medieval women writers and visionaries, who are often viewed as exceptional, are part of a much longer tradition. With this in mind, I began by considering women's engagement with literary culture in the seventh and early eighth century in the early double monasteries at Whitby, Ely and Barking, looking in detail at the evidence found in the fourth book of Bede's *Ecclesiastical History*, which is sometimes referred to as the 'Book of Abbesses' because it includes the lives of three founding mothers of the English church: Æthelburh (Ethelburga) of Barking (*fl.* 664); Æthelthryth (Etheldreda) of Ely (*c.* 636–79); and Hild of Whitby (614–80) (Watt "Lost Books," "Earliest Women"s"). In brief, I suggest that Bede's accounts of these elite women elide their sources, which would certainly have included lives of the founding abbesses originally composed within their religious houses, very possibly by the nuns themselves. My argument is that Bede 'overwrote' the women's lives in the sense that he wrote over, and thus partially obliterated accounts, whether written or oral, that had been produced in the abbesses' own monasteries.

2. Project reference MRF-2016-014; see full conclusions in Watt, *Women, Writing and Religion*.

Through conversation at the second network meeting, I found out about the published work of Michael Drout and his colleagues that complements my own findings (Downey, Drout, et al). The computer-assisted statistical analysis of parts of the *Ecclesiastical History* reported in that article appears to support my argument that Bede drew heavily on a lost written source in writing his life of Hild, and fascinatingly indicates that Bede's immediate source also included the material about Barking that he drew upon in his account of Æthelburh. In other words, the Lexos findings suggest that an earlier, now vanished, book of abbesses does indeed underpin Bede's account. As a researcher well established in medieval literary studies but new to the field of digital humanities, I am only now beginning to understand the ways in which these tools can support, and at times challenge, more traditional literary analysis.

At the 2018 "Medieval Canon in the Digital Age" conference, I was fortunate to have the opportunity to give a joint presentation with Mary, entitled "Women's

Authorship, Collaboration and Patronage in the Medieval Literary Canon", in which we jointly explored how a consideration of 'women's texts' and collaborative authorship can enable a widening of the medieval literary canon, as well as consideration of the contributions digital humanities tools might make to this process. My most recent project investigates a whole range of other early material, including, for example, the correspondence of St Boniface, saints' lives such as Hugeburc of Heidenheim's *Lives of Willibald and Winnebald* and Rudolf of Fulda's *Life of Leoba,* and also later texts, including the hagiographical and devotional works of Goscelin of St Bertin (including *The Legend of Edith* and the *Liber confortatorius*). I have therefore followed with considerable interest Mary's and Michael's exciting research on the anonymous *Vita* Ædwardi.

1 Introduction[3]

As the preface indicates, the findings reported here are part of a larger, discipline-wide trend of experimenting with the ways that digital tools can interact with traditional literary analyses and textual understandings. The varied methodologies of that work on a wide range of texts produced by or for medieval women have helped our team as we grappled with the unwieldy *Vita Ædwardi Regis*, a piece of medieval 'women's literary culture' that is finally having a moment. Commissioned by Queen Edith in the 1060s, this text has languished for many years in relative critical obscurity, castigated as both bad history and bad hagiography (Jordan 122–23). Recent scholars, however, have recognized the potential of this *Life* of Edward the Confessor (hereafter *VER*) to shed considerable light on eleventh-century English history, religion, and literature within a broader European context. Part of that attention has focused on identification of the author of this putatively anonymous text, although the search for certain authorial identification of the *VER* highlights the difficulty of assigning or even defining medieval 'authorship,' as varied contributions, collaborations, and revisions throughout the process of textual production create an extant text. In the quarter of a century that has passed since Pauline Stafford first suggested that the *VER* presents the "voice of a woman mediated through the clerical, dynastic, and male culture of the early Middle Ages" ("Portrayal" 165–66), scholars have focused in the quest for authorial identification on two known male clerics, Goscelin of Canterbury and Folcard, and on an anonymous poet of the Loire School. There are good arguments for any (or all) of these authors to have contributed to the text, but something has been lost in this concentration on sole authorship:

3. We would like to thank Jeroen De Gussem, Mike Kestemont, Tom Licence, Rosalind Love, Renee Trilling, Elizabeth Tyler, Diane Watt, Erica Weaver, and the editors and reviewers of *Interfaces* for suggestions and critiques as we worked on this project from initial blog posts and conference presentations to its published form.

the voice of a woman, of Edith of Wessex, Edward's widow and the dowager queen.

In this paper, we show how new techniques of computer-assisted analysis, paired with traditional methods of textual investigation, can not only recover that lost voice but also explain the ways it has been mediated through the work of other writers. The best explanation of the evidence, we argue, is that the *VER* is a composite text built by multiple contributors under the direction of the widowed queen. Not only did Edith's patronage cause the *VER* to be written, but her knowledge, and her personal and political interests, shaped the *Life*'s content. Hers was the active, guiding intellect behind the entire text, and in two passages the *VER* appears not only to communicate the queen's intentions but also to preserve her voice. If any person is to be identified as the 'author' of the *VER*, therefore, it is Edith, guiding a team of writers and scribes to tell her story.

*

Modern scholars use the title *Vita Ædwardi Regis qui apud Westmonasterium requiescit* to distinguish this text, found only in London, British Library, Harley 526, from other *Lives* of Edward the Confessor, composed later and for different reasons (see Barlow, *The Life*, for introduction, edition, and translation; Bloch; Aelred; Södergård). The unique manuscript lacks at least two folios and possibly more (Barlow, *The Life* lxxix).[4] Frank Barlow's edition of the *VER* therefore includes accounts from other texts to fill these gaps and provide basic narrative flow, but because our analysis focuses on authorial identification, we use only the text preserved in Harley 526; we cannot rely on texts restored from other sources to preserve the text as it was composed in the 1060s. Although the manuscript indicates narrative breaks with colored capitals, it does not explicitly indicate books or provide numbered chapter divisions, but for ease of reference we have retained Barlow's system of dividing the *VER* into two 'books,' which are then subdivided into numbered 'chapters' (see the appendix for a table indicating the contents of and other information about these various divisions).

4. Latin text and English translations throughout from Barlow, *The Life*.

The bulk of the extant manuscript, what Barlow terms Book I, is a 'historical essay' that might more fruitfully be titled an *Encomium Edithae Reginae* than the *Vita* of her husband King Edward. This part of the *VER* is indebted more deeply to the literary tradition of the *encomium* or secular biography than to that of hagiography; recent work on the text has shown that the creators of the *VER* knew the thematically similar *Encomium Emmae Reginae*, which was composed in England 1041/1042 by a Flemish cleric (Campbell and Keynes; Tyler, "Wings" 94; Tyler, *England* 151). Throughout the *VER*, Queen Edith is acknowledged as patron and guiding force for the narrative. Barlow, Tom Licence, and Elizabeth M. Tyler all argue separately, with slightly different emphasis and interpretation of the evidence, that 'Book I' was composed before the Norman Conquest, some time between the autumn of 1065 and the spring or summer of 1066 (Barlow, *The Life* xxx; Licence, "Date and Authorship" 272; Tyler, *England* 143–44). While many scholars have seen this book to focus quite firmly on praise of the Godwin family, Tyler has persuasively argued instead for the text's overall purpose as praise specifically for Edith. The *VER* both celebrates and criticizes Earl Godwin (Edith's father) and the earls Harold and Tostig (her brothers) in its construction of Edith as a figure of pathos, concord, and wisdom in turbulent times (Tyler, *England* 145–55); Tyler refers to the poet's "fiercely uncritical loyalty to her [Edith], which contrasts with his backhanded attitude to the men in her family" (*England* 211). This first section of the *VER* is prosimetric, with lyrics interspersed periodically throughout the narrative. The poems comment, usually allegorically and sometimes quite critically, on the events of the prose text.

Barlow's 'Book II,' which he starts with the last of the eight poems, narrates the death of Edward and enumerates some of his early miracles, eliding entirely the events of the Norman Conquest. Because of missing folios, this material is contained in only folios 54r–57r of Harley 526; when texts by Osbert of Clare and others are removed (those that Barlow interpolated into the text in his edition), Book II is only about one-third the length of Book I. Since Edward's death and miracles are told as if in the recent past, Barlow, Licence, and Tyler all date this material to the months immediately following the Conquest, *c.* 1067 (Barlow, *The Life* xxxii; Licence, "Date and Authorship" 272; Tyler, *England* 200). The text of Book II makes it clear that the author has had to adapt the text's overall purpose to the change in political circumstances: rather than a celebration of the Queen and the newly-royal family of her birth, the *VER* becomes a remembrance of the widowed Queen's husband. In her analysis of the ways that trauma figures in the *VER*, Catherine A.M. Clarke has referred to the text's "cycle of insistent, intrusive re-telling and re-playing" of events leading up to and following the elided Norman Conquest.

Other scholars, however, have disagreed both with this dating and with the conclusion that the composition of the text spanned the Conquest. Simon Keynes and Rosalind Love state that "it seems more likely that the whole work was written at one time (perhaps *c.* 1068), and that it was intended from the outset to rationalize for Edith's benefit the turn of events following Edward's death in January 1066 and Harold's death in October" (Keynes and Love 199). In this claim, they follow Eleanor K. Heningham, who provides New Critical arguments for the unity of the *VER* as a text that primarily celebrates the peace that Edward's reign brought to England (Heningham, "Literary Unity" and "Genuineness"). While Victoria Jordan similarly argues for the *VER*'s thematic unity as a celebration of peace and cooperation, she shies away from statements about dating and authorship of the composition. Heningham's and Keynes/Love's arguments gloss over both the assumptions early in the text that Edward is still alive (his death is noted at the end of Book I and described in greater detail in Book II) and also the *VER*'s obvious initial goal of celebrating Edith and, more hesitantly, the extended Godwin family. Highlighting the many details that argue against a post-Conquest start of composition, Tyler's analysis of Poem Two shows that "The Anonymous's stance – that Harold and Tostig have not yet destroyed each other – militates against a post-1066 composition for this portion of the VER" (Tyler, *England* 164).

In addition, the final poem of the prosimetrum describes the process of the text's change of purpose, from praise of Edith to a celebration of Edward's holy life, stating that *Vsque sub extremum deuoti codicis unguem / rebamur sanctam dicere progeniem* ("We thought to the last page of this devoted book to tell of blessed progeny") but now will focus on *Ædwardum forma meriti[sque] decorum* ("Edward fair in form and worth") (Barlow, *The Life* 84–85 and 88–89). While remaining agnostic about the dating issue, Monika Otter does note that a reading of the text as a unified document composed at one time requires the understanding of the text's internal chronology and logic to be a "literary fiction" (Otter, "1066" 580).

2 Authorship: circumstance and style

Since 1943, when R.W. Southern suggested that Goscelin wrote the *VER*, scholars have struggled to identify the author of the text. Recently, the pendulum of scholarly opinion has seemed to swing toward a different monk, Folcard, who, like Goscelin, came to England from St. Bertin in Flanders (Licence, "Date" 273–85; Love, "Goscelin"). Both Goscelin and Folcard could have composed the *VER*, but scholars have not been able to confirm either as the author of the *VER*. All other evidence (for example, that the author received much of his narrative information directly from Queen Edith, or that he worked primarily at Wilton) is, although sensible, necessarily circumstantial (Barlow, *The Life* xliv–xlvi).

In their numerous discussions of the *VER*, both Barlow and Tyler remain carefully neutral, referring to the author as "the Anonymous." Barlow also emphasizes that Goscelin's and Folcard's biographies overlap so substantially that differentiating between them is not easy: the two men "were contemporaries, with the same educational background, and made similar careers in England" (Barlow, *The Life* xlvi). Both monks were educated at St. Bertin before coming to England in the late 1050s or the early 1060s, where they served the English church in a variety of capacities and wrote hagiographical texts. Both were employed by Bishop Herman, a recipient of Queen Edith's patronage who had himself become a monk of St Bertin during a period of absence from his diocese. Goscelin was surely with Herman through the mid- to late-1060s (the time of the *VER*'s composition); Folcard's exact whereabouts during those years, and his precise relationship with Herman during them, are less certain, although he may have been in the Bishop's service at this point as well (Barlow, "Folcard" and "Goscelin"). Furthermore, if Rosalind Love is correct in identifying a "Saint-Bertin school of hagiographical writing," both Goscelin and Folcard would have had a very similar academic training (Love, *Three* xl). Barlow concludes his reflections on the identity of the *VER* author by stating that "it is impossible to make a completely convincing case for either Goscelin or Folcard," but "no other claimant of any merit has hitherto been put forward" (Barlow, *The Life* lix). Further complicating the conversation, Love has not suggested either as the author of the *VER* in her extensive scholarship on each monk, and Monika Otter in her substantial work on Goscelin never includes the *VER* (even hesitantly) in her discussion of Goscelin's writings (Love, *Three*; Otter, "Closed").

Any identification of the author of the *Life of King Edward*, therefore, needs not only to address the text's circumstances and style but also recognize that the scholarly focus on the two named, known Flemish monks has circumscribed the discussion. Most previous analysis ignores the possibility that a person (or people) unknown by name to historians created or contributed to the text. Although Barlow remarks that "it would be remarkable indeed if there were more than two Flemish monks writing in England at the same time"

(Barlow, *The Life* lix), the high level of cross-Channel religious/political activity does not rule out the number of itinerant Flemish hagiographers in eleventh-century England being greater than two. Indeed, Tyler discusses continental clerics working in England in the second half of the eleventh century, providing a number of examples and noting that, "The mobility of clerics who found preferment in the Confessor's court is remarkable and adds to the difficulty in identifying the Anonymous or understanding where his poetics were formed" (Tyler, *England* 253). Additionally, none of the scholars mentioned above or in the notes has considered the possibility that the text is a composite composed by a variety of "authors."

The circumstantial evidence for the monks known by name can seem compelling. As Barlow states, "Goscelin could easily have written this book," especially since we have extra-textual evidence that Goscelin attended the celebrations for the new buildings at Wilton and Westminster that are described in the *VER* (Barlow, *The Life* l). A monk at St. Bertin until about 1058, Goscelin came to England to serve Herman, Bishop of Ramsbury and Sherborne. Throughout his service to Herman, Goscelin may have found time to write a few of his hagiographical texts, but he was obviously busy with his duties as part of the episcopal staff. It was only after Herman's death in 1078 that Goscelin became something of an itinerant hagiographer who seems to have traded *Vita*-composition and chaplain services for temporary residency in a number of religious establishments, including the monastic houses of Wilton, Barking, and Ely. By 1090 he had settled at St Augustine's Canterbury, where he continued producing hagiographical texts for that Abbey's program of relic translation and promotion. Goscelin was renowned not just for his hagiographical skill but also for his poetry and his musical compositions (Barlow, *The Life* xlix; "Goscelin"). He certainly had substantial opportunity to be involved with the *VER*'s composition.

Perhaps even more importantly, Goscelin can also be placed in the right places at the right times. As chaplain of Wilton and a member of Herman's staff through the 1060s, he had ongoing access to the court before the Conquest and, afterwards, to the dowager queen at Wilton. Queen Edith had been instrumental in securing the Sherborne bishopric for Herman in 1058, so the obligation of a patronage relationship was already in place for Goscelin's superior (Barlow, *The Life* xlix; William of Malmesbury ii.83.6–11). In 1065, especially before the Northern Rebellion, a request from the queen to write an *encomium* must have seemed like a stellar opportunity for advancement; it is easy to imagine Herman eagerly acceding to Edith's desire for a highly literate cleric to work her version of her family's history into a suitably sophisticated, literary format. Goscelin had composed at least one hagiographical text, the *Vita Amalbergae*, before he came to England; his next surely-ascribed hagiographical text, the *Vita Wulsini*, was composed at Sherborne *c.* 1078 (Love, "Wulfsige"). Intriguingly, Rosalind Love also ascribes the *Vita Kenelmi*, written *c.* 1066-1075, to Goscelin, and that text as well lauds Queen Edith for her patronage and generosity (Love, *Three* xci–ci), although Stephanie Hollis disagrees with that attribution (Hollis, "Wilton" 332, n. 123).

However, the patronage of the queen also figures in the circumstantial arguments for Folcard as the author of the *VER*. Like Goscelin, Folcard came to England from Flanders; unlike Goscelin, he left a relatively small corpus of texts composed in England. Only the *Vita* of John of Beverley (hereafter *VJB*) and a group of texts written *c.* 1070 at Thorney (which includes a *Vita* of St Botwulf) can be certainly attributed to him from his time in England (Folcard; Love, "Thorney"). The prologue to the *VJB* includes praise of and gratitude to "the queen," who is not named. This queen sends Folcard to Ealdred, Archbishop of York, for protection after Folcard's expulsion from an unnamed monastery, and Folcard then dedicates the *Life* of John of Beverley to Ealdred. The *VJB* was written between 1061 and 1069, so the queen in question could be Edith or Matilda, although there is no explicit internal evidence for either. Ealdred was definitely part of Edith's court circle; his archbishopric intersected with her brother Tostig's earldom of Northumbria, and Tostig was instrumental in securing that position for Ealdred, as the narrative in *VER* of their 1061 journey to Rome indicates (Barlow, *The Life* 53–57).

In his argument for Folcard as the author of *VER*, Tom Licence identifies the queenly patron of *VJB* as "probably Edith," but does not acknowledge (as Barlow does) that the *regina* of the *VJB* prologue could just as easily refer to Matilda (Licence, "Date" 275–77; Barlow, *The Life* lv). Like Edith's, Matilda's court circle included Ealdred of York – indeed, in 1068, Ealdred crowned Matilda just as he had crowned her husband William the year before (Nelson 398). Ealdred's ability to serve both queens in quick succession indicates his political astuteness and versatility; it also leaves the identity of the *VJB*'s *regina* an open question. In order to strengthen what he sees to be the text's connections with Folcard and Ealdred, Licence makes the very tenuous and even startling claim that the *VER* was composed in York. This localization stems partly from the praise given in the *VER* to Siward, Earl of Northumbria before Tostig. In addition, Licence extrapolates from the diction of that praise:

> Siward two years later was buried 'in the church . . . of St. Olave, king and martyr.' St Olave's was in York. Of all the churches mentioned in the work it was the most obscure. Yet it is the only church for which the author fails to name the location. That it did not occur to him to do so suggests that he may have written in York. To him, St Olave's was simply St Olave's. (Licence, "Date" 274)

Licence elides the point that the *VER* text includes the geographical information that Siward was Earl of Northumbria, thus localizing the church (albeit in a somewhat general way). The full sentence from the *VER* reads:

> Nec multo post tempore occubuit etiam moriens Northumbrorum dux Siwardus, cuius meminimus supra, sepultusque est in ea quam ipse a fundo construxerat in beati Olaui regis et martyris <honore> ecclesia.
>
> (Not long afterwards also died Siward, earl of the Northumbrians, whom we have mentioned before; and he was buried in the church he had built from its foundations in honour of St Olave, king and martyr). (Barlow, *The Life* 48–49)

St Olave's was not a common church dedication; Bond lists only one St Olave's in York (17 and 204). A church built by the Earl of Northumbria would have been in Northumbria, most likely in York, his seat; the *VER* author may have simply assumed that the reference to Northumbria was enough of a localization, especially if that author were in a more southern location that considered "Northumbria" to be a somewhat hazy hinterland. More importantly, all previous scholarship on the *VER* has assumed that the text was composed at or near the court (before Edward's death) and at or near Wilton Abbey (after Edward's death) in order to be close to Edith and the version of events she wanted included in the text. The Godwins were notoriously unpopular in York and throughout Northumbria: Edith was accused of facilitating the murder of a Northumbrian nobleman at the royal court, Tostig had been driven from his earldom during the Northern Rebellion, the northern lords had pillaged his household in York, and Tostig's and his father's names had been erased from the Durham *Liber Vitae*'s lists of those for whom the community should pray (Dockray-Miller 49–

50). It was a not good location, before or after the Conquest, to be composing an *encomium* to the Godwins, especially when the primary source of information was more than 200 miles away. The author of the *VER* had regular access to Queen Edith throughout the process, an impossibility if the author was in York, so if Folcard was in York at the time of the *VER*'s composition, he is a weaker candidate to be author of the *VER*. We can surely date Folcard's appointment to Thorney in late 1069, but other attempts to date to his whereabouts are speculative, so it is only safe to claim that he was probably in England but not yet at Thorney at the time of the *VER*'s composition. Folcard certainly could have served Edith at Wilton (rather than in York, as Licence claims) and then gone to York and, later, to Thorney.

Barlow, Licence, and others have examined the various permutations of patronage and location that allow both Goscelin and Folcard to be at the right places at the right times in their careers to carry out the commission of composing the *VER*. Rather than repeat those details here, it will suffice to say that the information we have about Goscelin's and Folcard's activities throughout the 1060s does not allow us to prove that one or the other of them was the sole author of the *VER*. Indeed, those circumstantial links suggest that it is logistically possible that both monks worked on various parts of the text at various times between the beginning of 1065 and the end of 1067, a scenario in keeping with the Lexomic evidence we discuss below.

Since evidence of circumstances remains, well, circumstantial, the question of the *VER*'s style becomes paramount. To this point, most stylistic analysis has been focused on identifying specific words or phrases in the *VER* that are found primarily (or only) in the undisputed works of either Folcard or Goscelin. Rhona Beare's argument for the *VER*'s authorship, for example, turns on attributing the single phrase *Cyllenius heros* ("Cyllenian hero"), used to refer to the Roman god Mercury, to Goscelin; Keynes and Love have shown crucial weaknesses in this argument (Keynes and Love 205–06; Licence, "Date" 275).

In his extensive examination of the poetry and prose styles of Goscelin, Folcard, and the *VER*, Licence identifies similarities of both vocabulary and phrasing that he believes link the *VER* to Folcard. For example, the word *interdum* is used with unusual frequency in Folcard's Thorney texts (including the *Life* of Botwulf) and in the *VER*, as is the phrase *proh dolor* (Licence, "Date" 278–79). There is no question that these items appear more frequently in the work of Folcard than they do in that of Goscelin, but, as we discuss below, not merely the presence, but the specific locations in the *VER* of these characteristically Folcardian stylistic features is significant.

However, Licence ascribes some phrases, usages, and vocabulary only to Folcard, when they should be acknowledged as at least somewhat Goscelin-like as well. For example, Licence identifies a connection between the *VER* and Folcard through a specific usage of the word *munificentia*:

> . . . the very rare noun *munificentia* appears five times in the *VAEdR* to refer to royal or princely munificence. Folcard uses it of royalty too ... as did Ivo of Chartres, but this usage is rare; mostly the word is used of heavenly generosity. Bede uses it twice, both times with reference to divine munificence. Goscelin uses it rarely and in the Bedan sense (Licence, "Date" 278).

But Licence has not included in his corpus Goscelin's reference to *regalis munificentia* in the *Vita Wulfhildae*, where *munificentia* refers to the bountifulness of King Edgar and his confirmation of ancient gifts of Barking Abbey to Abbess Wulfhild (423). This usage matches those in the *VER* and Folcard's *Life* of St Bertin in that it refers to the generosity of a historical royal personage, not that of God. Similarly, Licence sees unique connections between Folcard's corpus and the *VER*'s use of forms of *rutilo* to begin a poem, although one of Goscelin's *Vita Edithae* poems includes *prerutilant* in its first line (Licence, "Date" 280; Goscelin, "La légende" 89). These items dilute (but do not refute) Licence's argument for Folcard as the sole author of the *VER*: there is substantial stylistic overlap among the poems and prose of the *VER*, the small corpus of extant Folcard works, and the very much larger corpus of texts by Goscelin. These intersections do not point clearly to one or the other of the monks as 'the' author of the *VER*; instead, they suggest that either or both of the Flemish clerics – and possibly other 'authors' as well – could have contributed to the text. Again we note that the exact locations of these stylistic features in the text may be more important than their mere presence or absence.

Licence also provides criteria for stylistic attribution to Goscelin in his discussion of a set of *miracula* of St. Edmund, which he assigns to Goscelin (*Miracles of St. Edmund* cxvi–cxxvi). Some of these features overlap with stylistic elements in the *VER*, although in a general and nondefinitive way. For example, Licence sees frequent use of agentive nouns ending in *–or* or *–rix* as a feature of Goscelin's style (the *VER* includes forms of *persecutor*, *lector*, *rector*, *auctor*, *moderatrix*, etc.), as well as of diminutives and superlatives (like *iuuencula* and *strenuissimus*, both in the *VER* with many other examples). Most of the items on Licence's list of Goscelin's idiosyncratic words and phrases do not appear in the *VER*, although *contubernii* and *supernis civibus* do (Barlow, *The Life* 76 and 92). One item on Licence's list of "unusual words reminiscent of Goscelin" is *coclea* used to mean "spiral stairwell" (*Edmund* cxx). In Goscelin's *Vita Edithae*, Edith's chapel at Wilton is compared to the Temple of Solomon *cum cocleis,* with winding stairs (89); however, in the *VER* description of Edward's building of Westminster Abbey, the church *cocleis multipliciter ex arte ascendentibus plurimis tumescit,* swells with many a stair spiraling up in artistic profusion (Barlow, *The Life* 68–69). Thus there are some stylistic connections between Goscelin's surely attributed works and the *VER*, but, as with the stylistic criteria that would tend to support the identification of Folcard as the author, these overlaps with 'Goscelinesque' criteria are indicative but not definitive: they are at least as (if not more so) indicative of a 'house style' that trained both monks than of either's authorship.

Albeit at a larger scale than vocabulary or phrasing, genre is also a stylistic feature. The *VER* is one of only two prosimetric texts from eleventh-century England, both of which were commissioned at Wilton, indicating, as Elizabeth Tyler notes, the literary sophistication of that community ("Politics" 153; *England* ch. 5). The other prosimetrum is the *Vita Edithae*, by Goscelin, who is praised by his contemporaries for his poetic and musical skills (Rigg 14–15); in addition to the poetry preserved in the *Vita Edithae*, there are also short poetic texts in the preface to the Edmund miracles and at the end of the *translatio* of St Wulfhild. In contrast, there is no extra-textual, contemporary praise of Folcard as a poet, and he left us with only one short poem, in praise of St. Vigor (we do not know when or where he composed it); indeed, Tyler seems to question the very attribution of the St. Vigor poem to Folcard in *England in Europe*, where she refers to that poet as 'Fulcardus' (249–50). Genre, then, weighs much more heavily toward Goscelin than Folcard as the author of the *VER*: the definitively identified author of the only other prosimetrum from the relevant time period is Goscelin. However, Tyler has recently argued persuasively against identifying Goscelin as the poet of the *VER*, referring to "the very different poetry and learning of Goscelin and the Anonymous" and stating that they "are definitively not the same writer" (*England* 241 and 248). Similarly, Tyler seems hesitant to accept Licence's stylistic connections between the *VER* poems and Folcard's St. Vigor poem; not only does she question the attribution of that poem to Folcard, but Tyler states that the poetics of the St. Vigor piece "show more affinity with those of Goscelin (who was himself a metrical experimenter) than with those of the Anonymous" (*England* 250).

Tyler introduces a new potential author into the discussion of the *VER*, a continental cleric-poet familiar with the emerging Loire School and its affinities for classical poetry and allusion. "The virtuosity of the Anonymous's poetry," she argues, "emerges strongly and requires that it be situated in the context of the famous Loire school, especially the work of the later eleventh-century poets Baudri of Bourgueil and Hildebert of Larvardin" (*England* 137). Tyler's detailed analysis of the poetry is entirely convincing in its connection to the Loire school, and we have accepted her attribution of the poetry in the prosimetrum to a currently-anonymous Loire school poet. However, Tyler's attribution of the prose sections to the same person is not as convincing – her analysis focuses almost entirely on the poetry and its connections to what she terms the "Roman story world," its allusions to Virgil, Lucan, Statius, and others. Tyler approaches the *VER* as a single prosimetrical text with only one author; she does not consider the possibility that the *VER* is composite. Eliminating Goscelin or Folcard as poet, as Tyler has done so effectively, does not eliminate either as author of some or all of the prose, although Tyler's Loire School poet could have authored (parts of) the prose as well.

Detailed, careful examinations of the vocabulary, phrasing, genre and poetic style can thus support the identification of either Goscelin, Folcard, a Loire School poet, or some other anonymous writer as the single author of the entire *VER*. Traditional stylistic analysis has, it seems, led to an impasse. When the meticulous analysis of extremely capable scholars leads to such disparate conclusions, new methods or new assumptions (or both) may be needed to make better sense of the conflicting evidence. We have therefore augmented the traditional approaches of previous scholars with 'Lexomic' methods of digital analysis and have proceeded with the assumption that the authorial unity of the *VER* is not a settled question.

3 Lexomics: definitions and methodologies

What we call 'Lexomic' methods combine computer-assisted statistical analyses with traditional literary methods such as close reading, philological analysis, source studies and cultural interpretation

(Dyer; Burrows; Hoover). Lexomic approaches provide us with more data about texts than traditional stylistic analysis alone. Lexomic analyses have led to fruitful conclusions consistent with traditional forms of analysis in textual research – giving us confidence in the applicability of the digital approaches – and have shed new light on texts in multiple languages and cultural traditions, including Old English poetry and prose texts, Old Norse, Modern English, and, most relevant for the present investigation, medieval Latin poetry and prose (Drout, Kahn, *et al.*; Drout and Chauvet; Downey, Drout, *et al.*; Drout, Kisor, *et al.*; Boyd *et al.*; Drout, "Adapting;" Berger and Drout; Drout, Hitotsubashi and Scavera). Lexomics methodologies and techniques were developed separately from but somewhat parallel to those of the European "Stylometrics" group (Eder *et al.*); the two digital tools demonstrate substantial overlap in their coding and processes. We will use Lexomics terminology throughout but also provide comparable Stylometry terms for ease of reference.[5]

5. For an overview of Lexomics tools, see: Wheaton College Lexomics Project and Lexos [accessed 3rd December 2021]; for stylometrics, visit Computational Stylistics Group website [accessed 15 December 2021]. Both are public access digital tool sets.

The accuracy of Lexomic methods has been validated by their confirmation of previously-known consensus about authorship and sources for certain texts. For example, Lexomics correctly indicated that the ninth-century poem *Waltharius* is homogeneous, and that the preface and conclusion of Sulpicius Severus' *Vita sancti Martini* are stylistically, distinctively different from the rest of the text (both of these points were generally acknowledged before Lexomic confirmation). The methods were able to detect the influence of previously-known external sources on both Alan of Lille's *De planctu naturae* and Geoffrey of Monmouth's *Vita Merlini*. In research most directly related to the investigation of the authorship of the *VER*, Lexomic techniques were able to separate the sections of the *Gesta Frederici Imperatoris* written by Otto of Freising from those known to have been written by his secretary Rahewin and to distinguish between those sections of the *Ecclesiastical History* that have acknowledged sources and those that are fresh compositions by Bede (Downey *et al.*). In each of these cases, the conclusions drawn from the Lexomic evidence is completely consistent with pre-existing knowledge about the texts.

The specific Lexomic techniques employed in this paper fall into two categories: rolling window analysis and hierarchical clustering. While more methodological detail follows in the relevant sections and in the notes, it will suffice to state here that rolling window analysis produces a visual representation of the changing frequencies throughout the text of the occurrence of individual words or phrases. In contrast, hierarchical clustering groups texts or segments based on similarity of their complete vocabulary distributions (rather than of individual words or phrases). The results of cluster analysis are most strongly influenced by the distribution of the most common words in a text, 'function words' such as conjunctions, prepositions and pronouns. Together, the two methods compensate for each other's weaknesses by allowing us both to map patterns of word distribution throughout a given text and also to compare the similarities of and differences between vocabulary distribution in whole texts or large segments.

4 Corpus selection and preparation

As all digital methods can be substantially influenced by the characteristics of the electronic corpora being analyzed, it is important to make sure that we are comparing like with like and not accidentally biasing the investigation, either by constructing an unrepresentative corpus or by embedding hidden interpretation inside the electronic texts or attempting to perform analysis on insufficient data.

Although we accept Tyler's attribution of the *VER* poetry to an anonymous Loire Poet, we initially attempted to include the poetry in our Lexomic explorations to see if it would help to identify affinities among the sections of the prosimetric text, between sections of the *VER* and poetry by Goscelin, or between sections of the *VER* and poetry by Folcard. However, issues of textual length impeded that line of inquiry. Since Folcard's poem on St. Vigor is only 170 words, it provides insufficient data for Lexomic analysis; the word counts of the *VER*'s poems range from 132–665 words. We therefore could not use our digital methods on the poetic sections of the *VER* because cluster analysis requires texts or text-segments to be close to 1000 words long (and certainly no less than 500 words).[6] By necessity, then, our final cluster analysis is limited to the prose of the *VER,* to prose sections of texts definitely identified as authored by Folcard and Goscelin, and to a variety of prose texts chosen as control group comparisons.

Restricting ourselves to prose, however, still does not eliminate all the challenges of constructing a representative corpus. Previous Lexomic research shows that an author's use of sources can be detected through hierarchical agglomerative clustering; for example, sections of Bede's *Ecclesiastical History* that draw heavily upon the works of historians Gildas and Orosius, and those based on Papal letters, cluster separately from the main body of Bede's text (Downey *et al.* 255–60). We do not know if this source-influence is sufficient

6. Analyses of segments smaller than 500 words usually produce results that are inconsistent with the known composition of texts, or they fail to detect any hierarchical relationships at all among the segments of a text. We have far more confidence in cluster analysis that uses segment sizes of 1000 words or greater (Drout *et al.*, "Dendrogrammatology" 320).

to make the vocabulary of a text or segment so different from the rest of an author's works that it does not cluster with them, but it seems prudent to reduce or eliminate segments of texts that are known to be based primarily on external sources. This was most difficult when dealing with Goscelin's *Vita Edithae.* Although this text is in many ways the best comparison to the *VER* (both are long, prosimetrical texts about royal saints), both traditional analyses and substantial variations in various rolling window plots indicate that Goscelin had external sources for several large sections of the *Vita Edithae*, thus somewhat complicating our analyses. There is also simply so much more extant work by Goscelin that it would be easy to digitally swamp Folcard's texts within an enormous Goscelin corpus. On the other hand, that we have so few of Folcard's texts could lead us to create an impoverished comparative corpus of Goscelin's work if we used only the same number of texts as can be attributed to Folcard.

To create as representative and directly comparable a corpus as possible, we removed from our corpus those texts that are not securely attributed to either writer (*e.g.*, the *Vita* of St. Kenelm) or which in their entirety are strongly influenced by external sources (*e.g.* Goscelin's *Vita* of St. Ivo of Ramsey). We also excluded Goscelin's later work, composed at Canterbury after 1090, since this is somewhat distant in time from the mid-1060s *VER*. We excluded both Goscelin's *Life* of Amalberga and Folcard's *Life* of St. Bertin, because both of these texts were composed earlier and on the continent rather than in England. These texts also appeared as outliers in analyses of the individual authors' separate corpora (*i.e.*, in a cluster analysis of known texts by Goscelin, the *Life* of Amalberga is substantially different in vocabulary from all the others securely attributed to Goscelin; see figures A1 and A2 in the ancillary figures section at the end of this paper).

In order to avoid complications of genre, we excluded Goscelin's *Liber Confortatorius*, his book of consolation on the departure of his protégé Eve to an anchoritic life in France composed *c.* 1083 (an area for potential further research, the *Liber Confortatorius* segments did not overlap substantially in cluster analysis with other texts known to be authored by Goscelin, raising interesting questions about the ways that genre affects vocabulary choices within an author's corpus). We included all of Folcard's texts composed in England, but because the *Life* of St Botwulf and the brief texts about the anchorites at Thorney were individually too short for cluster analysis, we combined these into a single file which was, when appropriate, segmented, just as the longer texts were. We included Goscelin's *Life* of Wulfsige, since it was composed relatively close in time to the *VER* (and has a male subject, unlike many of Goscelin's other *vitae*); the prose of the *Vita Edithae,* since it is generically similar to the *VER* as a prosimetric text; and the *Lives* of the Barking abbesses Wulfhild and Æthelburh, since their subjects are also historical, royal English saints.

Previous research has shown that careful preparation of the electronic versions of the texts to be studied is absolutely essential to producing results in which we can have confidence. Variations in encoding have the potential both to obscure relationships that really do exist and to produce artificial similarities that are only the result of the flawed processing. Unfortunately, there exists no complete and standardized electronic corpus of early medieval Latin texts analogous to the consistently edited and encoded *Dictionary of Old English* corpus. For many of the texts we are investigating, there are no electronic editions at all, and both print and electronic editions that do exist, including the *Patrologia Latina*, use a variety of different editing and encoding standards. To produce our corpus, therefore, we had to combine electronic tools (scanning with optical character recognition [OCR], and the powerful 'scrubbing' software included in the Lexos Integrated Workflow) with old-fashioned letter-by-letter proofreading against the standard print editions.[7] The texts in our corpus, therefore, are normalized, but to themselves rather than to some external standard.

The longer texts were then divided into sections that corresponded to their chapter divisions or groups of chapter divisions (for example, the prose of the *Vita Edithae* was divided into six sections, each with 2–6 chapters, so that each section contained roughly 1500 words). While these segments were not precisely the same length (i.e. exactly 1500 words), they were close enough to be mathematically comparable; the sample sizes did not diverge enough to disturb the relative frequency analysis (see Downey *et al.* 228–33 for specific details and analysis about variation and divergence in Lexomic sample size).

We removed from the *VER* all of Barlow's restored texts and inserted the material missing from his edition of the second poem (lines 23–54 of which were published and discussed by Henry Summerson in 2009) so that our electronic version is made up of all of the text extant in Harley 526 as well as the few lines of poetry surely there before the folio loss (although that poetry was ultimately not part of our Lexomic analysis). As part of our initial inquiries, we made a series of files that separated the poetry from the prose of the *VER* and the *Vita Edithae* so that we could compare the complete prosimetric texts, the prose alone from those texts, and the poetry

7. Even after all of these electronic files were identical in content to the printed texts, additional work was necessary before we could begin our analyses. Most significantly, we had to standardize the inconsistent treatment of certain letters in the editions. For example, some editors print manuscript <uu> as <w> while others retain the original orthography, and similar practices are followed in the representation of <u> and <v>, <i> and <j>, and e-caudata (hooked-e) <ę>. Although the Lexomic methods we used are not highly sensitive to individual minor variants or errors, small but consistent differences in orthography in frequent words have the potential to produce artifactual similarities or differences. Variants that are distributed either randomly or evenly throughout an entire text usually do not affect the geometry of a dendrogram; variants that are concentrated in only one part of a text, such as the B-Scribe's spellings in Beowulf, often do (Drout, Kisor, *et al.* 17–22). We therefore self-normalized our corpus by using the "consolidation" and "lemmatization" functions of Lexos to make our electronic corpus consistent in its orthography, converting <w> to <uu>, <v> to <u>, and <j> to <i>. Ideally, hooked-e would not be represented as <e>, but since some of the early editions printed <ę> and <e>, we were forced to follow them (fortunately, the total number of hooked-e characters was small). Editorial practice with regard to <ę> (variously, hooked-e, e-caudata or cedillated-e) is extremely inconsistent (Cain). Some editors normalize the spelling as <ae>, others as <æ> and still others as <e> (these are mostly electronic editions). Fortunately, comparison of dendrograms suggest that the character did not appear frequently enough in the texts in question for its inconsistent use (alone) to produce artifacts. We also used the Lexos 'scrub' functions to remove all punctuation, formatting, and digits from the files, and to change all capital letters to lower-case, thus allowing us to compare the distribution of words rather than the distribution of editorial spellings in the text.

alone from those texts. Initial experiments indicated (as noted above) that the dearth of poetry outside those two main *vitae* complicated findings that included the prosimetric texts instead of just their prose sections; the results of those initial experiments did not contribute to our inquiry, showing simply that the vocabulary of the prose and poetry sections of the individual texts are substantially different (see figures A3 and A4 at the end of this paper).

Since the *VER* exists in only that one manuscript, we had no issues with choosing among manuscript witnesses. In contrast, the *Vita Edithae* exists in two versions, Cardiff, Public Library I. 381 and Oxford, Bodleian Library, Rawlinson C. 938. We chose the text of the Cardiff manuscript as our base text since it was composed for nuns (probably at Wilton but possibly at Barking), and thus corresponds to the needs of the commissioners and first readers of the *VER* more closely than does the text in the Oxford manuscript, which was created for the distant archbishop (Hollis, "Introduction" 11–12). Rosalind C. Love very generously shared her pre-publication editions of the works of Folcard, providing up-to-date and correct Latin texts in electronic form; similarly, Tom Licence shared electronic and easily-convertible versions of his editions of the *lectiones* of St. Eadwold.

5 Initial rolling window analysis of the *VER*

Rolling window analysis visually represents the distribution of individual phrases, words, or letters throughout an entire text.[8] Because the rolling average moves continuously through the entire text, there are no statistical artifacts produced by the placement of segment boundaries. Abrupt changes in the rolling average of textual features are frequently associated with changes in authorship or source.

Previous research has shown that rolling window plots of the most frequent words in a text can not only separate poetry from prose but can also determine whether a text is stylistically heterogeneous and, if so, which parts of the text differ from each other (Eder; Eder *et al.*). We therefore used the Lexos software to plot the frequency of the most commonly used words – the function-words *et, ad, in, ut,* and *est* – in the prose of the *VER*, producing Figure 1 (for the sake of legibility, we have only printed the plots of *et* and *in*; the plots of the other most common words in the text exhibit abrupt changes at the same places).

8. We begin by selecting a 'window' size, w, which must be substantially smaller than the total number of units, T, in the text to be examined. The first window begins with the first unit and ends with the w^{th} unit of the text (so if we are using a window of 1000 words, the first window is made up of words 1-1000). We then count the number of features of interest, n, found in this first window and divide by the window size in units, providing an average of the number of features per unit (p = n/w). From this information, we produce a data pair composed of the ordinal number of the window, k, and the value of p (k, pk), so for the first window, where k=1, the data pair is (1, p1). We then shift the window one unit towards the end of the text by incrementing both the initial and final units in the window by 1 (k+1, w+1); tabulate the number of times the feature of interest appears in this shifted window; and calculate p2=n2/w, producing a new pair of data-points, (2, p2). This process is repeated, moving the window through the text until the edge of the window meets the end of the text (i.e., where k+w=T), producing a set of k coordinates in the form (k, pk). Formally, the value of p at any location k is equal to:

$$\boxed{p_k = \left[\left(\sum_{i=k}^{k+w} n\right) \div (w)\right], \mathrm{k} + \mathrm{w} \leq \mathrm{T}}$$

where: k is the ordinal number of the first unit in the window, w is the size of the window in units
n is the total number of features of interest in the window, and T is the total number of units in the text. The graph produced by plotting the total set of coordinates not only indicates the simple presence of features but also highlights clusters of elements of interest in a way that a simple inspection often does not.

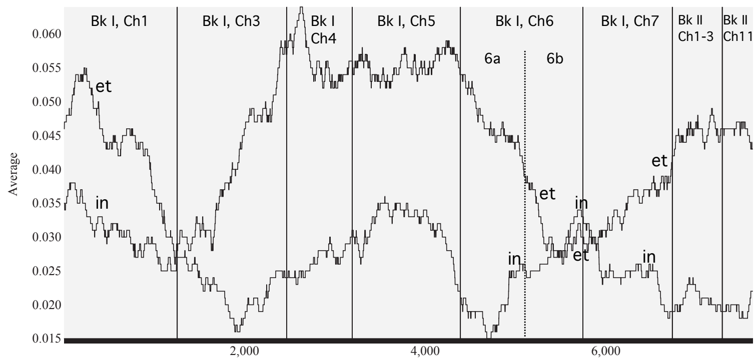


Figure 1. Frequency of *et* and *in* in the prose chapters of the *Vita Ædwardi Regis* in a rolling window of 1000 words.

The rolling window plot is characterized by steep-sided peaks and valleys. Abrupt changes in frequency are almost all coincident with the boundaries between textual sections, with the differences in frequencies in each section being readily visible even when the poems have been removed from the text. The two most striking features of figure 1 are the two large drops in *et* frequency – one at the start of Chapter 3 and the other towards the end of Chapter 6 – and the plateau of a higher frequency of *et* in Chapters 4 and 5. The second half of Chapter 1, the end of Chapter 3, the beginning of Chapter 6, and both Book II chapters employ *et* at an intermediate frequency. The dip at the end of Chapter 1 is really just the result of the rolling window moving into the much lower frequency area at the start of Chapter 3. The large change in *et* within Chapter 6, however, does not appear to be an artifact of changing chapters; the shift in *et*-frequency occurs when the *VER* changes its focus from Tostig's and Harold's accomplishments to Edward's and Edith's building programs: *Redeamus interim ad regem Ædwardum eiusque regiam coniugem Ædgith, cui potissimum nunc hac famulamur descriptione presenti* ("Now let us turn to Edward and his royal consort Edith – the illustrious mistress whom we chiefly serve in this present account") (Barlow, *The Life* 66–67). The section of lower-frequency *et* continues to the end of Chapter 7, where there is a sudden upwards jump in the rolling window plot.

If our analysis of the *VER* is consistent with previous research into rolling window analysis, the difference in frequencies of common words in these two sections implies that they have distinct textual or authorial histories and that those histories might be the same for the first half of Chapter 3, the end of Chapter 6, and Chapter 7. Likewise, the high frequency of *et* at the beginning of Chapter 1 and in Chapters 4 and 5 appear to indicate that these sections of the text have similar histories, sources or authors. Rolling window analysis alone cannot determine if the middle range of frequencies at the ends of Chapters 1 and 3 and in the Book II material is also distinct from the high- and low-frequency sections of the poem or if it has an affinity with one or the other.

The rolling window analysis of *et*, *ad*, *in*, *ut*, and *est* indicates that the *VER* is heterogeneous with regard to the most common words used in the text, with at least two distinctly different frequencies appearing in several places, with abrupt changes in frequency often coincident with chapter or book boundaries. These features, while not completely diagnostic in themselves, are consistent with a hypothesis of different sections of the text having different sources, authors, or transmission histories, and must be taken into account when comparing the overall distribution of vocabulary in the *VER*.

6 Cluster analysis of the *VER*

Cluster analysis can often identify broad patterns of vocabulary distribution that are not always evident to the unaided eye. Variations in the distribution of very frequent words, which are often 'function words' such as conjunctions, prepositions, and pronouns, more strongly influence dendrogram geometry than the presence or absence of rare words in particular segments. The complete distribution of all vocabulary – the entire 'bag of words,' no matter their order or meaning – determines the geometry of the dendrogram; the hierarchical clustering software does not focus on the distribution of any single word or phrase (as more traditional stylistic analysis does).[9]

Some of our Lexomic analyses of the *VER* use the manuscript's sectional divisions (which correspond to Barlow's numbered books and chapters), and early in the process we also separated the poetry from prose to elicit different sorts of comparisons of the *VER* with various texts by Goscelin, Folcard, and control authors; hierarchical clustering of the *VER*, the *Vita Edithae*, and other texts continually grouped the prosimetric texts together, no matter the other texts in the group. Only when the poetry was removed did the *VER* and *Vita Edithae* (prose only) begin to interact with other known texts by Goscelin, Folcard, and others. But we have also revised the boundaries of the segments when other information – such as that produced by rolling window analysis of high-frequency words – suggests that the most obvious natural boundaries might be masking underlying differences.

Cluster analysis allows us to determine if the patterns we see in figure 1 extend beyond the most frequently appearing words in the text. Figure 2 is the result of performing hierarchical agglomerative

9. To perform cluster analysis, we first determine the relative frequencies of every word in a group of texts or text-segments, calculate the differences among these frequencies, square the resulting numbers, and use the square-root of the sums of the differences to find what is called the 'Euclidian distance' between each pair of segments. Manhattan and Canberra metrics have produced no significant difference in the final clustering results. The Lexos software allows researchers to choose among these metrics and between different linkage methods. The free implementation of hierarchical, agglomerative clustering is then used to group the texts or segments by identifying those that have the shortest distances between them (these have the most words in common). From this information, the Lexos software produces a branching diagram, or dendrogram, that visually represents the relative similarities of the segments (for an example, see figure 2 below). The length of the vertical lines leading from the bottom of the graph to any branch-point indicates the similarity of the segments below that branch: the shorter the distance to the branch-point, the greater the similarity of the segments below it.

As noted above, there appears to be a lower limit of between 500 and 750 words to the size of text-segments that will lead to non-artifactual results in cluster analysis (this lower limit prevented us from using Folcard's poetry in Lexomic analysis). This problem of minimum segment-size is interconnected to the problem of segment boundary placement. Within hierarchical clustering techniques, the arrangement of words *within* a segment does not influence the results of the analysis; the clustering represents only the relative frequencies of all the words in the entire segment. However, the division of the text into segments does have the potential to affect the analysis substantially. The placement of segment boundaries has the potential either to split up real concentrations of features (if a cluster is divided by the placement of a segment boundary) or to artificially join together otherwise distinct concentrations (if there are concentrations of features at each end of a segment). These problems can be mitigated by using natural boundaries within a text (i.e. chapters, stanzas or book-divisions) and also by comparing the results of a series of analyses that use segments with different boundaries and identifying relationships that persist through multiple small changes in segment boundaries (we call such relationships *robust*).

clustering on the *VER* when the text is divided at the places where the chapters are separated by poems. Unfortunately, both I.4 and II.1–3 are quite short, 720 and 554 words respectively, and thus do not provide robust enough data to make them mathematically comparable to the other segments (see the appendix for detail about exact word counts for each section of the *VER*). As noted above, segments shorter than 1000 words do not in most cases cluster with the rest of a text (even when we know that the text is homogeneous). That phenomenon is apparent with these two segments in figure 2: they appear as single-leafed clades at the edges of the dendrogram. We therefore cannot determine their affinities from this analysis alone.

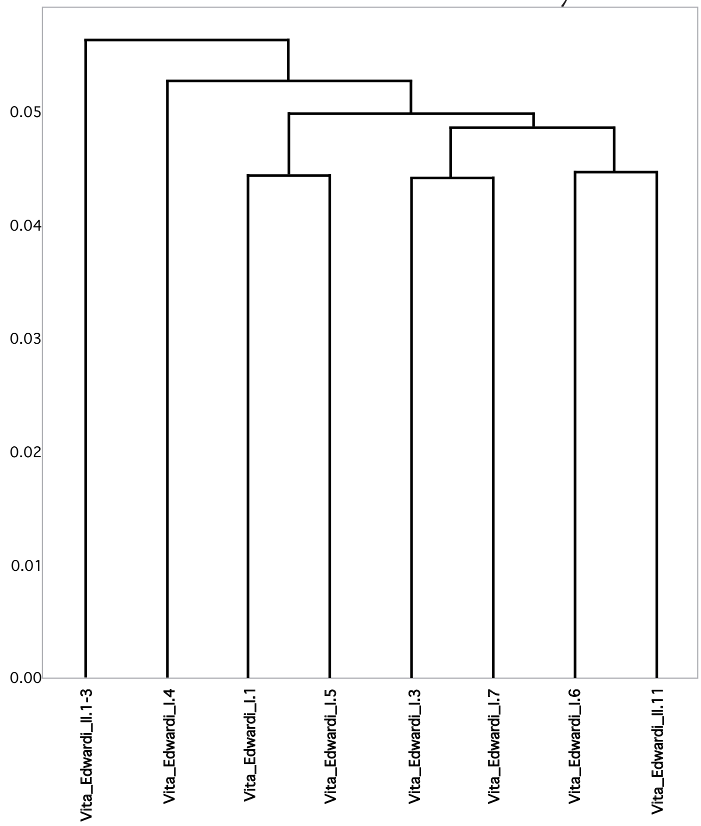


Figure 2. Dendrogram of the *VER* when divided at Chapter boundaries.

The placement of the other chapters in the figure 2 dendrogram, however, does provide some information about their similarities and differences. In terms of vocabulary distribution compared among the segments/chapters as determined by the clustering tool, figure 2 shows that I.1 is similar to I.5, I.3 is similar to I.7, and I.6 is similar to II.11. Furthermore, the I.3–I.7 and I.6–II.11 pairings are more similar to each other than they are to the I.1–I.5 pairing. This arrangement would be consistent with I.1 and I.5 having a source, author, or history different from that of I.3, I.6, I.7 and II.11.

Chapters I.1 and I.5 both discuss the rise of the Godwin family, so the similarities between those chapters could hypothetically be attributed to overall similarity of content, but I.3 and I.7 demonstrate lexical similarities even though they are distinct in content (I.3 focuses on tensions between Edward and Earl Godwin, while I.7 narrates the Northern Rebellion against Tostig). Furthermore, differences in content are not exhibited in the most frequently used words in these or any of the other segments: the Lexomics 'top words' tool shows that 92% of the top 10 words in each segment are function words (see figure A5). The few content words (*dei, regni, ducis, rex,* and *dei*) that appear in the ten most frequent words for each segment are not shared by either I.3 and I.5 or I.3 and I.7 (in fact, only one, *ducis,* is shared by two segments, but these, I.3 and I.4, do not cluster together in the dendrogram).[10] We therefore conclude that the overall vocabulary similarity in the paired segments (and the differences among the pairs and clusters) is not due to their topics and must therefore be caused by some other factor.

However, before proceeding further in this analysis we need to take into account the evidence of the rolling window analysis of high frequency words (figure 1). Chapters I.3 and I.7, which cluster together in figure 2, are characterized by distinctly lower frequencies of *et* and *in*, and higher frequencies of *cum* and *ad*. To be certain that the dendrogram was not just a different visual representation of the rolling window analysis (i.e. that the geometry of the dendrogram was not caused solely by the distribution of the five most frequent words in the text), we used the StopWords function of the Lexos software to remove *et, ad, in, ut*, and *cum* from every segment and then repeated the hierarchical cluster analysis. (The StopWords function is analogous to the 'unmasking' function of Stylometry; see Kestemont *et al.*) The resulting dendrogram was identical to figure 2, indicating that the similarities and differences in vocabulary distribution detected by the cluster analysis extend beyond these five most frequently used words in the text and thus that the evidence of the dendrograms is entirely independent of the rolling window analysis (see figure A6). This result is even more significant than it might first appear, because the highest-frequency words in a text contribute much more to the final results of cluster analysis than do uncommon words. There are thus substantial similarities in overall vocabulary distribution and the frequency of the most common words between chapters I.1 and I.5, chapters I.3 and I.7, and chapters I.6 and II.11; the last of these pairings is more like each other than they are like other portions of the *VER*. These results would be consistent with the linked segments sharing similar sources, transmission histories, or authorship.

10. Note that Latin forms are not lemmatized in this instance since the Lexomic software works with inflected rather than lemmatized forms, e.g. ducis (not dux) is one of the ten most frequent words in segment I.3 and in segment I.4. The Stylometric 'Most Frequent Words' (MFW) function is the equivalent to the Lexomic 'Top Words' function.

The rolling window analysis discussed above demonstrates that the frequencies of common words often shift at chapter boundaries, but it also indicates a few places where frequencies change abruptly within a chapter, most dramatically in the middle of Book I, Chapter 6, with the second half of that chapter being much more like Book I Chapter 7 in the frequency of common words than it is like the first half. Unfortunately, dividing Chapter 6 into two segments merely produces yet more single-leafed clades at the edge of the dendrogram because the resulting segments are too small (only 707 and 652 words) to cluster. We therefore added the first of these small segments (I.6a, the descriptions of Harold and Tostig) to I.5 and the second (I.6b, the descriptions of the Westminster and Wilton building programs) to I.7 and performed cluster analysis on the resulting text, producing figure 3.

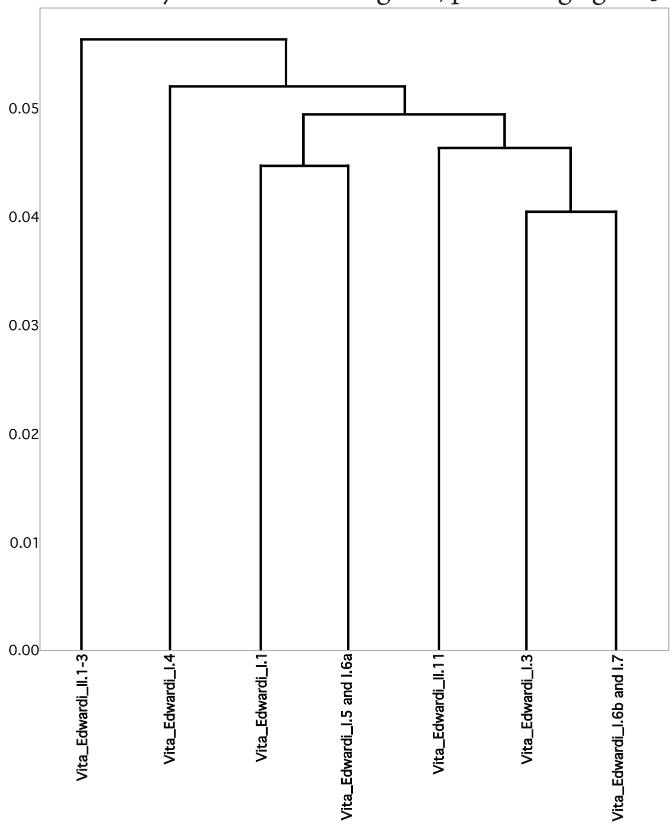


Figure 3. Dendrogram of the *VER* with I.6 divided, the first part being added to I.5, the second part to I.7.

Even though the first half of Chapter 6 is now blended with it, segment I.5 still clusters with I.1, and likewise I.3 remains with the now-augmented I.7. Book II Chapter 11, which had clustered with the undivided I.6, remains part of the higher-level clade containing the pairing of I.3 with the augmented I.7. Additional experiments show that II.11 is similar enough to the I.3–I.7 pair that it remains part of that clade if either the second half of I.6 or the entire chapter is removed from the test's data set. Thus, we can conclude that, although II.11's greatest similarity is with I.6, it is also similar in vocabulary distribution to I.3 and I.7. The dendrogram does not change when the cluster analysis is performed on the texts with the five most frequent words removed.

Identifying the affinities of the short segments (I.4 and II.1–3) is more difficult. To see when the blending of segments would disrupt the original dendrogram geometry, we used the technique of combining a short segment with a longer segment, then producing a dendrogram of the blended text, then attaching the same short segment to a different longer segment and producing a new dendrogram, repeating until we examined every possible combination. Combining I.4 with either I.1 or the augmented I.5 produces a dendrogram that is only different from figure 3 in that there is no longer a single-leafed clade containing I.4. Similarly, II.1-3 does not disrupt dendrogram geometry at all when it is blended with II.11; however, when it is blended with either I.3 or the augmented I.7, II.11 pairs with the blended segment and the other chapter to connect to the pair. We therefore conclude that I.4 is most similar to I.1 and I. 5, and that the two Book II segments are most like each other but also somewhat similar to I.3 and the augmented I.7. These results are summarized in the diagram in Figure 4.

As noted above, previous research using both Lexomics and Stylometry has shown that this kind of clustering can be caused by a shared source, transmission history, or author. Since no substantial sources for the *VER* have ever been identified, and since the text was composed almost contemporaneously with the events it narrates, we provisionally conclude that the cause of the groupings is shared authorship among the clustering segments rather than shared source(s): one author most likely wrote the majority of segments I.1, I.4, I.5, and the first part of I.6, while another wrote I.3, the second part of I.6, I.7 and all of Book II.

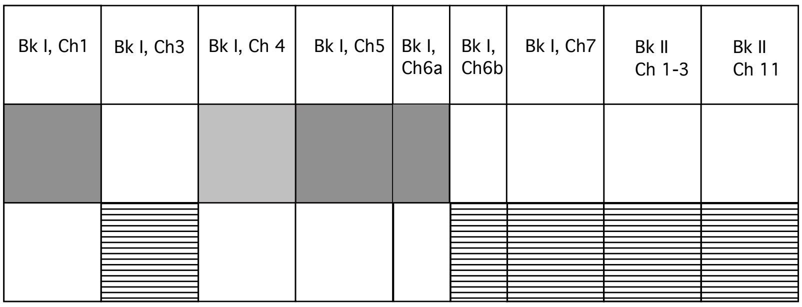


Figure 4. Representation of the similarities among the sections of the *VER*. Lighter squares indicate less certain but still likely similarities.

The next step is identification of those different authors. In order to begin our investigation with the known authors most frequently referred to in the authorship discussion, we performed cluster analysis upon the *VER* and two other sets of texts, one set definitely authored by Goscelin and the other by Folcard. We divided the prose of the *VER* into segments as per the above discussion (i.e. I.6 divided between I.5 and I.7, and all the Book II material in a single segment). The *Vita Edithae* was segmented based on additional research – beyond the scope of the present paper – into that text's likely sources, and the remaining texts were divided in content-sensible ways such that they produced segments of between 1500 and 2000 words. For all of the texts except the *Vita Edithae* (for which there is no real comparison in Folcard's corpus), we tried to pair a Folcard text with a similarly sized one by Goscelin.

For out-group comparison we used Osbern of Canterbury's *Vita Elphegi* because it was written at roughly the same time as the *VER* (*c.* 1080) and is by an English writer about a local and historical (rather than universal) male saint (Rigg 21, Rubenstein 35–37). But despite these similarities to the *VER*, the segments of the *Vita Elphegi* fell into a separate clade from all the other texts under investigation (figure A7). We also compared all the texts to the *Encomium Emmae*, but that text also clustered in its own distinct clades (figure A8). Our out-group comparison, then, merely showed that the texts under consideration are substantially more like each other than they are like the *Vita Elphegi* and the *Encomium Emmae*. For reasons of legibility we have left them out of the dendrograms we include here, as their presence in or absence from the analysis make no difference whatsoever in the rest of the dendrogram geometry.

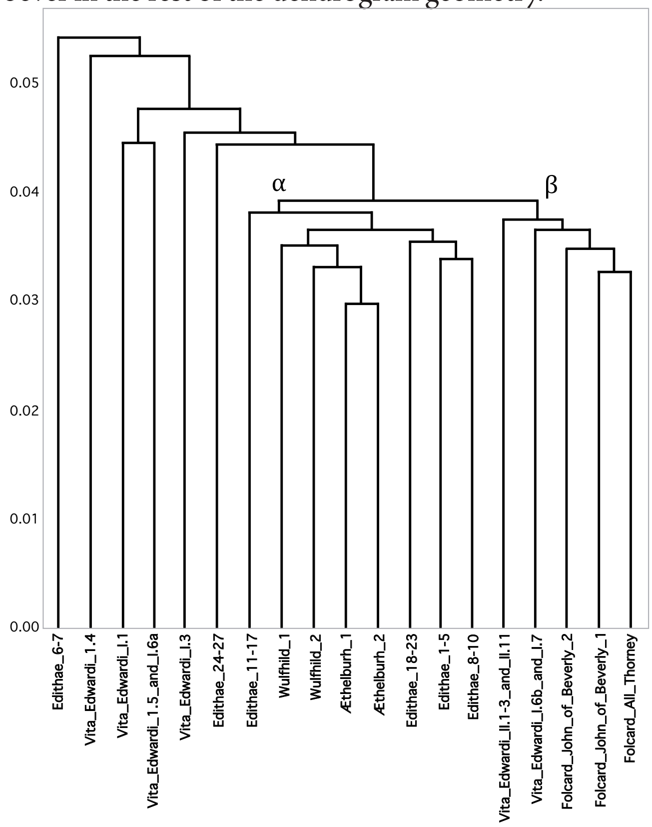


Figure 5. Dendrogram of the *VER* when clustered with core Goscelin and Folcard texts.

Figure 5 shows the results of this cluster analysis. The two most outlying single-leafed clades contain the two shortest segments in the corpus, chapters 6 and 7 of the *Vita Edithae* and chapter I.4 of the *VER*. Much previous research, as well as the cluster analysis of only the *VER* discussed above, indicates that the placement of these segments in the dendrogram is almost certainly a result of their lengths, since, regardless of content, very short segments almost always appear in simplicifolious clades. The pairing of segments I.5 (augmented with I.6a) and I.1 is consistent with the analysis of the *VER* alone, as these two segments always link with each other even when I.5 is not augmented. That I.3 appears in a single-leafed clade is somewhat surprising, since I.3 and I.7 were a very robust pairing in multiple experiments. Why the presence of additional texts causes this segment to become simplicifolious is not immediately apparent (although below we discuss a possible explanation).

The most important feature of figure 5 is the very clear division between the clades labeled α and β in the dendrogram and the placement of Book I Chapter 7+ (i.e. augmented with the second half of Chapter 6) in β. Clade α contains only texts that are definitely written by Goscelin; β contains all the texts definitely written by Folcard as well as these two segments of the *VER*. If we remove these two segments of the *VER* and repeat the analysis, α and β are respectively all Goscelin and all Folcard, leading to the conclusion that Book I.7 (augmented with I.6b) and the blended Book II chapters were most likely written by Folcard rather than Goscelin. Modifications of the Folcardian texts made no difference in this key feature of dendrogram geometry: merging the two segments of the *VJB* into one or dividing them into three, dividing the Thorney texts into two or three content-sensible segments (the *vitae* of Botwulf and the various anchorites) does not change the affinity of I.7 (augmented) and Book II for the Folcardian texts. Furthermore, clade β has the 'stepwise' geometry that previous research has found to be characteristic of intra-clade homogeneity, indicating that all five of these segments are quite similar to each other even though they come originally from several different texts. In contrast, clade α includes three subdivisions (one of which is a single-leafed clade containing only chapters 11–17 of the *Vita Edithae*), none of which includes all the segments of the *Vita Edithae*. Clade β, therefore, shows every sign of being a non-artifactual grouping. Thus Folcard is much more likely than Goscelin, the putative Loire School poet, or some other anonymous writer to be the author of the second half of Chapter 6 and Chapter 7 in Book I and all of the extant Book II of the *VER*.

Some of the segments of the *VER* appear as outliers in the dendrogram (i.e. not in α or β). For our present purposes, it is sufficient to note that the addition of comparanda has in the past broken up the clade structure of a dendrogram of a single text: in some instances, introducing a new, closer match for a segment into the dendrogram causes that segment to break free of its old pairing to link with the new segment, leaving its old partner in a smaller clade or as an outlier.[11] We believe that this is what has happened with both I.3 and the pair of I.5+6a and I.1: it is not that they have been pushed away from their previous clusters, but that the other members of the clusters have been pulled away from them by the introduction of much more similar segments. If I.3 is very much like I.7+6b and the Book II segments in the *VER* by itself, and if these two segments are much like Folcard, then we believe that I.3 should be seen as being like Folcard as well, though not as much as like Folcard as the *VER* segments in clade β.

The short vertical distance between clades α and β supports Love's hypothesis of a 'St Bertin school' style, since the two groupings as wholes are more similar to each other than they are to the other texts or to the out-group comparanda of the *Vita Elphegi* and *Encomium Emmae*. This complicates the cluster analysis, since the similarity of the two monks' work and the small size of Folcard's corpus makes it difficult to know whether the outlying clades are by different people entirely or are simply deviations from this putative 'house style' caused by the influence of sources.

The last text in our corpus, Goscelin's *Vita Wulsini*, helps to place these outliers somewhat more firmly (see figure 6 below). When we add the *Life* of Wulfsige to the set of analyzed texts, two of its segments appear as a pair (clade b) outside the main clusters of Folcard's and Goscelin's work (clades d and e), as do the pairing of I.5+6a and I.1, and the simplicifolious segments I.3, I.4, and two sections of the *Vita Edithae*. Because of this placement of the two Wulfsige segments, we identify most of the outlying clades of the *VER* in Figure 6 as being somewhat more like the works of Goscelin even though they are not clustered in clade d – where the middle segment of the Wulfsige text appears. Several segments of the *VER* are closer to the combined Folcard and Goscelin cluster (clade c) than are some segments of the *Vita Edithae*, although this text is definitively known to have been written by Goscelin. The surprising pairing of the middle segment of Goscelin's *Vita* of Wulfsige with chapters 11–17 of the *Vita Edithae* (clade f) suggests an explanation for the changes in dendrogram geometry caused by the introduction of the Wulfsige text: in

11. There are good mathematical reasons for this phenomenon, but it is perhaps more intuitive to use the metaphor of clustering by color. In a dendrogram initially composed of many yellow segments, some orange segments, and one blue segment, an introduced reddish-purple segment would initially pair with blue. But if a red segment were then introduced into the analysis, the reddish-purple could then pair with that red, and so might some darker orange segments, leaving the blue in a single, outlying clade.

both segments, an external source may have affected the author's style, making these segments less similar in their vocabulary distributions than the other Goscelin texts are in clade g. In that clade – based on rolling window analysis of frequent words – the author does not appear to have been influenced to the same extent.

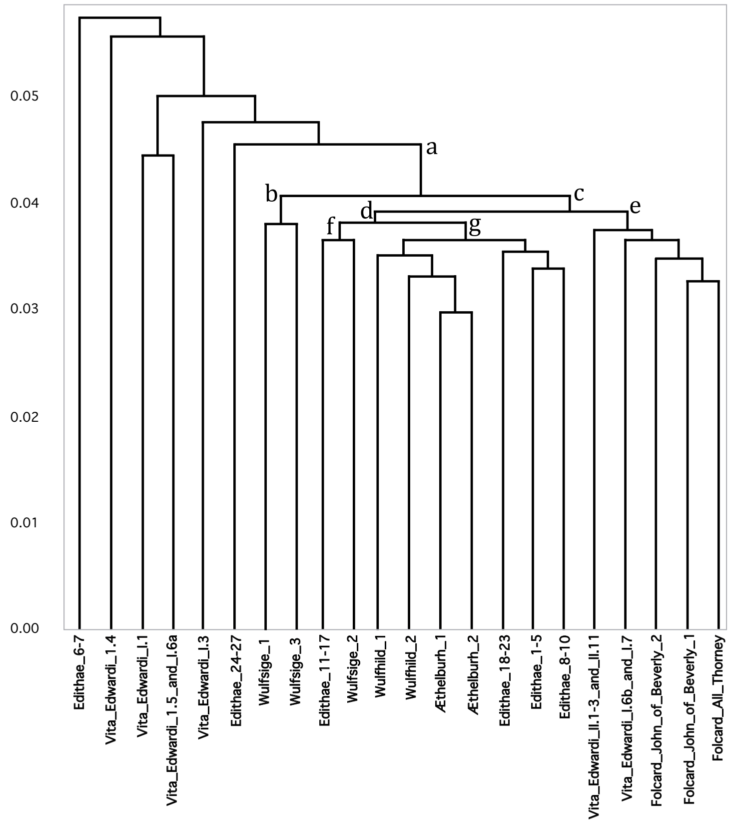


Figure 6. Dendrogram of the *VER* when clustered with the Goscelin and Folcard texts as well as Goscelin's Life of St. Wulfsige.

The combined results of the various cluster analyses strongly support a conclusion that Folcard is the primary author of I.3, I.6b, I.7, and Book II, chapters 1–3 and 11. The cluster-analysis evidence for Goscelin as the author of I.1, I.4, I.5, and I.6a is more equivocal, although it is not inconsistent with him being the primary author. However, it is important to note that these are general and broad affiliations and that the rolling window analysis suggests that there is some heterogeneity within sections as well as between them.

Furthermore, cluster analysis could be partly confounded if one writer revised the other's work. The segments of the text that are not surely identified with Folcard seem more strongly related to the pre-Conquest purpose of the *VER*: to celebrate Edith as the keystone of the Godwin family's inevitable rise to throne. Sections I.1, I.4, I.5, and I.6a celebrate Edith's father's rise to power, the glorious reinstatement of Godwin after the Crisis of 1051, and the maturation of his sons into powerful figures in their own right after his death. Book one, chapter two, which is lost in the version preserved in the Harley MS, celebrated Edith and her virtues; it is likely that this section was composed before the Conquest as well (either by Goscelin or another writer who is not Folcard). Folcard's sections, in contrast, adhere more closely to the *VER*'s post-Conquest purpose of lamenting the fatal errors of Edith's brothers and the death of her saintly husband. It is possible, and perhaps even likely, that the instability of segment I.3 – its tendency to move around in the dendrograms depending on which texts it is compared to – is caused by initial composition of this chapter by Goscelin or some other writer before the Conquest and its substantial revision by Folcard after it. Although Tyler is not addressing the possibility of composite authorship, this scenario accords with her suggestion that "though Book I was written before October 1066, it was strategically revised later" (*England* 143–44). In addition to revision, however, there may be another reason for the instability of segment I.3: the influence of yet another author on Folcard.

7 Another voice? High-resolution rolling window analysis

The degree of Edith's involvement in the creation of the *VER* has been something of an enigma – while it is evident that she is the text's patron and commissioner, it is not clear from intra-textual information how much input or detail she provided. Pauline Stafford, in her groundbreaking dual biography of Emma and Edith, sees both queens as having been proactively involved in the production of their respective texts:

> The work was produced for Edith in the immediate aftermath of the Norman Conquest. It is another post-1066 English story, the most sustained and detailed of them all. Its argument is perhaps even more mediated through the eyes of the Flemish monk who wrote it than was that of the *Encomium*. Nonetheless English voices can still be heard, and particularly that of an English queen. It is Edith's story, set within the memories of the survivors of the pre-1066 court, telling the recent English past in a form suited to the post-Conquest present. (Stafford, *Queen Emma* 41)

Thus, while she does not go so far as to claim authorship for Edith (or for Emma, of the *Encomium Emmae*), Stafford argues for the queen's playing an ongoing active role in the creation of the text, thus preserving her 'English' voice. Tyler follows Stafford in her analysis of a number of texts, including the *VER*, to show that "engagement on the part of the female patrons profoundly shapes the literary nature of each text, which is thus, in varying degrees, the result of a collaboration between writer and patron" (*England* 12). Licence, in contrast, sees Edith as a distant patron who would have given only generalized, overview instructions and financial rewards to the monastic author, with Ealdred, perhaps, providing more detailed guidance. Licence must be disagreeing with Stafford when he remarks that Ealdred's possible involvement in the creation of the *VER* "must serve to countermand the prerogative of scholars who wish to recover Edith's voice to read the *VÆdR* as it were her own words" ("Date" 284). Additional analysis, however, indicates two specific locations in the *VER* where we may hear the Queen's individual voice as she directed the creation of her version of the story she wanted recorded about her family, its rise and downfall.

As noted above, both clustering methods and rolling window analysis have limits to their resolution: the smaller the segment or window, the greater the likelihood of confusion in the resulting image. It has previously been established that segments smaller than 1000 words generally fail to cluster, regardless of their affinities. Less research has been done on the optimum sizes of rolling windows, but a general guideline has been to use a window of 5–10% of the total text length. However, although we cannot have the same degree of confidence in a plot with a smaller window as we do in one in which the window is large, we also have the chance of identifying smaller features. Because segment I.3 was behaving so unexpectedly in the dendrograms, we performed a new rolling window analysis of the most frequently used words in the *VER* using a window of 300 words, producing figure 7 (for the sake of legibility we have printed only the plot of *et*; the plot of *in* is positively and that of *ad* negatively correlated with the graph of *et*). As they do in lower-resolution rolling windows, abrupt changes in the frequency of a common word's use often indicate that a passage has a different source or author; steep-sided "W" or "M" formations, in which the material both immediately before and after a section has similar characteristics, are particularly diagnostic (Drout and Chavet 297–314). There are seven of these features in the rolling window graph of the *VER*, each of which is described and discussed below, with suggestions for the causes of these abrupt change in word frequency.

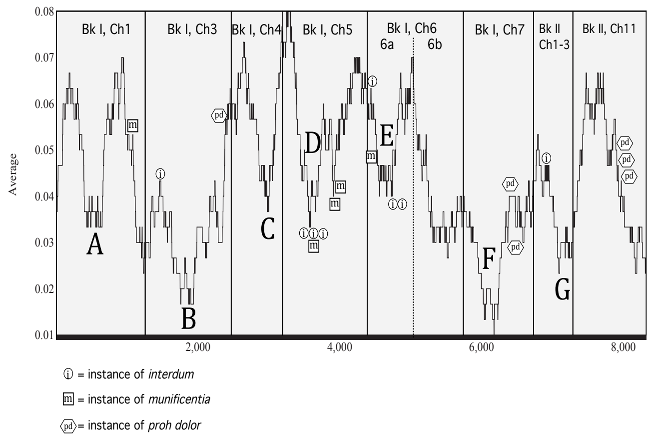


Figure 7. Frequency of *et* in a rolling window of 300 words as well as locations of *interdum*, *munificentia* and *proh dolor* in the *VER*.

A. The very distinct change in the frequencies of the most common words in I.1 begins with *Antiqui regis Æthelredi regia coniuge utero grauida* and continues to *Regnum, inquit, Anglorum est dei; post te prouidit sibi regem ad placitum sui* ("When the royal wife of old King Æthelred was pregnant in her womb... he answered, The kingdom of the English belongs to God; and after you He has already provided a king according to His own will") (Barlow, *The Life* 12–15). This section of the chapter tells of Queen Emma's pregnancy, which resulted in Edward's birth; its accompanying prophecies and oaths from prominent members of the English aristocracy and clergy; the removal of the child to Normandy in the face of Danish invasion; and Bishop Brihtwald of Wiltshire's vision of St Peter marking Edward for a life of chastity.

B. In chapter I.3, the abrupt change in the frequency of *et* begins at *Compos tandem desiderii sui, idem archipresul in adepta summi honoris dignitate...* and ends with ...*eumque dolo in regem irruere conari, ut quondam in eius fratrem, credere persuadebat* ("his ambition satisfied at last, the archbishop in the office of high honour he had obtained ... and brought Edward to believe that Godwin was guilefully scheming to attack him, just as once upon a time he had attacked his brother")(Barlow, *The Life* 30–33). This passage is a description of the scheming of Archbishop Rodbert against Godwin, who patiently suffers these unjust attacks *tum pro gentis innato more, quod nichil agant festine uel facile, sed ex consilio plurima uisa precipitatione per se expectant uel diffluere uel perire* ("because of the innate character of the family, for they do nothing hastily or readily, but when they see things happen with a great deal of turmoil, as a matter of policy wait for them to subside or disappear of themselves")(Barlow, *The Life* 32–33). The word *interdum*, which Licence finds to be characteristically Folcardian, appears in the second sentence of this passage.

C. This abrupt dip in the plot of *et* begins with *Fit magna inuicem letitia patris et fratrum se mutuo conspicientium*... and concludes *qui scilicet auctores fuerant illius concitati turbinis* ("with great joy the father and brothers looked on each other... since it was they who had been responsible for that storm of trouble") (Barlow, *The Life* 42–45). This passage describes the resolution of the Crisis of 1051, when most of the Godwin family had departed for Flanders and Queen Edith herself was sent to a women's monastic house; in this version of events, the family returns triumphantly, both to England and to power, once the King realizes his error.

D. The section of low-frequency *et* in I.5 is part of a celebration of two of Edith's brothers, Tostig and Harold. The passage begins *Vterque satis pulchro et uenusto pollebat corpore, et, ut conicimus non [in]ęquali robore, non disparis audacię*... and concludes *at ut legentibus de eorum moribus dicatur tota summa, nulla ętas, nulla regio, eius pretii duos mortales eodem educauit tempore* ("Both had the advantage of distinctly handsome and graceful persons, similar in strength, as we gather ... and to sum up their characters for our readers, no age and no province has reared two mortals of such worth at the same time") (Barlow, *The Life* 48–51). This passage contains three of the eight instances of *interdum* in the *VER* as well as one of the five appearances of *munificentia*, and two additional examples of this latter occur immediately after the passage. Like *interdum, munificentia* has been identified by Licence as a characteristically Folcardian word (though see above for some complicating examples with regard to Goscelin).

E. The words *interdum* and *munificentia* also appear just before the start of this passage, which praises first Edward's and then Edith's piety and humility. The passage begins *Cetera uir deo uoluntarie deditus in squalore mundi angelum uiuebat, et accepto tempore quam assidue esset in Christiana religione strennue manifestabat* ("Otherwise this man, of his free will devoted to God, lived in the squalor of the world like an angel and, 'at the accepted time' he zealously showed how assiduous he was in practicing the Christian religion") and ends with *Mulierem inquam cunctis nobilibus matronis siue regie et imperatorie dignitatis personis in exemplo uirtutis et honestatis anteponendam, tam ad Christiani cultus religionem quam ad mundi dignitatem seruandam* ("I say she was a woman to be placed before all noble matrons or persons of royal and imperial rank as a model of virtue and integrity for maintaining both the practices of the Christian religion and worldly dignity") (Barlow, *The Life* 62–65). Edward is said to have kindly received abbots and monks – *potissimum autem transmarinos* ("above all foreign ones") (Barlow, *The Life* 62–63) – whom he knew to be devout and strict, a kingly quality that surely either Goscelin or Folcard would have appreciated.

F. In chapter I.7 the W-formation begins with *quicunque poterat notari quod de eius aliquando fuerit curia...* and ends at *...sed ille citius ad sacramenta nimis, proh dolor, prodigus, hoc obiectum sacramentis purgauit* ("Whosoever could be identified as having been at some time a member of Tostig's household ... but Harold, rather too generous with oaths (alas!), cleared this charge too with oaths") (Barlow, *The Life* 76–81). This passage is an apologia for Tostig as a firm and just Earl of Northumbria (and object of the Northern Rebellion of 1065) as well as an equivocation regarding Edward's and Harold's assent in Tostig's loss of his earldom and exile to Flanders. The passage refers to the lawless and wicked condition of the north before Tostig assumed the earldom and after he was expelled; the odd diction elides the point that King Edward and Earl Harold did not or could not garner enough support for their brother (-in-law) to retain that earldom. As in the Archbishop Rodbert passage (B above), negative perceptions of members of the Godwin family are said to be due to the dishonesty of others: *Dicebatur quoque, si dignum esset credere, fratris sui Haroldi insidioso, quod absit, suasu hanc dementiam contra ducem suum aggressos esse* ("It was also said, if it be worthy of credence, that they had undertaken this madness against their earl at the artful persuasion of his brother, Earl Harold – which heaven forbid!") (Barlow, *The Life* 78-81). The narrator thus simultaneously alludes to and then dismisses the charge that Harold had betrayed his brother. Two instances of the phrase "proh dolor," which Licence has linked to Folcard, appear right after the end of the passage.

G. The final W-formation in the plot of *et* includes all of II.3, a miracle story in which a blind man is healed by the water in which the king had washed his hands; Edward tests the sight of the healed man first by holding up different numbers of fingers and then by pulling on his beard. The word *interdum* appears toward the beginning of the chapter.

Four of these passages appear in sections of the *VER* (A, C, D, and E) that we have tentatively attributed to Goscelin (or, more confidently, to a writer other than Folcard). In each case, the reductions in the frequencies of *et* and *in* and the increase in the frequency of *ad* bring the passage roughly into line with the frequencies we see in the majority of the sections of the poem that cluster with the Folcard texts. Two of the passages (D and E) also contain clusters of words that Licence has argued are markers of Folcard's authorship. These features of the text could be explained by Folcard's revising and extending an original draft of the *VER* by an earlier writer, inserting passages to further elaborate upon or explain the material. Passage D is fulsome praise of Queen Edith's brothers, and passage E that of her and her husband. It may be that Folcard was trying to ingratiate himself with a new patron by adding panegyric material to the original narration (which is not itself lacking in praise of the Godwin family). This could also be the case with A and C, but the lack of Folcardian words in these passages implies instead that their author was working with external sources. The story of Edward's birth and the Bishop of Wiltshire's vision of St Peter is a shift from the focus on Godwin found in the preceding and subsequent text in this chapter; such a shift would be consistent with this specific section relying on a written source focused on Edward himself, but we do not have enough information to do more than speculate here. Passage C, however, relates events that are included in known written sources, most famously the *Anglo-Saxon Chronicle*, so it is likely that the author is here working from a written source; Barlow even suggests some overlap in translated phrasing between the *VER*'s Latin and the *Chronicle*'s Old English (Barlow, *The Life* 44, n. 106).

The influence of either inserted passages by Folcard or external sources upon the text in chapters I.1, I.4, I.5 and I.6a could explain why these segments do not cluster tightly with the core Goscelin texts in the dendrogram. When those vocabulary distributions of hybrid or composite segments are averaged across a full segment, they would end up not quite as similar to either each other or to the other Goscelin texts as a segment without such sources would be. However, it is also possible that these portions of the *VER* were not by Goscelin, but by a writer other than him or Folcard (either Tyler's Loire School poet or another anonymous writer).

Passages B, F, and G appear in segments that cluster tightly with Folcard's texts. In these instances, the changes in the frequency of common words bring them out of Folcard's normal range but not closer to those of the other author of the prose of the *VER*. If, as we have argued, all three of these passages are instances of a source strongly influencing Folcard's style, then there is something qualitatively different about the sources of these passages. These variations in the frequencies of common words could be the result of the different effects of oral or written sources, or sources in Latin and vernacular languages, on Folcard's style. Passage G, the healing of the blind man at the end of II.3, is different in its frequencies of common words from the other very similar miracle stories in Book II of the *VER*; it likely has a different source from those miracles – a separate booklet or *libellus* in the vernacular or even an oral source from someone present at the episode. The lower frequency of *et* in B and F similarly points towards oral or vernacular sources for these passages, since at least some portion of the higher levels of *et* in other passages can be attributed to their more elaborate rhetorical style: longer sentences have more *et*s, as do those that include the ornamental use of paired nouns, adjectives, and verbs.

Passages B and F have the lowest frequency of *et* in the entire *VER*. There are none of Licence's Folcardian words in either passage, though *interdum* appears just before B and two instances of *proh dolor* are found soon after F. In content, both B and F imply that readers, if they knew the whole truth about the situations being described, would see the righteousness of the Godwin family. Both indicate that the author at this point has substantial knowledge not only of the specific activities of Earl Godwin and of Tostig, but also of their thought processes and individual personalities. There is no extant written source commissioned by Godwin or Tostig narrating these events and it is highly unlikely that one ever existed; given the circumstances of the *VER*'s creation, it is most likely that the specific information and even the unusual diction of these sections came directly from Edith in her role as Queen, reshaping versions of events to construct a history with the Godwin family on the side of right and good. The lower frequency of *et* in sections B and F is then explained by Edith's primary responsibility in the phrasing and presentation of these passages; as the Lexomic research discussed above shows, different authors produce different distributions of function words in their texts.

An identification of Edith as the probable source of both the information and the phrasing of sections B and F also explains the surprising behavior of segment I.3 in the cluster analysis that included both Goscelin's and Folcard's texts as well as the *VER*. Passage B makes up nearly 40% of I.3, so this segment is not nearly as Folcardian as the combination of segment I.6b and I.7, or the Book II materials. Similarly, segment I.7 alone, without the addition of 6b, did not always cluster with Folcard's texts in every permutation of the materials, and we now see why that might be: without I.6b, I.7 is also only about 40% Folcardian. An understanding of the insertion of Edith's voice in these sections, defending her family and "correcting" its history, adds another authorial strand to the composite text, complicating even further our understanding of its "authorship."

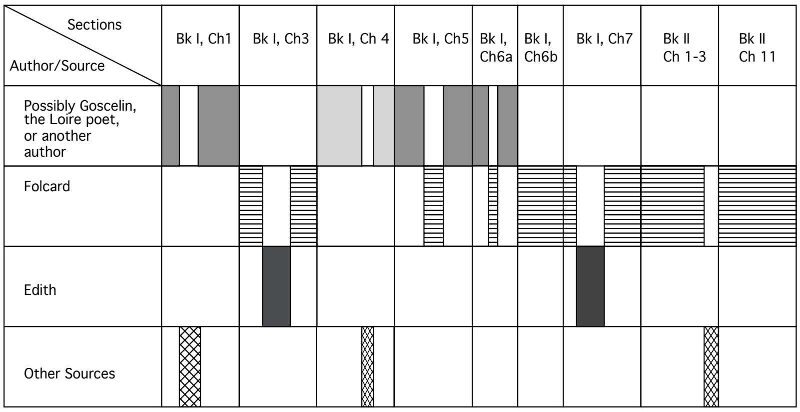


Figure 8. Diagram of the sections, sources and likely authors of the *VER*.

The diagram in figure 8 is our overall interpretation of the data regarding authors and sources for the composite *VER*. Not only do we identify Edith as the primary author of sections B and F, but we see the contents of these sections to emphasize how she shaped the final narrative.

8 The authorship of the composite text

That modern ideas of authorship are often not applicable to medieval works is a contemporary scholarly commonplace. Neither the traditional Romantic notion of the author as an individual creative genius producing work *ex nihilo*, nor the Foucaultian conception of the author as merely a 'discursive function' comes very close to describing the practice of textual creation in the Middle Ages (Barthes; Foucault; Kittang). But despite recent efforts, there exists no widely accepted model of medieval authorship, especially for anonymous texts (see essays collected in Rankovic). The action that corresponds most closely to the work performed by the Romantic idea of the author – the assembling of the specific words of an individual text – is just one in a chain of potential activities that can include compiling, translating, composing, redacting, and dictating, as well as literal writing (placing ink onto parchment) and copying. Any of the individual humans who performed the tasks described in Lars Mortensen's model of medieval textual production – in which a text can evolve from oral interviews, through notes and drafts on wax tablets or disposable sheets, and into fair copy manuscripts that are then subject to repeated revision and modification in a potentially recursive process – could reasonably be identified as an 'author.' It is not immediately obvious that one particular role should be privileged over the others.

The mixture of Lexomic and traditional textual analysis methods used in this paper have, in the particular case of the *VER*, allowed us to identify the traces of the work of multiple authors – Folcard, the Loire Poet (as identified by Tyler), Queen Edith, and possibly Goscelin or other(s) – each of whom had different and specific roles in the production of the text. Evidence indicates that all of them composed sections of the text at the sentence level, and any or all of the four might also have redacted, edited and augmented the text he or she received. However, only one of these authors was *also* responsible for the *VER* at a higher level of abstraction. Only Edith caused the text to be brought into being.

Although she did not physically write the *Vita* herself, putting ink onto vellum, Edith created the form of the final work to be not just about saintly King Edward, but also the ways that his accomplishments were brought about by her own greatness and, more circumspectly, that of the Godwin family. A plausible scenario of textual creation begins in early 1065 with Queen Edith asking Bishop Herman to recommend a highly literate cleric to produce an *encomium* to the Godwins. Perhaps he sends Goscelin to work at the queen's bidding; perhaps he sends a relatively new arrival from the continent, a cleric who can write poetry in the vein of the new Loire School as well as more traditional narrative prose. If the pre-Conquest prose author and the poet are not the same person, the poet must have begun work somewhat simultaneously with the first prose writer, composing a series of poems full of classical and Christian allusion to be added to the in-process prose text, creating a generically sophisticated prosimetrum. These poems are aware of the growing tensions between Harold and Tostig, and strive to present Edith as a figure of Concord and Peace in the face of escalating conflict.

Such a commission would appear to be a substantial opportunity for Herman to ingratiate himself even more with his powerful, royal patron. Throughout the spring and summer of 1065, this person or pair composes the bulk of 'book one,' but by the autumn of 1065 the Northern Rebellion, the exile of Tostig, and Edward's declining health make this original narrative an awkward fit to the current situation. By spring of 1066, Edward is dead and work on the *VER* has largely ceased, as Edith's brothers prepare to engage in armed conflict against each other, and her place in the new (and ultimately temporary) hierarchy is unclear.

In any case, the texts of the prose chapters and the poems must have been stored or copied separately. In the text's extant form, the content and theme of the poems sometimes align precisely with the prose chapters; for example, the celebratory poem about the gift of a ship from Godwin to Edward fits neatly between book one's chapter one (the narrative of Edward's rise to the kingship with Godwin's help) and chapter two (a celebration of Edith and the Godwin family in general). At other times, the composite and asynchronous nature of textual production creates abrupt or uneasy changes in tone. Poem six, which warns of fratricide, civil war, and even cannibalism, must have been composed after the Northern Rebellion (autumn 1065), but it precedes book one, chapter six, which celebrates the 1063 military victories of Harold and Tostig that brought peace to the kingdom and allowed the flourishing of the religious building programs of Edward at Westminster and Edith at Wilton.[12]

12. See Tyler, *England in Europe*, 151–77, for her analysis of the ways the classical allusions in these poems contribute to the 'instability' of the text and its ambivalent attitudes towards the Godwin family. See also Otter, "Closed Doors," for close analysis of Poem Seven, the epithalamium for Edith that follows the prose description of her building of Wilton in book one, chapter six.

The narrative of the Northern Rebellion is then not related until book one, chapter seven (and thus is starkly separated from the poem that would most sensibly complement that narrative). The chapters proceed in chronological order, but the insertion of the poems between the chapters is neither smooth nor seamless. The placement of poem six implies that the final compiler had the right number of poems and the right number of prose chapters, but that the two sets did not mesh thematically as well as they had been intended to. The lack of poems to punctuate book two also indicates that the poet/pre-Conquest author had departed the project (and maybe the country) before the text was fully complete: definitely composed after the battle of Stamford Bridge in September of 1066 and probably after Hastings in October 1066, the last of the poems introduces the second book and reframes the text's overall purpose as a hagiographical celebration of Edward, and then the voice of the poet departs the text as the prose recitation of Edward's miracles begins.

At some point soon after the Conquest, Edith determines to complete her book. Her place at Wilton is not as secure as she would like; she resides there as the honored, widowed Queen of King Edward, not as the sister of the defeated King Harold, and she needs to emphasize the former and minimize the latter. Tyler's analysis of Wilton's reception of the text argues that Edith largely failed in her goal for the text to "promote the good reputation of Edith among the West Saxon aristocracy" as Wilton in the later eleventh century demonstrated itself as "a foundation eager to disassociate itself from the Godwine dynasty" (*England* 214, 215). However, Edith was at least somewhat successful in her design to style herself as Edward's respectable widow rather than the disgraced Harold's sister; when she died less than a decade later, the D manuscript of the *Anglo-Saxon Chronicle* included notice of her death:[13]

13. The standard print edition is Dumville, Keynes, *et al.* For manuscript D, see Cubbin. Tony Jebson's open-access edition is referenced throughout.

> *Eadgyð seo hlædie forðferde, seo wæs Eadwardes geresta, seofon niht ær Christesmæssan on Wincestr, 7 se cyngc hig let bryngan to Westmysntre mid mycclan weorðscype, 7 leide heo wið Eadwarde cynge hire hlaforde*
>
> (The Lady Edith died, she who was Edward's consort, seven nights before Christmas in Winchester, and the king [William] had her brought to Westminster with great honor, and she lies with King Edward her lord). (Jebson, annal for 1076)

The version of events presented in the *VER* and its celebration of Edith may have contributed to the Chronicler's decision to include her death as one of the important events of that year – and to present her in relation to her husband, not to the family of her birth.

In the early months of 1067, then, Edith uses her remaining influence with Ealdred or Herman to secure the services of a literate cleric to reshape and complete her encomium text; Folcard presents himself in response to her request. Rather than the lucrative opportunity of the pre-Conquest commission, this post-Conquest work is a politically and culturally delicate task because it awkwardly, perhaps even dangerously, affiliates Folcard and his superior with the failed house of Godwin. Tyler even suggests that "it is not accidental that it [the *VER*] is anonymous," since any of the text's creators would have realized the political risks of explicit, named association with the Godwins ("Skype").

Retired at Wilton, Edith has more opportunity than she did as Queen Consort to work directly with the cleric-author, so she is able to reshape the text's purpose, emphasizing the moral goodness of her now-dead family members within Folcard's narration of the events that led to the Conquest and the eventual canonization of Edward. Folcard also engages in some revision of the chapters composed before the Northern Rebellion in order to align those earlier chapters with the text's new purpose. Once his work for the Dowager Queen is done, she sends Folcard (back) to Ealdred, and he then composes the *VJB*.

During the post-Conquest segment of the textual production, Edith may have had the secretarial services of some of the Wilton nuns or oblates at her call as well – even as Edith composed and collaborated with Folcard, the person inscribing the words in draft on wax tablets or on parchment in permanent form is likely to have been one of the highly-educated female residents of Wilton Abbey, acting as *scriptrix* to assist the Dowager Queen in her endeavor (for discussion of the high levels of literacy at eleventh-century Wilton, see Hollis, "Wilton" and Tyler, *England* 213–20).

Much more than simply a patron who provided financial incentive and general instructions, Edith participated in the creation of the text to such an extent that she even influenced the sentence structure of the final product as she directed the changes in purpose and narrative content. Tyler notes that "in order to understand how the *Vita Ædwardi* fits into literary history we must ascribe determining agency to its female patron and audience" (*England* 202). Modern readers can now see Edith not as a distant patron but as an active creator of her book. She ably accessed the cultural prestige of Latin for her text, a prestige that spanned the entire medieval period (Momma 226–27). Edith's multi-lingualism is crucial here as well: through her education and her marital and familial relationships, she was functional in Latin, English, forms of French, Danish and, if the later *Edwardi* texts are to be believed, in Irish as well (Barlow, *The Life* 22–23). As such, she experienced no linguistic gaps among her contributors and their written and oral sources, from the Loire poet's French to the Old English of the *Anglo-Saxon Chronicle* to the Latin of church documents and Queen Emma's previous *Encomium*. Edith had the language skills to be involved at the micro level at every step of the process.

As noted in the preface to this essay, many feminist scholars have argued for years that varieties of medieval women's literacies and textualities have been obscured by male medieval scribes and our modern scholarly assumptions of masculinity in medieval textual creation. An understanding of the *VER* as a composite text with multiple contributors and sources furthers both this specific discussion and broader revisions to the concept of 'authorship' in medieval literature.[14] The narrative of composition suggested here is somewhat analogous to the practices of the 'writers' room' utilized by modern TV shows or of 'studio sessions' during which bands compose new songs, so that creation of the final product is a group rather than a solitary effort, with ideas and phrases constantly drafted, revised, and changed within group processes and dynamics.

Our analysis of the authorship of the *VER* illuminates the weaknesses of the modern scholarly acquiescence to the Romantic model of a single, implicitly male author, individually creating an entire text. Just as the *VER* challenges modern definitions of historiography and hagiography (as ably described by Victoria B. Jordan), it

14. See, for example, Minnis; Partridge and Kwakkel; D'Angelo and Ziolkowski. Most of these scholars, however, focus on known, named authors from the High and later Middle Ages.

challenges as well modern ideas of 'the author.' A form of this Romantic model, 'The Anonymous,' who never existed as an individual, is the actual fiction in this discussion. In seeing Edith and her team working cooperatively over a lengthy period of time, we are chronologically and culturally extending Kimberly Benedict's analysis of collaborative authorship between religious women and scribes in the High and Later Middle Ages. An eleventh-century secular woman, Edith was in a similarly 'dominant role' as that which Benedict identifies for the women in the pairs and groups she analyzes; exercising power over the men and women on her team, the Queen directed the project of her book (Benedict x). Our argument also complements Therese Martin's use of the term 'maker' to refer to medieval women who patronized art objects and thus were integral parts of the creative process (30). We recognize Edith as *auctrix* of the *VER*: not an 'author' in the isolated, individualistic Romantic sense, but as "she that originates a thing" (*auctrix*). While *auctrix* refers more usually in medieval Latin to the Virgin Mary, its usage is appropriate here as well, since Edith organized, directed, and contributed to the text: she is the originator of the *VER*, and because Modern English no longer uses 'authoress,' the most accurate translation of *auctrix* is simply "author." Edith is the author of the *Vita Ædwardi Regis*.

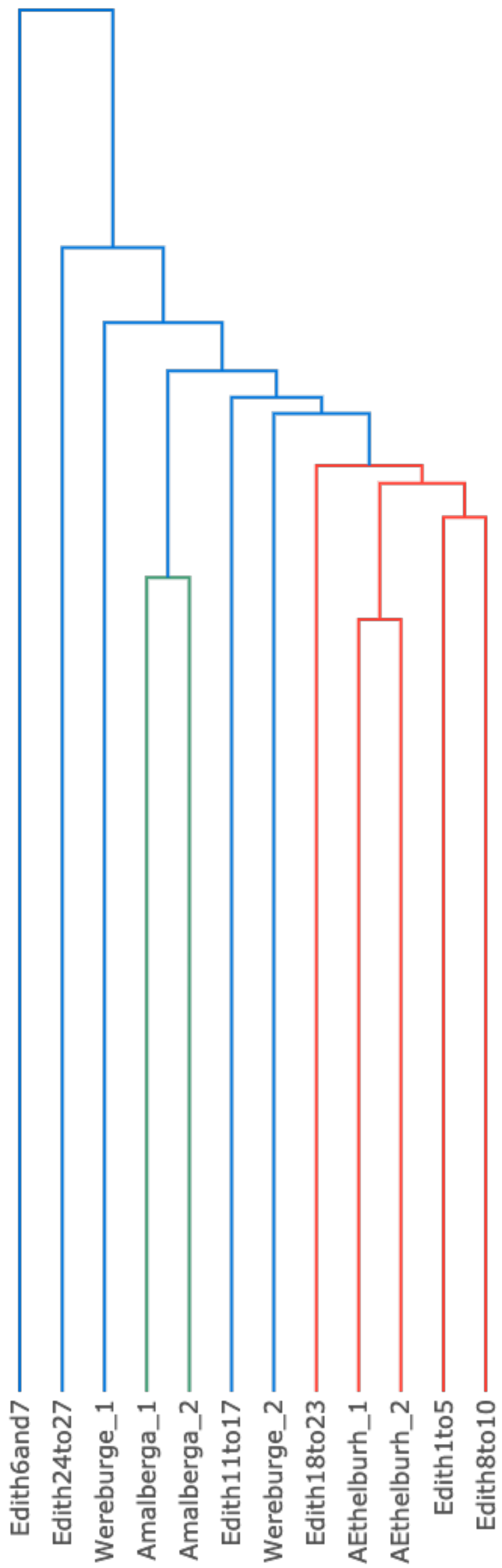
The composite nature of the *VER* improves our understanding of Queen Edith's authorial and patronage practices in the fraught decade of 1060–70, demonstrating some of the ways medieval secular women could use patronage and commissions to tap into religious networks and literary expertise for their own purposes. Like her mother-in-law Emma, Edith understood the importance of publicizing her version of events. After the Conquest, in her retirement at Wilton, Edith would have had substantial motivation to invest time, money, and effort in bringing about the creation of this work that would celebrate her role in her family's greatness, mourn the tragedy of its fall, and affirm the holiness of her dead, royal husband, all as part of her campaign to maintain her economic, social, and political status under the aegis of the new Norman rulers.

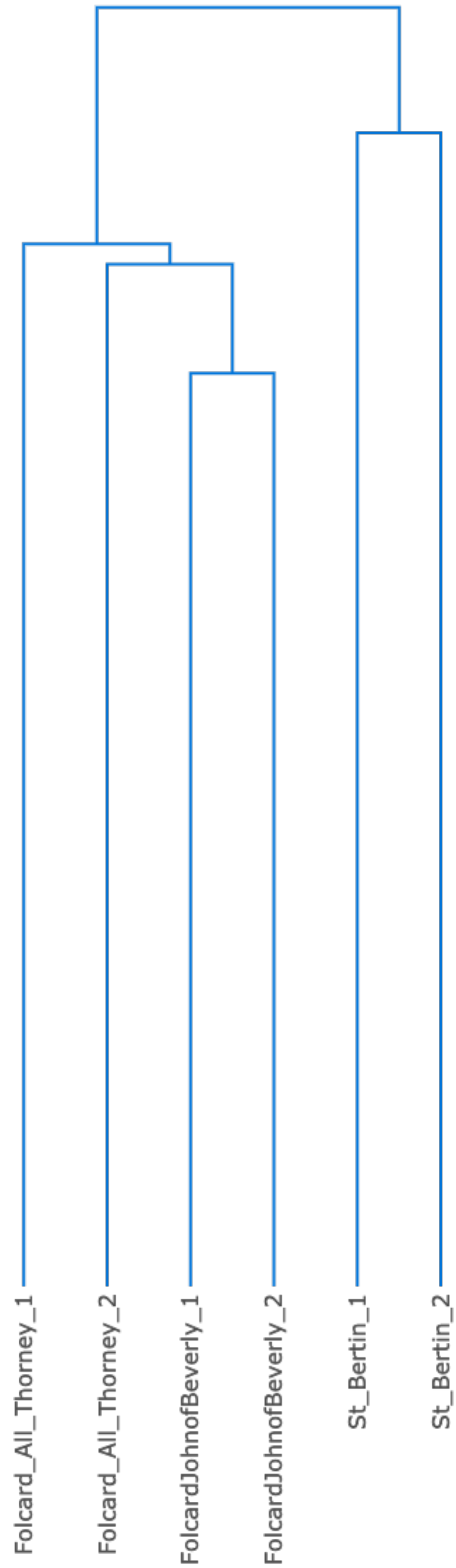
The *VER* is thus a composite text financed, directed, and coordinated by Edith; it was produced over an extended period of time by at least three contributors (the queen, the Loire-School poet, and Folcard) with the possibility of more (Goscelin or other anonymous writers), some of whom used written and oral sources produced by still other contributors. This understanding of the *Vita Ædwardi Regis* helps to us to recognize that the actual practice of textual creation in the Middle Ages was a collaborative effort among patrons, writers, translators, editors, archivists and copyists, each of whom was an individual person with his or her own talents, idiosyncrasies and agendas. The realization of a controlling, organizational intellect behind this collaborative production both explains the text's final, complex form and identifies Edith as its ultimate author.

Appendix: Contents Table, *Vita Ædwardi Regis*:

Item	Contents	Barlow pgs	MS folios	word count
Poem one	Invocation of/dialogue with the muse and patron	2–9	38r–38v	546
Chapter one File I.1	Godwin's rise under Cnut; his support of Edward; praise of Edward	8–21	38v–40v	1254
Poem two	Celebration of Godwin's gift of a ship to Edward	20–21	40v (right before a missing section)	296
(Barlow includes	*Textual restorations from*	*Osbert/Richard*	*here as ch.2)*	
Poem three	Praise of Godwin's children; warnings of the fragility of peace	26–29	41r–41v	253
Chapter three File I.3	Tension between Godwin and Edward; Crisis of 1051 (exile to Flanders)	28–39	41r–43v (crumbling MS corner here)	1211
Poem four	Lament for unjust suffering in general (and of Earl Godwin in particular)	38–39	43v	132
Chapter four File I.4	Resolution of Crisis of 1051 (Godwin's reinstatement)	38–45	43v–44v	723
Poem five	Analogies of Godwin/ Edward with David/ Saul	44–47	44v–45r	290
Chapter five File I.5	Death of Godwin; descriptions of Harold and Tostig; their journeys to Rome	46–57	45v–47r	1197
Poem six	Warnings of and laments about fraternal discord related to Harold and Tostig	58–61	47r–48r	353
Chapter six File I.6	Celebration of Tostig's and Harold's endeavors; Edward builds Westminster; Edith builds Wilton	60–73	48r–50r	1354
Poem seven	Praise of Wilton, Mary, and Edith	72–75	50r–50v	296
Chapter seven File I.7	Northern Rebellion; break between brothers; death of Edward	74–83	50v–52r	989
(Barlow's Book	Two Begins)			

Poem eight	Mourning for lost peace; reconfigured plan for the text	84–91	52r–54r	665
Book II, Chapters 1–3 File II.1–3	Two of Edward's healing miracles	90–97	54r–54v	552
(restored miracles	from various places)	(96–115)	(missing folios)	
Book II, chapter 11 File II.11	Details about Edward's death	116–127	55r–57r	1337

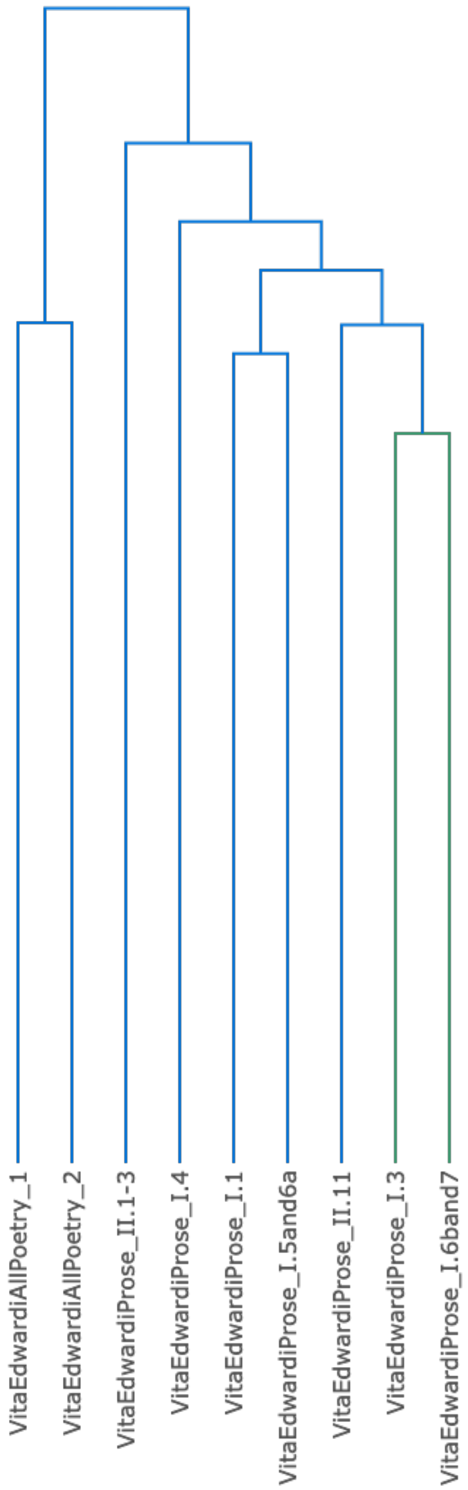


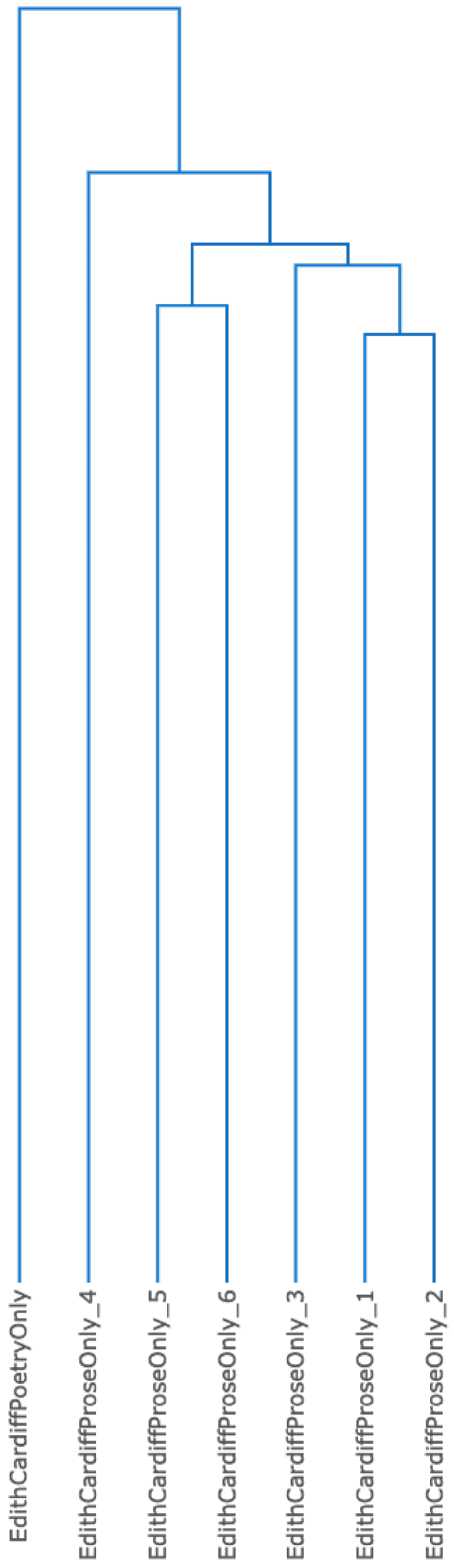


Ancillary Figure 1. Dendrogram of the *Vita Amalbergae* w/other texts by Goscelin.
Ancillary Figure 2. Dendrogram of the *Vita S. Bertini* w/other texts by Folcard.

Ancillary Figure 3. Dendrogram of poetry and prose of the *VER* (segments of *c.* 1200 words).

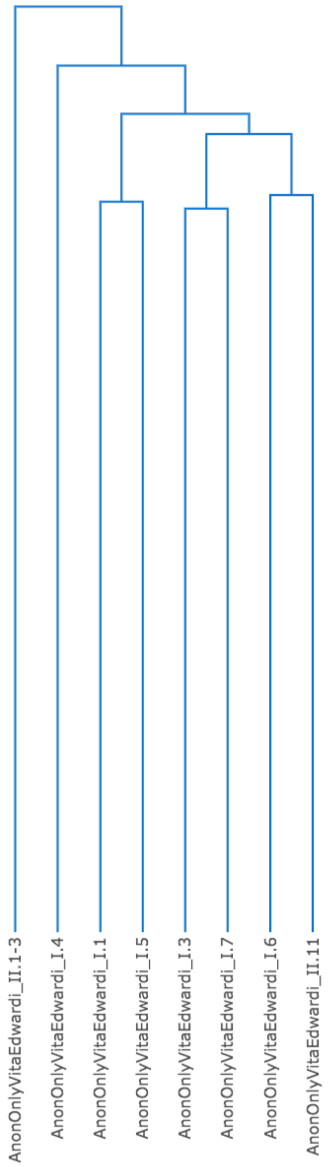
Ancillary Figure 4. Dendrogram of poetry (one segment of 1452 words) and prose of the *Vita Edithae* (segments of *c.* 1500 words).



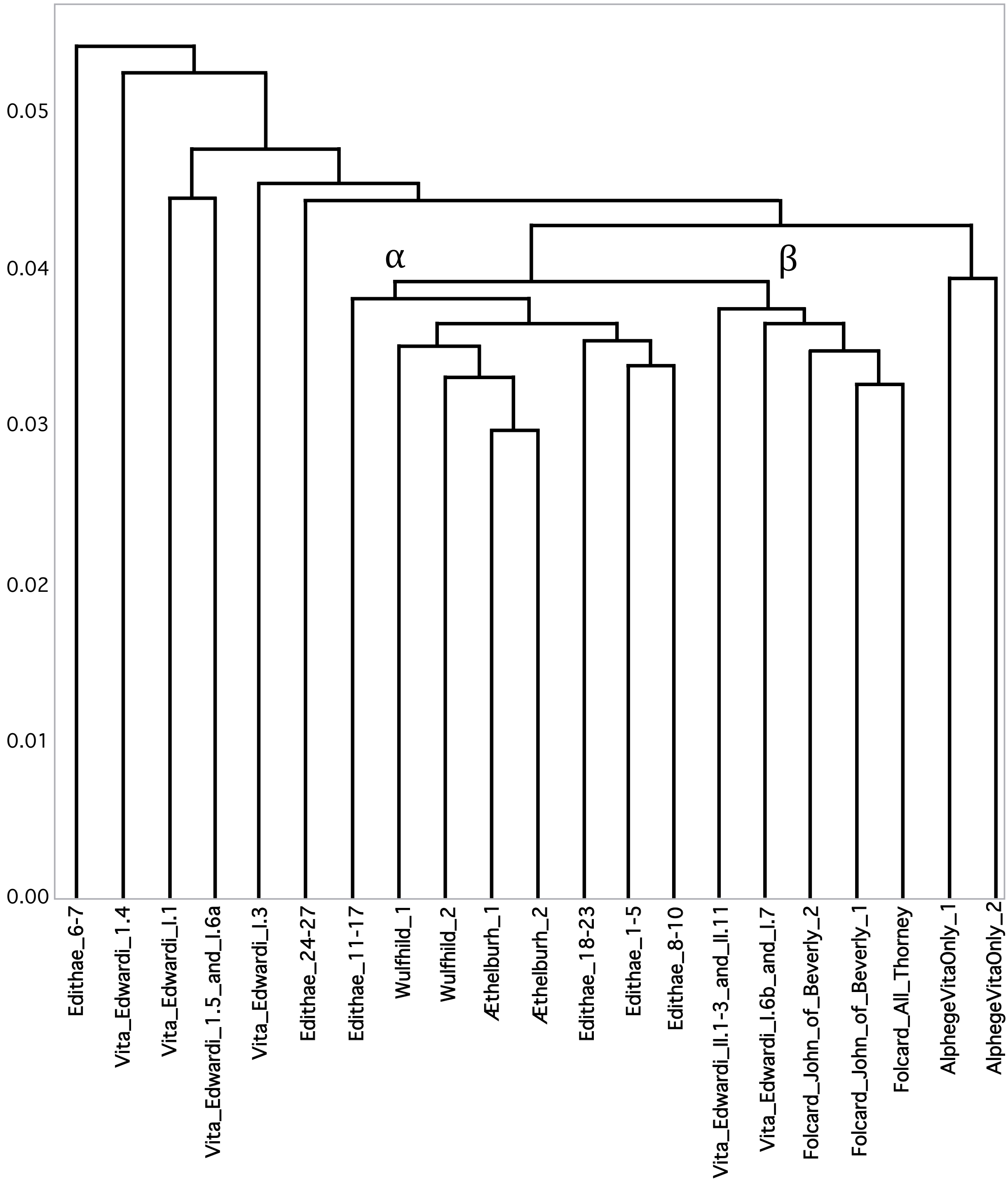


	FullText		I.1		I.3		I.4		I.5		I.6		I.7		II.1-3		II.11
Rank	Word		Word		Word		Word		Word		Word		Word		Word		Word
1	et		et		et		et		et		et		in		et		et
2	in		in		in		in		in		in		et		in		in
3	ut		ut		ut		ut		ut		ad		ad		rex		ad
4	ad		non		a		ab		non		quam		ex		a		cum
5	cum		dei		ad		cum		cum		non		eius		ad		ut
6	non		cum		cum		eius		eius		cum		cum		ut		uel
7	a		eius		non		pro		a		ex		quod		erat		dei
8	eius		regni		etiam		se		suo		quoque		non		eius		non
9	ex		sibi		ducis		ducis		quoque		a		a		cum		a
10	est		hic		quod		a		est		per		aut		ille		qui

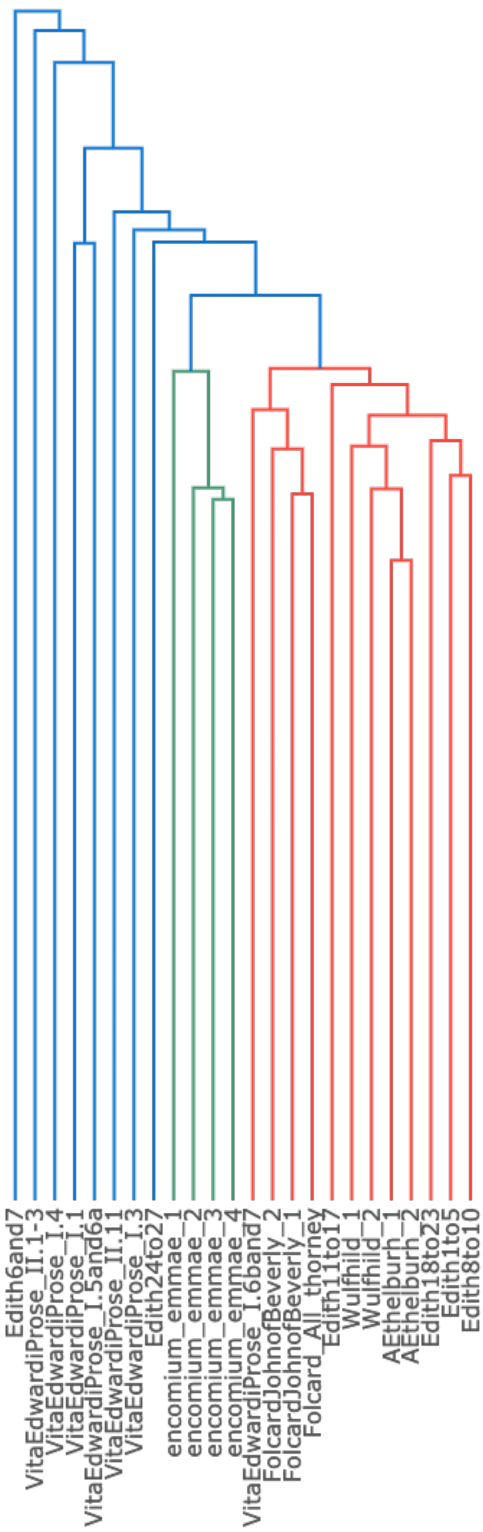
Ancillary Figure 5. Table of "Top Words" for separate *VER* chapter segments.



Ancillary Figure 6. Dendrogram of *VER* segments with "StopWords" function applied to *et*, *ad*, *in*, *ut*, and *cum*.



Ancillary Figure 7. Dendrogram of core texts in the study with Osbern of Canterbury's *Vita Elphegi* (segments of *c.* 1600 words).



Ancillary Figure 8. Dendrogram of core texts in the study with the *Encomium Emmae* (segments *c.* 2000 words).

Bibliography

Aelred. *The Life of Saint Edward, King and Confessor.* Ed. Jerome Bertram. Southampton, UK: Saint Austin Press, 1997.

Arnold-Forster, Frances Egerton. *Studies in Church Dedications: Or, England's Patron Saints.* London: Skeffington and Son, 1899.

"Auctrix." *A Latin Dictionary*. Eds. Charlton T. Lewis and Charles Short. Oxford, UK: Clarendon Press, 1879. [accessed via Perseus Digital Library 15 December 2021].

Barlow, Frank. *Edward the Confessor.* Berkeley, CA: University of California Press, 1970.

---. "Folcard." *Oxford Dictionary of National Biography.* Oxford: Oxford University Press, 2004. [accessed 29 October 2016. Web].

---. *The Godwins : The Rise and Fall of a Noble Dynasty.* London: Longman, 2002.

---. "Goscelin." *Oxford Dictionary of National Biography.* Oxford University Press, 2004 [accessed 29 October 2016. Web].

---. ed. *The Life of King Edward Who Rests at Westminster*, 2nd edition. Oxford, UK: Clarendon Press, 1992.

Barthes, Roland. "The Death of the Author." 1967. *Modern Criticism and Theory*. Ed. David Lodge. London: Longman, 1988, 167–72.

Bately, Janet. "Alfred as Author and Translator." *Companion to Alfred the Great*. Ed. Nicole Guenther Discenza and Paul E. Szarmach. London: Brill, 2015. 113–42.

Bateson, Mary. "Origin and History of Double Monasteries." *Transactions of the Royal Historical Society* 13 (1899): 137–98.

Beare, Rhona. "Did Goscelin Write the Earliest Life of Edward the Confessor?" *Notes & Queries* 55.3 (2008): 262–65.

Bell, David N. *What Nuns Read: Books and Libraries in Medieval English Nunneries.* Kalamazoo, MI: Cistercian Publications, 1995.

Benedict, Kimberly. *Empowering Collaborations: Writing Partnerships between Religious Women and Scribes in the Middle Ages.* New York: Routledge, 2004.

Berger, Rose, and Michael Drout. "A Reconsideration of the Relationship Between Víga-Glúms Saga and Reykdæla Saga: New Evidence from Lexomic Analysis." *Viking and Medieval Scandinavia* 11 (2015): 1–32.

Blanton, Virginia, *et al.*, eds. *Nuns' Literacies*. 3 vols. Medieval Women: Texts and Contexts. Turnhout: Brepols, 2013-2018.

Bloch, Marc, ed. "La vie de S. Édouard le Confesseur par Osbert de Clare." *Analecta Bollandiana* 41 (1923): 5–131.

Bolton, Whitney F. *A History of Anglo-Latin Literature, 597–1066.* Princeton, NJ: Princeton University Press, 1967.

Bond, Francis. *Dedications and Patron Saints of English Churches.* Oxford: Oxford University Press, 1914.

Boyd, Pjoebe, Michael Drout, Namiko Hitotsubashi, Michael J. Kahn, Mark D. LeBlanc and Leah Smith. "Lexomic Analysis of Anglo-Saxon Prose: Establishing Controls with the Old English Penitential and the Old English translation of Orosius." *Revista de la Sociedad Española de Lengua y Literatura Inglesa Medieval (SELIM)* 19 (2014): 7–58.

Brown, Jennifer N. and Donna Alfano Bussell, eds. *Barking Abbey and Medieval Literary Culture: Authorship and Authority in a Female Community*. York, UK: York Medieval Press, 2012.

Brown, Michelle. "Female Book Ownership and Production in Anglo-Saxon England: The Evidence of the Ninth-Century Prayerbooks." *Lexis and Texts in Early English: Studies Presented to Jane Roberts*. Ed. Christian Kay and Louise Sylvester. Amsterdam: Rodopi, 2001. 45–67.

---. "Mercian Manuscripts? The Tiberius Group and Its Historical Context." *Mercia : An Anglo-Saxon Kingdom in Europe*. Eds. Michelle Brown and Carol Ann Farr. London: Continuum, 2003. 278 –91.

Bugyis, Katie Ann-Marie. "Recovering the Histories of Women Religious in England in the Central Middle Ages: Wilton Abbey and Goscelin of Saint-Bertin." *Journal of Medieval History* 42.3 (2016): 285–303.

---. "The Practice of Penance in Communities of Benedictine Women Religious in Central Medieval England." *Speculum* 92.1 (2017): 36–84.

Burrows, John. "The Englishing of Juvenal: Computational Stylistics and Translated Texts." *Style* 36.4 (2002): 677–98.

---. "Questions of Authorship: Attribution and Beyond." *Computers and the Humanities* 37 (2003): 5–32.

Cain, Christopher M. "Some Observations on *e*-caudata in Old English texts." *Old English Philology: Studies in Honour of R.D. Fulk*. Eds. Leonard Neidorf, Rafael J. Pascual and Tom Shippey. Woodbridge, UK: D.S. Brewer, 2016. 233–55.

Campbell, Alistair, and Simon Keynes, eds. *Encomium Emmae Reginae*. 2nd edition. Cambridge University Press, 1998.

Cardiff, Public Library, MS I. 381 (includes *Vita Edithae*).

Clarke, Catherine A.M. "Reading Trauma in Early Medieval English Texts." *2021 Toller Lecture*, University of Manchester, delivered via Zoom 26 April 2021.

Clarke, Peter A. *The English Nobility under Edward the Confessor.* Oxford: Clarendon Press, 1994.

Colgrave, Bertram, and R. A.B. Mynors, eds. *Bede's Ecclesiastical History of the English People*. Oxford: Clarendon Press, 1969.

Crick, Julia. "The Wealth, Patronage, and Connections of Women's Houses in Late Anglo-Saxon England." *Bulletin d'histoire Benedictine* 109 (1999): 154–85.

Cubbin, G.P., ed. *The Anglo-Saxon Chronicle, MS D*. Cambridge, UK: D.S. Brewer, 1996

D'Angelo, Edoardo and Jan Ziolkowski, eds. *Auctor et Auctoritas in Latinis Medii Aevi Litteris / Author and Authorship in Medieval Latin Literature*. Florence: Edizioni del Galluzzo, 2014.

Dockray-Miller, Mary. *The Books and the Life of Judith of Flanders.* Farnham, UK: Ashgate, 2015.

Downey, Sarah, Michael Drout, Veronica E. Kerekes, and Douglas C. Raffle. "Lexomic Analysis of Medieval Latin Texts." *Journal of Medieval Latin* 24 (2014): 225–74.

Downey, Sarah, Michael Drout, Michael Kahn and Mark LeBlanc. "'Books Tell Us': Lexomic and Traditional Evidence for the Sources of Guthlac A." *Modern Philology* 110 (2012): 1–29.

Drogo. *Vita Godeliph.* Eds. Nikolaas-Norbert Huyghebaert and Stefaan Gyselen. Tielt: Lannoo/Bussum, 1982.

Drout, Michael. "Adapting Lexomic Analyses to Old English Gloss Corpora: A General Strategy and Some Preliminary Results." *Studies on Late Antique and Medieval Germanic Glossography and Lexicography in Honour of Patrizia Lendinara.* Eds. Claudia Di Sciacca *et al.* Pisa: Edizioni ETS, 2019. 265–86.

Drout, Michael. "'I am large, I contain multitudes': The Medieval Author in Memetic Terms." *Modes of Authorship in the Middle Ages*. Ed. Slavica Ranković. Toronto: Pontifical Institute of Medieval Studies, 2012. 30–51.

Drout, Michael, and Elie Chauvet. "Tracking the Moving Ratio of þ to ð in Anglo-Saxon Texts: A New Method, and Evidence for a lost Old English version of the 'Song of the Three Youths.'" *Anglia* 133.2 (2015): 278–319.

Drout, Michael, Namiko Hitotsubashi and Rachel Scavera. "Tolkien's Creation of the Impression of Depth." *Tolkien Studies* 11 (2014): 167–210.

Drout, Michael, Michael Kahn, Mark LeBlanc and Christina Nelson. "Of Dendrogrammatology: Lexomic Methods for Analyzing the Relationships Among Old English Poems." *Journal of English and Germanic Philology* 110 (2011): 301–36.

Drout, Michael, Yvette Kisor, Leah Smith, Allison Dennett and Natasha Piirainen. *Beowulf Unlocked: New Evidence from Lexomic Methods*. New York: Palgrave, 2016.

Dumville, Keynes, *et al.* eds. *The Anglo-Saxon Chronicle: A Collaborative Edition*. Cambridge, UK: D.S. Brewer, 1983.

Dyer, Betsey. "Blunt End." *Genome Technology* 1.27 (2002) [accessed Nov. 2014].

Eder, Maciej. "Rolling stylometry." *Digital Scholarship in the Humanities* 31.3 (2015): 457–69.

Eder, Maciej, Jan Rybicki, and Mike Kestemont. "Stylometry with R: A Package for Computational Text Analysis." *The R Journal* 8.1 (2016): 107–21.

Fell, Christine, ed. *Edward, King and Martyr*. Leeds, UK: University of Leeds, 1971.

Fleming, Robin. *Kings and Lords in Conquest England.* 1st paperback edition. Cambridge, UK: Cambridge University Press, 2004.

Folcard. "Vita S. Bertini." *Acta Sanctorum* Sept, ii. 604–13; *PL* 143.1089–98.

---. "Vita et Miraculae of John of Beverly." *The Historians of the Church at York and Its Archbishops*. Vol. 1. Ed. James Raine. London: Longman, 1879. 239–91.

---. "Prefatio." Ed. T.D. Hardy. *Descriptive Catalogue of Materials Relating to the History of Great Britain and Ireland*, Rolls Series 26. Vol. 1, 373–74 (in notes).

---. "De S.Botulpho Abbate." *Acta Sanctorum* June 4.327–28.

---. "Vita SS. Tancredi, Torhtedi et Toue." Ed. Walter de Gray Birch. *Liber vitae: register and martyrology of New Minster and Hyde abbey, Winchester.* London–Winchester: Simpkin, 1892, 284–86.

Foot, Sarah. *Veiled Women II: Female Religious Communities in England, 871–1066.* Farnham, UK: Ashgate, 2000.

Foucault, Michel. "What is an Author?". *Modern Criticism and Theory*. Ed. David Lodge. Longman, 1988. 197–210.

Goscelin of Canterbury. "Texts of Jocelyn of Canterbury which relate to the history of Barking Abbey" Ed. Marvin L. Colker. *Studia Monastica* 7 (1965): 383–460.

---. "The Liber Confortatorius of Goscelin of Saint Bertin" Ed. Charles H. Talbot. *Studia Anselmiana* 37 (1955): 2–177.

---. "La légende de Ste Édith en prose et vers par le Moine Goscelin" Ed. A. Wilmart. *Analecta Bollandiana* 56 (1938): 5–101.

---. "The Vita of Edith." Trans. Michael Wright and Kathleen Loncar. *Writing the Wilton Women: Goscelin's Legend of Edith and Liber Confortatorius*. Ed. Stephanie Hollis. Turnhout: Brepols, 2004. 23–68.

---. "Vita Sanctae Amalbergae Virginis." *Acta Sanctorum* Jul. iii. 90–102.

Gransden, Antonia. *Historical Writing in England.* Ithaca NY: Cornell University Press, 1974.

Halpin, Patricia. "Women Religious in Late Anglo-Saxon England." *Haskins Society Journal* 6 (1994): 97–110.

Hamilton, Thomas J. "Goscelin of Canterbury: A Critical Study of His Life, Works, and Accomplishments." PhD Dissertation, University of Virginia, 1973.

Heningham, Eleanor K. "The Genuineness of the Vita Æuuardi Regis." *Speculum* 21.4 (1946): 419–56.

---. "The Literary Unity, the Date, and the Purpose of the Lady Edith's Book: 'The Life of King Edward Who Rests in Westminster.'" *Albion: A Quarterly Journal Concerned with British Studies* 7.1 (1975): 24–40. doi:10.2307/4048396.

Hollis, Stephanie. "Introduction." *Writing the Wilton Women: Goscelin's Legend of Edith and Liber Confortatorius*. Ed. Stephanie Hollis. Turnhout: Brepols, 2004. 1–17.

---. "Wilton as a Centre of Learning." *Writing the Wilton Women: Goscelin's Legend of Edith and Liber Confortatorius*. Ed. Stephanie Hollis. Turnhout: Brepols, 2004. 307–38.

Hoover, David. "Testing Burrows's Delta." *Literary and Linguistic Computing* 19 (2004): 453–75.

Jebson, Tony, ed. and compiler. "Manuscript D: Cotton Tiberius B.iv." *The Anglo-Saxon Chronicle: An Electronic Edition*. 2007. Web. [Accessed 9 April 2021].

Jordan, Victoria B. "Chronology and Discourse in the Vita Ædwardi Regis." *The Journal of Medieval Latin* 8 (1998): 122–55.

Kestemont, Mike, Kim Luyckx, Walter Daelemans, and Thomas Crombez. "Cross-Genre Authorship Verification Using Unmasking." *English Studies* 93.3 (2012): 340–56. doi: 10.1080/0013838X.2012.668793

Keynes, Simon, and Rosalind Love. "Earl Godwine's Ship." *Anglo-Saxon England* 38 (2009): 185–223.

Kittang, Atle. "Authors, Authorship, and Work: A Brief Theoretical Survey." *Modes of Authorship in the Middle Ages*. Ed. Slavica Ranković. Toronto: Pontifical Institute of Medieval Studies, 2012. 17–29.

Licence, Tom. "Goscelin of St. Bertin and the Life of St. Eadwold of Cerne." *Journal of Medieval Latin* 16 (2006): 182–207.

---. "The Date and Authorship of the Vita Aedwardi Regis." *Anglo-Saxon England* 45 (2016): 259–85.

---, ed. *Miracles of St. Edmund*. Trans. Lynda Lockyer. Oxford Medieval Texts. Oxford University Press, 2014.

London, British Library, Harley 526 (includes the *Vita Edwardi Regis*).

Love, Rosalind. "'Et Quis Me Tanto Oneri Parem Faciet?': Goscelin of Saint-Bertin and the Life of St Amalberga." *Latin Learning and English Lore: Studies in Anglo-Sax-*

on Literature for Michael Lapidge (Vol.2). Ed. Katherine O'Brien O'Keeffe and Andy Orchard. Toronto: University of Toronto Press, 2005, 232–52.

---. "Folcard of Saint-Bertin and the Anglo-Saxon Saints at Thorney." *The Long Twelfth-Century View of the Anglo-Saxon Past*. Eds. M. Brett and D.A. Woodman. Farnham: Ashgate, 2015. 27–45.

---. "Goscelin of Saint-Bertin." *The Blackwell Encyclopaedia of Anglo-Saxon England*. Eds. Michael Lapidge *et al.* London: Blackwell Publishing, 2001. 213.

---. "'Torture Me, Rend Me, Burn Me, Kill Me!' Goscelin of Saint-Bertin and the Depiction of Female Sanctity." *Writing Women Saints in Anglo-Saxon England*. Ed. Paul E. Szarmach. Toronto: University of Toronto Press, 2013. 274–306.

Love, Rosalind C., ed. and trans. *Three Eleventh-Century Anglo-Latin Saints' Lives: Vita S. Birini, Vita Et Miracula S. Kenelmi, and Vita S. Rumwoldi.* Oxford, UK: Clarendon Press, 1996.

Love, Rosalind, ed. and trans. "The Life of St Wulfsige of Sherborne by Goscelin of Saint-Bertin: A New Translation with Introduction, Appendix, and Notes." *St Wulfsige and Sherborne: Essays to Celebrate the Millennium of the Benedictine Abbey, 998–1998*. Eds. Katherine Barker *et al.* Oxford, UK: Oxbow Books, 2005. 98–123.

Martin, Therese. "Exceptions and Assumptions: Women in Medieval Art History." *Reassessing the Roles of Women as 'Makers' of Medieval Art and Architecture.* Ed. Therese Martin. Leiden: Brill, 2012. 1–33.

Mason, Emma. *The House of Godwine : The History of a Dynasty.* London: Hambledon and London, 2004.

McAvoy, Liz Herbert, and Diane Watt. "Introduction: Women's Literary Culture and Late Medieval English Writing." *Chaucer Review* 51 (2016): 3–10.

McAvoy, Liz Herbert, and Diane Watt, eds. *Women's Literary Culture and Late Medieval English Writing*, special issue of *Chaucer Review*, vol. 51, 2016.

Miles, Laura Saetveit and Diane Watt, eds. "Colloquium: Women's Literary Culture and the Medieval English Canon: Gender and Genre." *Studies in the Age of Chaucer* 42 (2020): 285-378.

Minnis, Alastair. *Medieval Theory of Authorship.* 2nd edition. Philadelphia: University of Pennsylvania Press 2012.

Momma, Haruko. "Narrating the Battle of Hastings: Multilingual Britian and the Monolingualism of William of Malmesbury." *Multilingualism in Medieval Britain*. Eds. J. Jefferson and A. Putter. Turnhout: Brepols, 2012. 225–39.

Mortensen, Lars Boje. "From Vernacular Interviews to Latin Prose (ca. 600–1200)." *Oral Forms and Their Passage into Writing*. Eds. Else Mundal and Jonas Wellendorf. Copenhagen: Museum Tusculanum Press, 2008. 53–68.

Mortimer, Richard. *Edward the Confessor: The Man and the Legend.* Woodbridge, UK: Boydell Press, 2009.

Musset, Lucien. *The Bayeux Tapestry.* Trans. Richard Rex. Woodbridge, UK: Boydell Press, 2005.

Nelson, Janet. *Politics and Ritual in Early Medieval Europe.* London: Hambledon Press, 1986.

Osbern of Canterbury. *Vita Sancti Elphegi Archiepiscopi Cantuariensis et Martyris. PL* 149:0375-0387.

Otter, Monika. "1066: The Moment of Transition in Two Narratives of the Norman Conquest." *Speculum* 74.3 (1999): 565–86.

---. "Closed Doors: An Epithalamium for Queen Edith, Widow and Virgin." *Constructions of Widowhood and Virginity in the Middle Ages*. Eds. Cindy L. Carlson and Angela Jane Weisl. New York: St Martin's Press, 1999. 63–92.

---. "Introduction." *The Book of Encouragement and Consolation [Liber Confortatorius]*. Trans. Monika Otter. Oxford, UK: Brewer, 2004.

Oxford, Bodleian Library, Rawlinson C.938 (includes the *Vita Edithae*).

Partridge, Stephen, and Erik Kwakkel, eds. *Author, Reader, Book: Medieval Authorship in Theory and Practice.* Toronto: University of Toronto Press, 2012.

Pinner, Rebecca. *The Cult of St Edmond in Medieval East Anglia.* Woodbridge: Boydell, 2015.

Ranković , Slavica , ed. *Modes of Authorship in the Middle Ages*. Toronto: Pontifical Institute of Medieval Studies, 2012.

Rigg, A. G. *A History of Anglo-Latin Literature, 1066–1422.* Cambridge, UK: Cambridge University Press, 1992.

Rubenstein, Jay. "The Life and Writings of Osbern of Canterbury." *Canterbury and the Norman Conquest: Church, Saints, and Scholars 1066–1109*. Eds. Richard Eales and Richard Sharpe. London: Hambledon Press, 1995, 27–40.

Sharpe, Richard. "Goscelin's St Augustine and St Mildrith: Hagiography and Liturgy in Context." *Journal of Theological Studies* 41 (1990): 502–16.

---. "Words and Music by Goscelin of Canterbury." *Early Music* 19 (1991): 95–97.

Smith, Mary Frances, Robin Fleming, and Patricia Halpin. "Court and Piety in Late Anglo-Saxon England." *The Catholic Historical Review* 87.4 (2001): 569–602.

Smith, William. "Iwi of Wilton, a Forgotten Saint." *Analecta Bollandiana* 117 (1999): 297–318.

Södergård, Östen, ed. *La Vie d'Édouard le Confesseur: poème anglo-normand du XIIe siècle.* Uppsala: Almqvist & Wiksell, 1948.

Southern, R.W. "The First Life of Edward the Confessor." *The English Historical Review* 58 (1943): 385–400.

Stafford, Pauline. *Queen Emma and Queen Edith: Queenship and Women's Power in Eleventh-Century England.* London: Blackwell Publishers, 1997.

---. "The Portrayal of Royal Women in England, Mid-Tenth to Mid-Twelfth Centuries." *Medieval Queenship*. Ed. John Carmi Parsons. New York: St. Martin's Press, 1993. 143–67.

Summerson, Henry. "Tudor Antiquaries and the *Vita Ædwardi Regis*." *Anglo-Saxon England* 38 (2009): 157–84.

Tyler, Elizabeth M. "Crossing Conquests: Polyglot Royal Women and Literary Culture in Eleventh-Century England." *Conceptualizing Multilingualism in England, c. 800–c. 1250*. Ed. Elizabeth M. Tyler. Turnhout: Brepols, 2011. 171–96.

---. *England in Europe: English Royal Women and Literary Patronage, c. 1000–c. 1150.* Toronto: University of Toronto Press, 2017.

---. "When Wings Incarnadine with Gold Are Spread': The *Vita Aedwardi Regis* and the Display of Treasure at the Court of Edward the Confessor." *Treasure in the Medieval West.* Ed. E. M. Tyler. York: York Medieval Press, 2000. 83–107.

---. "From Old English to Old French." *Language and Culture in Medieval Britain: The French of England c. 1100–c. 1500*. Eds. Jocelyn Wogan-Browne *et al.* York, UK: York Medieval Press, 2009. 164–78.

---. "German Imperial Bishops and Anglo-Saxon Literary Culture on the Eve of the Conquest: *The Cambridge Songs* and Leofric's Exeter Book." *Latinity and Identity in Anglo-Saxon Literature*. Eds. Rebecca Stephenson and Emily V. Thornbury. Toronto: University of Toronto Press, 2016. 177–201.

---. "Skype Conversation with Elizabeth Tyler." 11 August 2017.

---. "The Vita Aedwardi: The Politics of Poetry at Wilton Abbey." *Anglo-Norman Studies: Proceedings of the Battle Conference* 31 (2009): 135–56.

Walker, Ian W. *Harold, the Last Anglo-Saxon King.* Stroud: Sutton, 1997.

Watt, Diane. "Lost Books: Abbess Hildelith and the Literary Culture of Barking Abbey." *Philological Quarterly* 91 (2012): 1–22.

---. *Medieval Women's Writing: Works by and for Women in England, 1100–1500*. Cambridge, UK: Polity Press, 2007.

---. "Small Consolation: Goscelin of St. Bertin's Liber Confortatorius and the Middle English Pearl." *Chaucer Review* 51 (2016): 31–48.

---. "The Earliest Women's Writing? Anglo-Saxon Literary Cultures and Communities." *Women's Writing* 20 (2013): 537–54.

---. *Women, Writing and Religion in England and Beyond, 650–1100.* London: Bloomsbury Academic, 2020.

Whitelock, Dorothy. "The Pre-Viking Age Church in East Anglia." *Anglo-Saxon England* 1 (1972): 1–22.

William of Malmesbury. *Gesta Pontificum Anglorum. The History of the English Bishops*. Eds. Michael Winterbottom and Rodney M. Thomson. Oxford, UK: Clarendon, 2006.

Williams, Ann and Geoffrey H. Martin. *Domesday Book: A Complete Translation.* New York: Penguin, 2002.

Yorke, Barbara. "Edgar's Women." *Edgar, King of the English 959–975: New Interpretations*. Ed. Donald Scragg. Woodbridge, UK: Boydell Press, 2008. 143–57.

---. *Nunneries and the Anglo-Saxon Royal Houses.* London: Continuum, 2003.

EVELINE LECLERCQ AND MIKE KESTEMONT

Advances in Distant Diplomatics

A Stylometric Approach to Medieval Charters

Abstract

The quantitative analysis of writing style (stylometry) is becoming an increasingly common research instrument in philology. When it comes to medieval texts, such a methodology might be able to help us disentangle the multiple authorial strata that can often be discerned in them (issuer, dictator, scribe, etc.). To deliver a proof of concept in 'distant diplomatics', we have turned to a corpus of twelfth-century Latin charters from the Cambrai episcopal chancery. We subjected this collection to an (unsupervised) stylometric modelling procedure, based on lexical frequency extraction and dimension reduction. In the absence of a sizable 'ground truth' for this material, we zoomed in on a specific case study, namely the oeuvre of the previously identified dictator-scribe known as 'RogF/JeanE'. Our results offer additional support for the attribution of a diplomatic oeuvre to this individual and even allow us to enlarge it with additional documents. Our analysis moreover yielded the serendipitous discovery of another, previously unnoticed, oeuvre, which we tentatively attribute to a scribe-dictator 'JeanB'. We conclude that the large-scale stylometric analysis is a promising methodology for digital diplomatics. More efforts, however, will have to be invested in establishing gold standards for this method to realize its full potential.[1]

1. University of Strasbourg and University of Antwerp.
The authors would like to thank Godfried Croenen for his valuable feedback on an earlier version of this paper.

1 Introduction: stylometry, authorship and diplomatics

In recent decades, and due to the influence of Digital Humanities, the quantitative study of writing style (or stylometry) has established itself as a relatively mainstream approach in literary studies. Certainly for modern literature, there now exist powerful modelling techniques that can shed new light on the authorship of anonymous or disputed documents on the basis of their writing style. Most of these methods are drawn from subfields of computer science, such as machine learning and information retrieval, that are concerned with similar issues regarding the provenance and authentication of documents. In computational studies for present-day texts, however, the concept of authorship is rarely explicitly defined, let alone critically questioned. For a given body of written text, the task of authorship identification comes down to the demarcation of the set of individuals that are directly responsible for its verbal (linguistic and stylistic) properties. Typically, although not exclusively, the author is understood to be a single person in these cases. While this operationalization might often suffice for modern texts, the apparent ease with which the concept of authorship can be applied in present-day computer science cannot easily be transposed to the realm of medieval text production.

For medieval texts, authorship is in many instances a much more layered phenomenon than for more recent literature. Medieval autographs, for instance, rarely survive, and one must account for the series of subsequent scribes that were involved in the transmission of a text, who all had their contribution to its final appearance – not to mention the impact of the modern text editor, who has inevitably also left traces in the edited text. In this contribution, we focus on medieval charters, where the phenomenon of authorship is even more complex and fragmented than in other medieval text varieties. A multitude of authorial roles must be distinguished, at least if one would like to do justice to the complex textual production process from which these texts resulted.[2] Indeed, at least three authorial roles must be distinguished when modelling the production of a medieval charter, and commonly, it was not a sole individual who fulfilled all these roles.

Firstly, the authority (*i.e.* the bishop, pope, count, local lord, abbot, …) responsible for the production of the charter can take on the role of author (the person expressing his/her will in the charter[3]) or that of 'issuer' (the person in whose name the charter is produced).[4] In this paper, for example, the bishop (the authority) frequently occurs as the 'issuer' of an episcopal charter. Apart from this author(ity), it is furthermore necessary to distinguish between the 'dictator' – *i.e.* the person who composes and perhaps dictates the (gist of the) text – and the 'scribe', *i.e.* the person putting the act into its final form of the original charter. This paper will henceforth make strict use of the terms 'dictator' and 'scribe' so as to avoid confusion between the two roles.

Identifying (or even just distinguishing between) these individuals is an essential task in diplomatics, the scholarly field that is concerned with the study of medieval charters, because this helps to sit-

2. An excellent discussion of this problem can be found in Tock, "Auteur ou impétrant?" 215–48. Here, we define charters as short legal documents, describing, for example, the accomplishment of a legal act or the existence of a legal fact, or thirdly a fact which gains its validity from the fixed form in which it has been written down (Cárcel Ortí 21)

3. "L'auteur d'un acte juridique est la personne qui manifeste la volonté exprimée dans cet acte." (Cárcel Ortí 23).

4. "L'auteur d'un acte écrit est la personne au nom de qui cet acte est intitulé." (Cárcel Ortí 24).

uate charters in space and time. Lexical (*i.e.* word-level or phrase-level) analyses, amongst others, have been previously applied to assess which individuals might have transcribed or composed specific charters; especially the use of fixed or formulaic language has frequently drawn attention in this respect. The term *dictamen* is commonly used to capture aspects of the discourse or writing style in the field of diplomatics.[5] This type of fixed-form writing heavily depended on local preferences and habits in the composition of documents, such as standard formulas shared by the dictators of a particular writing office. Such intertextual phenomena are crucial to understand how texts participated in the discursive culture of the Middle Ages (Culler 1380–1396). Somewhat surprisingly, computational techniques so far have been applied only infrequently in diplomatics, especially on a larger scale, although these could offer a useful complement to the kind of manual, and typically very labour-intensive approaches that already exist in the field.[6] Nevertheless, important advances have already been made regarding the electronic availability of source collections, as multiple digital editions and online databases of charters have emerged online in the last few decades such as the *Diplomata Belgica, Chartae Galliae* and *monasterium.net*, as well as a plethora of tools for transcribing and analysing historical texts such as the projects *Groningen Intelligent Writer Identification System*,[7] *Transkribus*,[8] *Escriptorium*,[9] *Arkindex*[10] and *Digipal*.[11] When it comes to stylometric techniques, one could furthermore mention Michael Gervers' DEEDS-project, used primarily to date undated medieval English charters (Gervers and Margolin 2007).[12] More recently, Nicolas Perreaux has applied unsupervised statistical techniques to a corpus of 250,000 charters to discover general trends in the diplomatic scriptural practices of France and the regionalization of these texts' vocabulary (Perreaux 2015 and 2016). This work is an important precursor to ours.

Thus, in an analogy to 'distant reading' (as opposed to 'close reading') in literary studies, this paper sets out to assess the feasibility of a stylometric approach in the context of 'distant diplomatics', *i.e.* the application of computational techniques to analyze charter corpora that are larger than one could analyze manually using conventional methods. Perreaux has already demonstrated that a panoramic perspective allows the detection of patterns and trends that would otherwise remain invisible. Whereas his research focuses on studying the dissemination of the vocabulary used in charters and its reflection of medieval society, our focus will lie with a more specific appli-

5. The definition used by Cárcel Ortí describes dictamen as "the internal arrangement of an act, its style, which is supposed to meet the rules of the chancery and the precepts of rhetoric" (Cárcel Ortí 82).

6. The latest advancement toward a digital approach has been the method of E. De Paermentier, which in a nutshell carefully compares selected formulas in a charter corpus, drawn from extensive databases. (De Paermentier, 48–67). As such, the method of E. De Paermentier could be viewed as a manual version of a stylometric analysis.

7. Web. Accessed 20th May 2021.

8. Web. Accessed 20th May 2021.

9. Web. Accessed 20th May 2021.

10. Web. Accessed 20th May 2021.

11. Web. Accessed 20th May 2021.

12. Currently, the part of the project which analyses the text of the charters has been discontinued; a database of dated charters allowing for comparison is still available and being expanded.

cation, namely stylistic similarities in the presence of the layered authorial structure presented above. The main challenge here is that we must mostly work in the absence of a 'ground truth', *i.e.* most of the time we do not have a small starting corpus for which we know the actual dictators and against which we can compare a wider set of documents. That will inevitably call into question, if we find stylistic similarities at all, at which authorial layer these resemblances must be interpreted.

From the beginning, we should note a few major methodological challenges. Firstly, charters contain fairly short texts, with a typical length ranging from 200 to 400 words, and even less once preprocessing techniques have been applied (see figure 1). This is problematic for many stylometric techniques (Luyckx, Daelemans 35–55; Koppel, Schler, and Shlomo 83–94). However, shorter texts such as blogs, e-mails, newspaper articles and tweets have already succesfully been considered in stylometric approaches (Hirst and Feiguina 405–17; Diederich, Kindermann, Leopold, and Paass 109–23; Sanderson and Guenter 482–91). Secondly, charter texts have a very formulaic character: their language and used formulas (dictamen) are largely fixed, depending on the writing office in which they were produced. In the larger discussion concerning the personal voice of the dictator in the dictamen of charters, it is nevertheless assumed that a degree of personal, stylistic freedom was still possible (Dijkhof 50). The application of stylometric methods to charter texts must nevertheless acknowledge this idiosyncratic aspect of the material.

The central focus here is the analysis of dictamen with the aid of stylometric techniques applied to a single case study. This case study concerns the twelfth-century bishops' charters of Cambrai, chosen for two reasons. Firstly, this particular writing office was rather well-organized and established during a time period when chanceries, dictamen and the *artes dictandi* in general were still in the process of development, thus offering a large corpus of preserved sources readily available in online databases. At the moment of writing, 505 charters dated between 1100 and 1201 are available (with their transcriptions) in the *Diplomata Belgica*[13] and 140 in the *Chartae Galliae*.[14] 100 out of 645 charters were duplicates (included in both databases), which left us with a corpus of 545 individual texts to encode. Secondly, the bishops' charters have been amply studied, allowing for a deeper analysis instead of still having to do the ground work (Van Mingroot, *De bisschoppelijke kanselarij*, 693–701; Van Mingroot, *Les chartes*, 1–15; Barré, "Chancellerie *épiscopale*,» 129–46; Leclercq,

13. This online database aims at containing all preserved charters relating to the current territory of Belgium dated before 1250. De Hemptinne, *et al.* In this paper, charters from this database will be referred to as 'DiBe' numbers.

14. This online database collects charters, dated up until the end of the thirteenth century, relating to the current territory of France. In this paper, charters from this database will be referred to as '*Chartae Galliae* Charter n°' numbers.

"L'élaboration des chartes *épiscopales*"). An explorative analysis like ours, we hope, could mean a step forward in the wider application of statistical methods in diplomatics.

The structure of this paper is as follows: first, we will describe the materials and detail the methodology, with ample attention to the limitations of our undertaking. Next, we zoom in on a case study (RogF/JeanE) and discuss the result from a stylometric perspective. In a follow-up section, with a qualitative analysis, the paper interprets the stylometric results with a conventional dictamen approach. Importantly, we resort to text reuse detection as an aid in assessing the similarities between documents. Finally, we comment on the possibilities of such an approach for dictator research, and its place in the future of the field of diplomatics.

2 Method and limitations

Below, we report on a stylometric analysis that we have performed on a representative corpus of medieval charter material; that is to say: a large enough group of charters, that is adequate in scope, but which doesn't overwhelm the scholar either. The main limitation of this material, as mentioned, is that most of these charters lack trustworthy labels, or a 'ground truth' in machine learning terms, regarding the dictators (and often also scribes) that were involved in their production. This means that we have to resort to an unsupervised analysis of the material which cannot be evaluated using traditional quantitative measures, such as attribution accuracy. We shall therefore critically discuss a visualization (in the form of a scatter plot) in terms of the global and local clusters which emerge. Through a close reading of some of the original charters in these local clusters, we aim to determine how these groupings relate to the state of the art in the non-quantitative scholarship in the field. To add focus to our discussion, we shall reserve special attention for a specific group of charters which were in all likelihood produced by a single individual introduced in greater detail further below: "RogF/JeanE."

In diplomatics, individuals who where active in the production of charters often cannot be identified with a specific name. As such, they are attributed using an identifier based on when they were active in a specific group, *c.q.* the bishop's chancery. The term 'chancery' itself could be seen as problematic: the definition of the term varies according to the period and region under scrutiny. In this paper, we use the term as *wissenschaftliche Hilfskonstruktion* designing "the grouping of the people in charge of the production of charters and other official documents, in a more or less regular capacity, in the service of a public authority."[15] The label, or 'emergency name', RogF/JeanE alludes to the presence of this dictator during the periods of office of Roger of Wavrin (1179–91) and Jean II of Antoing (1192–96) as bishops of Cambrai. The capital letter presents the chronological 'order' in which they appeared; RogF/JeanE appears as the sixth chancery collaborator under Roger of Wavrin and as the fifth under Jean II of Antoing. This chronological order is of course dependent on the source material, *i.e.* the preserved charters.

15. Definition by Eveline Leclercq as part of a larger discussion on the problematic term 'chancery'. Leclercq 4-7.

Preprocessing

The composition of this corpus has been guided by the following principles. It contains the texts of all charters available in the databases *Diplomata Belgica* and *Chartae Galliae* for which the Cambrai bishops Roger of Wavrin (1179–91) and Jean II (1192–96) were the responsible authorities, including the charters of the twenty-three beneficiaries implied in the bishop's charters during this period. All charters issued *by* and *for* these beneficiaries are included, as considering only the charters issued *by* the beneficiaries would present too limited a corpus. In total, 108 other authorities are present, such as the Pope, the Count of Flanders and local lords. Of the 591 charters mentioned in the consulted databases, 545 are included with transcriptions (92.2%); though not exhaustive, this corpus is large enough to allow for preliminary conclusions while being managable enough to keep an overview. Next, we have encoded this corpus of 545 charters, by marking the presence of conventional sections as follows: *invocatio* (the protocol: invocation, intitulatio, greeting), *dispositio* (preamble, the corpus of the text – *narratio* and *dispositio* – as well as the announcement of the witnesses), *testes* (the witness list) and *postscriptum* (date, subscriptions and eventual appreciation) using an ad hoc encoding scheme. The analysis reported below is largely restricted to the *dispositio*, as it can be argued that the other sections are (a) too formulaic to reveal any personal, stylistic traits or (b) too rich in case-specific proper nouns to yield stylistic features that would scale well to other documents.

Additionally, we have recorded charter-specific metadata in a separate spreadsheet.[16] This metadata includes for each charter (when available):

Identifier: the file name, composed of the charter reference number in the *Diplomata Belgica*, preceded by the name of the subcorpus. The episcopal charters carry the identifier "Ca_," whereas the beneficiaries are mentioned as a whole (for example "Affligem_1677").
Text: the reference to the text edition in the *Diplomata Belgica* (DiBe) or *Chartae Galliae* (ChaGal), followed by their reference number in the respective database.
Date: the date of the charter, specifically based upon the tag "datation interprétée" in the *Diplomata Belgica*.
Authority: the diplomatic author of the charter, designated by a name or initials. The initials are derived from these available in the *Diplomata Belgica*: "CO" (Count), "DUC" (Duke), "ROI" (King), "EMP" (Emperor), "SE" (lord), "EP" (Bishop), "AEP" (Archbishop), "Pope," "LEGAT" (papal legate), "Other" (all other available titles, mostly of private persons). In case of multiple charters issued by the same private person, these last initials are replaced by a specific name, as well as the specific title such as "bourgeois" or "châtelain." Finally, charters could be issued by clerical institutions or their members; these charters carry the name of the institution as the *authority* tag.
Specific name: the proper name of the implied authority, for example, "Roger of Wavrin."
Issuer: the person in whose name the charter is produced.
Beneficiary: the beneficiary of the charter.
Subject: the subject treated in the charter text.
Authenticity: whether the charter is considered a forgery, of doubtful provenance, or not suspicious.
Tradition: the textual tradition, specifically "copie" (a copy, of which sometimes the type has been specified in the databases: "copie (cartulaire)," "copie (source diplomatique)," "copie (manuscrit)" or "copie (d'érudit)"), "inconnue" (unknown), "original" or "vidimus."
Scribe: the individual responsible for the transcription of the original charter. In case the charter has only been preserved as a copy, the placeholder provided is "n/a." Often, this person is unknown, in which case the label "ncid" (no

16. This spreadsheet is provided along with the code on Zenodo, with DOI 10.5281/zenodo.5548217 and URL https://doi.org/10.5281/zenodo.5548217. As the texts themselves are subject to copyright within the databases they are published in, we provide the references to these databases.

current identification) has been used. When the scribe has been identified, the initials are adopted from the preliminary palaeographic research.[17]

17. This study has been executed in the context of a Ph.D. dissertation: Leclercq.

Dictator: the person who composed the text. In case of doubt, the initials are followed by a question mark. Most often, these persons remain unknown. Whenever possible, the place of redaction has been determined as follows: "chancery," "beneficiary," "mixed" (in case of a dictamen showing characteristics of the chancery as well as the beneficiary). "Uncertain" has been adopted for the undetermined cases.

Colour code authority: a unique code, allowing for regrouping the charters by authority.

Colour code subcorpus: a unique code, allowing for regrouping the charters by subcorpus.

Because this textual corpus contains many references to named entities (*e.g.* proper nouns), which are less usable for a stylistic analysis, we have decided to 'mask' these named entities, inspired by the practice proposed by Stamatatos (Stamatatos 461–73). Because the corpus is drawn from critical editions that consistently capitalize most named entities, this process could be automated. The only problematic cases that remain are capitalized words at the start of sentences. Therefore, unless the token also appeared in a non-capitalized form somewhere in the corpus, we masked out all capitalized words by replacing them with a series of asterisks of the same length as the original token ('Rogerus' would, for instance, become '*******'). Finally, the entire *dispositio* was lowercased and punctuation was removed. Below, we define words as space-free character strings in the preprocessed material. Figure 1 below summarizes some charter-level lexical statistics about the corpus: with a boxplot, we show the distribution of the word length of the charters, the number of unique words in them, as well as the number of unique words after masking (including the .25, .50 and .75 quartiles to give an idea of the distribution). Cumulatively, the charters in this dataset amount to 107,635 words, of which 18,540 are unique; the latter number drops to 12,254 after masking.

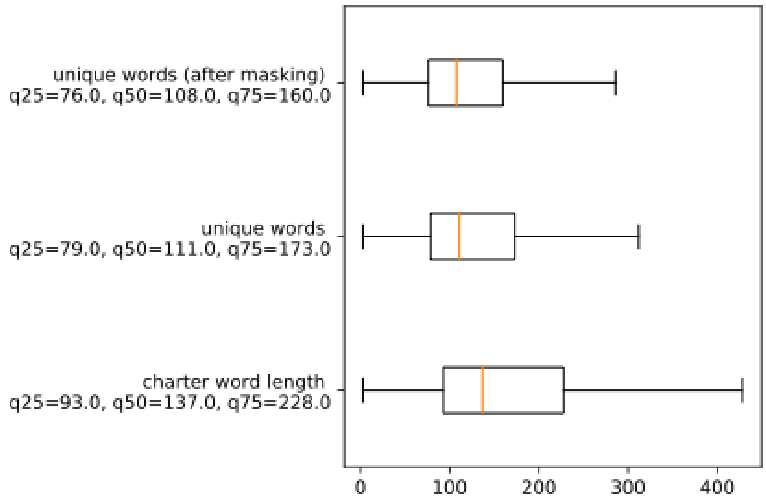


Figure 1. Charter-level lexical statistics: boxplots for the word length and number of unique words (before and after masking) for the 545 charters in the dataset. We include the .25, .50 and .75 quartiles to give a sense of the distribution.

Analysis: stylometry

For the analysis, we rely on a bag-of-words model, which is common practice in digital text analysis (Sebastiani 1–47). We represent the corpus as a frequency table, in which each row represents the *dispositio* of a single charter, and each column a particular word. The entirety of words in this table are referred to as the vocabulary. The cells of this table contain the relative frequency of each term. The rows in such a table are commonly called 'document vectors:' a list of numbers that characterize a document through a list of frequency values. We have applied a common scaling procedure to these numbers that is called TF-IDF normalization (term frequency-inverse document frequency). Simply put, this procedure will assign a relatively higher weight to terms that are relatively less frequent in the corpus, and thus more document-specific. Importantly, we have limited our bag of words model to the 1,000 words that have the highest frequency across the entire corpus. This limitation ensures that we work with a limited set of words that are well enough distributed over the data; *i.e.* not too sparsely distributed (Rybicki and Eder 315–21).

Next, we have created a square distance matrix: using an established distance metric from geometry (the Euclidean distance), we have calculated the distance between each combination of two charters. In the fictional case of a corpus consisting of three documents, this calculation would yield 9 (= 3 x 3) distance values that can be organized in a square matrix of 3 rows and 3 columns. This matrix would be symmetrical (*i.e.* the distance between document A and B would be equal to the distance between document B and A). Additionally, this matrix would have a diagonal of three zeros, because the Euclidean distance of a document to itself would always be zero. Previous research has shown that such distance metrics are well suited to capture the stylistic differences in writing style between document vectors. If two documents have a similar stylistic profile, the geometric distance between them will be relatively small – and vice versa, in the case of two documents that have a highly dissimilar writing style. Due to a lack of ground truth data, we have not been able to optimize this system. We, therefore, resort to parameters that seem well established in the literature.

Note that in the present case, we would end up with a 548 x 548 distance matrix, in which each row can again be considered a document vector, because it characterizes a single charter through a list of distance values, *i.e.* it reflects how distant a document is with respect to all other documents. We then represent this distance matrix using a popular visualization method called t-SNE, or *t-Distributed Stochastic Neighbor Embedding* (Van der Maaten and Hinton). This method visualizes the entire corpus as a two-dimensional scatterplot, in which each charter corresponds to a geometric point. Importantly, this technique is well-apt at preserving *local* clusters of similar documents in the resulting plot: charters with a similar stylistic profile can be expected to end up in the same region in the plot. Our discussion below will confront the clusters which emerge from this charter map with insights derived from traditional scholarship on this material.

Analysis: Text Reuse Detection

To support the discussion of the local clusters in the charter map, we have also applied a text reuse detection algorithm: early on we noted that many of the lexical similarities between charters seemed to correspond to the use of specific formulaic chunks. Text reuse detection, which singles out shared 'intertexts' or formulae between pairs of charters, yielded useful assistance in interpreting the stylistic proximity of text clusters during a close reading of the relevant documents. For this part of the analysis, we have relied on the Python *text-matcher* package developed by Jonathan Reeve (Reeve, "Text-Matcher"). Although this package has been developed for modern English-language text, much of the approach is language-independent and we have applied it here with its default settings. Future research could aim to finetune the parametrization for medieval Latin, which might certainly pay off (Manjavacas). The results below nevertheless demonstrate that this approach, even 'out of the box', already yields very useful results. The text-matcher package internally relies on Python's *difflib*, which implements a number of established routines for string alignment. This analysis, too, was restricted to the lowercased and preprocessed *dispositio* with masked named entities.

We have paired each charter with each other charter in the corpus and the resulting 'matches' have been saved in a tabular format, accommodating the easy perusal of the results (one file per document pair). An example is offered in figure 2: in the central column, the matching passage can be found, with the textual context in the columns on either side. The sources and targets of the matches alternate in the rows. The examples illustrate that the package allows for some 'fuzziness' when detecting matches (*e.g.* minor mismatches in the orthography of words).[18] The resulting matches have been taken into account during the analysis as additional arguments in the study of the dictamen.

18. Consult the package's documentation for more details (Reeve).

left context	match	right context
udo nos ammonet ut eos propensius confouere et promouere studeamus qui religiose conuersationis propositum sectari satagunt et amplecti inde est quod	dilectis in christo filiis xxxxxxx et sociis eius religionis habitum	in ecclesia sanctę xxxxx in pratis per dei inspirationem et institutionem consilii nostri suscipientibus eorum que sucessoribus altare sancti saluato
am eos precipue plenius confouere cohortari et adiuuare tenemur qui sanctę conuersationis iter artum et arduum amplecti et tenere ordiuntur propterea	dilectis in christo filiis xxxxxxx et sociis eius religionis habitum	secundum ordinem et institutiones ęcclesię sancti xxxxxxxx xxxxxxxxxxx assumere proponentibus terram illam quę est inter ecclesiam sancti saluatoris
us religionis habitum in ecclesia sanctę xxxxx in pratis per dei inspirationem et institutionem consilii nostri suscipientibus eorum que sucessoribus	altare sancti saluatoris et personatum eius atque omnes obuentus ad eundem personatum pertinentes preter annonam quam ecclesia xxxxxxxxxxx thesaurario ęcclesię sancte xxxxx xxxxxxxxxxxx annua pensione	persoluit deuote contulimus et nomine elemosinę in perpetuum assignauimus atque in sollemni synodo nostra recognouimus ea conditione quod prefata ecc
ibus libera electione instituatur preterea bono eorumdem proposito deo inspirante admodum delectati ipsa die susceptionis ordinis et habitus canonici	altare sancti saluatoris et personatum eius atque omnes obuentus ad eundem personatum pertinentes preter annonam quam ecclesia xxxxxxxxxxx thesaurario ęcclesię sanctę xxxxx xxxxxxxxxxxx annua pensione	persoluit contulimus et nomine elemosinę pro redemptione peccatorum nostrorum in perpetuum assignauimus eo tenore quod dies obitus nostri anniuersari
is presbyterum instituere unum de canonicis suis qui jus parrochiale prouideat et episcopo ac ministris eius de jure parrochiali respondeat cura uero	eiusdem parrochię in manu abbatis remaneat quoniam uero parrochia illa ad dignitatem thesaurarię ęcclesię sancte xxxxx xxxxxxxxxxxx pertinere dinoscebatur communi assensu capituli eiusdem ęcclesię simul que adhibita	coniuentia et beniuolentia xxxxxxx thesaurarii et decani predictę donationis sollemnitatem canonice terminauimus ac eidem xxxxxx eius que successorib
instituere presbyterum unum de canonicis suis qui ius parrochiale prouideat qui episcopo et ministris eius de iure parrochiale respondeat cura tamen	eiusdem parrochię in manu abbatis remaneat quoniam uero locus predictus in quo noua fundabatur ecclesia et prenominata parrochia sancti saluatoris ad dignitatem thesaurarię ęcclesię sancte xxxxx xxxxxxxxxxxx pertinere dinoscebatur communi assensu capituli eiusdem ecclesię simul que adhibita	coniuentia ac plenissima beniuolentia xxxxxxx thesaurarii et decani predicte donationis sollemnitatem canonice terminauimus ac eidem xxxxxx ac succes
atem thesaurarię ęcclesię sancte xxxxx xxxxxxxxxxxx pertinere dinoscebatur communi assensu capituli eiusdem ęcclesię simul que adhibita coniuentia et	beniuolentia xxxxxxx thesaurarii et decani predictę donationis sollemnitatem canonice terminauimus ac eidem xxxxxx eius que successoribus ad eiusdem thesaurarię titulum pleniorem restitutionem reddidimus	tria uidelicet altaria quę expressis nominibus duximus annotare altare de xxxxx altare de xxxxxxx altare de xxxxxx cum appendiciis suis statuentes ig
rarię ęcclesię sancte xxxxx xxxxxxxxxxxx pertinere dinoscebatur communi assensu capituli eiusdem ecclesię simul que adhibita coniuentia ac plenissima	beniuolentia xxxxxxx thesaurarii et decani predicte donationis sollemnitatem canonice terminauimus ac eidem xxxxxx ac successoribus eius ad eiusdem thesaurarię titulum pleniorem restitutionem reddidimus	cum celebratione obitus sui qui in predicta ęcclesia annis singulis recolendus instituetur statuentes igitur et sub anathematis interdicto precipient

Figure 2. Tabular example of the detected intertexts using text reuse detection for DiBe ID 7273 (blue) and DiBe ID 7652 (green). The overlapping text is shown in red in this example; left and right context of the match in both document can be found on either side of the matches.

3 Charter map: the case of RogF/JeanE

RogF/JeanE

This case study is situated in the context of the Cambrai episcopal chancery, a rather well-organized example of the administrative writing activity in the circle of a bishop. From its beginnings in 1057, the dictamen has been fairly well established for each individual bishop (Van Mingroot, *De bisschoppelijke kanselarij*, 693–701; Van Mingroot, *Les chartes*, 1–15). In particular, the first half of the twelfth century constitutes an interesting period with the presence of chancellor Werinbold III, whose influence largely regulated the chancery dictamen (Van Mingroot, *De bisschoppelijke kanselarij* 728; Barré, "Chancellerie épiscopale" 139; Brunel 238–240; Bedos-Rezak 120). His influence partially remained during the second half of this century. By the end of this period, the episcopal chancery became a less stable environment, as the bishop encountered political turbulence (De Moreau 76–77).

It is during this more unstable episode that the presence of one particular dictator has been previously noted, instigated by the recurrent use of the phrase *committimus … memoriali*. In the databases *Diplomata Belgica* and *Chartae Galliae*, used during a preliminary study, this formula is present in nine episcopal charters from Cambrai, dated from 1185 to 1198 (Leclercq 411).

Table 1. The Cambrai charters containing '*commitimus...memoriali*'.

DiBe ID	**Charter description**	**Date**	**Hand**
1870	Roger of Wavrin for Grand-Bigard	**1185/1187**	**Preserved as copy**
7648	Roger of Wavrin for the Templars	**1187**	**RogF/JeanE**
1804	Roger of Wavrin for Affligem	**1189**	**Preserved as copy**
1989	Roger of Wavrin for Tongerlo	**1189**	**RogF/JeanE**
2119	Roger of Wavrin for Saint-Martin of Tournai	**1189**	**Preserved as copy**
2130	Jean II of Antoing for Saint-Martin of Tournai (confirmation)	**1193**	**Preserved as copy**
3681	Jean provost and Adam dean of Notre-Dame for Anderlecht	**1195**	**Unknown hand**
3682	Jean II of Antoing for Anderlecht (confirmation)	**1195**	**RogF/JeanE**
8694	Hugues elect for Saint-Saulve of Valenciennes (confirmation)	**1198**	**Preserved as copy**

The dictamen of these charters is similar; in particular the phrases used in the protocol and eschatocol, combined with the *committimus memoriali* expression, hint at one possible dictator. Specifically, the charters of Roger of Wavrin for Affligem (1189), Tongerlo (1189) and Saint-Martin of Tournai (1189) show several similarities (underlined) but enough differences as well to conclude that they were not mere copies of each other (DiBe ID 1989):

> *In nomine domini. Rogerus diuina permissione Cameracensis episcopus tam posteris quam modernis in perpetuum. Quicquid sollemniter gestum est firmiter conualescit dum sacris litterarum annotatum apicibus thesauris memorie commendatur. Eapropter presenti committimus memoriali ut in communem noticie lucem prodeat quod pauperi ecclesie Tongerlensi altare de Ouelo sub elemosine titulo pro nostre predecessorum que nostrorum animarum salute libere contulimus ita tamen quod sorores eiusdem ecclesie apud Aiwen demorantes ter in anno cum sibi minute fuerint ex eiusdem prouentibus altaris refectione carnium contentur. Hanc igitur huius doni nostri et institute elemosine paginam ne quis mortalium attemptet infringere inhibentes in eius conseruatores diuinam diffundi benedictionem poscentes in eius uero detractores eterni penam promulgantes anathematis. Ipsam appensi caractere sigilli et subsignatione testium duximus communire. Signum Walteri et Sigeri archidiaconorum. Signum Walteri capellani. Signum Egidii de montibus. Signum Walteri Ciruiensis decani. Signum Iohannis Bruxellensis decani. Actum anno uerbi incarnati* M° C° LXXX° IX° *presulatus uero nostri decimo. Ego Walcherus cancellarius subscripsi et publice recognoui.*

The above charter can be considered a typical example of this dictator's dictamen; the protocol formulas (*intitulatio*, address, *salutatio*, clause of corroboration, witness list, dating) adhere to chancery practice. The details of each text in the list are resumed in the analysis below. We start from the working hypothesis that a single dictator was responsible for all of these charters, with the exceptions of the charter of Jean II of Antoing for Saint-Martin of Tournai (DiBe ID 2130) and the charter of Hugues elect for Saint-Saulve of Valenciennes (DiBe ID 8694). As these are confirmations, parts of these texts could very well be copied by a dictator in service of the beneficiary.

Of the above list, four charters are preserved in their original form, of which three are written by the same hand (see figure 3). The charter issued by Jean and Adam, respectively provost and dean of Notre-Dame of Cambrai, for Anderlecht from 1195 (DiBe ID 3681), has been executed or engrossed by another hand, probably situated in the Anderlecht chapter, and is a textual copy from the episcopal charter of that same year regarding the same subject (DiBe ID 3682). From the preliminary palaeographic research, we also have the following list of charters engrossed by RogF/JeanE:

Table 2. The list of charters likely engrossed by RogF/JeanE

DiBe ID	Charter description	Date	Place of conservation
7648	Roger of Wavrin for the Templars	1187	Archives Nationales Paris, S255/1
1989	Roger of Wavrin for Tongerlo	1189	Tongerlo, Abbey Archives n°37
3680	Provost Siger and dean Lambert of Anderlecht for Anderlecht	1195	Archives Départementales du Nord, 4G 704/6974
3682	Jean II of Antoing for Anderlecht	1195	Maison d'Érasme, n°6
1823	Siger d'Arras, archdeacon of Cambrai for Affligem	1196	Rijksarchief Leuven, A eccl. 4608/32

The charter of Siger d'Arras (DiBe ID 1823) does not contain *"commitimus… memoriali"* and is thus not included in table 1. This charter does contain a corroboration of the RogF/JeanE type: *"Nos igitur abbitrium nostrum ratum uolentes permanere et sigilli nostri appensione et testium digna subscriptione paginam presentem dignum duximus communire,"* but no additional elements we can link clearly to the established RogF/JeanE dictamen. As such, we prefer not to label this charter a RogF/JeanE product for lack of arguments. Plausibly, the other four charters of table 2 have been composed *and* engrossed by the same person, whom we term 'RogF/JeanE'; below, our aim is to assess, via stylometric means, the current working theory that dictator and scribe coincide in this specific case, and also, whether the oeuvre of this individual could potentially be enlarged.

The eight charters coined as RogF/JeanE products form our starting point for the analysis and are labeled as such in the visualizations below.

Table 3. The list of charters considered as RogF/JeanE products at the start of the analysis

DiBe ID	Charter description	Date
1870	Roger of Wavrin for Grand-Bigard	1185/1187
7648	Roger of Wavrin for the Templars	1187
1804	Roger of Wavrin for Affligem	1189
1989	Roger of Wavrin for Tongerlo	1189
2119	Roger of Wavrin for Saint-Martin of Tournai	1189
3681	Jean provost and Adam dean of Notre-Dame for Anderlecht	1195
3682	Jean II of Antoing for Anderlecht (confirmation)	1195
3680	Provost Siger and dean Lambert of Anderlecht for	1195

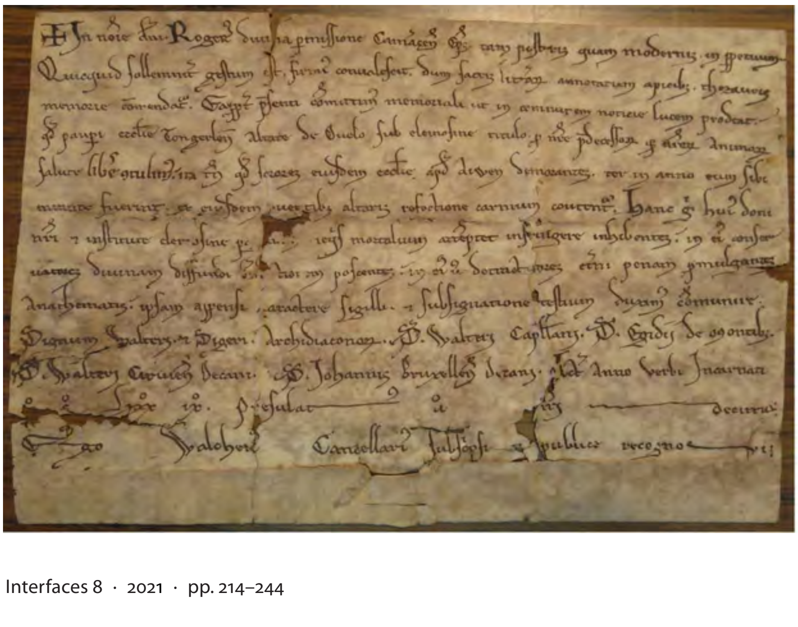


Figure 3. The hand RogF/JeanE in Tongerlo, Abbey Archives n°37.

The possible identity for this individual could be found in the person of a certain *Siger*, as this name is present in all the charters linked to RogF/JeanE.[19] We have compiled a list of all Sigers – a widespread name during this period – in the Cambrai charters and in the necrologic documentation.[20] A potential candidate for the identification of RogF/JeanE, is Siger of Arras, archdeacon of Cambrai, mentioned in the *Diplomata Belgica* charters from 1187 (DiBe ID 1872) to 1211 (DiBe ID 14662). He is specifically mentioned as *magister* in 1201 (DiBe ID 13101) and 1211 (DiBe ID 14662). Potentially, Siger moved to the Anderlecht chapter and took up the role of provost as well. A Siger is mentioned in the witness lists of charters pertaining to members of the Saint-Peter's chapter from 1173 onward,[21] and specifically as *magister* in 1175 (DiBe ID 3686). The provost Siger even issued a charter destined for Kortenberg in 1195 (DiBe ID 10476). All originals written by RogF/JeanE are issued by the bishop or by a Siger, the provost in 1195 and the archdeacon in 1196.

As the 1196 charter (DiBe ID 1823) has been issued in this Siger's own name, and is of the hand of RogF/JeanE, it could reinforce the argument that all these references are to a single person. Unfortunately, save the corroboration we are uncertain of its status as a RogF/JeanE product. This charter does contain a corroboration of the RogF/JeanE type: "*Nos igitur abbitrium nostrum ratum uolentes permanere et sigilli nostri appensione et testium digna subscriptione paginam presentem dignum duximus communire*." The charters in the *Diplomata Belgica* database which mention this archdeacon (1187-1211) additionally present a collection of writing styles that seemingly differ from RogF/JeanE; other dictators were probably involved in their conception[22].

Analysis of the charter map

The t-SNE visualization is shown in figures 4 and 5 with different colourings. In figure 4, the charter material is presented using colour codes encoding the different origins, *i.e.* charters issued by the beneficiaries and by the Cambrai bishops' charters. The scatter plot shows, for example, the papal charters (purple areas) on each side of the scatterplot, which have a very distinct dictamen. The charters for Ename abbey (blue areas), too, are distinctly regrouped.

19. *Sigeri de Atrebato archidiaconorum* (DiBe ID 1870); *Sigeri archidiaconi* (DiBe ID 7648; DiBe ID 1804. DiBe ID 1989. DiBe ID 2119. DiBe ID 8694); *Sigeri […] presbiterorum* (DiBe ID 3681. DiBe ID 3682); *Sigerus dei gratia Cameracensis archidiaconus* (DiBe ID 1823); *Sigeri […] praesbiterorum* (DiBe ID 3682).

20. We arrive at the following list for the second half of the twelfth century: 1160: deacon Siger (*Chartae Galliae* Charter n° 212748); 1162: *magister* Siger (DiBe ID 4779); 1185-1186: archdeacon Siger of Arras (DiBe ID 1870. DiBe ID 1823); 1187-1205: archdeacon Siger, mentioned 1189 with the additional title of *magister* (DiBe ID 496. DiBe ID 2799. DiBe ID 496. DiBe ID 13757). An archdeacon Siger is mentioned in the Notre-Dame of Cambrai obituary on the twenty-fourth of October (Municipal Library of Cambrai, B 229, f°79v°); 1195 : the priest Siger (DiBe ID 3682). A *Segardus presbiter* is mentioned on the 24th of March in the Notre-Dame of Cambrai breviary (Municipal Library of Cambrai, B 46, f°2v°). The thirteenth-century cathedral chapter obituary shows *Sygerus presbiter* on the sixteenth of February, but this mention has been erased (Municipal Library of Cambrai, B 1161 f.12r.); 1195: *magister* Siger, provost of Saint-Peter's of Anderlecht (DiBe ID 3680). It is quite probable that a *magister* mentioned in 1162, the archdeacon and the *magister* mentioned from 1185 until 1205 refer to the same person.

21. DiBe ID 1981. DiBe ID 3518. DiBe ID 3685. DiBe ID 3686. DiBe ID 3517.

22. DiBe IDs 1872, 1803, 4482, 2886, 31032, 8692, 2902, 10897, 10898, 13045, 13563, 34033, 32274, 14484 and 14662.

Figure 4. Two-dimensional t-SNE scatter plot visualization of the 545 x 545 Euclidean distance matrix, obtained on the basis of a TF-IDF normalized bag of words model (for a vocabulary of 1,000 words, after masking). The colours refer to the episcopal charters (teal) versus the various other authorities. The episcopal charters are dispersed through the complete visualization as they have textual links to the various institutions the chancery wrote for.

When looking closer at our dictator-scribe RogF/JeanE, the charters hypothetically attributed to him are located, surprisingly close to one another, within a group of Cambrai bishops' charters (see figure 5). To corroborate this impression of proximity, we collected all rows in the distance matrix, tentatively attributed to RogF/JeanE and paired them exhaustively to calculate the Euclidean distance between them. Next, we did the same for all other charters that were not attributed RogF/JeanE. The latter operation would of course yield much more distances, but nevertheless allows us to assess whether the distance between the hypothetical RogF/JeanE documents is indeed smaller than that for two random charters in the dataset. The boxplot visualization in figure 6 (first and second row) does suggest this to be the case.

The more detailed analysis of the charter texts below is organized in five, manually assigned clusters (see figure 7). Cluster A contains multiple charters linked to the abbey of Saint-Martin of Tournai. Cluster B includes multiple charters linked to the Saint-Peter's chapter of Anderlecht, as well as a few other charters. Cluster C consists almost exclusively of Cambrai bishop's charters. Cluster D presents a rather heterogeneous group which will not be discussed in detail in this paper as these texts show no connection to RogF/JeanE. Finally, cluster E comprises two bishop's charters that demand our attention in particular.

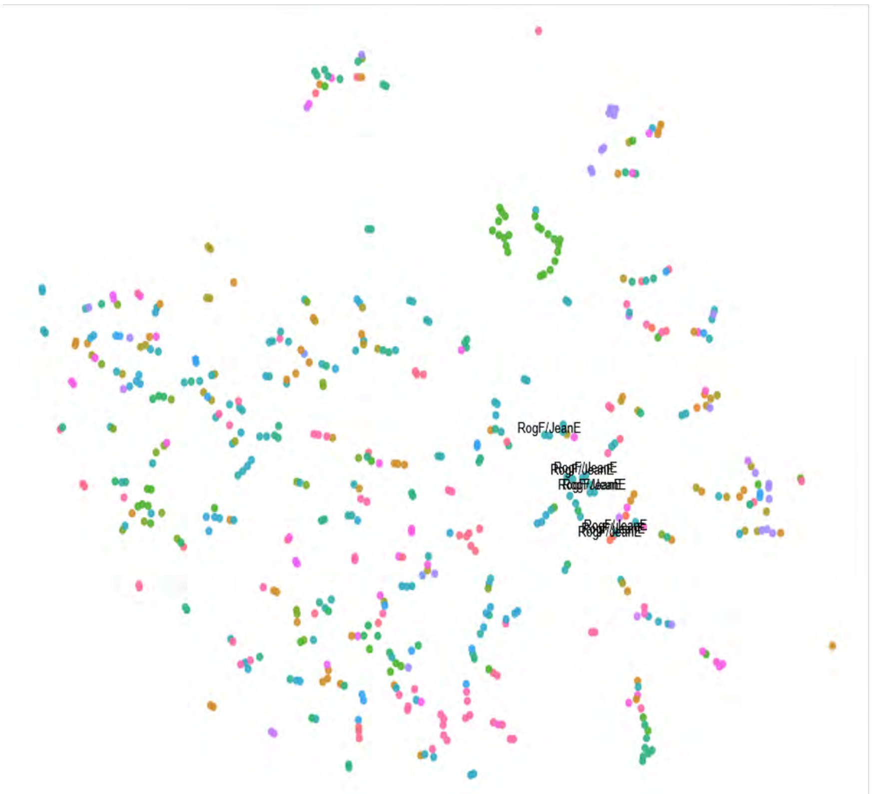


Figure 5. Same as figure 4, but with the RogF/JeanE charters explicitly labeled. Colouring based on the different beneficiaries, with the exception of the Cambrai episcopal charters (teal).

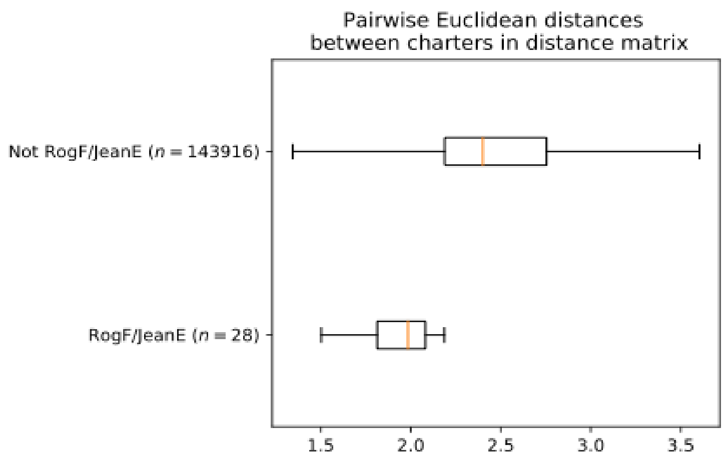


Figure 6. Boxplot visualization of the Euclidean distances between rows in the distance matrix, for all document pairs from two categories: RogF/JeanE and all documents not currently attributed to RogF/JeanE.

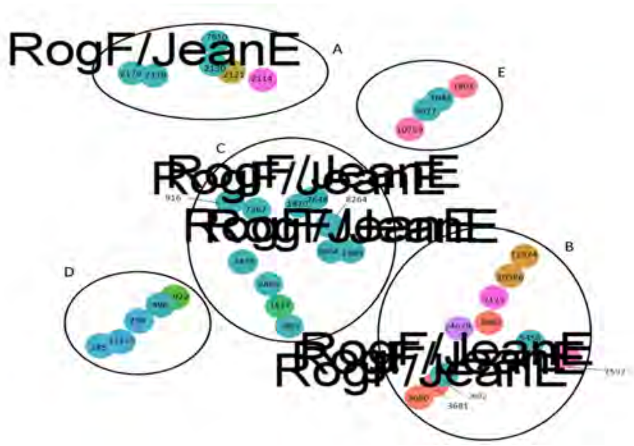


Figure 7. Detail of the visualisation featuring the *Diplomata Belgica* references.

Cluster A

In the first cluster, featured in the top left corner of this image, we can find the following charters:

DiBe ID	Charter description	Date
2114	Guillaume I of Champagne Archbishop of Reims for Tournai (Saint-Martin)	1186
2179	Roger of Wavrin for Mons (Sainte-Waudru)	1186
2121	Jean provost and Hugues dean of Cambrai (Notre-Dame) for Tournai (Saint-Martin)	1189
2119	Roger of Wavrin for Tournai (Saint-Martin)	1189
7810	Jean II of Antoing for Saint-Amand	1193
2130	Jean II of Antoing for Tournai (Saint-Martin)	1193

Table 4. The description of the charters in cluster A.

The presence of multiple charters linked to Saint-Martin of Tournai, issued by different authors, is immediately clear. Three of these charters can be neatly regrouped. The charter of Guillaume I of Champagne (DiBe ID 2114) shows only a tenuous link to the other texts. When comparing this charter to the other Cambrai texts, its dictamen does not feature the Cambrai characteristics. Rather, it contains rather general phrases.[23] These appear in multiple charters coming from different dioceses. The longer sentence "*presentis scripti patrocinio … audeat infringere"* is present in six other corpus texts, of which three are issued by this archbishop[24]. As such, the dictamen might be linked more to the Archbishop of Reims. This charter is linked to the other Saint-Martin of Tournai texts, as well as to a Vaucelles and an Affligem charter, through parts included in the clause of corroboration.[25] The other Saint-Martin of Tournai texts are connected through their subject.

The charter of Jean provost and Hugues dean of Notre-Dame of Cambrai for Saint-Martin of Tournai, dated 1189 (DiBe ID 2121), ratifies the donation of the Saint-Martens-Lierde, Beloeil and Ormegnies altars, donated the same year by Roger of Wavrin to Saint-Martin of Tournai (DiBe ID 2119). The charter of Jean II of Antoing from 1193 confirms the donation (DiBe ID 2130). These three texts share a particular phrase: "*altare de Lierde sancti Marini et altare de Bailluel cum altari de Ormegnies.»* It is valuable to note that the text reuse detection result seems very generic: "*xxxxxxx xxxxxxxxxxx altare de xxxxxx sancti xxxxxxx et altare de xxxxxxxx cum altari de,*" yet it has yielded an interesting connection. The phrase "*altare de Lierde sancti Martini et Deiamicus clericus noster altare de Bailluel cum altari de Ormegnies"* can also be found in a charter of Roger of Wavrin for Saint-Martin of Tournai from 1189, which announces the donation to the deans of Chièvres and Grammont (DiBe ID 2120). This text is not presented near this cluster A: the remaining dictamen is indeed different.

The charter issued by Jean provost and Hugues dean of Notre-

23. "*ad quos littere iste peruenerint in domino salutem,*" "*nouerit uniuersitas uestra,*" "*presentis scripti patrocinio et sigilli nostri impressione confirmamus statuentes … ne quis hanc nostre confirmationis paginam audeat infringere.*"

24. DiBe ID 1677. *Chartae Galliae* charter n°211866. *Chartae Galliae* charter n°212636. *Chartae Galliae* charter n°212637. *Chartae Galliae* charter n°212640. *Chartae Galliae* charter n°212641.

25. "*Ne quis hanc nostre confirmationis paginam audeat infringere uel*" in the charter of Guillaume I of Champagne for Vaucelles, 1192. DiBe ID 36258. "*Presentis scripti patrocinio et sigilli nostri auctoritate confirmamus statuentes et*" in the charter of Guillaume I of Champagne for Affligem, 1188. DiBe ID 1677.

Dame of Cambrai (DiBe ID 2121) shows a part of the *notificatio* close to the episcopal model;[26] the clause of corroboration in particular fits this mold.[27] The charter of Jean II of Antoing from 1193 (DiBe ID 2130) almost completely copies the preamble from the original donation by Roger of Wavrin.[28] These two texts were not drafted by RogF/JeanE. They show proximity due to their shared subject, as well as the few chancery characteristics mentioned above. They are featured closer to each other than to the Roger of Wavrin charter for Saint-Martin from 1189 (DiBe ID 2119) to which these two charters refer. This last charter has been established during the preliminary dictamen-research as a typical charter of RogF/JeanE, of which we have detailed the text above while introducing our dictator.

The charter issued by Roger of Wavrin for Sainte-Waudru of Mons, from 1186 (DiBe ID 2179), is shown closer to the typical dictamen of RogF/JeanE as well. This text contains an episcopal dictamen, especially in the clause of corroboration linked to the penal clause, which is close to the dictamen of RogF/JeanE: "*Hanc igitur iuste et honeste donationis nostrę et elemosinę paginam ne quis mortalium ausu temerario attemptet infringere sub anathematis interminatione districtius inhibentes et ut ratior perseueret eam sigilli nostri appensi karactere et sufficienti testium subsignatione duximus communire.*" The protocol, the use of *eapropter* in the beginning of the *dispositio*, the use of "*pro nostra et predecessorum nostrorum Cameracensium Episcoporum*" as well as "*misericorditer … concessimus et firmauimus*" and finally the dating clause point to a RogF/JeanE dictamen. As such, the stylometric analysis has provided us with a first addition to the list of charters considered as RogF/JeanE products.

Finally, this cluster includes the charter of Jean II of Antoing for Saint-Amand, from 1193 (DiBe ID 7810). This charter's text shows chancery elements which differ from the RogF/JeanE dictamen, especially in the protocol[29] and the penal clause.[30] The formula "*Nulli ergo omnino hominum liceat hanc paginam nostre confirmationis*" has been found by the text reuse detection in twelve papal charters and one charter by Count Baudouin IX of Constantinople.[31] It is not exactly clear why the analysis has placed this charter closely to the charter issued by Jean II of Antoing for Saint-Martin of Tournai in 1193 (DiBe ID 2130): the general episcopal dictamen could be the defining factor.

Cluster B

In this second cluster, three Anderlecht charters are put close to each other by the applied algorithms and could well be considered prod-

26. "*Eapropter nouerit uniuersitas paginam presentem inspicientium quoniam dilectissimus episcopus noster Rogerus pro salute anime sue et suorum concessit monasterio et fratribus.*"

27. "*Hanc ergo donationem concedentes et per omnia ratam habentes presenti scripti subnixam esse et uolumus et sigilli nostri appensione corroborare dignum duximus.*»

28. "*Sacris litteram apicibus facta perpetuantur sollemnia et cauillationes littium ne aduersus ea suscitentur in posterum sopiuntur. Presenti eapropter memoriali committimus quod altare de Lierde sancti Marini et altare de Bailluel cum altari de Ormegnies que predecessor noster dominus Rogerus bone memorie Cameracensis episcopus assensu capituli sancte Marie Cameracensis ecclesie sollemniter et canonice sub elemosine titulo contulit.*"

29. "*Uniuersis ad quos littere presentes peruenerint salutem in domino*"

30. "*Nulli ergo omnino hominum liceat hanc paginam nostre confirmationis et diffinitionis infringere uel ei temere obuiare salua auctoritate apostolice sedis et metropolitan*"

31. DiBe ID 4480, DiBe ID 1786, DiBe ID 2115, DiBe ID 809, DiBe ID 780, DiBe ID 779, DiBe ID 735, DiBe ID 732, DiBe ID 2257, DiBe ID 2823, DiBe ID 7248, *Chartae Galliae* charter n°201279, DiBe ID 1819.

DiBe ID	Charter description	Date
4629	Godefroid III Duke of Brabant for the Templars	1181
5456	Roger of Wavrin for Bellingen	1182
12924	Gautier abbot of Arrouaise for Arrouaise	1183
10386	Jean provost and Hugues dean of Cambrai (Notre-Dame) for Arrouaise	1188
2125	Jean abbot of Tournai (Saint-Martin) for Roger of Wavrin	1189
3680	Sigerus provost and Lambert dean of Anderlecht for church of Anderlecht	1195
3681	Jean provost and Adam dean of Cambrai (Notre-Dame) for Anderlecht	1195
3682	Jean II of Antoing for Anderlecht	1195
3683	Henri I Duke of Brabant for Anderlecht	1195
7592	Baudouin IX of Constantinople Count of Flanders-Hainaut for Valenciennes (Saint-Saulve)	1196

Table 5. The description of the charters in cluster B

ucts of RogF/JeanE. The charter issued by Jean provost and Adam dean of Notre-Dame of Cambrai, dated 1195 (DiBe ID 3681), concerns the transfer of the Anderlecht altar and all its possessions; this charter is almost completely copied from the one issued by Jean II of Antoing the same year (DiBe ID 3682). The same legal act is confirmed by the charter from Sigerus provost and Lambert dean of Anderlecht (Dibe ID 3680). Finally, a fourth charter intended for Anderlecht has been issued by the Duke of Brabant Henri I the same year (DiBe ID 3683): the text confirms this same transfer and copies a few parts of the dictamen.[32] The remainder of the dictamen differs from the formulas used by RogF/JeanE.

The charter presented next to it, issued by the Duke of Brabant Godfrey III for the Templars in 1181 (DiBe ID 4629), is probably shown closer to the Henri I charter due to a possibly ducal dictamen. This could indicate the existence of some form of ducal chancery; this assumption seems to be incorrect for the twelfth century however: according to Michel Margue there was in the Mosan region no chancery linked to a prince in the strict sense; at the same time, true beneficiary products seem rare as well, as the prince could count on clerics, sometimes connected to one of the Hausklöster, who were charged with the writing of the charters (Margue 227, 235 and 242).

These two ducal charters do not show particular common formulas, with the exception of the *intitulatio* "*dei gratia dux Lotharingiae*." A full study of the duke's possible dictamen does not fit within the confines of this paper; we can at least identify clear traces of a non-episcopal dictamen. As such, a redaction by RogF/JeanE is improbable. It is possible that the vectorial representation of the second ducal charter (DiBe ID 4629) is geometrically close to the RogF/JeanE texts due to the nature of our corpus: after all, the complete ducal charter corpus is not included, thus, ducal texts present in the visualization are scattered. More general formulas (in particular "*munimine roborauimus*" and "*sigilli nostri appensione*") can be noted in a few other ducal charters present in the databases.[33]

32. "*in publicam prodire uolumus notitiam, sub annua pensione 40 librarum Cameracensis monetae*" and "*inconuulsum manere uolentes sigilli nostri appensione.*"

33. DiBe ID 16388. DiBe ID 29782. DiBe ID 34161. DiBe ID 18107. DiBe ID 29772. *Chartae Galliae* charter n°211898.

The two charters studied next show an episcopal dictamen: the charter issued by Jean abbot of Saint-Martin of Tournai for Roger of Wavrin, dated 1189 (DiBe ID 2125), and the one issued by Jean provost and Hugues dean of Notre-Dame of Cambrai for Arrouaise, dated 1188 (DiBe ID 10386). These texts were not included in the preliminary dictamen study, as the bishop takes up the role of beneficiary and author respectively and not the one of issuer. It is certainly possible these documents were written in the episcopal chancery as the prelate played a prevalent role in their juridical conception, or was at least the superior authority implied in the legal act.

The charter by Jean abbot of Saint-Martin of Tournai (DiBe ID 2125) contains a distinctly episcopal dictamen: "*in nomine domini*," "*tam modernis quam posteris in perpetuum*," the use of "*eapropter*" at the beginning of the *dispositio*, "*libere et absolute contradidimus in usus*," "*Actum anno uerbi incarnati*." These elements, in particular combined with the corroboration "*Hanc igitur huius doni nostri paginam inconuulsam in euum manere uolentes eam nostre ymagine sigilli et sub signatione testium duximus roborare*," relate to a dictamen by RogF/JeanE, and constitute our second addition.

The presence of an episcopal dictamen in the charter by Jean provost and Hugues dean of Notre-Dame for Arrouaise (DiBe ID 10386) is hardly surprising. After all, the chapter charters and the episcopal charters are considered to be produced by the same group of people (Barré 129-146). This case here shows multiple chancery characteristics in the eschatocol[34] as well as at the end of the text.[35] The dictamen is not particularly evocative of that of RogF/JeanE, while it is probably a chancery product.

This last charter shows a link to the charter issued in 1183 (DiBe ID 12924) by Gautier abbot of Arrouaise for that same institution, only through the use of the phrase "*rata habemus*," rather frequently found in the *Diplomata Belgica* and the *Chartae Galliae* databases.[36] The only other connection remains their shared beneficiary. It is possible the computer code has classified these two texts close together due to the appearance of a literal citation in a non-exhaustive corpus. In addition, the Gautier abbot charter is very short and does not allow for much comparison.

The two last charters in the B cluster prove to be problematic. The charter issued by Roger of Wavrin for Bellingen in 1182 (DiBe ID 5456) and the charter issued in 1196 by the Count of Flanders Baudouin IX of Constantinople for Saint-Saulve of Valenciennes (DiBe ID 7592) show no resemblances in their dictamen, nor do they share their subject

34. "*In nomine sancte et indiuidue Trinitatis, amen. Iohannes, Dei gratia Beate Marie Cameracensis.*»

35. "*Presens scriptum appenso sacro beate Uirginis karactere muniuimus et testes legitimos ac sufficientes subscripsimus*" and "*Actum anno Uerbi Incarnati*."

36. We can report 118 occurrences of "*rata habemus*" in the *Diplomata Belgica* from 1160 to 1250 (as well as a forgery from 1628 but dated 642) of which 22 cases are Cambrai episcopal charters (1178 tot 1250 and the aforementioned forged charter). The *Chartae Galliae* report 100 occurrences between 1145 and 1295, none in Cambrai charters. Accessed 16th Jan. 2019.

or beneficiary (DiBe ID 5456. DiBe ID 7592). The charter from Roger of Wavrin showcases a few episcopal characteristics, such as "*notum igitur sit tam posteris quam modernis*" shared with the charter from Roger of Wavrin for Aymeries, dated 1179 (DiBe ID 10910). This last text is represented in one of the large collections of Vaucelles charters, on the opposite side of the visualization. One would rather expect to find these two charters closer to one another on the graph. Whether this is due to a 'deeper' comparison than the simple reuse of words is currently unclear.

Cluster C

Table 6 - The description of the charters in cluster C.

DiBe ID	**Charter description**	**Date**
2865	Roger of Wavrin for Ninove	1179
3455	Roger of Wavrin for Kortenberg	1180
7367	Roger of Wavrin for Hautmont	1185
916	Roger of Wavrin for Ename	1185
1870	Roger of Wavrin for Grand-Bigard	1185
8264	Roger of Wavrin for Arras (Saint-Jean)	1186
7648	Roger of Wavrin for the Templars	1187
1804	Roger of Wavrin for Affligem	1189
1989	Roger of Wavrin for Tongerlo	1189
803	Jean II of Antoing for Ghent (Saint-Pierre)	1192
1817	Lambert provost and Christine provost of Mons (Sainte-Waudru) for Forest	1195

All charters included in this cluster show characteristics of the episcopal chancery. Four of these texts have indeed been identified as RogF/JeanE products during the preliminary dictamen research: the charters issued by Roger of Wavrin for Grand-Bigard in 1185 (DiBe ID 1870), for the Templars in 1187 (DiBe ID 7648), for Affligem in 1189 (DiBe ID 1804) and for Tongerlo the same year (DiBe ID 1989). These texts contain the phrase considered typical of this dictator: "*commitimus… memoriali.*" In the Affligem charter (DiBe ID 1804) we find the use of the phrase "*diem obitus nostri patris que nostri (ac) matris,*" equally found in a charter from this dictator included in cluster A, the charter issued by Roger of Wavrin for Saint-Martin of Tournai in 1189 (DiBe ID 2119), which as discussed above showcases the dictator's typical dictamen.

These four texts are organized around Roger of Wavrin's charter for Saint-Jean of Arras, dated 1186 (DiBe ID 8264), which shows many similarities to the dictamen of RogF/JeanE and is considered our third addition. "*Presenti eapropter memoriali in omnium noticiam diffundi*" is close to the charter issued in the same year by Roger of Wavrin for Sainte-Waudru of Mons (DiBe ID 2179), equally presumed to be a RogF/JeanE product. "*Paginam rata manere volentes in ejus conserva-*

tores diffundentes benedictionem" is also found in a charter from Roger of Wavrin for Vaucelles, dated 1189 (DiBe ID 10760).[37] This last writ is presented on the other side of the visualization, in a group of charters connected to Vaucelles, next to the charter issued by Jean II of Antoing for Vaucelles in 1193 (DiBe ID 10772).[38] Finally, the penal clause "*eterni penam promulgantes anathematis*" is equally present in the charter issued by Roger of Wavrin for Tongerlo in 1189 (DiBe ID 1989) and the one issued by the same prelate for Hautmont in 1185 (DiBe ID 7376).

This last charter is shown close to the four RogF/JeanE products and clearly contains an episcopal dictamen. Even though no absolute argument such as *"commitimus… memoriali"* is present to rule this text a RogF/JeanE product, we consider this to be the case. This brings our current total of additions to four.

The charter issued by Roger of Wavrin for Ename in 1185 (DiBe ID 916) is shown closest to the Hautmont text (DiBe ID 7376) and contains chancery characteristics as well. It is certainly not drafted by RogF/JeanE, in particular when we look at the use of "*dei uocatione"* in the intitulatio and "*pie fauentibus cauterio anathematis infestantes,*" both phrases this dictator never used as far as we know. The preamble contains *abiecta mundi sarcina*, a phrase linked by B.-M. Tock, D. Van de Perre and J. Barrow to a reform movement started in the abbey of Saint-Martin of Laon (Van de Perre 56; Tock, "Les chartes de fondation" 159-163 ; Barrow 26). This element is also found in the charter issued by Roger of Wavrin for Kortenberg in 1180 (DiBe ID 3455); this last one does show a few of the RogF/JeanE elements but not enough to be considered one of his products.

The charter for Ninove from 1179 (DiBe ID 2865) was already considered as a chancery product by M. Van den Noortgate (Van den Noortgate 167-168), in which we observe multiple episcopal chancery characteristics, especially in the penal clause combined with the corroboration. No specific dictamen elements currently point at RogF/JeanE as its dictator. The remaining two charters (DiBe ID 1817 and DiBe ID 803) probably are not drafted/composed by RogF/JeanE, but they do display a few chancery characteristics.[39]

JeanB: a second dictator-scribe?

Finally, even though cluster E does not add to our knowledge of charters written by RogF/JeanE, and thus will not be discussed at the same depth as cluster D, the group merits our attention due to two Cambrai charters which feature a chancery dictamen which clearly

37. *Chartae Galliae* charter n°211854.

38. *Chartae Galliae* charter n°211872.

39. The charter from Lambert provost and Christine provost of Sainte-Waudru of Mons for Forest (DiBe ID 1817) contains "*tam presentibus quam futuris in perpetuum,*" "*libera traditione contulimus"* and a corroboratio modeled on the chancery type. The charter issued by Jean II of Antoing to Saint-Pierre of Ghent from 1192 (DiBe ID 803) contains "*Johannes dei gratia Cameracensis episcopus,*" the corroboratio "*nullus ergo hanc nostrę donationis paginam infringere uel ipsi temere contraire presumat"* and finally the subscription and datation "*Data per manum magistri Danihelis Cameracensis ecclesię canonici anno uerbi incarnate.*"

differs from the RogF/JeanE model. They (DiBe ID 1042 et 4077) are clearly aligned due to their shared expressions, in particular in the clause of corroboration: "*… nostrum presentis pagine patrocinio et nostri sigilli … confirmantes et ne quis … sub periculo … inhibentes.*" The use of "*suscepte administrationis*" is limited to these two charters in the *Diplomata Belgica* database as well as in this corpus according to the text reuse detection results. This element could explain their proximity. In the *Chartae Galliae* database, we observe this same expression in a papal charter, from Celestinus III for the abbey of Saint-Jean-des-Vignes, dated 1197 (*Chartae Galliae* charter n° 210698).

As these two charters have been transcribed by the same hand (fig. 8), "JeanB" (1194–96), we consider the possibility of determining another case where a scribe and dictator coincided in the Cambrai chancery.

In the visualization, two other charters by this hand are located in each other's close vicinity: one issued by the cathedral chapter of Notre-Dame of Cambrai in 1195 and one issued by the Holy Roman Emperor Henry VI in 1196, in favour of Jean II of Antoing (DiBe ID 7373. DiBe ID 8686). A second charter issued by Henry VI in the same year, intended for Jean II of Antoing and the abbey of Saint-André-du-Cateau, is from the same hand (DiBe ID 8687). This charter was not included in our test corpus as the Cambrai bishop is not its author nor its beneficiary; as a confirmation of the 1196 Cambrai charter, however, the text is almost a complete copy.

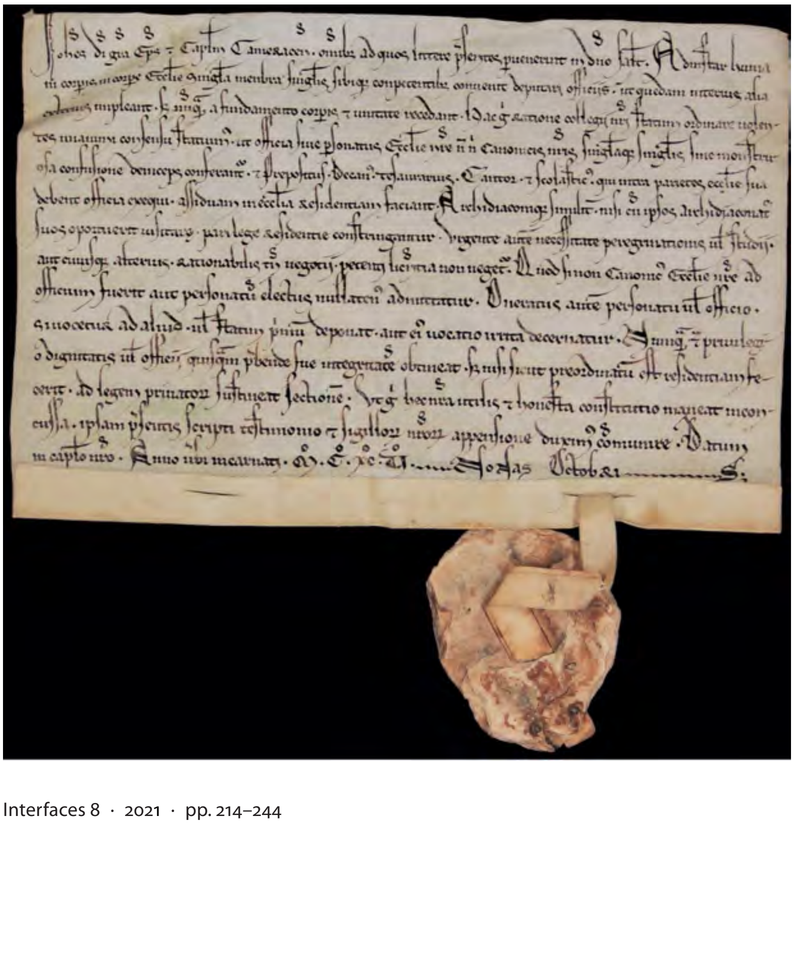


Figure 8. The hand JeanB in Archives Départementales du Nord, 4 G 58/796.

The four JeanB originals are represented in the same region of the visualization:

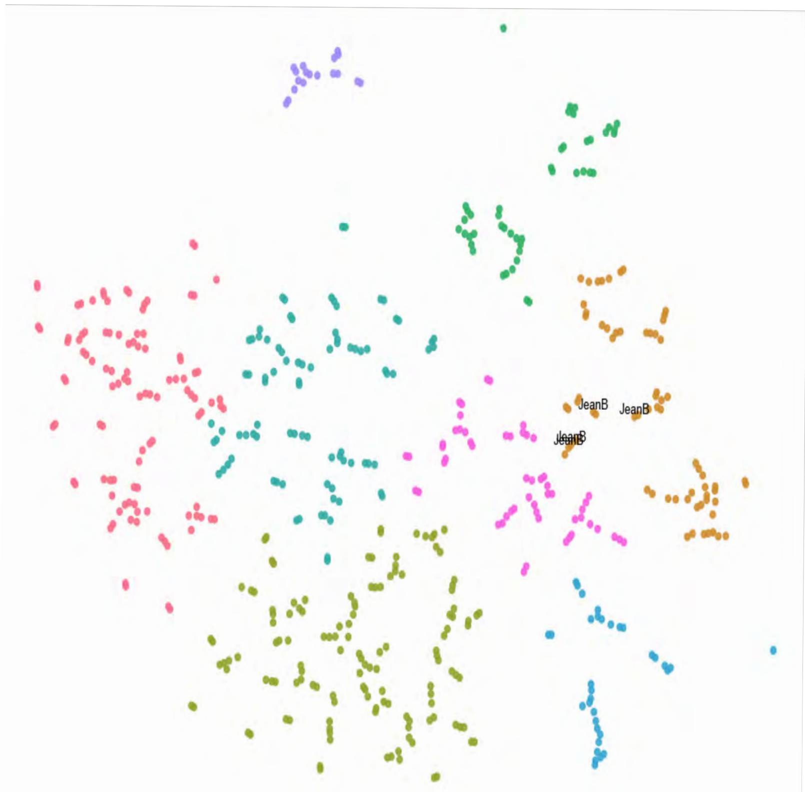


Figure 9. The vicinity of the charters of JeanB in the complete visualization as shown in figure 3. Colouring based on a clustering protocol (8 clusters) that assigns the same colour to nearby points, as a reading aid.

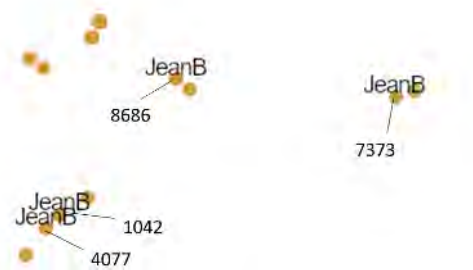


Figure 10. Detail of the charters transcribed by JeanB.

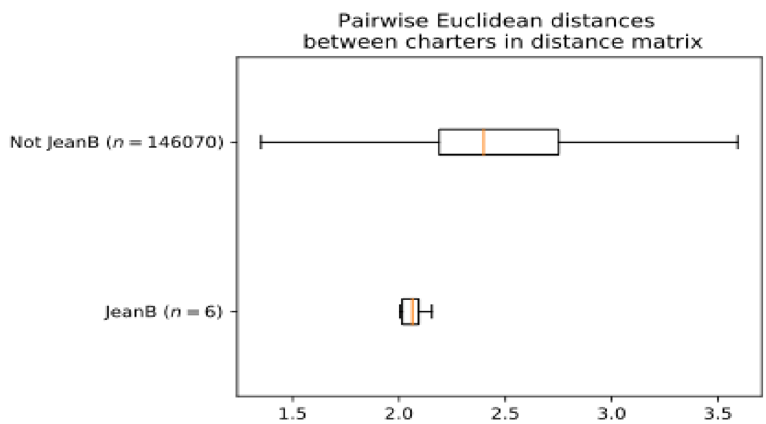


Figure 11. Boxplot visualization of the Euclidean distances between rows in the distance matrix, for all document pairs from two categories: JeanB and all documents not currently attributed to JeanB.

In figure 13, we have also included the pairwise distance for the JeanB group (as did for RogF/JeanE in figure 6): these show a distribution that is similar to RogF/JeanE, with smaller than average distances. A short comparison of their dictamen reveals a few textual links. "*Omnibus ad quos littere presentes peruenerint*" is present in two of these charters, both dating from 1195: the one issued by the cathedral chapter (DiBe ID 7373) and the one issued by Jean II of Antoing (DiBe ID 4077). In the *Diplomata Belgica*, this expression is found in 23 charters ranging from 1194 to 1241, of which three are Cambrai charters.[40] In the *Chartae Galliae* this exact wording can also be found in the charter issued in 1175 by papal legate Pierre of Saint-Chrysogonus for Saint-Bertin and in the one issued in 1214 by Aubry archbishop of Reims for Arrouaise (*Chartae Galliae* Charter n° 210234. *Chartae Galliae* charter n° 201367). The *Diplomata Belgica* includes this phrase in archiepiscopal charters from Reims starting in 1186 (DiBe ID 2340). The exact penal clause "*Hanc nostre confirmationis paginam audeat infringere aut ei in aliquo temeraria presumptione contraire*" is present in the two charters issued in 1196 by Emperor Henry VI, as well as in a charter issued in 1192 by Guillaume I of Champagne, of which the hand is extremely close to JeanB (DiBe ID 36258). This close hand can also be found in two other charters issued by the same archbishop (DiBe ID 7455; DiBe ID 7606).

40. These texts are the two 1195 charters as well as one issued by Jean II of Antoing for Ename in 1194 (DiBe ID 950), probably transcribed by the hand JeanA.

The two Cambrai charters from cluster E seem to have been written by the same person, who differs from RogF/JeanE. While the hypothesis of a single dictator-scribe for the charters transcribed by JeanB is certainly credible, a closer study of the Cambrai charters of which the scribes are known seems necessary. Such a study should, in particular, pay attention to the texts of which the Cambrai bishop is the beneficiary, or implied in the legal action (disposant) rather than the authority issuing it.

Comparison of the digital text analysis with the established diplomatic method has allowed for the confirmation and the expansion (bold) of the determined RogF/JeanE dictamen in the clusters A, B and C, which has led to the following list of charters produced by this same dictator:

DiBe ID	Charter description	Date
7367	**Roger of Wavrin for Hautmont**	**1185**
1870	Roger of Wavrin for Grand-Bigard	1185
8264	**Roger of Wavrin for Arras (Saint-Jean)**	**1186**
2179	**Roger of Wavrin for Mons (Sainte-Waudru)**	**1186**
7648	Roger of Wavrin for the Templars	1187
2125	**Jean abbot of Tournai (Saint-Martin) for Roger of Wavrin**	**1189**

Table 7.The expanded list of plausible RogF/JeanE products

1804	Roger of Wavrin for Affligem	1189
1989	Roger of Wavrin for Tongerlo	1189
2119	Roger of Wavrin for Tournai (Saint-Martin)	1189
3681	Jean provost and Adam dean of Cambrai (Notre-Dame) for Anderlecht	1195
3682	Jean II of Antoing for Anderlecht	1195
3680	Sigerus provost and Lambert dean of Anderlecht for Anderlecht	1195

As for further confirmation as to whether we should consider this individual to have been the dictator as well as the scribe of these charters, we have no access to supplementary original charters from these additions; therefore, this identification must remain a working theory for the time being. When we return to the problem of identifying RogF/JeanE with a name, a Siger is mentioned again in two of these additions:

- *magistri Sigeri Anderlectensis ecclesie prepositi* (DiBe ID 3680)
- *Signum Walteri et Sigeri Cameracensium archidiaconorum* et *Sygeri […] presbiterorum* (DiBe ID 2125)

In spite of this complementary information, the identification must remain uncertain.

4 A new approach?

In this paper, our contributions have been the following. We have used stylometry to assess the oeuvre of single dictator-scribe (RogF/JeanE): our quantitative analyses not only corroborated pre-existing theories about the products of this scribe, but have also enabled us to semi-automatically enlarge his oeuvre via new, highly plausible attributions. Secondly, our analyses have pointed towards the possible existence of another, similar, yet clearly distinct, oeuvre in the vicinity of RogF/JeanE. Tentatively, we have attributed this group of charters to 'JeanB' and we have called for further research into the matter by experts in this domain. Moving beyond this specific case study, we would now like to discuss, in conclusion, some of the wider implications of applying stylometric methods to diplomatic sources. Currently, even though researchers are increasingly developing digital tools to assist in such an endeavour, the use of statistical and stylometric methods is far from mainstream in the field of diplomatics. In what way, then, could this approach add to the current scholarly practice, now and in the future?

Much like Nicolas Perreaux, we believe that the development of new methods need not exclude existing practices. The largest advancement concerns increased efficiency: panoramic visualizations allow the diplomatist to extract starting points for the study of the dictamen and certainly implies saving time in the detailed analysis of the charter texts. The matches yielded by text reuse detection have additionally provided welcome support in interpreting the results. Analysing the frequencies of phrases and word combinations would allow to better determine their 'weight' in the corpus, as Perreaux has done in part through lemmatization. De Paermentier's method does this to a large extent as well, albeit still in a manual fashion, with word groups being tested against the full *Diplomata Belgica* Database. Automating this process through text reuse detection is a significant step forward into saving time during the analysis as well as a more statistical approach allowing for clear numbers. How often certain formulas appear in the texts, and in which period and/or region, could tell us more about the dictamen of a certain group, how far formulas spread, about standard formulas shared by the dictators of a particular writing office, and thus allow for a study of 'influences'. This would also allow to spot 'outliers' such as the *commitimus … memoriali* for RogF/JeanE more easily. Perreaux is working in this direction in observing "the lexical dynamics of the scriptorium of the abbey. We can thus identify the periods in which the writing of acts evolved most strongly, the breaks, the concentration or, conversely, the variability of the forms" (Perreaux, "Possibilities").

The expansion of the corpus, the explorative assessment of other case studies and the paleographic comparison of scribal hands should allow fine-tuning the method and determining more precisely to what degree and which stylometric techniques could be of use to the diplomatist. Especially the question of corpus bias needs to be reviewed, as the influence of charters by other great authorities distorts the results to a certain degree (*i.e.* the clear regrouping of the papal charters). It could be more interesting to compare episcopal charters of multiple dioceses with each other, to allow less bias from 'higher' authorities as well as a better basis for comparison. Enlarging the corpus to test this could be possible with Perreaux's *Cartae Europae Medii Aevi*, which is set to be made available to the public shortly.

Furthermore, the use of methods based on lexical features could take into account the grammatical grasp of dictators and help in the determination of which charter was written by whom. Elements such as the use of literary devices could maybe even come in to play (the use of rhetorical devices, references to other texts such as the Bible and the Church fathers …) and maybe even the presence of rhymed prose. Another element to address would be the influence of the charter type. In literature, writing style could be influenced by the genre: charters also have a genre typology. In the current test, the vast majority of texts concerns the types of donations and confirmations, but adding the dimension of charter types in future tests could certainly be interesting.

In conclusion, the present paper demonstrates the feasibility of using a stylometric method on a reasonably large charter corpus. We currently cannot speak of an end-to-end 'Distant Diplomatics', as the detailed analysis clearly still asks for manual corroboration via close reading, in order to suggest plausible explanations as to why certain texts are placed in each other's vicinity. This case study has thus served as a first foray into the possibilities of using stylometry on charters for detailed *dictamen* research; especially the automation provided by text reuse detection could prove to be a valuable addition to the diplomatist's toolbox.

Bibliography

Barré, Nathalie. "Chancellerie épiscopale, chancellerie canoniale: unicité ou pluralité des institutions à Cambrai au XII^{e} siècle ?" *Bulletin de la Commission royale d'Histoire*, 176.2 (2010): 129–46.

Barrow, Julia. "Les évêques et leur conception de la réforme ecclésiastique dans l'Europe du Nord-Ouest (XI^{e}-XII^{e} siècles)." *Autour de Lanfranc (1010-2010): Réforme et réformateurs dans l'Europe du Nord-Ouest (XI^{e} - XII^{e} siècles): Colloque international de Cerisy 29 septembre-2 octobre 2010*. Ed. Julia Barrow, Fabrice Delivré and Véronique Gazeau. Caen: Presses universitaires de Caen, 2015. 21–32.

Bedos-Rezak, Brigitte. *When Ego was Imago: Signs of Identity in the Middle Ages*. Leiden and Boston: Brill, 2010.

Brunel, Ghislain. "Chartes et chancelleries épiscopales du Nord de la France au XI^{e} siècle." *A propos des actes d'évêques: hommage à Lucie Fossier*. Ed Michel Parisse Nancy: Presses universitaires de Nancy, 1991. 227–44.

Cárcel Ortí, Maria Milagros. *Vocabulaire international de diplomatique.* Valéncia: Universitat de València, 1997.

Chartae Galliae. Web. Accessed 6th July 2020.

Culler, Jonathan. "Presupposition and Intertextuality." *MLN. Comparative literature* 91.6. (1976): 1380–96.

De Hemptinne, Thérèse, Jeroen Deploige, Jean-Louis Kupper, Walter Prevenier, eds. *Diplomata Belgica*. *Les sources diplomatiques des Pays-Bas méridionaux au Moyen Âge*. Bruxelles: Commission royale d'Histoire, since 2015. Accessed 6th July 2020.

De Moreau, Edouard. *Histoire de l'Église en Belgique, tome III: l'Église féodale 1122–1378*. Bruxelles: Ed. Universelle, 1946.

De Paermentier, Els. “In cuius rei testimonium et firmitatem. Oorkonden en kanselarijwerking in de entourage van de graven en gravinnen van Vlaanderen en Henegouwen (1191–1244). Een diplomatische en paleografische studie.” Ph.D. dissertation, Universiteit Gent, 2011.

Diederich, Joachim, Jörg Kindermann, Edda Leopold and Gerhard Paass. “Authorship Attribution with Support Vector Machines.” *Applied Intelligence* 19.1–2(2003): 109–23.

Dierkens, Alain and David Guilardian. “Actes princiers et naissance des principautés territoriales: du duché de Basse-Lotharingie au duché de Brabant (XI^e - XIII^e siècles).” *Bulletin de la Commission royale d’Histoire* 176.2 (2010): 243–58.

Dijkhof, Everardus Cornelis. *Het Oorkondenwezen van enige kloosters en steden in Holland en Zeeland, 1200–1325*. Leuven: Peeters, 2003.

Gervers, Michael and Michael Margolin. “Managing Meta Data in a Research Collection of Medieval Latin Charters.” München, 2007. Web. Accessed 8th November 2021.

Hirst, Graeme and Olga Feiguina. “Bigrams of Syntactic Labels for Authorship Discrimination of Short Texts.” *Literary and Linguistic Computing* 22.4 (2007): 405–17.

Kestemont, Mike. “What Can Stylometry Learn From Its Application to Middle Dutch Literature?” *Journal of Dutch Literature* 2.2 (2011): 46–65.

---. “Stylometry for Medieval Authorship Studies. An Application to Rhyme Words.” *Digital Philology: A Journal of Medieval Cultures* 1/1 (2012): 42–72.

Kestemont, Mike, Sara Moens and Jeroen Deploige. “Collaborative Authorship in the Twelfth Century: a Stylometric Study of Hildegard of Bingen and Guibert of Gembloux.” *Digital Scholarship in the Humanities* 30.2 (2015): 199–224.

Koppel, Moshe, Jonathan Schler and Shlomo Argamon. “Authorship Attribution in the Wild.” *Language Resources and Evaluation* 45.1 (2011): 83–94.

Leclercq, Eveline. “L’élaboration des chartes médiévales. L’exemple des évêchés d’Arras, Cambrai et Liège (XI^e–XII^e siècles).” Ph.D. dissertation, Université de Strasbourg, 2019.

Luyckx, Kim and Walter Daelemans. “The Effect of Author Set Size and Data Size in Authorship Attribution.” *Literary & Linguistic Computing* 25 (2010): 35–55.

Margue, Michel. “Actes princiers et naissance des principautés territoriales: chartes et pouvoirs laïques dans les espaces mosan et mosellan (fin Xe – début XIIe siècle).” *Bulletin de la Commission royale d’Histoire* 176.2 (2010): 219–44.

Municipal Library of Cambrai. B 229.

---. B 46.

---. B 1161.

Perreaux, Nicolas. “L’écriture du monde (I). Les chartes et les édifices comme vecteurs de la dynamique sociale dans l’Europe médiévale (VII^e – milieu du XIV^e siècle).” *Bulletin du centre d’études médiévales Auxerre* 19/2 (2015). Web. Accessed 6th May 2021.

---. “L’écriture du monde (II). L’écriture comme facteur de régionalisation et de spiritualisation du mundus: études lexicales et sémantiques.” *Bulletin du centre d’études médiévales Auxerre* 20.1 (2016). Web. Accessed 6th May 2021.

---. “Possibilities, Challenges and Limits of a European Charters Corpus (Cartae Europae Medii Aevi – CEMA).” 2021. Archive ouverte HAL. Accessed 10th May 2021.

Prevenier, Walter. *De oorkonden der graven van Vlaanderen (1191 – aanvang 1206).* Vol. 1. Bruxelles: Palais des Académies, (1964).

Reeve, Jonathan. “Text-matcher.” Accessed 9th Feb. 2019.

Rybicki, Jan and Maciej Eder. “Deeper Delta Across Genres and Languages: Do We Really Need the Most Frequent Words?” *Literary and Linguistic Computing* 26.3 (2011): 315–21.

Sanderson, Conrad and Simon Guenter. “Short Text Authorship via Sequence Kernels, Markov Chains and Author Unmasking: An Investigation.” *2006 Conference on Empirical Methods in Natural Language Processing (EMNLP 2006), University of Technology, Sydney, Australia, 22-23 July 2006*. Eds. Dan Jurafsky and Eric Caussier. Sydney: Association for Computational Linguistics, 2006. 482–91.

Sebastiani, Fabrizio. “Machine Learning in Automated Text Categorization.” *ACM Computing Surveys* 34.1 (2002): 1–47.

Spiegel, Gabrielle. *Romancing the Past. The Rise of Vernacular Prose Historiography in Thirteenth-Century France*. Berkeley: University of California Press, 1993.

Stamatamos, Efstathios. “Masking Topic-related Information to Enhance Authorship Attribution.” *Journal of the Association for Information Science and Technology* 69.3 (2018): 461–73.

Tock, Benoît-Michel. "Les chartes de fondation des abbayes de Vicoigne (1129) et de Château-Dieu (1155), dans le diocèse d'Arras." *Analecta Praemonstratensia* 63 (1987): 159–63.

---. "Auteur ou impétrant ? Réflexions sur les chartes des évêques d'Arras au XII^{e} siècle." *Bibliothèque de l'École des Chartes* 149 (1991): 215–48.

Van den Noortgate, Machteld. "Diplomatisch-paleografisch onderzoek van de oudste oorkonden van de Sint-Cornelius- en Cyprianusabdij van Ninove (1137–1300)." Master thesis, Universiteit Gent, 1990.

Van de Perre, Dirk. "De oudste bisschoppelijke en grafelijke oorkonden van de abdij van Ninove (1138–1167)."*Analecta Praemonstratensia* 77 (2001): 54–93.

Van der Maaten, Laurens and Hinton, Geoffrey. "Visualizing Data using t-SNE." *Journal of Machine Learning Research* 9 (2008): 2579–2605.

Van Mingroot, Erik. "De bisschoppelijke kanselarij te Kamerijk (1057–1130)." Ph.D. dissertation, Katholieke Universiteit Leuven, 1969.

---. *Les chartes de Gérard I^{er}, Liébert et Gérard II, évêques de Cambrai et d'Arras, comtes du Cambrésis (*1012–1092/93*)*. Leuven: Leuven University Press, 2005.

GUSTAVO FERNÁNDEZ RIVA

Naming and Renaming Texts

Rubrics in Middle High German Miscellany Manuscripts

Abstract

This article analyses rubrics in Middle High German miscellany manuscripts of short texts in rhyming couplets (*Reimpaargedichte*). A corpus consisting of 1433 rubrics from 68 manuscripts was created to be able to perform this study. As rubrics in medieval manuscripts were not authorial, but composed by scribes, they offer insights into the reception of the texts. This paper analyses their features and functions as a proxy to interrogate the standing and status of *Reimpaargedichte* between the thirteenth and fifteenth centuries. The main methodology is distant reading, *i.e.* the application and interpretation of statistical methods on a textual corpus. The features analysed include the length of the rubrics, their level of variation, the presence of author names, and vocabulary. Although no general patterns regarding length nor level of variation were detected, some important conclusions can be drawn: 1. there were no clear markers of literary genre in rubrics; 2. authorship was mostly absent, except for some specific cases of famous authors; 3. relatively stable keywords were used to identify particular texts, but they were more common in manuscripts with narrative texts (*Erzählungen*) and less common in later manuscripts dominated by the genre known as *Minnereden*. Furthermore, the analysis revealed that rubrics used a series of linguistic procedures to show that they participated in a different speech act than the main text – they embodied an interaction between scribes and readers, in which the former framed the reception of the work.[1]

1 Introduction[2]

This article deals with Middle High German (MHG) short texts in rhyming couplets, known as *Reimpaargedichte* in German scholarship. These texts are extremely diverse in subject matter and style. They were composed between the thirteenth and fifteenth centuries and compiled in large collections between the late thirteenth and the early sixteenth centuries. Nowadays they are part of what Lars Boje Mortensen calls the "open archive" (59), texts regularly referred to

1. University of Heidelberg.
I would like to express special thanks to Dr. Abigail Armstrong for reading and suggesting improvements on this article. I would also like to thank the reviewers who made useful observations that have improved the text. An earlier version was presented at the conference "The Medieval Literary Canon in the Digital Age," which took place in Ghent on 17 and 18 September 2018. I am grateful for questions and comments from participants there.

2. Throughout this article, the following abbreviations for libraries, archives, and collections will be used: **Strass.** = Strassbourg, City Library; **Bodm.** = Cologny-Genf, Fondation Martin Bodmer; **Cgm.** = Munich, Bavarian State Library, Codices germanici monacenses; **Cpg.** = Heidelberg, University Library, Codices palatini germanici; **FB** = Innsbruck, Tiroler Landesmuseum Ferdinandeum, Cod. FB; **Leone** = Munich, University Library, 2° Cod. ms. 73; **W** = Vienna, Austrian National Library.

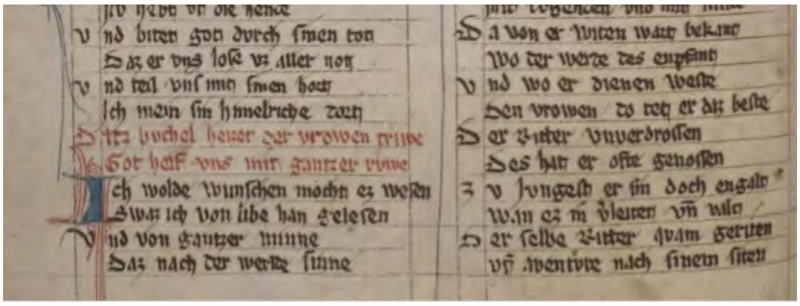
by specialists, mostly available in good editions and mentioned in detailed literary histories, but generally unknown and marginal within the field of medieval studies. This article, however, is not primarily concerned with the standing and status of these texts today, but in the period in which they were copied into miscellany manuscripts. It focuses on their *Reimpaargedichte*'s variable rubrics, located in the perimeters and margins of the text. In that sense, rubrics can even be assorted to what Mortensen called the "closed archive," since they are poorly identified and often left unspoken by scholars.

Many factors suggest that, even at the time of copying, *Reimpaargedichte* were marginal to what people might have considered a literary canon.[3] Firstly, these short texts in rhyming couplets were written in a vernacular language, while most canonical texts in Western Europe were in Latin. This includes not only the classics from Antiquity and the Church Fathers, but also medieval Latin texts that had achieved canonical status. Secondly, they do not usually have enough witnesses to suggest widespread success. Thirdly, they do not show enough influence on other texts, or appear enough in their references, to be regarded as vernacular classics like Dante and Petrarch in Italian or the *Roman de la Rose* in French. In the German-speaking world, that status could arguably be assigned to Wolfram von Eschenbach's *Parzival* or Gottfried von Strassburg's *Tristan*, for example, but rarely to any *Reimpaargedicht*. Finally, the usually high level of textual variation in the testimonies implies that copyists may not have considered these texts as authoritative sources and felt free to rewrite them.

3. I use the concept of 'canon' as it is articulated in the field of cultural studies by Aleida Assmann: "actively circulated memory that keeps the past present" (98). A reformulation of the concept for medieval literature can be found in Mortensen.

Nevertheless, saying that they were not canonical texts is a relatively vague statement. Most texts in any culture are not canonical, but are still read and interpreted, and there is a wide spectrum of possible attitudes towards them. If we want to understand how these texts were considered during the Middle Ages, we need to perform a more detailed analysis. One possible avenue to study this issue is through the rubrics attached to them in their manuscript transmission.

Rubrication was a very common practice in medieval manuscripts. In a strict sense, rubrics are just script in red ink. As they were commonly used as headings for texts or sections in medieval manuscripts, the word rubric is used in this article in an expanded sense that includes all headings, even when written with black ink – which only happens occasionally in some later manuscripts. Some examples of rubrics in MHG manuscripts in our corpus can be seen in figures 1 and 2. They exemplify the consistency of this practice over time. The first figure shows a manuscript from the first quarter of the thirteenth century, the second from 1512. The script, material and layout has changed considerably, but the use of rubrics as headings dividing the different textual units persists.



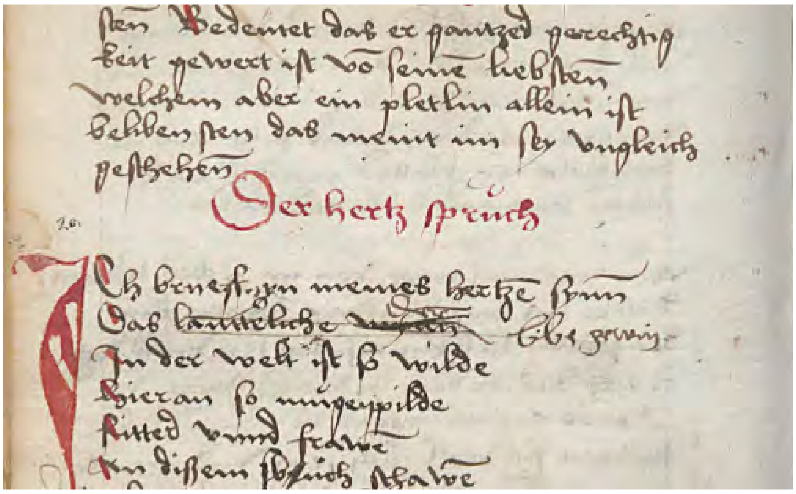


Figure 1. Heidelberg, Universitätsbibliothek, Cod. Pal. germ. 341, fol. 137v.
Figure 2. Leipzig, Universitätsbibliothek, Ms. Apel 8, fol. 226v.

Rubrics are one of the paratextual elements surrounding works in medieval manuscripts, which also include other features such as colophons, illuminations, initials and decorations. All these elements are important sources to understand the reception of texts throughout the period. As Genette points out, the paratext is "a privileged place of a pragmatics and a strategy, of an influence on the public, an influence that – whether well or poorly understood and achieved – is at the service of a better reception for the text and a more pertinent reading of it" (2). Of course, these medieval paratexts are different from their modern counterparts. Rubrics, unlike most modern titles, were not irrevocably attached to the text and could be adapted and rewritten often. For this reason, they reveal something about how scribes read and understood the works they copied. Like other paratextual elements in medieval manuscripts, they are the result of an active act of reproduction and reception of the text. As I will show, rubrics were explicitly separated from the main text and constitute a different speech act that corresponds to an interaction between the scribe and the readers. They are not really part of the text they refer to, but an external instance in which scribes framed the reception of the text.

The main method used in this article to study these rubrics is distant reading.[4] Distant reading involves the application of statistical methods to study quantities of texts that are difficult to investigate with traditional philological methods or to explore general trends and patterns in a textual corpus. In medieval studies, the available materials are not as abundant as for modern literature, but still large enough to be examined using distant reading.

4. A recent description and exemplary use of the method can be found in Underwood.

2 Sources

The rhyming couplet was arguably the dominant poetic form in German literature from the twelfth to the fifteenth century. It was used from Arthurian epics to theological and didactic treatises. Written in this form, there is a huge group of what Fischer calls *Reimpaargedichte,* short texts of up to two thousand lines, although rarely more than eight hundred and most commonly between three hundred and six hundred lines. Fischer distinguishes two main categories: *Erzählung* (narrative) and *Rede* (discourse), each with their own subcategories.

An important feature of *Reimpaargedichte* is that they are usually found in miscellany manuscripts.[5] Before being copied into these large collections, many of these texts were probably transmitted in short standalone booklets, although most are no longer extant (Mihm 13–23). During the fourteenth and fifteenth centuries, however, large manuscripts of *Reimpaargedichte* were quite common. Each codex was produced following certain criteria. In some cases, these criteria are clear, in others they are harder to identify. However, it is fair to assume that the process of copying and adapting these big collections always involved a reason, a goal, and a methodology, even if incidental factors played an important part too.

The corpus for this study comprises 1433 rubrics from sixty-eight manuscripts, which correspond to over eight hundred different works.[6] This sample has been sourced from a number of monographs which compile rubrics of medieval manuscripts and texts (Dahm-Kruse; Klingner and Lieb; Mihm; Moelleken). Additionally, some library catalogues and digital manuscript facsimiles were consulted.[7] The result is not an exhaustive corpus of Middle High German rubrics for *Reimpaargedichte*, but it includes all the most important manuscripts and can be considered representative. These rubrics have been

5. I use the term 'miscellany manuscript' to mean a manuscript that collects different texts within one codex. Of course, some of them are collections of very heterogeneous materials (proper *miscellanea*) while others may be careful selections of texts (*collectanea*). However, there is no clear dichotomy of practices, but rather a continuum, and we can identify some level of selection in all cases. For this reason, I prefer to use only one of the terms 'miscellany' as a general concept that encompasses all cases.

6. The corpus has been published in the open repository *Zenodo*: Fernandez Riva.

7. Although it does not include transcriptions of the rubrics, the Handschriftencensus (consulted 04-11-2021) was used as a source for relevant information about the sources and links to digital facsimiles.

assembled into spreadsheets with information concerning their palaeographic transcription, an automatically generated lemmatized version,[8] and a standardized modern title of the work. Additionally, the database contains basic information for each manuscript (identification, date of composition, language). For some rubrics, it was not possible to identify a modern title from the sources, so only the rubric and the manuscript are recorded without any other information.

8. Generated using the POS-Tagger for Middle High German by Echelmeyer, Reiter and Schulz.

The most common genres in the dataset are *Maeren* and *Minnereden*, with over two hundred titles each. *Maeren* are defined by Fischer as fictional secular narratives with mostly human participants, and can be of many different kinds (for example, humorous or courtly).[9] *Minnerede* is a late medieval genre with limited narrative content that focuses on love, although there is great variety within it (dialogues, letters, and allegorical dream accounts in the tradition of the *Roman de la Rose*, among others). The corpus also includes fables, *bîspel* (akin to the Latin *exempla*), hagiography and miracle stories. There are also a few texts that belong to completely different genres (epic, lyric poetry) but which have been incorporated in the database because they are attested in the same miscellany manuscripts as the *Reimpaargedichte* and have rubrics in the same style. It is worth noting that all these genre definitions are modern rather than medieval. The question of whether categories for literary genres appear in the medieval rubrics will be addressed later.

9. A new edition of the Middle High German Mären is Ridder and Ziegeler.

The dataset also includes 382 occurrences of texts which have no rubrics and yet are witnessed in the same miscellany manuscripts. For the purposes of this analysis, these cases are mostly omitted. For lexical comparisons, the lemmatized version of the rubrics are used.

3 Background

Systemic Reading and the *Reimpaargedichte*

The attempt to understand *Reimpaargedichte* by analysing a large corpus and trying to deduce some general principles is not an innovation of this study. This group of texts has been subject to an analytical method I would call 'systemic reading' – a method located at the crossroads of the creation of a catalogue and the history of literature. The main objective of systemic reading is not the interpretation of individual works, but the creation of an organized typology in order to understand the relationships within a complex literary system composed by a considerable number of texts. Between 1967–68, three important books used this approach: *Überlieferung und Verbreitung der Märendichtung* *im Spätmittelalter* (Mihm), *Studien zur deutschen Märendichtung* (Fischer), and *Mittelhochdeutsche, mittelniederdeutsche und mittelniederländische Minnereden* (Brandis). The curious emergence of these works at virtually the same time might be explained by the need to explore under-researched literary genres that were considered marginal up to that point, in the cultural context of a general search for change.

In the seventies and eighties, many other books addressed the issues presented by the corpus of *Reimpaargedichte* with a strong theoretical focus. One of their key concerns was differentiating sub-genres and their features (cf. Grubmüller; Haug; Heinzle; Holznagel; Röcke; Strasser; Ziegeler). However, in the last decade, there has been a renewed interest in cataloguing and ordering the *Reimpaargedichte* as a more efficient way of understanding them. Two main titles with this perspective appeared in the 2010s: *Handbuch Minnereden* (Klingner and Lieb) and *Geistliches Erzählen: Zur deutschsprachigen religiösen Kleinepik des Mittelalters* (Eichenberger).

Against the background of this scholarly tradition, distant reading does not offer a revolutionary perspective. Nevertheless, it is a way of pursuing a trend that is already present in the field, but with different strategies and tools that hopefully can build upon the results of previous approaches.

Research on Medieval Rubrics

During the High Middle Ages, rubrication became a central feature of manuscript production. The proliferation of rubrics in Gothic manuscripts is generally considered part of a change in reading culture and habits, particularly due to the modes of reading typical of cathedral schools and universities (cf. Gumbert; Hamesse). However, this process and its relationship to rubrication is still not completely understood.

Rubrics in medieval manuscripts have been studied from multiple perspectives, although it has never been a mainstream field of research. Many studies have shown that rubrics were not a marginal feature of medieval book production, but a very important component which authors, scribes, editors, owners, and readers considered carefully.[10] If we focus only on Middle High German rubrics, there are two important articles worth mentioning here. Backes compares how rubrics were used in French and German romance. Meyer and Zotz, for their part, identify three functions for rubrics in the sources: to separate, to indicate a text's content, and to index a story. These three functions are similar to modern titles in anthologies, but they tended

10. Some of the most relevant articles dealing with medieval rubrics are Busby; Chavannes-Mazel and Brownrigg; Croenen; Dines; Rouse and Rouse; Rudy.

to work in quite a different way in medieval texts. The most visible difference is that medieval rubrics were a lot more inconsistent, in the sense that the rubric for the same work could change considerably from one manuscript to the other. In other words, they were not considered as a standardized name for the text, but as something that could be customized by the copyist. In that sense, rubrics are worthy of study, as they reveal the scribe's understanding of the literary text.

4 Analysis

Length

The length of rubrics is a basic way to evaluate how much information they carry. The average length of the title given to these texts acts as a useful baseline for comparison. The modern titles for these texts have been constructed by editors and scholars during the nineteenth and twentieth centuries, sometimes based on the original rubrics, but adapted to the features of modern titles – mostly a short nominal phrase.

The average number of words in modern titles for the texts in the corpus is 3.17, while the average number of words in the medieval rubrics for the same corpus is 7.88. Rubrics have a more complex structure and offer more information than the modern titles. The blue crosses on figure 3 indicate for each manuscript in the corpus, dating from the late thirteenth to the early sixteenth century, the average length of all the rubrics it contains. There does not seem to be any standard length, as they vary widely depending on the manuscript. However, the rubrics in all manuscripts but one are consistently longer than the average length of the modern titles for the same works.

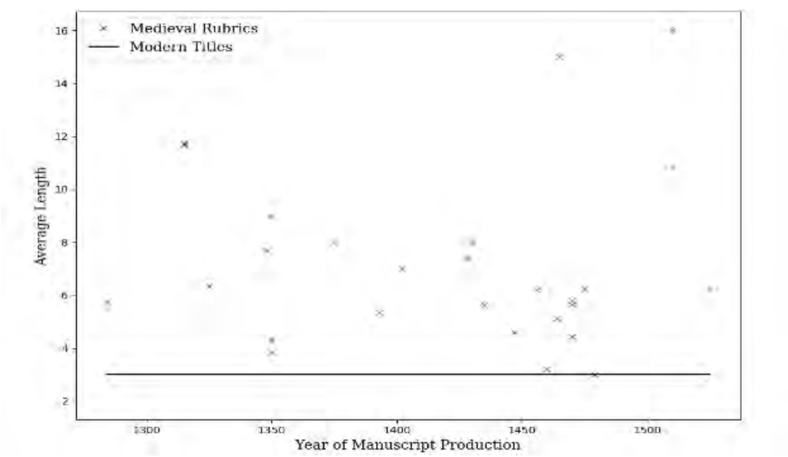


Figure 3. Average length of modern titles compared to average rubric lengths in the manuscript corpus.

Level of Variation

Another interesting measure is what I call the level of variation (LOV), which measures how stable or variable rubrics are for the same text in different manuscripts. This calculation is important in order to understand in which cases scribes were more creative and in which they just copied their sources. The LOV is based upon the 'Levenshtein distance', a common measure to quantify the dissimilarity of two strings.[11] This metric computes the minimum number of single-character edits (insertions, deletions or substitutions) required to change one word into another. The LOV used in this article calculates an average of the Levenshtein distance for all possible combinations of the rubrics for the same text, in order to assess the variation experienced by the rubrics for one work regardless of how many textual witnesses are extant. In other words, if a text appears in three different manuscripts with one rubric each (A, B, C), then we would need to calculate the individual distance of the sets (A, B), (A, C) and (B, C), then divide by three. However, it is also useful to consider the length of the title to get a better measurement of the actual variation. The change of one word in a two-word title is more significant than one word in an eight-word title. For that reason, the complete function to calculate the LOV proposed here is: the average of the Edit Distance between all possible combinations of the rubrics, divided by the Average Length of those same rubrics. This can be represented in the following notation, where *S* is the set of all rubrics for the same title, *d* is the Edit Distance function and L is the set of lengths of all rubrics for the same title.

$$D = \{d(x) : x \in \binom{S}{2}\}$$

$$LOV = \frac{\bar{D}}{\bar{L}}$$

The bigger the resulting LOV, the more variable and unstable the rubric is in its transmission. A LOV with value zero means that all rubrics for that text are identical (all values of *d(x),* and therefore $\bar{D}$, are equal to zero). For the calculation, I use the lemmatized version of the titles to avoid considering spelling variations as actual differences. Some examples of how the LOV reflects the changes can be seen here:

11. This measure is used, for example, by collation tools such as CollateX (consulted on 4 November 2021). I implemented the Levenshtein Distance in Python following the code in Wikibook (consulted on 4 November 2021).

Modern Title	Rubrics				LOV
Die feisten Jagdvögel	Got hat der herren harte vil / Die tunt recht als daz veder spil (Cpg. 341)	Von den herren (Bodm. 155)			1.36
Liebe und Schönheit	Dis ist liebe vnde schoene (Strass. 94)	Ain ander vast guoter spruch (Cgm. 270)	Gar ain Schöne rede uon der liebin vnd der Schonin wie sie kriegten mitt ain ander (Cpg4)	Sequitur alter (Cgm. 379)	1.22
Der Spiegel	Ditz mere hebet sich also an / Von vnser herren lichnam (Cpg. 341)	Dieß ist der spiegel (Cpg. 358)			1.04
Von bösen Frauen	Welt ir mit vride beliben / So hvt evh vor vbelen wiben (Cpg. 341)	Hvt ecvh vor vbelen wiben / Ob ir welt bi vride beliben (Bodm. 72)	Von den übeln wiben (Bodm. 155)		0.97
Der arme Heinrich	Dis ist von dem armen heinriche (Strass. 94)	Ditz ist der arme Heinrich / Got mach vns im gelich (Cpg. 341)	Ditz ist ein mere rich / von dem armen Heinrich (Bodm. 72)		0.54
Die Blume und der Reif	Von der Maid plumen (W 2885)	Von schon blümen (Leone)	Von der maid plümen etc (FB 32001)		0.52
Der Esel	Ditz ist von einem Esel ein mere / Daz leret vns der Strickere (Cpg. 341)	Ditz ist von einem esel ein mer / daz leret vns der stricker (Bodm. 72)			0

For this analysis, only texts attested with at least two rubrics in the corpus can be considered, which means using a sub-corpus of only 284 texts. In general, there seems to be no single principle guiding the amount of change to the rubrics. Some scribes just copied the rubrics as they were in their source, some changed them partially, and some completely. However, some behaviours were more common, as shown in figure 4. To create this plot, the results of the LOV were rounded up to the second decimal. A large number of works (eighty-eight) have a LOV between 0.1 and 0.6, which means that they change only partially – the rubrics were not completely rewritten, but merely adapted to different degrees. However, there are two individual peaks in the distribution, at 0 (twenty-three works) and at around 0.7 (twenty works), which means that the most common approaches were either to leave the rubric unaltered or to change about half of it. There is another small peak close to 0.9 (seventeen works), which represents changing the rubric almost entirely. A bigger corpus, with more balanced rubrics per manuscript, could improve the results of this exploratory analysis.

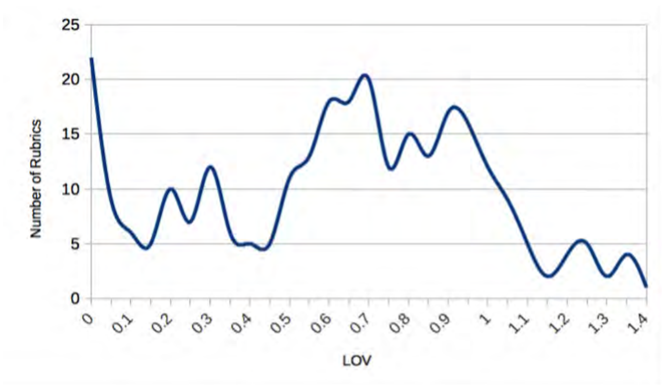


Figure 4. Level of Variation (LOV).

Partial changes (between 0.1 and 0.5) are particularly interesting when we consider manuscripts that are closely related, like Cpg. 341 and Bodm. 72.[12] These two manuscripts are very similar and the latter is probably a direct copy of the former. Many of the rubrics for the same works are extremely similar in both manuscripts, but small and noteworthy details were changed. Both have rubrics in the form of rhymed couplets and altering them involved some degree of poetic ingenuity:[13]

12. Previously Kalocsa, Kathedralbibl., Ms. 1.

13. Only selected relevant examples of these changes are shown.

	Cpg. 341	Bodm. 72
Konrad von Würzburg's *Die goldene Schmiede*	Hie hebent sich vnser vrowen **gruze** an / anderhalb hvndert **wol getan**	hie hebent sich vnser vrowen **san** / anderthalp hvndert **grvzze an**
Thomas von Kandelberg	Ditz ist ein bvch **ze horen** / **von** zwelf schvleren	Ditz ist **von den** zwelf schvleren / Ein buoch **gvt zv leren**
Marien Rosenkranz	Hie ist ein schones mere / von einem schvlere	Hie ist ein schones mere / von einem **andern** schvelere
Siegfried der Dörfer's *Frauentrost*	Ditz **mere** ist **von dem** graben mantel / **vnd vnser vrowen wunder an allen wandel**	Ditz ist **des** grawen mantels mere / **Got helf vns von aller swere**
Der heller und der armen Frau	**Wie eines** kvnges mvnster **volquam** / **von** einer armen spinnerin helbelinc **san**/ **Mit dem si alle ir not vber quam**	**Ditz ist ein mere wie ein** arme spinnerin **mit einem** helbelinge **ein** mvnster **eines** kvniges **vil bracht**
Der Hauskummer	Ditz bvch ist der kvmber genant/ vnd bringet manchen in **sorgen** bant	Ditz ist der kvmber genant / vnd bringen manchen in **groze** bant
Frauenlist	Ditz bvchel heizet vrowen list/ **Got herre vns selben bie ist**	Ditz buoch heizet vrowen list / **Der vil mancher wise ist**

The example of *Marien Rosenkranz* is particularly telling of the scribe's agency in the form of minor interpretative edits. As the preceding text, *Thomas von Kandelberg*, deals with students and its rubric mentions twelve students, the scribe in Bodm. 72 adds "about **another** student" and not just "about a student" to *Marien Rosenkranz*. In this way, perceiving a thematic thread in this section, the scribe established an explicit link between the two texts. This is also a clear example of the rubrics' paratextual function, as a speech act between the scribe and the reader. It is also possible to identify other general scribal attitudes in rubrics. For example, in the case of *Frauenlist*, Bodm. 72 has a title that satirically expands on the women's trickery and cunning, which are the subject of the story ("This book is called women's cunnings, which have many forms"). However, in Cpg. 341, which is characterized by a more clerical attitude (cf. Stutz), the second verse only contains a general religious formula ("God, the Lord, is with us").

Unlike the previous examples, in many cases the rubrics in different manuscripts changed radically. Thirty-two texts have rubrics with a LOV higher than 1, while twenty-eight have a level of variation between 0.9 and 1. Many cases with very high LOV are titles that changed fundamentally between Cpg. 341 and Bodm. 155. These two manuscripts contain many of the same texts in similar order and must therefore be related. However, the scribe of Cpg. 341 composed all rubrics in rhyming couplets while that of Bodm. 155 used summarized and concise phrases. In other words, there can be distinct principles that different scribes followed when creating rubrics for the same collection of texts and based on the same sources.

Vocabulary

To understand the use of language in the corpus of rubrics, lexical choices are key. The five most frequent lemmas in the entire corpus are:

1- *sîn* (408): verb, 'to be' in the infinitive

2- *diser* (376): pronoun, 'this' (many variant declinations and spellings possible, *ditz*, *diz*, etc.)

3- *daz* (186): article, 'the'

4- *mere* (157): noun, 'story/narrative'

5- *hie* (112): noun, 'here'

Using only the four most frequent words (MFW), it is possible to compose the beginning of a typical rubric: *ditz ist daz maere* … ("this is the story…"). It is possible to arrange the most frequent words by manuscript, which offers a more precise overview. A sample of the spreadsheet with that information is shown in Figure 5. Each lemma is paired with the number of times it appears in the rubrics of the corresponding manuscript. The lemmas are ordered from most to least frequent.

Figure 5. Sample of a spreadsheet containing most frequent lemmas paired with their frequency in the corresponding manuscript.

	A	B	C	D	E	F	G
1		Bodm72	cpg341	A94	M717	FB32001	W2885
2	1	['ein', 179]	['ein', 204]	['diser', 20]	['der', 11]	['von', 52]	['der', 58]
3	2	['diser', 145]	['diser', 173]	['von', 18]	['daz', 7]	['der', 52]	['von', 56]
4	3	['sîn', 143]	['sîn', 160]	['der', 16]	['von', 7]	['mer', 22]	['daz', 22]
5	4	['von', 139]	['von', 144]	['sîn', 15]	['sîn', 4]	['daz', 20]	['mer', 22]
6	5	['der', 106]	['der', 126]	['und', 5]	['ein', 4]	['ein', 13]	['ein', 15]
7	6	['mere', 79]	['mere', 99]	['sagen', 4]	['got', 3]	['etcetera', 11]	['an', 11]
8	7	['wir', 46]	['wir', 50]	['mêr', 3]	['guot', 3]	['an', 9]	['hie', 10]
9	8	['hie', 41]	['und', 43]	['sô', 3]	['gebet', 3]	['heben', 7]	['heben', 10]
10	9	['und', 30]	['die', 36]	['ein', 3]	['mit', 3]	['hie', 6]	['sîn', 7]
11	10	['die', 29]	['man', 36]	['wîp', 2]	['sant', 2]	['sich', 6]	['und', 6]
12	11	['daz', 29]	['got', 35]	['list', 2]	['lîden', 2]	['und', 6]	['die', 5]
13	12	['man', 27]	['wie', 30]	['minnen', 2]	['singen', 2]	['sîn', 4]	['guot', 5]
14	13	['wie', 23]	['hie', 26]	['mahte', 1]	['nie', 2]	['ritter', 4]	['vrouwe', 3]
15	14	['vil', 23]	['daz', 25]	['meister', 1]	['süeze', 2]	['mit', 4]	['ritter', 3]
16	15	['vrouwe', 17]	['heizzen', 24]	['gotfrit', 1]	['ritter', 2]	['güete', 3]	['mit', 3]
17	16	['sich', 17]	['schoene', 21]	['strazburg', 1]	['pater', 1]	['die', 2]	['künic', 3]
18	17	['Strickære', 17]	['zuo', 17]	['minne', 1]	['nos', 1]	['kneht', 2]	['sich', 2]
19	18	['schoene', 16]	['vrouwe', 16]	['sint', 1]	['avemaria', 1]	['lieben', 2]	['zwei', 2]

As expected, the MFW are usually function words (articles and prepositions) that are very common in any given sample of language. However, some prominent non-function words occur significantly above average. Furthermore, even the common function words can offer some insight into the structure and semantic of rubrics. There are four types of words that feature prominently in the spreadsheet: the word *von*; demonstrative pronouns *ditz/diser*; copulative and other verbs that allow characterization or identification; and words that refer to the 'genre' of the text.

The best way to visualize the importance of these terms is to convert the spreadsheet into a plot as shown in figure 6. The x-axis represents the manuscripts (the columns of the spreadsheet), ordered by approximate date of composition. The y-axis consists of the numbers 1 to 14 in reverse order, denoting the word's rank among the MFW of each manuscript, as indicated by the points on the graph. A colour and shape is assigned to each of the four categories of words introduced above. In this way, it is possible to compare and easily visualize the relevance of the MFW according to their type.

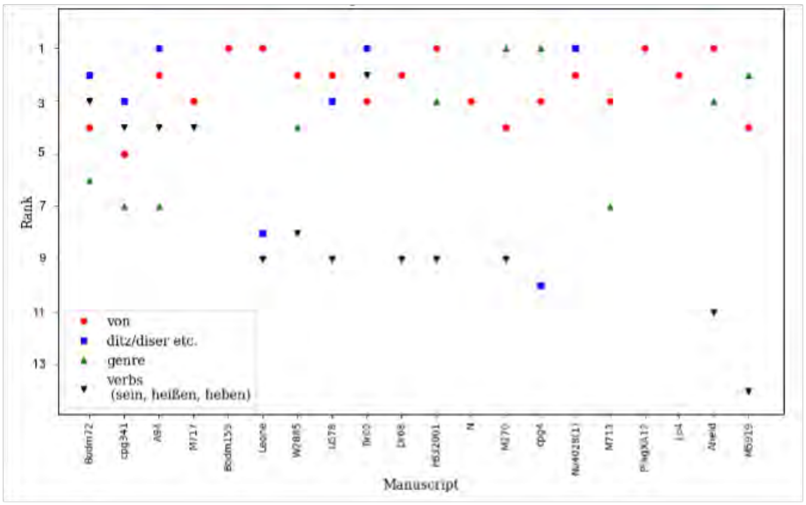


Figure 6. Important common words and their frequency rank (y-axis) for the manuscripts in the corpus (x-axis).

The word *von* is at the top of the list for most manuscripts. This preposition was used to indicate the subject of the text and could be translated as "of" or "about," like the *de* so common in Latin rubrics. Some rubrics have an introductory statement like *ditz ist von* ("This is about..."), but many others just offer a prepositional phrase like ***von** dem ritter mit der halben bir* ("About the knight with the half pear") or ***von** dem armen Heinrich* ("About poor Henry"). Unlike modern titles, scribes considered it meaningful to use this preposition in rubrics, making it explicit that the rubric mentions the subject of the text. This practice means that rubrics did not only have the function of describing the content of the text, they also clearly stated the function itself.

Very prominent in most manuscripts, *ditz/diser* was a demonstrative that worked almost as a deictic marker pointing at the text: ***ditz*** *ist das mere von…* ("**This** is the story of..."). The word linked the rubric to the text and the reader to the page – *ditz* denoted the text as it was inscribed in front of the reader. Modern titles conventionally do not explicitly point to the text with a demonstrative in this way. Medieval rubrics, on the contrary, were constructed as if they were directly addressed to the recipient, separated from the text and pointing at it. In other words, modern titles and medieval rubrics have some similar functions, but rubrics made that function explicit by the use of prepositions and demonstratives.

Just like *von* or *ditz,* there are some verbs, more common in the earlier manuscripts but still relevant in the later ones, that explicitly proclaim that the rubric is the place where the text is being named or described. It is common to encounter *sîn* (to be), usually combined with *von* or some similar structure to introduce the topic of the text ("This is about…"). Not as common, but also present, is the verb *heißen* ("to be called"), which assigned a title or name to the text. Finally, the expression *Hier hebt sich an,* which could be loosely translated as "here begins" (literally "here X raises itself"), is also frequent. In this case, the expression has a very strong demonstrative value. The *hier* refers to the semantic universe of space and the page more than a performance situation, which could be implied with *jetz* ("now").

With verbs like *heißen* or *sich anheben*, rubrics perform a complex speech act that establishes a name for the text. A rubric like *Diß büchlyn heißet der dogende krancz / Vnd leydet zu des hymmels dancz* ("This small book is called the garland of virtue / and leads to the dance of heaven") is constructed as a statement that includes the name of the text: *der dogende krancz*, the garland of virtue. These kind of rubrics are common, especially for *Maeren*.

There is a perceptible distinction between rubrics that provide a name for the text, commonly introduced by the verbs *heißen* or *sich anheben*, and rubrics that provide keywords, commonly introduced by the preposition *von* or the verbs *sîn* or *sagen*. A clear example of the latter is the expression *von der minne* ("about love"): "*Dis mére seit von der minnen*" (*Frau Minne warnt vor Lügen* in Straßburg, Cod. 94), "*Dise mére ist von der minnen*" (*Sekte der Minner* in idem), "*Dise mére mahte Meister gotfrit von strazburg vnd seit von der minne*" (*Herzmaere* in idem), "*Von der minne*" (*Ochse und Hirsch* in the Leone manuscript), "*Ein spruch von der mynn*" (*Der unentwegte Liebhaber* in Cpg. 313).

Finally, there are many words that might designate 'genre:' *mere, spruch, rede, buoch, bispel*.[14] The first, *mere*, is a very common MHG word which means narrative, news, story, something that someone tells. It is the origin of the modern genre category *Maere*. Originally, it had the meaning of 'well known/famous' and derived to something that is worth telling. *Spruch* is related to *sprechen*, speak; it means something that is said. *Rede*, related to the verb *reden*, also means to speak or talk. However, it can be used to define a language or the general ability to utter speech. *Buoch* derives from the same root as English 'book' and originally designated the surface upon which something is written. In this way, considering etymology, *buoch* comes from the world of writing, while *mere*, *spruch*, and *rede* from that of orality. Finally, *bispel* (less common than the others) is the Middle High German translation of Latin *exemplum* and was used for short narrative didactic texts.

14. I normalize the spelling not according to the standard Middle High German, but to the prevalent forms in the palaeographic transcriptions of the rubrics. This also helps avoid confusion between *mere (term used in the rubrics) and Maere (modern genre designation).*

Mere is the most common of these terms with 181 occurrences. The use of *spruch* and *buoch* are the next most popular, albeit trailing considerably with sixty-two and sixty incidences respectively. *Rede* is used in only twenty-two rubrics and *bispel* in just three cases. It is unclear if there were any overarching principles directing their use. A possible answer appears when considering the approximate date of production of the different manuscripts. *Mere* appears mostly in the earliest manuscripts, while the word *spruch* and *rede* appear mostly in the later medieval productions. *Buoch* is evenly distributed. *Bispel* is not considered as there are only three cases in the whole corpus.

In other words, the period of production seems to have had more influence on the lexical choices to refer to the work than did its genre. *Maeren* were more common up to 1400, *Minnereden* afterwards. There are many examples of works which were described as *mere* in early manuscripts and as *spruch* in later ones, contradicting a possible use of those terms to identify genres. For example, the rubric for the *Maere* "*Des Mönches Not*" was "*Ditz ist ein schoner* **mere** *gnvc / Wie ein mvnch ein kint trvc*" in Cpg. 341 (first quarter of thirteenth century) and "*Ain ander* ***spruch***" in Cgm. 5919 (composed 1500–10). The words *mere*, *spruch*, *buoch* and *rede* did not generally designate genre, but were synonyms for 'text', and their use varied according to time and place. Of course, it is possible that some manuscripts did use these and other words in a systematic sense to indicate different kinds of works. For example, Mihm (59–60) has postulated the hypothesis that Cpg. 341 only used variants of *buoch* (*bvch* or *bvchel*) for the works that were transcribed from standalone copies. The only word that (in the few occasions in which it appears) has a clear meaning related to its genre is *bispel*. The didactic narratives inspired by Latin *exempla* were clearly identified as distinct from *mere*. For example, the Leone manuscript introduced the compilation of short texts under the rubric: *daz buoch nennen die werlt daz sagen von bispeln und von mern* ("the book is called the world and deals with *bispeln* and with *meren*").

Apart from function words and the four terms for 'text' just discussed, other lexical items, such as adjectives and nouns, are worth studying, as they usually refer partly to the subject of the texts. The most common of these in the corpus are *vrouwe* (woman, 93); *got* (god, 61); *schoene* (beautiful, 60); *ritter* (knight, 59); *guot* (good, 58). That women were the most predominant subject is not surprising. This trend stems from the centrality of women and love in *Minnereden*, but is also due to the presence of some religious Marian poetry in the corpus. Knights also figured prominently, representing a widely occurring character, although far behind *vrouwen*. God is in second place, which was the result of the amount of religious literature and the use of invocations not related to the content in the rubrics.

However, one of the most interesting words in the list is *schoene* ("beautiful"). This word was used in two different ways. There are titles like *von ein schoene vrouwe* ("about a beautiful woman"); *ditz ist von der gans / daz was ein schoene jvncvrowelin* ("this is about a goose, that was a beautiful maiden"). Here *schoen* was used to describe characters or events in the text. However, more common is the expression *ditz ist ein schoene mere* ("This is a beautiful *mere*"), as in *Ditz ist ein schones mere / von einem ritter lobere* ("This is a beautiful *mere* / about a praiseworthy knight"). In these cases, the word did not refer to the content of the text; it highlighted the function of the rubric as an evaluative instance. The rubric was a place where literary works were judged and reviewed. Like the demonstrative pronoun *ditz*, the *schoen* increased the distance between rubric and text – the rubric was part of a different voice evaluating the literary work.

Authorship

For the most part, rubrics do not mention author names. *Reimpaargedichte* are either anonymous or contain the name of the author in the text itself, especially in the prologue or epilogue. The authorial attribution of the same text might even differ in different witnesses. In some special cases, however, rubrics identify the author of the works, which implies that these poets were particularly well known. The most common case is Der Stricker. He was sometimes mentioned in the rubric in addition to the name for the corresponding text, as in *Hie sait der strickere von dem / konige Salomone* ("Here Der Stricker talks about Salomon," Bodm. 72). In other cases, the author's name is mentioned, but the text itself is described only in very general terms or not at all: *Hie ist des Strickers mere / Got bvz vns vnser swere* ("Here is a story from Der Stricker; let God heal our pain," Cpg. 341). This suggests that he was a known author and his name was even more important than the identification of the text itself.

Another interesting case regarding authorship is the German translation of the *Disticha Catonis*, one of the most canonical texts in Western Europe during the Middle Ages, as it was widely used in educational contexts to teach Latin and as a source of moral instruction. This text was usually mentioned in the rubrics as *Cato*, to whom the collection was unjustly ascribed in the Middle Ages. The name of the alleged author was used as the name of the text itself, which was not an uncommon metonymy for famous works in the Middle Ages. In our corpus, it also happens to Freidank, whose work, even if not as famous as Cato's, was sometimes just referred to by his name – for example, *der fridang* in the Leone manuscript. One of the rubrics for *Cato* in our corpus specifically referred to the use of the text in educational contexts, which can be read as a mechanism of referring to the canonical status of the Latin source: *Ditz buoch heizet Katho / vnde liset man ez in der schvele do* ("This book is called Cato, and is read in school," Cpg. 341)

5 Conclusions

In this article, I have tried to implement a distant reading approach to MHG rubrics in miscellany manuscripts. This methodology indicates that length and syntactic structures were highly variable features of these rubrics. The attitude of the scribes towards the rubrics in their sources was also not uniform. There were many common practices: copying the rubric as it was, rephrasing it, or replacing it completely. In general, it is possible to conclude that the diversity was considerable and specific conventions for particular times, places and even for each manuscript were normal. In this sense, each witness deserves to be evaluated as a specific case.

Nevertheless, there is one thing that remains consistent in most manuscripts: the general principle of constructing rubrics in such a way that they are explicit about the communicative act between scribe and reader they are performing. In other words, rubrics were the place where scribes deliberately presented the text to the readers. This makes sense when the context of creation and the performative function of rubrics are considered. In contemporary literature, title and text are the creation of the same author, so the communicative act between author and reader starts with the title. In medieval manuscripts, on the contrary, the rubrics were not part of that communicative act between author and receiver. Instead, scribes assumed the role of intermediaries between author and reader, and they introduced the work. Rubrics were external to the text and one of their functions was to make this communicative act between scribes and readers explicit. They are the place where scribe and reader meet.

Going back to the original question of what information regarding the status of these texts can be extracted from rubrics, it is possible to draw some conclusion from our analysis.

1. Rubrics do not identify literary genre. The words used to refer to the texts changed with time and did not correlate with internal textual features. There might have been some implicit conception of different genres that elicited different kinds of attitudes, but rubrics do not provide any information in this regard.[15]
2. The level of variation suggests that the texts were not easily identifiable by a particular name. However, in many cases, even when the rubrics changed, some important keywords that serve the purpose of identifying the text remained consistent. Furthermore, the use of verbs like *heizen* or *sich anheben* points to some concept of name or title for the text. In this respect, there is also a fundamental transition between the early *Maeren* and the later *Minnereden*. The manuscripts of the thirteenth and fourteenth centuries that contain predominantly *Maeren* use more precise words to identify specific texts. The later manuscripts, containing mostly *Minnereden,* do not possess this feature. They often display generic constructs which they applied for different texts, sometimes with the sole purpose of enumeration. This suggests that the narrative *Maeren* were, in a way, more

15. An analysis of these terms in Middle High German texts was performed by Düwel.

canonical than *Minnereden*, as it was more common for them to be identified by particular keywords.

3. Authorship was mostly absent from rubrics, except in the case of famous authors. These authors were sometimes more relevant than their specific works (Der Stricker) and sometimes used metonymically to refer to their texts (Cato and Freidank). These are the only texts that can truly be considered as canonical in the corpus.

Bibliography

Assmann, Aleida. "Canon and Archive." *Cultural Memory Studies: An International and Interdisciplinary Handbook*. Ed. Astrid Erll and Ansgar Nünning. Berlin: De Gruyter, 2010. 97–107.

Backes, Martina. "Geordnete Text: Zur Geschichte und Entwicklung von Rubriken in deutschen und französischen Romanen des Mittelalters." *Text und Text in lateinischer und volkssprachiger Überlieferung des Mittelalters*. Ed. Eckart Conrad Lutz, Wolfgang Haubrichs, and Klaus Ridder. Berlin: De Gruyter, 2006. 301–15.

Brandis, Tilo. *Mittelhochdeutsche, mittelniederdeutsche und mittelniederländische Minnereden; Verzeichnis der Handschriften und Drucke*. München: Beck, 1968.

Busby, Keith. "Rubrics and the Reception of Romance." *French Studies* 53 (1999): 129–41.

Chavannes-Mazel, Claudine A. and Linda L. Brownrigg. "The Expansion of Rubrics for the Sake of the Layout: Mise-en-page as Evidence for a Particular Workshop?" *Medieval Book Production: Assessing the Evidence*. Ed. Linda L. Brownrigg. Los Altos Hill, Calif.: Anderson Lovelace, 1990. 117–32.

Croenen, Godfried. "Rubricating History in Late Medieval France." *Vernacular Manuscript Culture 1000–1500*. Ed. Erik Kwakkel. Leiden: Leiden University Press, 2018. 105–41.

Dahm-Kruse, Margit. *Die Sammlung als Kontext. Formen der Retextualisierung und Kontextualisierung mittelhochdeutscher Versnovellen in kleinepischen Sammelhandschriften am Beispiel von Konrads von Würzburg "Herzmaere."* Tübingen: Narr Francke Attempto, 2018.

Dines, Ilya. "Between Image and Text: The Long Rubrics and Captions in Medieval Bestiaries." *Frühmittelalterliche Studien* 49/1 (2016): 149–64.

Düwel, Klaus. *Werkbezeichnungen der mittelhochdeutschen Erzählliteratur: 1050–1250*. Göttingen: Vandenhoeck & Ruprecht, 1983.

Echelmeyer, Nora, Nils Reiter, and Sarah Schulz. "Ein PoS-Tagger für 'das' Mittelhochdeutsche." *Dhd 2017 Konferenzabstracts*. Ed. Michael Stolz. Bern, 2017. 141–47. DOI: 10.18419/opus-9023

Eichenberger, Nicole. *Geistliches Erzählen: Zur deutschsprachigen religiösen Kleinepik des Mittelalters*. Berlin: De Gruyter, 2015.

Fernandez Riva, Gustavo. Collection of Middle High German Rubrics in Miscellany Manuscripts 12th–16th centuries, Version 1.0, 2019, [Data set]. [New expanded and upgraded versions of the corpus might be published in the future. Version 1 has been used for this article.]

Fischer, Hanns. *Studien zur deutschen Märendichtung*. Tübingen: Max Niemeyer, 1968.

Genette, Gérard. *Paratexts. Thresholds of interpretation*. Translated by Jane E. Lewin. Cambridge: Cambridge University Press, 1997.

Grubmüller, Klaus. *Die Ordnung, der Witz und das Chaos. Eine Geschichte der europäischen Novellistik im Mittelalter: Fabliau - Märe - Novelle*. Tubingen: Niemeyer, 2006.

Gumbert, Johann Peter. "'Modern' layout in classical manuscripts." *The Classical Tradition in the Middle Ages and the Renaissance: Proceedings of the first European Science Foundation Workshop on "The Reception of Classical Texts," (Florence, Certosa del Galluzzo, 26–27 June 1992).* Ed. Claudio Leonardi and Birger Munk Olsen. Spoleto: Centro italiano di studi sull'alto Medioevo, 1995. 23–32.

Hamesse, Jacqueline. "Le modèle scolastique de la lecture." *Histoire de la lecture dans le monde occidental.* Ed. Roger Chartier and Guglielmo Cavallo. Paris: Seuil, 1995. 125–45.

Haug, Walter. "Entwurf zu einer Theorie der mittelalterlichen Kurzerzählung." Kleinere Erzählformen des 15. und 16. Jahrhunderts. Ed. Walter Haug and Burghart Wachinger. Tubingen: Max Niemeyer, 1993. 1-36.

Heinzle, Joachim. "Märenbegriff und Novellentheorie. Überlegungen zur Gattungbestimmung der mittelhochdeutschen Kleinepik." *Zeitschrift für deutsches Altertum und deutsche Literatur* 107 (1978): 121–38.

Holznagel, Franz-Josef. "Verserzählung - Rede - Bîspeln. Zur Typologie kleinerer Reimpaardichtungen des 13. Jahrhunderts." *Eine Epoche im Umbruch. Volkssprachliche Literalität 1200–1300. Cambridge Symposium 2001.* Ed. Christa Bertelsmeier-Kierst and Christopher Young. Tübingen: Max Niemeyer, 2003. 291–306.

Klingner, Jacob, and Ludger Lieb. *Handbuch Minnereden*. Berlin, Boston: De Gruyter, 2013.

Meyer, Matthias, and Nicola Zotz. "How to Name a Story? Rubrics - Headings - Titles." *The Dynamics of the Medieval Manuscript: Text Collections from a European Perspective.* Ed. Karen Pratt, Bart Besamusca, Matthias Meyer, and Ad Putter. Göttingen: Vandenhoeck & Ruprecht, 2017. 203–16.

Mihm, Arend. *Überlieferung und Verbreitung der Märendichtung im Spätmittelalter*. Heidelberg: Winter, 1967.

Moelleken, Wolfgang Wilfried. *Die Kleindichtung des Strickers*. 5 vols. Göppingen: Kümmerle, 1973.

Mortensen, Lars Boje. "The Canons of Medieval Literature from the Middle Ages to the Twenty-First Century." *Analecta Romana Instituti Danici* XLII (2017), 47–63.

Ong, Walther. *Ramus, Method, and the Decay of Dialogue*. Cambridge, Mass.: Harvard University Press, 1958.

Ridder, Klaus, and Hans-Joachim Ziegeler. *Deutsche Versnovellistik des 13. bis 15. Jahrhunderts (DVN). Edition und Kommentar*. Berlin: Schwabe, 2020.

Röcke, Werner. *Die Freude am Bösen. Studien zu einer Poetik des deutschen Schwankromans im Spätmittelalter*. München: Wilhelm Fink, 1987.

Rouse, Mary A., and Richard Rouse. "Some Assembly Required: Rubric Lists and Other Separable Elements in Fourteenth-Century Parisian Book Production." *Li premerains vers: essays in honor of Keith Busby.* Ed. Catherine M. Jones y Logan E. Whalen. Amsterdam: Rodopi, 2011. 405–16.

Rudy, Kathryn M. *Rubrics, Images and Indulgences in Late Medieval Netherlandish Manuscripts*. Leiden: Brill, 2016.

Shevlin, Eleanor F. "To Reconcile Book and Title, and Make 'em Kin to One Another: The Evolution of the Title's Contractual Functions." *Book History* 2 (1999): 42–77.

Strasser, Ingrid. *Vornovellistisches Erzählen: mittelhochdeutsche Mären bis zur Mitte des 14. Jahrhunderts und altfranzösische Fabliaux*. Wien: Fassbaender, 1989.

Stutz, Elfriede. "Der Codex Palatinus germanicus 341 als literarisches Dokument." *Bibliothek und Wissenschaft* 17 (1983): 8–26.

Underwood, Ted. *Distant Horizons*. Chicago: University of Chicago Press, 2019.

Ziegeler, Hans-Joachim. *Erzählen im Spätmittelalter: Mären im Kontext von Minnereden, Bispeln und Romanen*. München: Artemis, 1985.

Zwierzina, Konrad. "Die Kalocsaer Handschrift." *Festschrift Max H. Jellinek*. Ed. Gustav Ehrismann. Österreichischer Bundesverlag für Unterricht, Wissenschaft und Kunst: Vienna/Leipzig, 1928. 209–32.