Earl Jeffrey Richards

Bergische Universität Wuppertal

David Joseph Wrisley

American University of Beirut

Liliane Dulac

Université de Montpellier III

The Different Styles of Christine de Pizan

An Initial Stylometric Analysis

Abstract

This article attempts to identify the different styles employed by Christine de Pizan in all of her works using empirically based stylometric analysis. The results, at once heuristic but also statistically significant, suggest as well that besides Christine de Pizan, other medieval French authors such as Jean de Meun, Froissart and Gerson, have at least two, if not more, stylometric footprints. The methods employed and the ramifications of the results are discussed briefly as well.

Résumé

Il s'agit d'un essai d'identifier les différents styles employés par Christine de Pizan dans l'ensemble de sa production littéraire à partir d'une analyse stylométrique empirique. Les résultats, à la fois heuristiques mais aussi statistiquement significatifs, suggèrent aussi qu'en plus de Christine de Pizan, d'autres auteurs français médiévaux comme Jean de Meun, Froissart et Gerson, possèdent au moins deux « empreintes » stylométrique, sinon encore plus. Les méthodes employées et les ramifications des résultats obtenus sont brièvement discutés.

> *Ich fürchte, wir werden Gott nicht los,*
> *weil wir noch an die Grammatik glauben.*
> Nietzsche[1]

In this paper we wish to identify Christine de Pizan's various styles, in verse and in prose, with the help of stylometry and to comment briefly on what each of these styles may mean[2]. Hitherto, following traditional stylistic and rhetorical approaches, scholars have identified what they have called clerical, allegorical, legal-juridical and courtly styles in her different writings, styles that have more to do with critical idiosyncrasy than empirically detectable evidence[3]. One of the major issues under discussion is the relationship between verse and prose in her *œuvre*, whether for instance, the prose passage in the *Mutacion de Fortune* regarding the history of the Jews has a different epistemological status (in other words, whether it is somehow « truer » by having been written in prose)[4]. Christine wrote in different styles: the issue is whether these styles can be detected computationally, that is, quantitatively, and repeatedly over a very large number of words. Christine's writings constitute a corpus of over one million words, composed in different genres. The challenge is to understand the relationship among her different styles which hitherto traditional stylistics has failed to do.

---

[1] *Gotzen-Dämmerung oder, wie man mit dem Hammer philosophiert*, « Die *Vernunft* in der Philosophie », in Fr. Nietzsche, *Werke*, ed. K. Schlechta, vol. 2, Munich, Hanser, 1954, p. 959.

[2] Some five years ago, Liliane Dulac assembled a small team of colleagues, including Christine Reno, Claire Le Ninan and Jeff Richards, to collaborate on an edition/ translation of the *Lai leonime* in the festschrift for Danielle Bohler (« Jeux d'amour et de rimes : le *Lai leonime* de Christine de Pizan. Édition (provisoire), traduction et commentaire », in Fl. Bouchet et D. James-Raoul (ed.), *Desir n'a repos, Hommage à Danielle Bohler*, Bordeaux, Eidôlon, 2015, p. 25-55). The *Lai leonime* could, *mutatis mutandis*, be termed (with apologies to Raymond Queneau) a veritable medieval *Exercices de style*, and the reflections in this paper on stylistics and its limits, go back to this happy collaboration. At the same time, the different styles of the *Lai leonime* anticipate the multiplicity of styles throughout Christine's writings.

[3] J. D. Burnley, « Christine de Pizan and the so-called *style clergial* », *The Modern Language Review*, 81 (1986), p. 1-6 ; A. Strubel, « Le style allégorique de Christine », in L. Dulac et B. Ribémont (ed.), *Une femme de lettres au Moyen Âge. Études autour de Christine de Pizan*, Orléans, Paradigme, 1995, p. 357-372 ; M. Curnow, « *La Pioche d'inquisicion* : Legal-Judicial Content and Style in Christine de Pizan's *Livre de la Cité des Dames* », in E. J. Richards *et al.* (ed.), *Reinterpreting Christine de Pizan*, Athens, U. of Georgia P., 1992, p. 157-172 ; D. Demartini, « Style et critique du discours courtois chez Christine de Pizan, *Le livre du duc des vrais amants* », in Ch. Connochie-Bourgne and S. Douchet, *Effets de style au Moyen Âge*, Aix-en-Provence, PU de France, 2012, p. 315-325.

[4] E. J. Richards, « Poems of Water without Salt and Ballades without Feeling, or Reintroducing History into the Text. Prose and Verse in the Works of Christine de Pizan », in E. J. Richards, *Christine de Pizan and Medieval French Lyric*, Gainesville, UP of Florida, 1998, p. 206-230.

Christine studies have in many ways pioneered different approaches to digital humanities and medieval French. The « Making of the Queen's Manuscript » project at Edinburgh created TEI-compliant XML digital editions of much of her writing[5]. In the realm of literary geography, D. J. Wrisley has suggested in another topical form of analysis, that of toponymic frequency across her *œuvre*, resulting in the digital mapping project « The Geographies of Christine de Pizan »[6]. Besides two articles in French currently in press by E. J. Richards[7], to our knowledge, there are only three other applications of stylometry to medieval French. First, Brian Reilly and Moira Dillon have used quantitative analysis on a single romance by Chrétien de Troyes in order to assess the historically attributed shift in authorship in *Lancelot*[8]. Maciej Eder has applied a computational process of supervised machine-learning classification known as « rolling stylometry » on three individual texts with dual authorship: the *Roman de la Rose*, a 15th-century Polish translation of the Bible known as *Queen Sophia's Bible*, and *The Inheritors*, a novel by Joseph Conrad and Ford Maddox Ford written jointly in 1901[9]. D. J. Wrisley has also taken on the question of large corpus stylometry in the context of Guillaume de Tignonville's *Dits Moraux des philosophes*, a traveling text of Arabic origin that served as one of Christine's sources in the *Epistre Othea*[10]. Stylometry has been applied primarily in questions of authorial attribution or other literary forensics, and secondarily to assessing discursive proximity among different authors. In this paper, after first discussing the difference between stylistics and stylometry,

---

[5]   J. Laidlaw *et al.*, « Christine de Pizan. The Making of the Queen's Manuscript (London, British Library Harley Ms. 4431) », on line [http://www.pizan.lib.ed.ac.uk/index.html].

[6]   Available at http://djwrisley.com/maps/cdep/.

[7]   E. J. Richards, « Jean de Meun mis en réseau : une analyse stylométrique de la Querelle de la *Rose*, réponse de tentative à la question 'le *style clergial*, existe-t-il ?' (A. Strubel) », in *Jean de Meun et la culture médiévale : littérature, art, science et société aux derniers siècles du Moyen Âge (Orléans, mai, 2014)*, forthcoming and « À la recherche des communautés discursives au Moyen Âge : un regard numérique sur la connectivité dans la culture vernaculaire et le rôle des traductions dans l'évolution de la prose en moyen français », in *Les états de langues à l'heure du numérique (Paris, novembre 2014)*, ed. J. Ducos.

[8]   Br. J. Reilly et M. R. Dillon, « Virtuous Circles of Authorship Attribution Through Quantitative Analysis : Chrétien de Troyes' *Lancelot* », *Digital Philology*, 2 (2013), p. 60-85.

[9]   M. Eder, « Rolling stylometry », *Digital Scholarship in the Humanities*, 30 (2015), online [http://dsh.oxfordjournals.org/content/digitalsh/early/2015/04/06/llc.fqv010.full.pdf].

[10]   D. J. Wrisley, « Modeling the Transmission of al-Mubashshir Ibn Fātik's *Mukhtār al-Ḥikam* in Medieval Europe : Some Initial Data-Driven Explorations », *Journal of Religion Media and Digital Culture*, forthcoming April 2016.

we will, aided by stylometry, next try to detect stylistic « communities » in a corpus of Christine's writings, first separate from the writings of her contemporaries, and second along with them.

In medium corpus stylometry, that is, when we are analyzing many dozens of authors together, it is normal to observe affinities between the works of the same author. In observing distances among authors within a network of calculated distance metrics, it may be possible to see clusters of single authors. This finding has been observed for the case of an ad-hoc corpus of ancient Greek prose, poetry and drama[11]. In medieval French, however, it turns out that the works of authors writing in both prose and verse are not close textual neighbors: beyond the case of Christine, we have determined that Jean de Meun's part of the *Rose* does not cluter with his prose translations, Froissart's verse compositions do not cluster with his prose chronicles, nor do the French poems of Jean Gerson cluster with his prose works. For this reason, in this article we will examine whether the communities found in a stylometric network for Christine's works in prose and verse persist when we scale up the corpus to include writings of her contemporaries. Finally, we will comment on the potential significance of our findings.

Stylistics vs Stylometry

At the risk of recapitulating certain facts all too well known to adherents of stylistics, on the one hand, and practitioners of stylometry on the other, it might be useful to recall the salient differences between the two approaches to the problem of style in texts. Traditional stylistics in Romance Studies, as epitomized and inspired by the works of Leo Spitzer, Charles Bally and Helmut Hatzfeld[12], to name only a few of its most famous representatives, invokes the notion of an unquantifiable

---

[11]   M. Eder, « Larger-Scale Stylometry Using Network Analysis », *Qualico 2014 : Book of Abstracts*, Olomouc, Palacky University, p. 38-39.

[12]   Ch. Bally, *Traité de stylistique française*, 3rd ed., Genève, Georg & Cie, 1951 ; L. Spitzer, *Die Wortbildung als stilistisches Mittel exemplifiziert an Rabelais*, Halle, Niemeyer, 1910 ; *id.*, *Aufsätze zur romanischen Syntax und Stilistik*, Halle, Niemeyer, 1918 ; *Stilstudien*, Munich, Hueber, 1928, 2 vol. For a survey of the hermeneutic circle, see M. Wallace, « The Hermeneutic Circle and the Art of Interpretation », *Comparative Literature*, 24 (1972), p. 97-117. Martin notes (p. 98) : « For Heidegger and his followers (notably Hans-Georg Gadamer and Emil Staiger) interpretive circularity is ontological rather than methodological : it is an inescapable part of any act of perception ». Stylometrics seeks to break out of this circle by objectifying stylistic distances rather than focusing on subjective affective stylistic effects. See *Romanistische Stilforschung*, ed. H. A. Hatzfeld, Darmstadt, WBG, 1975, and E. J. Richards' review of this collection in *Romance Philology*, 34 (1981), p. 212-218. Hatzfeld, unlike most practitioners of stylistics, sought to objectify the subjective affective his Munich dissertation (*Über die Objektivierung subjektiver Begriffe im Mittelfranzösischen Ein Beitrag zur Bedeutungslehre, Leipzig, Noske*, 1915).

deviation from an implicit linguistic norm in order to ascertain an author's stylistic features in primarily affective terms. Bally, following his teacher Ferdinand de Saussure, presupposed the arbitrariness of the linguistic sign, an assumption that introduces a circularity into stylistics. Spitzer's famous « hermeneutic circle », adapted from Heidegger, but growing out of his prior stylistic research, actually embraces this methodological contradiction, only in the end to spiral out into witty non-verifiability in anticipation of most post-modernist criticism. How can one verify stylistic deviation if all language is arbitrary in the first place ? Traditional stylistics does in fact provide valuable close readings of texts, micro-readings as it were, positing correlations between thematic repetition and linguistic idiosyncrasy, between individual parts and the whole. At its empirical best, stylistics also relies on the history of rhetoric to strengthen its conclusions, and can detect formal symmetry or dissymmetry, as the case may be, which stylometry does not detect because its point of departure is purely lexical frequency from what is known as a « bag of words » that is, without regard for syntax[13].

Combining statistical and philological expertise, the Computational Stylistics Group made up of Maciej Eder, Jan Rybicki (both of Krakow) and Mike Kestemont (Antwerp) have developed a package for the programming environment R entitled « Stylometry with R » (or « StyloR »)[14]. StyloR offers different functions for digital textual analysis with user-driven parameters across a given corpus of plain text, both on the command line and in a graphic user interface. Of interest here are the programs for performing cluster analysis and bootstrap consensus, programs that compute lexical distances between texts across many different parameters and many thousands of calculations. The steps involved in this calculation are presented in detail in the documentation at the website of this group, but a brief summary of them may suffice to explain the methodology involved.

StyloR works with plain-text electronic files formatted with UTF-8 encoding that preserves the diacritics of the modern editions from which they are derived. In a nutshell, StyloR tokenizes the texts, counting all of the words they contain. The frequency of a single word

---

[13]   There have been recent calls to redefine stylistics as the study of countable linguistic features. See J. B. Herrmann, K. van Dalen-Oskam and Chr. Schöch, « Revisiting Style, A Key Concept in Literary Studies », *Journal of Literary Theory*, 9 (2015), p. 25-52.

[14]   E. Maciej, M. Kestemont and J. Rybicki, « Stylometry with R : A Package for Computational Text Analysis », *R Journal*, 16 (2016), forthcoming ; advance access available on line [https://journal.r-project.org/archive/accepted/eder-rybicki-kestemont.pdf].

is divided by the number of all the words in the corpus, yielding a percentage of usage. These percentages are then compared across the corpus among texts. StyloR calculates distances based on the choice of a metric (a function that defines the differences between each pair of texts separately). For texts in English, the metric that some digital practitioners prefer for its statistically significant results is known as « Delta ». Eder has developed two metrics termed « Eder's Delta » and « Eder's Simple Delta ». They slightly weight the most frequent words accommodating inflected languages. For now, the latter metric will be used for medieval French texts.

Among the statistical analyses offered by StyloR, we have chosen cluster analysis and bootstrap consensus. Our stylometric analysis of Christine's writings follows a two-step procedure performed on three textbases: (1) the works of Christine except the *Livre de Prod'hommie* which remains unedited, (2) a larger context of 65 works in both prose and verse from her contemporaries, and finally (3) the two databases united as one (the Appendix lists these works and their editions). All the files used here for Christine's writings are corrected or « clean » files, some come from critical editions we digitized and others from transcriptions available from « Making of the Queen's Manuscript » digital project[15]. The files for works by Christine's contemporaries were digitized using ABBYY Fine Reader 12 and then corrected. Optical character recognition (OCR) quality was generally high, and these files are less than 5% uncorrected.

For drawing generic comparisons, we added four « redundant » files to the Christine database: the controversial section in prose on the history of the Jews in the *Mutacion de Fortune* (otherwise written in verse), the verse passages of the *Othea* (otherwise composed in prose), the *oraisons en vers*, in order to compare these prayers with other devotional prose works by Christine, and, as one test of the validity of the distance measures, the lengthy (and potentially) « lyrical narrative » text, the *Duc des vrais amans* (*Œuvres poétiques*, ed. M. Roy, vol. 3, which clustered with the node « Lyric 3 » as expected). At the same time, for the purposes of comparing Christine's styles with those of her contemporaries, we assembled a corpus of slightly over six million words. A full list of those works is included in the Appendix. All the Middle French texts used here were composed either at the royal courts of Charles V and Charles VI or in Paris, so that dialectical differences particularly prominent in Old French play

---

[15]   http://www.pizan.lib.ed.ac.uk/trans.html.

a subordinate role in our experiment. Orthographic and scribal irregularities (*lyon/lion*, etc.) of course occur in the same text transcribed by the same scribe, but an examination of the word list generated in the second step of our digital analysis shows these variants are statistically insignificant.

Cluster analysis produces a series of dendrograms depending on the most frequent word (« MFW ») settings. These dendrograms differ among each other, and in order to generate a statistically robust result for the varying distances between texts, another analysis termed bootstrap consensus is performed which provides a consensus across many calculations with differing parameters. StyloR generates a comma separated value (.csv) file of the distance calculations that can be visualized as a network. Furthermore, a number of statistical measures can be derived from these stylometrics. In particular, in a network of dense interrelationships of nodes (which are here the individual texts), we can calculate modularity, by which we mean the ability of a network to be divided into statistically significant sets of nodes called clusters or communities. We used the so-called « Louvain method » community detection algorithm built-in to the Gephi platform in order to explore our stylometric network[16]. The resulting communities can be visualized in an online interactive network graph, a static, colorless version of which is reproduced here (fig. 1)[17]. The final features generated from our stylometric analysis, including a most frequent word list from the combined text base, is available for download[18].

---

[16] See the brief introduction (based on the somewhat earlier beta version 0.6 than the beta version 0.8.2 used here), M. Bastian, S. Heymann and M. Jacomy, « Gephi : An Open Source Software for Exploring and Manipulating Networks », *International AAAI Conference on Weblogs and Social Media*, 2009, online [https://gephi.org/publications/gephi-bastian-feb09.pdf]. The community detection algorithm is that of V. Blondel, J.-L. Guillaume, R. Lambiotte and E. Lefebvre, « Fast Unfolding of Communities in Large Networks », *Journal of Statistical Mechanics. Theory and Experiment*, 10 (2008), p. 1000. Community detection is not a process without controversy. For discussion of these algorithms, see M. E. J. Newman, « Modularity and Community Structure in Networks », *Proceedings of the National Academy of Sciences of the United States of America*, 103 (2006), p. 8577–8696, online [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1482622/] as well as Br. Karrer, E. Levina and M. E. J. Newman, « Robustness of Community Structure in Networks », *Physical Review E*, 77 (2008), online [DOI : 10.1103/PhysRevE.77.046119].

[17] An interactive network graph of Christine de Pizan and her contemporaries is available online [http://djwrisley.com/networks/CdeP&Co/].

[18] The data generated by StyloR (the table with distances, 1000 MFW list) and the Gephi project file for the combined corpus of Christine de Pizan and her contemporaries are available on-line [http://djwrisley.com/networks/CdeP&Co/data/].
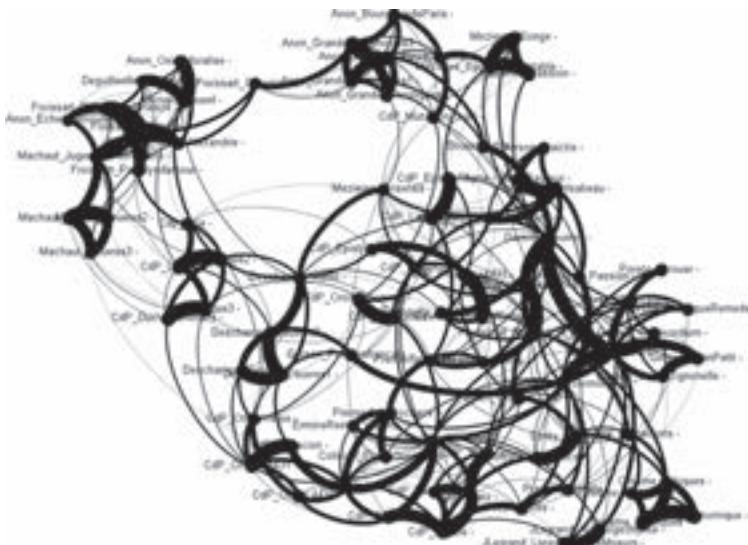
Fig. 1 *A network visualization of bootstrap consensus calculations based on the corpus of Christine de Pizan and her contemporaries*[19].

Christine de Pizan's Styles

To repeat, our stylometric analysis of Christine's works with three textbases: (1) the works of Christine includes all of Christine's works except the *Livre de Prod'hommie*, in corrected files; (2) 65 works in both prose and verse from her contemporaries; and (3) the two databases united as one (the Appendix lists these works and their editions). Many, but not all the files of Christine's contemporaries have been corrected to less than 5% error, an error resulting from optical character recognition software "correcting" medieval orthography to modern norms. As a test of the reliability of our digitized files, we compared the results from an uncorrected file of Nicolas de Baye's *Journal* (100 000 words, including many modern French footnotes) to those from the corrected file (80 000 words), that is, the « dirty » file had 20% error. In the network visualization produced by the stylometric analysis, the corrected file of Baye's *Journal* barely moved from where the « dirty » file had clustered.

The practice of stylometry relies upon the statistical comparison of most frequent words, which perhaps explains the insignificance of the textual error mentioned above. It might seem counter-intuitive to

---

19   This network is available in interactive form, and in color, online [http://djwrisley.com/networks/CdeP&Co/].

compare words that largely do not have semantic weight as the primary means of comparing authors, and yet, in practice, the MFW of any text are function words that, in the specific statistical distribution, allow us to generate empirically a stylometric profile.

Working within RStudio, and using our corpus of Christine's works, we ran version 0.6.0 of the Stylo package iteratively across number of parameters, varying the settings for minimum and maximum MFW as well as the increment. We performed bootstrap consensus analysis, which, as the name implies, establishes a consensus among these different cluster analyses. As we increased the MWF and the intervals, modularity in the network stayed relatively consistent and either four or five communities were detected (see Fig. 2):

Min. & max MFW, interval	Modularity	Number of communities
10-200-10	0.514	5
20-200-20	0.544	5
50-500-50	0.55	4
100-1000-100	0.529	5

FIG. 2 *Iterative experiments on the corpus of Christine's work, resultant modularity and communities*

Since five communities were generally detected, we list them below. These clusters remain largely stable when Christine's works are placed into corpus #3 along with her contemporaries, but there are some interesting shifts that take place, which in fact exhibit somewhat more suggestive patterns.

Group One	Group Two	Group Three	Group Four	Group Five
Lyric 1	Othea	Advision	Mutacion Juifs	Epistres Rose
Lyric 2	Othea verse	Charles V	7 Psaumes	Epistre Reyne
Lyric 3	Mutacion	Cité	Fais d'Armes	Prudence
Duc des Vrais amans	Chemin	Trois Vertus	Oroisons en vers	Lamentacion
Ditié		Policie	Heures	Prison
		Paix		

FIG. 3 *The five communities of Christine's writing detected by stylometric analysis. Works that cluster differently in the larger network are marked with an asterisk*

These results are preliminary and heuristic, and they raise new questions for future research. The most striking thing is that the *Ditié de Jeanne d'Arc*, the last of Christine's works, should cluster with lyrical works written almost thirty-five years earlier. Our very preliminary conclusion: since the *Ditié* has a very low lexical diversity, after so many years away from writing in verse, it seems that Christine returns to the highly conventional linguistic register as in her earlier works.

Stylometric analysis suggests linguistic affinities between Christine's lyric works and those of Machaut and Deschamps, but to different degrees over her lifetime. Given that Roy's edition is chronological, our analysis suggests affinity in the case of volume one with Froissart/Deschamps, for volume two with Deschamps/Machaut and for volume three with Machaut. Further research is needed to assess these findings.

When we scale up from the Christine-only corpus to the combined corpus of Christine and her contemporaries, several interesting realignments in the communities take place. Group Two of the Christine-only corpus (*Othea*, *Mutacion de Fortune*, *Chemin de longue estude*) stays together, but in the combined corpus now aligns with the *Cité des dames*. Group Three of the Christine-only corpus basically remains stable. Group Four of the Christine-only corpus is quite difficult to assess since the works which are found in that textual community do not bear thematic or generic resemblance. Seen in the context of her contemporaries, some initial comments can be made on the discursive groupings that stylometry suggests. The larger picture of literary history, in short, helps us understand the MFW linguistic comparisons made by stylometric analysis.

In the combined corpus of Christine and her contemporaries there are « crossovers » between verse and prose in Christine's works, that is, community alignment does not always group texts of similar form. She had definitely developed a « lyrical » style for use in fixed-form poems (as Group Ten of fig. 4 suggests). On the other hand, her religious lyric is revealed to be linguistically separate from her secular lyric, as it clearly clusters with other her religious works in prose such as the *Sept psaumes allégorisés* and the *Heures de contemplation* and other contemporary religious works in prose such as the *Passion Isabeau*, Courtecuisse's *Passion* or Gerson's translation of the Pseudo-Bede account of the Passion (*Traictié*). It is striking that the *Othea*, *Chemin de longue estude*, *Mutacion de Fortune* and *Cité*

Group One	Group Two	Group Three	Group Four	Group Five
Anon_MirDames	Anon_Echamour	Anon_PassIsab	Courtecuisse Serm	CdP_Advision
Bouvet_Arbre	Anon_OvideMorl	Anon_NBSauv	Gerson Canti	CdP_CharlesV
CdP_EpisRoyne	Deguilleville_Pel	CdP_7Psaumes	Gerson Tignon	CdP_FaisArmes
CdP_EpisRose	Froissart_Buissn	CdP_Heures	Gerson Homelies	CdP_Paix
CdP_Lament	Froissart_Meliadr	CdP_OroisVers	Gerson JeanPetit	CdP_Policie
CdP_Prison	Froissart_Paradys	Courtecuisse_Pas	Gerson Mont	CdP_3Vertus
CdP_Prudence	Gervais_Fauvel	Gerson_Traictie	Gonesse Plut	Presles_Cite
Courtecuisse_Ps-Seneque	Machaut_RoiNav		Legrand Archil	Presles_Dignete
Foulechat_Poli	Machaut_Oeu1		Legrand Moeurs	
Gerson_Œuvres	Machaut_Oeu2		Porete Mirouer	
Premierfait_Viell	Machaut_Oeu3			
Tignonville_Dits	Machaut_Prise			
Tremaugon_Song				

	Group Six	Group Seven	Group Eight	Group Nine	Group Ten
	CdP_Chemin	Anon_BourParis	Anon_Veg1380	Mezieres_EpLam	CdP_VrAmans
	CdP_Cite	Anon_GrChron1	Conty_Harmonie	Mezieres_Passio	CdP_Lyrique1
	CdP_Mutacion	Anon_GrChron2	Conty_JeuEschec	Mezieres_Songe	CdP_Lyrique2
	CdP_Othea	Anon_GrChron3	Oresme_Divin		CdP_Lyrique3
	CdP_OtheaVers	Anon_GrChron4	Oresme_Ethiques		Cdp_Ditie
	Collectif_EvQue	Baye_Journal	Oresme_Ciel		
	Deschamps_Oe1	CdP_Mut_Juifs	Oresme_Polit		
	Deschamps_Oe2	Froissart_Chron1	Oresme_Ycon		
	Deschamps_Oe3				
	Deschamps_Mirr				
	ErReims_Visions				
	Gerson_Poemesfr				
	Mezieres_Griseld				
	Premierfait_Dec				

FIG. 4 *The ten communities detected in the combined corpus of Christine and her contemporaries by stylometric analysis*

des dames make up a community of stylometric similiarity; while it is true these works were written at roughly the same time, they are highly disparate works. Is it possible that the signal picked up by stylometric analysis here is purely temporal, or is additional thought required? Furthermore, most of her later prose clusters with the works of Raoul de Presles, no doubt a rich subject for future research. It is also striking that Christine's prose passage on the history of the Jews in the *Mutacion de Fortune* aligns with the chronicles of Froissart, the *Journal d'un bourgeois de Paris*, the *Journal de Nicolas de Baye* and with the *Grandes Chroniques de France*, works in which the French is significantly simpler and less burdened with subordinate clauses than the prose found in the works of Oresme or of the other humanists at the royal court. Stylometry indeed is suggestive of many possible new lines of inquiry in Christine studies for future research.

Christine was particularly conscious of register, as her remarks to Eustache Deschamps reveal: *Te suppliant que a desplaisance / Ne te tourt se adés plaisance / Ay qu'em singulier nom je parle / A toy, car je l'ay apris par le / Stille clergial de quoy ceulx usent / Qui en science leurs temps usent* (*Epistre a Eustache Morel*[20]). Stylometric analysis of the literary production of her contemporaries who passed their time *en science* reveals that Christine's prose works were very much at the core of *stille clergial*. However, even this *stille clergial* was hardly homogenous. Traditional stylistics identified four styles for Christine – clerical, allegorical, legal-juridical and courtly styles – whereas stylometrics strongly suggest the inadequacy of these labels. A brief comparison of Groups Four and Eight reveals that Gerson's prose has an affinity with that of Jean Courtecuisse, Nicolas de Gonesse and Jacques de Legrand, all clerics like he, whereas Oresme's influential works cluster with those of Évrart de Conty, the personal physician of Charles V, and with the anonymous translation of Vegetius done in 1380. The latter group suggests closeness in space, time and intellectual orientation: they were both at the royal court, writing between 1370-1380 and participated in the revival of Aristotle. This conclusion, above all, calls for more digital textual research on medieval French texts, in particular in order to understand better the nature and evolution of French prose in the late 14th and early 15th century. It is above all important that future research recognizes the possibility that a single author can exhibit widely disparate styles.

---

[20]   Christine de Pizan, *Œuvres poétiques*, ed. M. Roy, *op. cit.*, v. 2, p. 296 ; v. 13-18.

Appendice

Primary Sources Used for Stylometric Analysis (including the abbreviations used in network visualisations)

Anon_BourgeoisdeParis.txt

Journal d'un bourgeois de Paris de 1405 à 1449, ed. C. Beaune, Paris, LGF, 1990 (*Lettres gothiques*).

Anon_Eschecsamoureux

Die Liebesgarten-Allegorie der échecs amoureux. Kritische Ausgabe und Kommentar, ed. Chr. Kraft, Berne, Lang, 1976.

Anon_GrandesChroniques1.txt

Anon_GrandesChroniques2.txt

Anon_GrandesChroniques3.txt

Anon_GrandesChroniques4.txt

Les grandes chroniques de France, selon que elles sont conservées en l'église de Saint-Denis en France, ed. P. Paris, Paris, Techener, 1836-1838, 6 vol. [Here only the first four volumes have been used.]

Anon_Miroir des dames.txt

Le miroir des dames de Durand de Champagne, Édition critique du ms. 11203-04 (2305) de la Bibliothèque Royale de Bruxelles, ed. Kr. de Bois, Bruxelles, ULB, 1986, mémoire de master inédit.

Anon_NostreBenoitSauveur.txt

La Vie de Nostre Benoit Sauveur Ihesuscrist and la Saincte Vie de Nostre Dame, ed. M. Meiss and E. H. Beatson, University Park, Pennsylvania State UP, 1990.

Anon_OvideMoralise.txt

Ovide moralisé, poème du commencement du quatorzième siècle, ed. C. de Boer, Amsterdam, Müller, 1915-1938, 5 vol. [The first two volumes, 1915 and 1920, covering the translation of Metamorphoses I-VI have been used here].

Anon_PassionIsabeau.txt

La Passion Isabeau, une édition du manuscrit Fr. 966 de la Bibliothèque Nationale de Paris, ed. E. E. DuBruck, Berne, Lang, 1990.

Anon_Vegece_1380.txt

Le Livre de l'art de chevalerie de Vegece, traduction. anonyme de 1380, ed. L. Löfstedt *et al.*, Helsinki, Finnish Academy of Sciences, 1989.

Baye_ Journal.txt

Journal de Nicolas de Baye, greffier du Parlement de Paris, 1400-1417, ed. A. Tuetey, Paris, Renouard, 1885-1888, 2 vol.

Bouvet_Arbre.txt

Honoré Bovet, *L'arbre des batailles*, ed. E. Nys, Brussels, Muquardt, 1883.

Christine de Pizan

CdP_Lyric I

CdP_Lyric II

CdP_Lyric III

Christine de Pizan, *Œuvres poétiques*, ed. M. Roy, Paris, Didot, 1886-1896, 3 vol.

CdP_Oraisons en vers

Oroyson Notre Dame, XV Joyes Nostre Dame, Oroyson de Nostre Seigneur, ibid., vol. 3, p. 1-26.

CdP_Chemin

Christine de Pizan, *Le chemin de longue étude*, ed. A. Tarnowski, Paris, LGF, 2000 (*Lettres gothiques*).

CdP_Advision

Christine de Pizan, *Le livre de l'advision Cristine*, ed. Chr. Reno and L. Dulac, Paris, Champion 2001 (*Études christinennes* 6).

CdP_DucVraisAmans

Le livre du duc des vrais amans, in *Œuvres poétiques*, ed. M. Roy, *op. cit.*, vol. 3, p. 59-208.

CdP_Othea

Transcription of the manuscript London, BL, Harley 4431, fol. 95a-141c, online (*The Making of the Queen's Manuscript* [http://www.pizan.lib.ed.ac.uk/]).

CdP_Othea Verse

Transcription of the manuscript London, BL, Harley 4431, fol. 95a-141c, online (*The Making of the Queen's Manuscript* [http://www.pizan.lib.ed.ac.uk/]).

CdP_Epistres Rose

Transcription of the manuscript London, BL, Harley 4431, fol. 237a-254a, on line (*The Making of the Queen's Manuscript* [http://www.pizan.lib.ed.ac.uk/]).

CdP_Mutacion

Christine de Pizan, *Le livre de la mutacion de Fortune*, ed. S. Solente, Paris, Picard, 1959-1966 (*SATF*), 4 vol.

CdP_Mutacion/Juifs

Ibid., IV, xix *Item, des Juifs*, vol. 2, p. 156-170.

CdP_Charles V

Christine de Pizan, *Le livre des fais et bonnes meurs du sage roy Charles V*, ed. S. Solente, Paris, Champion, 1936-1940, 2 vol.

CdP_EpistreRoyne

A. K. Kennedy, « Christine de Pizan's *Epistre a la reine* 1405 », *Revue des langues romanes*, 92 (1988), p. 253-264.

CdP_Cité

Christine de Pizan, *La Città delle Dame*, ed. P. Caraffi and E. J. Richards, Milan, Luni, 1997 [5th ed. 2010].

CdP_Trois Vertus

Christine de Pizan, *Le livre des trois Vertus*, ed. Ch. C. Willard and É. Hicks, Paris, Champion, 1989 (*Bibliothèque du xvᵉ siècle* 50).

CdP_Prudence

Transcription of the manuscript London, BL, Harley 4431, fol. 268a-287c, online (*The Making of the Queen's Manuscript* [http://www.pizan.lib.ed.ac.uk/]).

CdP_Policie

Christine de Pizan, *Le livre du corps de policie*, ed. A. J. Kennedy, Paris, Champion, 1998 (*Études christiniennes* 1).

CdP_Sept Psaumes

Christine de Pizan, *Les sept psaumes allégorisés. A Critical Edition from the Brussels and Paris Manuscripts*, ed. R. R. Rains, Washington D.C., Catholic U. of America P., 1965.

CdP_Fais d'Armes

Chr. M. Laennec, *Christine Antygrafe. Authorship and Self in the Prose Works of Christine de Pisan, with an Edition of B.N. Ms. 603 « Le Livre des Fais d'Armes et de Chevallerie »*, PhD Dissertation, Yale UP, New Haven, 1988.

CdP_Lamentacion

A. J. Kennedy, « La Lamentacion sur les maux de la France de Christine de Pisan », in *Mélanges de langue et littérature françaises*

du Moyen Âge et de la Renaissance offerts à Monsieur Charles Foulon, Rennes, Université de Haute-Bretagne, 1980, vol. 1, p. 177-185.

CdP_Paix

Christine de Pizan, *The Book of Peace*, ed. K. Green, C. J. Mews and J. Pinder, University Park, Pennsylvania State UP, 2008.

CdP_Prison

Christine de Pizan, *The Epistle of the Prison of Human Life, with an Epistle to the Queen of France, and Lament on the Evils of the Civil War*, ed. J. Wisman, New York, Garland, 1985.

CdP_Heures

Les Heures de la Contemplation de la Passion de Notre Seigneur, transcript from the forthcoming edition by L. Dulac, R. Stuip and E. J. Richards Paris, BnF, nafr. 10059, fol. 114r-144v.

CdP_Ditie

Christine de Pizan, *Ditié de Jehanne d'Arc*, ed. A. J. Kennedy and K. Varty, Oxford, Society for the Study of Mediaeval Languages and Literature, 1977.

Collectif_EvangilesQuenoilles.txt

Les évangiles des quenouilles, ed. M. Jeay, Paris, Vrin, 1985.

Conty_Harmonie.txt

Évrart de Conty, *L'harmonie des sphères. Encyclopédie d'astronomie et de musique extraite du commentaire sur « Les echecs amoureux » (XVᵉ s.), attribué à Évrart de conty*, ed. R. Hyatte and M. Ponchard-Hyatte, Berne, Peter Lang, 1986.

Conty_JeuEschecs.txt

Évrart de Conty, *Le livre des eschez amoureux moralisés*, ed. Fr. Guichard-Tesson and Br. Roy, Montréal, CERES, 1993.

Courtecuisse_Passion.txt

G. Hasenohr, « Le sermon sur la Passion de Jean Courtecuisse », *Le moyen français*, 16 (1985).

Courtecuisse_PsSeneque.txt

Seneque des IIII vertus. La « Formula honestae vitae » de Martin de Braga (pseudo-Sénèque) traduite et glosée par Jean Courtecuisse, ed. H. Haselbach, Berne, Lang, 1975.

Courtecuisse_Sermons.txt

Jean Courtecuisse, *L'œuvre oratoire*, ed. G. Di Stefano, Turin, Giappichelli, 1969.

Deguilleville_Pelerinage.txt

> Guillaume de Deguileville, *Le pelerinage de vie humaine*, éd. J. J. Stürzinger, Londres, The Roxburghe Club, 1893.

Deschamps_Œuvres1.txt

Deschamps_Œuvres2.txt

Deschamps_Œuvres3.txt

> Eustache Deschamps, *Œuvres complètes*, ed. A. Queux de Saint-Hilaire and G. Raynaud, Paris, Didot, 1878, 9 vol. [We have used the first three volumes, all published in 1878, in our network visualization: vol. 1 *Balades de moralitez* ; vol. 2 *Balades de moralitez*, *Lays* ; vol. 3 *Chançons royaulx, Balades amoureuses*].

Deschamps_miroir

> *Le miroir de mariage, poème inédit d'Eustache Deschamps*, ed. Pr. Tarbé, Reims, Brissart-Binet, 1865.

ErmineReims_Visions .txt

> *Entre Dieu et Satan. Les visions d'Ermine de Reims (+1396), recueillies et transcrites par Jean Le Graveur*, ed. Cl. Arnaud-Gillet, Florence, Galluzzo, 1997.

Foulechat_PolicratI_III_1372.txt

> Denis Foulechat, *Le policratique de Jean de Salisbury, 1372, livres I-III*, ed. Ch. Brucker, Genève, Droz, 1994 (*Publications romanes and françaises* 209).

Froissart_Chroniques1.txt

> Jean Froissart, *Chroniques. Livre III (du Voyage en Béarn à la campagne de Gascogne) et Livre IV (1389-1400)*, ed. P. F. Ainsworth and A. Varvaro, Paris, LGF, 2004 (*Lettres gothiques*).

Froissart_BuissondeJonesce.txt

> Jean Froissart, *Le joli buisson de jonece*, ed. A. Fourrier, Genève, Droz, 1975 (*Textes littéraires français* 222).

Froissart_Paradysdamour.txt

> Jean Froissart, *Le paradis d'amour. L'orloge amoureus*, ed. P. F. Dembowski, Genève, Droz, 1986 (*Textes littéraires français* 339).

Froissart_Meliador

> Jean Froissart, *Méliador, roman comprenant les poésies lyriques de Wenceslas de Bohême, duc de Luxembourg et de Brabant*, ed. A. Longnon, Paris, F. Didot, 1895-1899 (*SATF*), 3 vol.

Gerson_Œuvresfrancaises.txt

> Jean Gerson, *Œuvres complètes*, ed. P. Glorieux, Paris, Desclée, 1960-1973, 10 vol. [*Œuvres françaises*, vol. 7/1 (1966) and vol. 7/2 (1968)].

Gerson_Canticordium.txt

> Jean Gerson, *Canticordium du pèlerin*, in *Œuvres françaises*, *op. cit.*, vol. 7/1 (1966), p. 112-139.

Gerson_ContreTignonville.txt

> Jean Gerson, *Discours au roi contre Guillaume de Tignonville – Diligite justitiam*, in *Œuvres françaises*, *op. cit.*, vol. 7/2 (1968), p. 598-614.

Gerson_Homelies.txt

> Jean Gerson, *Œuvres françaises*, *op. cit.*, vol. 7/2, *passim*.

Gerson_JeanPetit.txt

> Jean Gerson, *Discours au roi contre Jean Petit – Rex in sempiternum vive*, in *Œuvres françaises*, *op. cit.*, vol. 7/2 (1968), p. 1005-1030.

Gerson_Montaigne.txt

> Jean Gerson, *La Montaigne de contemplation*, in *Œuvres françaises*, *op. cit.*, vol. 7/1 (1966), p. 16-54.

Gerson_Poemesfrancais.txt

> Jean Gerson, *Œuvres françaises*, *op. cit.*, *passim*.

Gerson_Traictie

> Jean Gerson [?], *De la mort et passion de Notre-Seigneur Iesuchrist*, in R. Thomassy, *Jean Gerson et le grand schisme d'Occident*, Paris, Librairie catholiques de Périsse Frères, 1852, p. 338-369.

Gervais_Fauvel.txt

> *Le roman de Fauvel*, ed. A. Strubel, Paris, LGF, 2012 (*Lettres gothiques*).

Gonesse_PlutarqueRemede.txt

> G. Di Stefano, « La découverte de Plutarque en France au début du XVᵉ siècle (traduction du *De remediis irae* ajoutée par Nicolas de Gonesse à sa traduction de Valère Maxime) », *Romania*, 86 (1965), p. 463-519.

JLeGrand_ArchilogeSophie.txt

> Jacques Legrand, *Archiloge Sophie* et *Livre des bonnes moeurs*, ed. E. Beltran, Paris, Champion, 1986 (*Bibliothèque du XVᵉ siècle* 49).

JLeGrand_BonnesMeurs.txt

Ibid.

Machaut_Œuvres1.txt

Machaut_Œuvres2.txt

Machaut_Œuvres3.txt

Guillaume de Machaut, *Œuvres*, ed. E. Hoepffner, Paris, Champion, 1908-1921 (*SATF*), 3 vol.

Machaut_Navarre.txt

Guillaume de Machaut, *The Judgment of the King of Navarre*, ed. R. Barton Palmer, New York, Garland, 1988.

Machaut_PrisedAlexandrie.txt

Guillaume de Machaut, *La Prise d'Alixandre. The Taking of Alexandria*, ed. R. Barton Palmer, New York, Routledge, 2002.

Mezieres_EpistreLamentable.txt

Philippe de Mézières, *Une epistre lamentable et consolatoire, adressée en 1397 à Philippe le Hardi, duc de Bourgogne, sur la défaite de Nicopolis (1396)*, ed. Ph. Contamine and J. Paviot, Genève, Droz, 2008 (*SHF*).

Mezieres_Griseldis.txt

Philippe de Mézières, *Le livre de la vertu du sacrement de mariage*, ed. J. B. Williamson, Washington D.C., The Catholic U. of America P., 1993.

Mezieres_Songe.txt

Philippe de Mézières, *Le Songe du Vieil Pelerin*, ed. G. W. Coopland, Cambridge, UP, 1969, 2 vol.

Oresme_Divinacion

G. W. Coopland, *Nicole Oresme and the Astrologers. A Study of His « Livre de divinacions »*, Liverpool, Liverpool UP, 1952.

Oresme_Ethiques

Nicole Oresme, *Le Livre de Ethique d'Aristote*, ed. A. D. Menut, New York, Stechert, 1940.

Oresme_ Ciel

Nicole Oresme, *Le livre du ciel et du monde*, ed. A. D. Menut and A. J. Denomy, Madison, U. of Wisconsin P., 1968.

Oresme_Politiques

Nicole Oresme, *Le livre de politiques d'Aristote*, ed. A. D. Menut, *Transactions of the American Philosophical Society* NS 60 (1970).

Oresme_Yconomique

Nicole Oresme, *Le livre de yconomique d'Aristote*, ed. A. D. Menut, *Transactions of the American Philosophical Society* NS 47 (1957), p. 783-853.

Porete_Mirouer.txt

Marguerite Porete, *Le mirouer des simples ames*, ed. R. Guarnieri, Turnhout, Brepols, 1986.

Premierfait_Boccace.txt

Laurent de Premierfait, *Traduction du Decameron de Boccace (1411-1414)*, ed. G. Di Stefano, Montréal, CERES, 1998 (*Bibliothèque du moyen français* 3).

Premierfait_Viellesse.txt

Laurent de Premierfait, *Livre de vieillesse*, ed. St. Marzano, Turnhout, Brepols, 2009 (*TCC* 6).

Presles_Cite.txt

La Cité de Dieu de saint Augustin traduite par Raoul de Presles (1371-1375), Livres I à III. Édition du manuscrit BnF, fr. 22912, ed. O. Bertrand, Paris, Champion, 2013, vol. 1/1.

Presles_Dignete.txt

M. Goldast, *La question est telle, assavoir se la dignité pontifical et imperial ou royal... [Quaestio inter clericum et militem]*, in *Monarchia Sancti Romani Imperii*, Hannover, Conrad Biermann, 1611 [repr. Graz, Akademische Druck- und Verlagsanstalt, 1960, vol. 1, p. 34-57].

Tignonville_DitzMoraulx.txt

R. Eder, « Tignonvillana inedita [*Les ditz moraulx des philosophes*] », *Romanische Forschungen*, 33 (1915), p. 851-1022

Tremaugon_SongeduVergier.txt

[Évrart de Trémaugon], *Le songe du vergier, édité d'après le manuscrit Royal 19 C IV de la British Library*, ed. M. Schnerb-Lièvre, Paris, CNRS, 1982, 2 vol.