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Is There a Reception of Algorithm-Based Research in Traditional Historical Scholarship?
Three Case Studies from Academic "Trading Zones"

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Abstract A decade or more into the 'digital transformation', Digital Humanities papers are notably absent in traditional research bibliographies. This study examines three use cases where non-digital historiography could benefit from algorithm-based research focused on the same subject matter: the medieval treatise *Imitatio Christi*, the rise of the Medici in fifteenth-century Florence, and the French *Encyclopédie*. The conclusion is that without any convergence on content-related matters, Digital Humanities might emerge as a separate historical discipline.

Keywords Digital Humanities convergence. Trading zones. Imitatio Christi. Medici. Encyclopédie.

1 Introduction

It seems that the limitlessness of digital resources has taken its toll on the conceptual coherence of humanities scholarship. While scholars with digital expertise try to formulate the traits of the ongoing digital transformation in regular iterations and inscribe it into the

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longer history of epistemological change in the humanities,[1] generations of students – and later PhD candidates – are still being academically supervised in keeping with a mindset in which digital references merit little more than a sheepish footnote.

If – as a central argument of the sceptical faction goes – digital scholarship fails to prove its added value, or at least one that justifies the significant efforts its practice entails, then it may be appropriate to ask in which ways traditional scholarship eventually should engage with those outcomes of digital research that can be considered secure and established knowledge. For this broader set of questions, Max Kemman (2021) has aptly introduced the Galsionian concept of "trading zones" to describe the interaction between history and digital tools and methods.[2] For this paper, I have selected three case studies providing 'digital' results which, as I will show, align with some of the dominant traditional research questions; this selection deliberately leaves aside more tentative and exploratory research where this connection is less obvious.

The choice of these three case studies is arbitrary and reflects my own background as a German-academia historian of premodern Central Europe.[3] It is a field in which – unlike archaeology, for example – there is traditionally no eye-level interaction between data analysis and interpretative scholarship. This is because (in general terms and with all due exceptions) its scholarly efforts consist of close reading and interpretative rendering of written historical source material that a scholar has chosen, ordered and prepared for argumentation

1 As one example among many, cf. the excellent and epistemologically ambitious series "Studies in Digital History and Hermeneutics": https://www.degruyter.com/serial/sdhh-b/html.

2 Kemman has dedicated a book to the academic successes and hindrances of that dialogue: "Yet as part of the detachment of historical research from the tool and technology, supervisors recommended that PhD candidates in history ultimately needed to produce a historical thesis […] and the disciplinary value of working not just with digital data, but also with 'paper archives'" (2021, 127). Cf. Kemman, Kleppe, Scagliola 2014; Cady 1990, 374-86.

3 However, the broader range of possible alternative case studies illustrate that the findings of this paper may by and large be considered representative: in early-modern newspaper and media studies as well, the algorithmic operationalisation of research questions is in its infancy (https://books18c.hypotheses.org/) despite existing historically and algorithmically informed research. Kittelmann, Purschwitz 2019; historical outlines of "Actor network theory" (like Füssel, Neu 2021) do not come with digital dimensions although reflected digital operationalisations of the concept exist, as in the *Campus Medius* project which deals with digital cartography in cultural and media studies: https://campusmedius.net/overview?lang=de#p:7; and the scholarly findings generated within the scope of COST Action "Reassembling the Republic of Letters" (Hotson, Wallnig 2019, especially section IV) have only very gradually found their way into traditional scholarship on the matter.

and selective presentation.[4] The fact that the methodological challenges brought about by the social sciences since the 1970s have perhaps never been fully digested makes scepticism of the digital seem like the echo of a repressed conflict over qualitative and quantitative methods.

What is more, there seems to be divergence even with regard to basic terminology. 'Methods' in the humanities denote epistemic frameworks and terminological toolkits rather than algorithms, which sometimes causes misunderstandings because of differing or even largely incompatible assumptions about the nature and value of respective research assertions: a non-structured description of an archival fonds, even if it contains all the necessary information, is of little use to a researcher using computer-based methods, while the comparison of network metrics in a given prosopography may remain strange even to scholars closely familiar with the data.

Rather than complaining or theorizing about or even trying to change this state of affairs, however, this paper attempts to shed light on what is actually happening in the bibliographies and footnotes of the respective books and papers. In all three case studies, an outline of the research problem will be provided before the 'digital' research in the field is described and its consideration in ongoing research is discussed.

2 *Imitatio Christi*

The spiritual treatise on the Imitation of Christ was not only "among the most successful texts of the fifteenth and sixteenth centuries" (Harrap 2017, 3), but also one of the texts most contested among ecclesiastical scholars of the early-modern period. While Jesuits, Augustinian Canons and others argued (rightly, as we know today) in favour of its creation by Canon Regular Thomas a Kempis (d. 1471), Benedictines of the seventeenth and eighteenth centuries in particular tried to claim authorship for their (possibly fictional) confrere Giovanni Gersen, abbot of Vercelli in the early thirteenth century – a view that still informs the 1982 edition of the text.[5]

While the early-modern controversy was mainly historical-critical (Benz 2003, 539-49), the debate already began to acquire a dimension of quantitative linguistics before 1900. Pierre Puyol, historian and bibliographer, tried to approach the question (and sustain the

4 Projects addressing premodern topics (like manuscript studies: `https://cima.or.at/links/`) from the perspective of heritage science remain an exception. With a stunningly externalist view (and often silence) on matters digital: Spoerhase, Martus 2022, 92.

5 *Imitatio Christi et contemptus omnium vanitatum mundi*. `https://geschichtsquellen.de/werk/3014`.

Gersen hypothesis) by grouping parts of the large surviving manuscript evidence into a stemma. While this grouping remains accepted, Puyol's conclusions were challenged from around 1940 by statistician George Udny Yule, who had turned to the matter of statistical analysis of texts towards the end of his career and with no particular historical ambition (Yates, Yule 1952, 312). By comparing first sentence length and then other linguistic features of the *Imitatio Christi* with the same features in the known works of the two potential authors, Yule made a robust argument for the authorship of Thomas a Kempis; while this can be considered confirmed in the meantime, today's historical and philological scholarship asks other questions than those related to original authorship, turning to the practices of textual transmission in the context of the *Devotio Moderna*.

As a result, recent scholarship will generally briefly mention the statistical approaches (Habsburg 2017, 15) and place them in the context of previous research (Harrap 2017, 15). However, it will not discuss any of the details or assume any validity of Yule's findings beyond the resolved question of authorship attribution. Conversely, one of the classic overview works of literary statistics reports Yule's criticism and further development of Puyol's work among its case studies on the statistical analysis of writing style (Oakes 1998, 203-5):[6] with the help of a computer as early as 1939, Yule began by comparing the sentence length of text samples before introducing additional criteria for stylistic analysis in a second step – among them the 'K characteristic', a measure of vocabulary richness. This method makes it possible to determine whether a text contains words that are rare and thus distinctive, and Yule – basing his statistics exclusively on nouns – combined this characteristic with the total size of the vocabulary, the frequency distribution of the different words used, the mean frequency of the words in a given sample and the number of nouns occurring only in that sample. Simply put, he developed basic stylometry based on the *Imitatio Christi*.

It should be added that none of the underlying data – a machine-actionable version of the text – have survived, and that to this day there is no digital version of the *Imitatio*. Together with the decreasing (if not entirely ceasing) interest concerning the question of authorship and the general shift in philological perspectives in the sense of the "New Philology" (Roelli 2020, chs. 1-2), this may explain why no further use has been made of the first-level statistical research of earlier decades.

But why should anyone interested in the *Imitatio* today make use of it? Recent studies deal with Catholic and Protestant translations of the work (Habsburg 2017) or more generally with its early-modern reception and adaptation (Aurnhammer, Steiger 2019), while others

6 For Yule's merely statistical refutation of Puyol, see Yule 1946, 44-52.

address the use of scriptural sources in the text (Becker 2002). For the former, it would not be inconceivable given the huge quantity of material at stake to reproduce Yule's statistically tested analysis on appropriate samples, which would allow for stylistic clustering alongside theological observations. For the latter, Yule's analyses cannot be repurposed – but the carefully distinguished types of use of scriptural material are a typical test case for text reuse software, where the adjustment of fuzziness parameters can become a hermeneutical counterpart to researchers' analytical efforts.[7]

In conclusion, we can affirm that research on the *Imitatio* accepts the episode of statistical analysis as a (minor) part of its bibliographic genealogy with regard to the authorship question but does not consider making use of its results or algorithmic methods for a formalized approach to its current questions.

3 *Robust Action and the Rise of the Medici*

Like the previous one, the second use case also points to a period in which statistical analysis was not yet framed as data science[8] and the internet was in its early days: in 1993, American political scientists John F. Padgett and Christopher K. Ansell published their article "Robust Action and the Rise of the Medici 1400-1434" in the *American Journal of Sociology* (Padgett, Ansell 1993, 1259-319). The text, which results from the authors' interest in organisational theory and power structures more than from genuine historical curiosity, has become one of the classical works of historical network research (e.g., Petz 2022).

The question addressed by Padgett and Ansell is how it was possible for the Republic of Florence, one of the flourishing states of the Italian Renaissance, to be brought under the autocratic regime of the Medici family, whose main exponent in the corresponding period – Cosimo il Vecchio – did not hold any public office. The sources on which the study is based reflect the administrative ambitions of a late medieval (city) state: surviving marriage and business registers along with accounts of the political organs of the republic and maps of the individual families' habitations. These sources had already been

7 Research of the past decade into the writing practices underlying the *Encyclopédie* has led to results of this type. While the team was initially interested in detecting undeclared text reuse – especially Rousseau – they went on to use word co-occurrence metrics to tentatively describe the similarity of thought; see for example the works of Clovis Gladstone (`https://rll.uchicago.edu/clovis-gladstone-0`), in particular Gladstone 2020; Gladstone, Cooney 2020 and also below, § 4.

8 For the problem of data science merely being a new label for statistics, see O'Neil, Schutt 2013, 1-16.

edited at the time of the two researchers' efforts, so that they could focus their energy on making them mathematically processable.

Based on this material, Ansell and Padgett constructed a network of weighted ties resulting in a block model showing – in very simple terms – that the Medici maintained strong connections with two rivalling factions that would otherwise not have been in contact. This gave them (and in particular, Cosimo) factual power in the social field that meant the undermining of the republican institutions was only a matter of time.

"Robust Action" thus not only represents a key paper within the history of historical network research, but also one in the history of Renaissance Florence and that of premodern state building in general. But does recent scholarship in the latter two fields take account of the work?

Given the iconic character of Renaissance Florence for any narrative of the 'West', there is an insurmountable quantity of books on the matter. However, we can identify works published after 1993 which gravitate around the topic in the broader and narrower sense.[9] John Najemy's overview *History of Florence* (2008) treats the crucial phase in the early fifteenth century without any reference to Padgett and Ansell, and the same is true for specialized works focusing on the Medici affirmation period from a perspective of state building[10] and social order,[11] which could arguably profit from a discussion of the results of this network research. Conversely, much of the historical literature including "Robust Action" is cited and discussed in a paper about "Patronage, Citizenship, and the Stalled Emergence of the Modern State in Renaissance Florence" by sociologist Paul D. Rutgers (2005). In other words, the bibliographical divide here seems to be a unilateral one.

But this bibliographical divide does not end at Florentine or Tuscan history. There is likewise no consideration of historical-sociological accounts or organization theory in recent historical scholarship on the formation of the modern state, including new administrative

9 Most of the following bibliography is taken from Brege 2021, 333 fn. 21.

10 E.g., Cohn 1999, who in his appendix I works with statistics as well (Regression Models: Wealth, Migration, and Taxes), and who in an introductory chapter named "Networks of Culture and the Mountains" (13-54) could have made explicit that the term, in a methodologically more rigorous sense, had been applied to the same matter only a few years earlier.

11 An engagement with "Robust Action" would have been obvious, to name but one example, in the context of the following passage in Taddei 2004, 39-62, section 26: "Cette forme de gouvernement non officiel mis en place par les Médicis nécessitait donc sans cesse la construction subtile d'un réseau de rapports personnels, familiaux et diplomatiques qui devait leur assurer l'appui politique des familles les plus influentes de l'oligarchie".

history.[12] This is surprising, since sources similar to those extant for fifteenth-century Florence would also be available for other early-modern polities;[13] also, because network-based studies on early-modern court culture[14] suggest that the existing research questions could be addressed fruitfully by taking the existing findings in the field seriously (Enderlin-Mahr 2022, 35-48).

An additional example seems to confirm the trend of the diverging bibliographies: the work of Katalin Prajda (2018), a historian of Renaissance Florence who collaborates closely with John Padgett, is referenced with regard to network research in a book on management studies (Tavanti 2019, 230), whereas she appears in traditional scholarship as a historian of the relations between Florence and the Kingdom of Hungary (Baker, Maxson 2020, 12 fn. 5). Similar observations can be made with regard to other medieval historians as well (e.g. Gramsch-Stehfest 2013).

Does this mean we will not only need 'institutional' "trading zones" but also long-term 'bibliographical' ones?

4 *Encyclopédie*: Can Algorithmic Research Contribute to Intellectual History?

The *Encyclopédie* was one of the most famous works of the French Enlightenment. Edited by Denis Diderot, Jean-Baptiste le Rond d'Alembert, Louis de Jaucourt and others, this highly controversial dictionary reframing existing knowledge from the perspective of enlightened thought was published in 17 volumes (and 11 volumes of plates) between 1751 and 1772. Large yet circumscribed works like this lend themselves to digital processing, and today, two major projects offer searchable full-text databases of the material: the French *Édition Numérique Collaborative et Critique de l'Encyclopédie* (ENCCRE), with scans of the original copy from the Bibliothèque Mazarine, and the Chicago-based ARTFL project,[15] which in turn comes with highly advanced search options.[16]

12 E.g., Reinhard 2007; Blockmans, Genet 1996, in particular part D: "Power Elites and State Building". See also the research design of the journal of administrative history, *Administory*: https://www.bar.admin.ch/bar/de/home/service-publikationen/verwaltungsgeschichte/administory--online-zeitschrift.html.

13 Taking the Habsburg Monarchy as an example, see the prosopographical material recorded in Hochedlinger, Mat'a, Winkelbauer 2019; as well as in the database https://viecpro-project.oeaw.ac.at/.

14 See Ahnert et al. 2020, 93-5, on a network-based analysis of the Tudor State Papers.

15 http://enccre.academie-sciences.fr/encyclopedie/.

16 https://encyclopedie.uchicago.edu/.

From the ARTFL context (and through the availability of machine-readable versions of 74,000 articles), research has emerged that attempts to bring together the analytical potential of the resource with the traditional *Encyclopédie*-related questions in intellectual history. For example, the article "Discourses and Disciplines" (Roe, Gladstone, Morrissey 2015) discusses the application of supervised and unsupervised machine-learning techniques to the corpus, and in doing so addresses at least three fields relevant to intellectual historians.

First, a tentative but convincing connection is made between corpus analyses and the early phases of French discourse analysis, specifically Pêcheux's "automatic discourse analysis" (Roe, Gladstone, Morrissey 2015, 5). These approaches, as the authors admit, were too structuralist in their perspective and too narrow in their scope, but could – following the broadening of the concept of discourse by Foucault – be re-evaluated with a view to techniques like topic modelling:

> It is not unreasonable, for instance, to posit that Foucault's concept of archeology, in fact, justifies the 'bag of words' analytical model used by topic modelling and other machine-learning algorithms; a model that has often come under scrutiny (for good reason) by humanists. By locating words within a set of discursive practices rather than linguistic rules, Foucault's concept of discourse frees us from exclusive interest in language structure, and what that structure conveys, and orients us more toward the association of the various words, concepts, or 'topics' that form a discourse.

However, this line of argumentation is not developed further in current introductions to discourse analysis,[17] and engagement with algorithmic approaches is generally rare in discourse studies and not recognized in its encompassing dimension.[18]

Second, the topics generated by using Latent Dirichlet allocation (LDA) on the *Encyclopédie* articles highlight a circumstance already known from earlier studies:[19] the "subversive classification practices" used by the *Encyclopédistes* to hide potentially controversial content and articles by either not classifying them or classifying them

17 E.g., Landwehr 2018, connecting discourse analysis with cultural history.

18 E.g., Bubenhofer 2018, 208-41. This chapter aptly introduces corpus building and analysis, but it also has to broadly introduce basics (like the TEI) and remains an isolated case, although the author states that there still is a need to "critically reflect the theoretical and methodical implications of corpus-analytical approaches against the background of the digital age" (209; Author's transl.). Although synthetic research is gradually also emerging (Vásquez 2022), a similar picture is also encountered in English-language handbooks, like Handford, Gee 2023, which strongly focuses the digital aspect on the analysis of digital communication.

19 Roe, Gladstone, Morrissey 2015, section "Topic Modelling the French *Encyclopédie*".

under different headings (for instance, Newton's biography can be found in the 'new geography' article on his birthplace, Wolstrope). However, the knowledge about the discursive makeup of individual articles acquired in this way is subsequently not applied, for example in a recent study on the relative chronology of the final ten volumes published all at once in 1765 (Boussuge 2020-21, 287-302).[20]

Finally, "Discourses and Disciplines" also identifies topics that "attest to the function of the *Encyclopédie* as a reference work, concerned, in the most general sense, with making comparisons and distinctions [...], providing the meaning of words [...], and appealing to the authority of the ancients".[21] Apart from the latter assertion, which leads directly to the debate on the actual making of the *Querelle des anciens et des modernes* (Edelstein 2011; Peper, Wallnig 2022), the other findings could certainly provide significant contributions to the understanding of compilatory works of the early-modern period. But while literary studies rarely engage with this type of lexical 'meta-discourses', historical studies dealing with compilation frequently use textual evidence like quotations, references and the like as material for praxeological analysis – rather than for discursive analysis of a text in its entirety.[22]

What we see in this third case study is a situation in which Digital Humanities scholarship with sound methodology[23] and questions directly related to the current state of the scholarly debate is simply not considered in traditional scholarship – not even with the intent of questioning its validity or foregrounding opposing methodological arguments. This corresponds to the – justifiable and reasonable – practice of not considering the bibliography of other disciplines commonly encountered in the social sciences and the various philologies, even when they treat the same historical topic. Where there is no trade, there can be no "trading zone".

20 The approach used in Roe, Gladstone, Morrissey 2015, could, for example, shed additional light on the chronological table on page 295.

21 Roe, Gladstone, Morrissey 2015, section "Topic Modeling the French *Encyclopédie*".

22 Zweifel 2021, see especially the introduction (1-52), in which recent scholarship on encyclopaedias is presented without any reference to digital approaches.

23 Cf. the detailed methodological description in Roe, Gladstone, Morrissey 2015, section "Supervised Machine Learning and the Encyclopedic Disciplines".

5 Outlook

As we have seen in the three described cases, the 'digital turn' seems in many ways to be stuck between the rhetoric of emergence and the reluctant and often clueless stances of traditional historical scholarship; "trading zones", if one seeks them, are rare. The arbitrary collection of material presented in this paper, however, should also have made clear that there is not one individual instance responsible for this situation, but rather that institutional and epistemic constrictions make fruitful interaction rare and often difficult. I would like to highlight two specific points that emerge from the examples provided.

First, the use of the same data by different disciplines can easily lead to methodological misunderstandings. 'Discourse' and 'style' mean different things to the linguist and the historian; a 'network' is something else in historical studies than in sociology or organisational theory. However, how much of the professional discussion on these matters – which in every mentioned case is extensive and detailed – can reasonably be transferred to other disciplines has not yet been fully determined: history has not reasonably digested the explosion of methodological diversity during the past three decades, and thus has good reason to not open the door to yet another set of epistemologies whose centres admittedly lie far outside the humanities in mathematics, statistics and programming.

Second, the few recent cases of gradual integration of algorithm-based scholarship into the core of historical research show that as is often the case, the 'paradigm shift' is likely to happen by way of a few key figures drawing their breakthrough success from the existence of a critical mass whose concerns they will be able to place in relation to the potential of the emerging new approach. However, if such an integration fails to occur, it is also conceivable that the Digital Humanities, isolated among the traditional humanities, could become a separate discipline beside (and thus in epistemic competition with) history – like art history, sociology or linguistics.

I will conclude by admitting that I criticize a scholarly practice in this paper that I myself have engaged in, namely that of drawing tentative conclusions from messy data on vague methodological ground (Wallnig 2020, 441-62; 2021, 207-19; Wallnig, Gasteiner, Bekesi 2023, 79-92). Nonetheless, I (and information theory; Weber, Hasenauer, Mayande 2018) do believe that nescience can best be addressed if made explicit in the first place – and not simply ignored, as is often the case, which also limits the "trading zones" approach to those fields where actual exchange is happening. In the second place, given the undisputable overload of potential research to consider, informed and reflexive collaboration remains the best way to master disciplinary plurilingualism before it results in academic language politics and power struggles (Wyatt et al. 2017, 102):

> one way of reconciling the epistemological contradictions between quantitative and qualitative methods [...] is to recognize that all types of constructs require interpretation in contexts of use, not only by other researchers but also by social actors, including respondents, policy makers, and other audiences.

If traditional scholarship and Digital Humanities should stipulate a 'marriage of convenience',[24] it will be a matter of academic politics – just like any "trading zone" ultimately is.

Bibliography

Ahnert, R. et al. (2020). *The Network Turn*. Cambridge: Cambridge University Press.

Ash, M.G. (2012). "Wissenschaftsgeschichte und Wissenschaftsphilosophie. Einführende Bemerkungen". *Berichte zur Wissenschaftsgeschichte*, 35, 87-98.

Aurnhammer, A.; Steiger, J.A. (Hrsgg) (2019). *Christus als Held und seine heroische Nachfolge. Zur imitatio Christi in der Frühen Neuzeit*. Berlin; Boston: De Gruyter.

Baker, N.S.; Maxson, B.J. (2020). "Where in the World is Renaissance Florence? Challenges for the History of the City after the Global Turn". Baker, N.S.; Maxson, B.J. (eds), *Florence in the Early Modern World. New Perspectives*. London; New York: Routledge, 1-19.

Becker, K.M. (2002). *From the Treasure House of Scripture. An Analysis of Scriptural Sources in De imitatione Christi*. Turnhout: Brepols.

Benz, S. (2003). *Zwischen Tradition und Kritik. Katholische Geschichtsschreibung im barocken Heiligen Römischen Reich*. Husum: Matthiesen.

Boussuge, E. (2020-21). "La chronologie de l'Encyclopédie interdite. Les dix derniers volumes: tomes VIII à XVII (1762-1765)". *Dix-huitième siècle*, 52, 287-302.

Brege, B. (2021). *Tuscany in the Age of Empire*. Cambridge (MA): HUP.

Bubenhofer, N. (2018). "Diskurslinguistik und Korpora". Warnke, I.H. (Hrsg.), *Handbuch Diskurs*. Berlin; Boston: De Gruyter, 208-41.

Cady, S.A. (1990). "The Electronic Revolution in Libraries: Microfilm Déjà Vu?". *College & Research Libraries*, 51(4), 374-86.

Cohn, S.K. Jr. (1999). *Creating the Florentine State. Peasants and Rebellion, 1348-1434*. Cambridge: CUP.

Edelstein, D. (2011). *The Enlightenment. A Genealogy*. Chicago: CUP.

Enderlin-Mahr, A. (2022). "Akteure und Netzwerke im Umfeld der k. u. k. Kabinettskanzlei". Ableidinger, C. et al. (Hrsgg), *Im Büro des Herrschers*. Göttingen: Vandenhoeck & Ruprecht, 35-48.
https://theemperorsdesk.univie.ac.at/

Füssel, M.; Neu, T. (2021). "Reassembling the Past?!". Füssel, M.; Neu, T. (Hrsgg), *Akteur-Netzwerk-Theorie und Geschichtswissenschaft*. Paderborn: Schöningh, 1-25.

Gladstone, C. (2020). *Rousseau et le matérialisme*. Liverpool: Liverpool University Press. Oxford University Studies in the Enlightenment.

24 The term is used by Mitchell Ash with regard to the relation between the history and philosophy of science, their different epistemologies and the fact that they are often merged because of institutional pressure (2012, 88).

Gladstone, C.; Cooney, C.M. (2020). "Opening New Paths for Scholarship: Algorithms to Track Text Reuse in ECCO". Burrows, S.; Roe, G. (eds), *Digitizing Enlightenment. Digital Humanities and the Transformation of Eighteenth-Century Studies*. Oxford: Voltaire Foundation, 353-74. Oxford University Studies in the Enlightenment.

Gramsch-Stehfest, R. (2013). *Das Reich als Netzwerk der Fürsten. Politische Strukturen unter dem Doppelkönigtum Friedrichs II. und Heinrichs (VII.) 1225-1235*. Ostfildern: Thorbecke.

Habsburg, M. (2017). *The Devotional Life. Catholic and Protestant Translations of Thomas a Kempis' Imitatio Christi, c. 1420-c. 1620* [PhD Dissertation]. St. Andrews: University of St. Andrews.

Handford, M.; Gee, J.P. (eds) (2023). *The Routledge Handbook of Discourse Analysis*. London: Routledge.

Harrap, D.A. (2017). *The Phenomena of Prayer: The Reception of the Imitatio Christi in England (1438–c.1600)* [PhD Dissertation]. London: Queen Mary University London.

Hochedlinger, M.; Mat'a, P.; Winkelbauer, T. (Hrsgg) (2019). *Verwaltungsgeschichte der Habsburgermonarchie in der Frühen Neuzeit*. Bd. 1, *Hof und Dynastie, Kaiser und Reich, Zentralverwaltungen, Kriegswesen und landesfürstliches Finanzwesen*. Vienna: Böhlau.

Hotson, H.; Wallnig, T. (eds) (2019). *Reassembling the Republic of Letters in the Digital Age. Standards, Systems, Scholarship*. Göttingen: GUP.
https://univerlag.uni-goettingen.de/handle/3/isbn-978-3-86395-403-1

Kemman, M. (2021). *Trading Zones of Digital History*. Berlin; Boston: De Gruyter.

Kemman, M.; Kleppe, M.; Scagliola, S. (2014). "Just Google It". Mills, C.; Pidd, M.; Ward, E. (eds), *Proceedings of the Digital Humanities Congress 2012*. Sheffield: The Digital Humanities Institute.
https://www.dhi.ac.uk/books/dhc2012/just-google-it/

Kittelmann, J.; Purschwitz, A. (2019). *Aufklärungsforschung digital: Konzepte, Methoden, Perspektiven*. Halle (Saale): Mitteldeutscher Verlag. Kleine Schriften, IZEA 10.

Landwehr, A. (2018). *Historische Diksursanalyse*. Frankfurt; New York: Campus.

Najemy, J.M. (2008). *A History of Florence, 1200-1575*. Malden (MA): Blackwell.

Oakes, M. (1998). *Statistics for Corpus Linguistics*. Edinburgh: EUP.

O'Neil, C.; Schutt, R. (2013). *Doing Data Science. Straight Talk from the Front Line*. Sebastopol (CA): O'Reilly.

Padgett, J.F.; Ansell, Ch.K. (1993). "Robust Action and the Rise of the Medici, 1400-1434". *American Journal of Sociology*, 98, 1259-319.
https://home.uchicago.edu/~jpadgett/papers/published/robust.pdf

Peper, I.; Wallnig, T. (eds) (2022). *Central European Pasts. Old and New in the Intellectual Culture of Habsburg Europe*. Berlin; Boston: De Gruyter.

Petz, C. (2022). "A (Not So) Short History of Historical Network Research. Part 3". *Digital Humanities Lab*, 9 September.
https://dhlab.hypotheses.org/3194

Prajda, K. (2018). *Network and Migration in Early Renaissance Florence, 1378-1433. Friends of Friends in the Kingdom of Hungary*. Amsterdam: AUP.

Reinhard, W. (ed.) (1996). *Power Elites and State Building*. New York: Clarendon Press. The Origins of the Modern State in Europe, 13th to 18th Centuries 2.

Reinhard, W. (2007). *Geschichte des modernen Staates. Von den Anfängen bis zur Gegenwart*. Munich: C.H. Beck.

Roe, G.; Gladstone, C.; Morrissey, R. (2015). "Discourses and Disciplines in the Enlightenment: Topic Modeling the French *Encyclopédie*". *Frontiers in Digital Humanities*, 2.
https://doi.org/10.3389/fdigh.2015.00008

Roelli, Ph. (ed.) (2020). *Handbook of Stemmatology. History, Methodology, Digital Approaches*. Berlin; Boston: De Gruyter.
https://doi.org/10.1515/9783110684384

Rutgers, P.D. (2005). "Patronage, Citizenship, and the Stalled Emergence of the Modern State in Renaissance Florence". *Comparative Studies in Society and History*, 47(3), 638-64.
https://doi.org/10.1017/S0010417505000289

Spoerhase, C.; Martus, S. (2022). *Geistesarbeit. Eine Praxeologie der Geisteswissenschaften*. Berlin: Suhrkamp.

Taddei, I. (2004). "Le système politique florentin au XVe siècle". Boutier, J.; Landi, S.; Rouchon, O. (éds), *Florence et la Toscane, XIVe–XIXe siècles. Les dynamiques d'un État italien*. Rennes: Presses universitaires de Rennes, 39-62.
https://books.openedition.org/pur/15775

Tavanti, M.; Wilp, E.A. (2019). "Humanistic Renaissance for Good. Leadership Lessons from Florence to Silicon Valley". Stachowicz-Stanusch, A. et al. (eds), *Humanistic Values from Academic Community Perspective*. Charlotte (NC): Information Age Publishing, 221-40.

Vásquez, C. (ed.) (2022). *Research Methods for Digital Discourse Analysis*. London: Bloomsbury.

Wallnig, T. (2020). "Distant Reading Austria. Ein Essay über die Habsburgermonarchie des langen 18. Jahrhunderts und die digitale Transformation der Geschichtswissenschaften". Seitschek, F.-S; Hertel, S. (Hrsgg), *Herrschaft und Repräsentation in der Habsburgermonarchie (1700-1740). Die kaiserliche Familie, die habsburgischen Länder und das Reich*. Berlin; Boston: De Gruyter, 441-62.

Wallnig, T. (2021). "Wissen in Wien, 1780: digitale Annäherungen". Fischer, N.; Mader-Kratky, A. (Hrsgg), *Schöne Wissenschaften. Sammeln, Ordnen und Präsentieren im josephinischen Wien*. Vienna: Verlag der ÖAW, 207-19.

Wallnig, T.; in collaboration with Bekesi, J.; Gasteiner, M. (2023). "Digital Humanities and Wissenschaftsgeschichte: A New Unity (Called Txt)?". Hunger, H. (Hrsg.), *Einheit oder Vielheit. Über Methode und Gegenstand in der Geschichte und Philosophie der Wissenschaften*. Vienna: Verlag der ÖAW, 79-92. Forschung und Gesellschaft 23.

Wyatt, S.; Milojević, S.; Park, H.W.; Leydersdorff, L. (2017). "Intellectual and Practical Contributions of Scientometrics to STS". Felt, U. et al (eds), *The Handbook of Science and Technology Studies, Fourth Edition*. Cambridge (MA): MIT Press, 87-112.

Weber, Ch.M.; Hasenauer, R.P.; Mayande, N.V. (2018). "Toward a Pragmatic Theory for Managing Nescience". *International Journal of Innovation and Technology Management*, 15(5).
https://doi.org/10.1142/S0219877018500451

Yates, F. (1952). "George Udny Yule (1871-1951)". *Obituary Notices of the Fellows of the Royal Society*, 8(21), 309-23.

Yule, G.U. (1946). "Cumulative Sampling. A Speculation as to What Happens in Copying Manuscripts". *Journal of the Royal Statistical Society*, 109(1), 44-52.

Zweifel, S. (2021). *Aus Büchern Bücher machen. Zur Produktion und Multiplikation von Wissen in frühneuzeitlichen Kompilationen*. Munich; Vienna: De Gruyter.