

Knowledge Actors

Revisiting Agency in
the History of Knowledge

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Actors out of sight?

Digital methods and the visibility of historical knowers

Jacob Orrje

In the last decade, history has experienced a digital boom. First, the mass digitization of sources has facilitated research, and more recently a wealth of computational and statistical methods for analysing text—often included under the umbrella term ‘distant reading’—has made it possible to approach the content of ever-larger collections of sources. Distant reading treats textual historical sources as sequences of words, from which we can identify frequencies, collocations, and more advanced semantic relationships.¹ Such methods make it possible for historians to follow the evolution of concepts in the *longue durée* or in transnational contexts.² While enabling a wealth of new studies, there are also risks involved when we adapt our historical methods to benefit from this new digital efficiency, especially given the substantial risk of treating textual sources as self-contained bags of words, reducing the contextual complexity that give sources meaning, but which is difficult to include in highly streamlined digital pipelines.

Since the 1970s, historians of all stripes have become increasingly aware of the processes by which historical sources were produced. To scholars using methodologies taken from cultural history, science studies, global studies, or the history of knowledge, a source text is more than just its contents: it inherently carries contexts of production and circulation.³ Sources have always been acted on by a wealth of heterogeneous categories of actors. This unruly lot of historical

people—their personas, relationships, and broader social context—is often of greater interest than the composition of words in collections of texts.⁴ In this essay I examine how digital approaches shape the way historians view these historical actors and their agency, thus focusing on ‘knowledge actors’ in two senses. First, I use the term for the people, with their broader social context, who populate our historical sources and narratives; the people who have made, circulated, and reacted to certain historical forms of knowledge. Second, however, I take knowledge actors also to be a prerequisite of all historical knowledge, whether as producers, mediators, or even destroyers of the historical record. In this sense, the sources we use result from knowledge actors who provide us with a multitude of heterogeneous, skewed, and narrow windows into the past.

This implication of historical actors—as makers of our past—raises particular challenges to some forms of digital history. I thus begin with a discussion of the role of seriality and homogeneous time series when constructing digital histories, and how such methodology, if used naively, may obscure actor agency. I then relate my experiences of two recent digital-history projects.

First, there are the problems of using digital and statistical methods to understand categories of correspondents with the Royal Swedish Academy of Sciences (1739–1850), from which I argue that the promised efficiency of digital-history techniques can cause us to forget important points of critical historical method, and in particular how digital analyses of large collections of texts make it more difficult for us to adopt actor-centric perspectives to the past. These statistical methods pose the question, central to this book, of what constitutes a ‘knowledge actor’. My answer is that a knowledge actor should be understood through its agency and its way of relating to historical hierarchies of diverse knowledge forms. Historians should use methods that recognize actor agency if we are to understand the interplay of historical knowledge actors.

Second, I turn to an ongoing project to study mobile knowledge actors by deep mapping historical spatio-temporalities. I chart the ways a digital history of knowledge might retain the fine-grained

understanding of power relationships and the distributions of agency necessary to understand how knowledge-making and circulation depends on the interactions, and mobility, of a myriad of heterogeneous categories of actors. Finally, I discuss how the practice of annotating historical data is central to digital analyses that aim to go beyond the mere source content. Annotation requires much work, and especially the integration of more traditional historical skills with digital expertise. Nonetheless, I would argue that data annotation enables us to highlight the complex relationships between diverse historical actors and knowledge forms.

Seriality and the analysis of knowledge actors

In their much-discussed book *The History Manifesto*, Jo Guldi and David Armitage criticize the prevalence of what they term the short-termism of historical scholarship. They argue that historians have in recent decades abandoned long diachronic narratives that address the great challenges of the present in favour of short microhistories of short timespans geared mainly towards a scholarly readership. In opposition to such limited narratives, they propose a radical reinvention of historical methodology, and a reorientation towards long-term history inspired by Braudel's concept of the *longue durée* coined in 1958.⁵

Guldi and Armitage's manifesto has attracted immense interest among historians, but also received much criticism. In an influential critique, Deborah Cohen and Peter Mandler argue it misconstrues recent history writing. Using the same long-period statistical methods proposed by Guldi and Armitage, they instead argue that recent historical scholarship has seen the opposite development, because history theses and monographs today in fact examine longer periods than those published in the early twentieth century.⁶ While they make an important point, particularly by nuancing Guldi and Armitage's narrative of historical research in crisis, by concentrating on the opposition between microhistory and the *longue durée* as a question

of time spans, they miss the one of the points of the manifesto—its historiographical basis.

Guldi and Armitage's proposed digital methodology builds not only on emerging technologies from computer science, but also on older traditions of long-term historical investigation and above all Braudel's *longue durée*. Key to this historiographical tradition is the wish to focus on the repetitive and serializable rather than the anomalous. In an article looking back at the method of microhistory, in practice the opposing approach to that of Braudel, Carlo Ginzburg pointed to what he perceived as the fundamental problem in the macroscopic, quantitative mode of history writing. Ginzburg's main problem with this form of history was that it tended to 'select as cognitive object only what is repetitive, and therefore capable of being serialized'. He argued that such approaches are 'paying a very high price in cognitive terms'.⁷ His concern with long-term history was not its timescale, but rather the criteria it used for valuing sources and the principles by which it ordered historical documentation into time series. He thus argued that the key limitation of Braudelian history 'emerges precisely through what should be its basic objective: "the equalization of individuals in their roles of economic or socio-cultural agents".' According to Ginzburg, this approach not only distorted power relationships in relation to who can produce documentation in a given society, but also 'cancels out many particulars in the existing documentation for the benefit of what is homogeneous and comparable'.⁸

I would argue that the points Ginzburg raised against Braudel in the 1990s are valid against much digital history of late. A key approach among digital humanists is that of 'distant reading', a concept introduced by the literary theorist Franco Moretti for a wide range of digital techniques for text analysis, centred on a computer-aided statistical analysis of word frequencies and collocations. Distant reading, as opposed to traditional close reading, thus ideally results in a holistic understanding of collections of texts that would be too time-consuming, or even impossible, for a human to read. In digital history, distant-reading methods have mainly been used for diachronic, conceptual histories of linguistic change.⁹ However,

when applied to the raw textual contents of historical sources, most distant-reading methods seem unsuited to analysing the power relationships of historical actors described in our sources, and perhaps even less useful for exploring the actors involved in the production and circulation of the sources themselves. An unsophisticated use of computer-aided statistical analyses of historical sources would thus encourage the search for the serial and repetitive, making it harder to discern diverse categories of actors with differing agency in relation to the production and circulation of knowledge.

When it was published, *The History Manifesto* also sparked discussion among historians of science. As pointed out by the historian of philosophy and science Stephen Gaukroger, the tension between microhistory and big-picture history can be understood using the concepts of under- and over-contextualization. Gaukroger points out that traditional forms of history of science are problematic in the way they under-contextualize their objects of study. For example, the traditional 'history of ideas' in the same vein as Arthur Lovejoy's *Great Chain of Being*, follows 'ideas whose essential content is wholly context free and explores them through radical contextual changes'. However, detailed microstudies that do not filter their detailed material also carry a risk of over-contextualization and risk 'obscuring the object of study' with unnecessary background noise.¹⁰ Gaukroger, much like Ginzburg before him, underlines how the difference between microhistory and *longue durée* 'lies not so much in the length of the period studied, but, rather, in the kinds of questions asked and the resources needed to answer them.' As an example, he points out how synchronic projects comparing disparate geographies face many of the same methodological challenges as those covering long periods.¹¹ Instead of becoming stuck in the dichotomy between the long term and the micro, we should thus perhaps instead focus on how we construct and contextualize the time series we use to write narratives of historical actors.

Efficient methods and bad history

The theoretical problems of how digital methods compel us to embrace specific historiographical modes of enquiry are more tangible if we relate them to one problematic example from my own work. Let us hence look at the minutes of the Royal Swedish Academy of Sciences (KVA). In the 1940s, KVA had their handwritten minutes from c.1739–1850 transcribed using typewriters. As part of this effort, they also compiled an *index nominum*. Besides names, the index includes dates of birth and death and short descriptions of any titles, profession, discipline, etc.

By first digitizing the index and using optical character recognition (OCR) and then a custom Python script to populate it, I have compiled a database of all the people in the index as well as of the references to where they are mentioned in the minutes. At first glance, this database simplified work on a new actor-centric perspective on the KVA for a century or more. In his work on its early history, Sten Lindroth, the doyen of Swedish history of science, gave an approximate demography of the academy's early members. By focusing only on its members he, however, provided a narrow understanding of the community around the KVA. Moreover, this narrow approach made high-status categories of actors visible (for example, aristocrats, civil servants, and university scholars), while failing to highlight the broader groups of, for example, the academy's correspondents or employees. Likewise, it favoured forms of knowledge traditionally viewed as 'scientific', while obscuring the many other ways of knowing—of, for example, farmers, sailors, craftsmen, or traditional medicine—that the academy related to in a broader context.¹² While there are wider narratives of the academy—most notably the volume *Knowledge in Motion* (2018)—there is no systematic analysis of these heterogeneous actors and forms of knowledge. Perhaps a digital analysis of the index would facilitate such a study?

While this digitally enhanced index thus constitutes a shortcut to analyses that would have required substantially more effort if the data had been compiled manually, I soon realized my approach had

several methodological problems. First, it was not clear what layers of interpretation I was basing my claims on, as the KVA index is not an unproblematic account of the actors mentioned in the minutes. For example: do we know if all people mentioned in the text are present in the index, or does it have a bias towards categories considered important by the people who compiled it in the 1940s? To understand the index, we would thus also need to understand the historical actors who produced it. Similarly, the KVA's eighteenth- and nineteenth-century minutes must be understood in relation to the changing cultures of Sweden's political and scientific elites. What categories of actors did the KVA's fellows consider important enough to discuss at their meetings and to note in the minutes? It is immediately apparent that the descriptions of the actors in the index were shaped by the multiple contexts of its production. Perhaps the most evident example is how women in the index are generally defined by their relationships to men (as wives or daughters), as opposed to men, who are described using their titles and professions.

Thus, in the course of working with the index, the analysis became an increasingly complex task. To understand it, I would need to decipher multiple contexts of production from three centuries, and relate that to a wide range of knowledge actors: those mentioned in the index, the twentieth-century individuals who compiled the index, and the eighteenth- and nineteenth-century academicians who produced the minutes. None of these problems is unique to the name index discussed here. Historians face these problems every day; we always need to relate historical representations to the context of their production and their intended audience. However, some digital methods—and especially distant-reading methods and statistical analyses of highly aggregated data—raise particular problems for historians. Being based on approaching historical representations as serializable as sequences of homogeneous and comparable data, digital methods' efficiency comes from comparing stable categories which are homogeneous over time. I would argue that it is exactly the efficiency offered by these methods that risk compelling us to ignore the contexts of production of the sources themselves. When

approaching compilations of historical data, which themselves are products of a historical context, we thus need to be attentive to what analytical categories we use for constructing our time series and how we relate to changing actors' categories, anomalies, and agency in our historical material.

The example of my own partly failed research process does not mean that distant reading is incompatible with detailed, critical history, or that statistical analyses of sources such as the KVA name index cannot contribute to our understanding of historical change in a meaningful way.¹³ Nevertheless, it highlights the importance of integrating a critical analysis of historical sources into digital-history practice. Towards the end of their manifesto, Guldi and Armitage make a similar point. In what seems like a wish to nuance their call for long-term history, they underline that 'events drawn from the lives of actual persons must continue to be a source of circumspection and critical analysis for historians, even as they take their arguments wider'.¹⁴ Studies technically possible from a digital perspective are not always good history. And when we approach sources critically, we might realize that digital methods need to be complemented with other forms of historical analysis.

Movement, deep maps, and scale

Critical approaches to digital history that abandon the strict seriality of statistical analysis in favour of a more contextual approach often require far more work to curate and closely engage with sources. For digital textual sources, such work generally involves describing it using metadata, as well as annotating the text itself.¹⁵ Metadata and annotations become a way of anchoring the source in relevant historical contexts, and enable other forms, and thicker, historical descriptions. While such approaches thus force us to tone down the promises of automatization and large scales that often, implicitly or explicitly, accompany calls for the digital humanities, it instead charts a way forward by combining long-term approaches with more contextual modes of history that, for example, highlight the agency of actors. As

pointed out by Johan Jarlbrink, in practice digital humanities research is generally far from automatized. Humans are not only required to make sense of results, but digital methods are more often than not based on ‘dull tasks that make data outputs possible’.¹⁶ Digital historians who take actors’ agency seriously would need to critically engage with these tasks, and think about how they annotate data in ways that facilitate research questions relevant to wider fields of historical research.

In recent decades, global historians have developed a large set of sophisticated tools to deal with multiple contexts and broader scopes. In both global history and history of knowledge, concepts such as circulation, scale-making, and friction have been used to analyse historical epistemologies beyond local contexts in a way that makes it possible to alternate between scales, ranging from actors’ performances through larger transnational infrastructures to global connections.¹⁷ Digital humanists, or more specifically scholars in the spatial humanities, have similarly developed a range of theoretical tools for approaching historical space. In a key monograph, Stuart Dunn points to how the field has moved from a focus on specific spatial technologies (primarily geographical information systems, or GIS) towards ‘the study of general principles and broad understanding, as opposed to answering particular research questions’.¹⁸ Dunn particularly points to the development of ‘deep mapping’, a method which blurs the distinction between maps and spatial relations.¹⁹

Deep maps have been described as ‘finely detailed, multimedia depictions of a place and the people, buildings, objects, flora, and fauna that exist within it and that are inseparable from the activities of everyday life’, which can be used ‘to engage evidence within its spatio-temporal context and to provide a platform for a spatially-embedded argument’.²⁰ Deep mapping can contribute much to the history of knowledge, for example by illuminating the interplay of mobile actors, disparate geographies, and various cultures in the circulation of knowledge. It offers what is perhaps the most concise example of a digital method that facilitates thick descriptions of historical contexts. In contrast to methods of distant reading originating

in literature studies, the way deep mapping enables the switching of scales—from following individual actors in the streets to mapping long-term, larger geopolitical developments—might for example make it more compatible with modes of history that wish to go beyond an analysis of text and language to instead focus on actors' performances, material aspects, and spatial relationships.

To illustrate how deep mapping could be integrated into long-term historical narratives that preserve focus on heterogeneous knowledge actors, I use the example of my research project, *Mapping the Geographies of Early Modern Mining Knowledge: A Digital History of the Study Tours of the Swedish Bureau of Mines, 1691–1826*, where we use digital deep maps to structure a transnational diachronic history of European state-related knowledge. From the seventeenth to the mid nineteenth century, the Bureau of Mines (*Bergskollegium*) was charged with controlling and upholding the Swedish state's interest in the production and trade of metals. Policing these activities required officials knowledgeable in several fields (ranging from mathematics and mechanics, chemistry, geology, and law to the hierarchies of the mines and miners' working techniques).²¹ To gather relevant knowledge, the Bureau encouraged officials to tour foreign territories and compile travelogues, primarily about European mines, ironworks, and other worksites deemed of interest to the Swedish government. These handwritten accounts, consisting of Swedish text written in a German script typical of eighteenth-century Northern European manuscripts, were submitted to the Bureau archive and are now held by the National Archives of Sweden in a series comprising some 12,000 pages.²²

Our project explores how methods from the spatial humanities might benefit research in the history of knowledge. We examine how such methods might enable large-scale spatio-temporal studies that retain the focus on historical actors. Such an approach requires a great deal of manual work, however. Our workflow thus consists of several steps. Using the *Transkribus* platform for handwritten text recognition, we transcribe the folios.²³ Then we annotate the text, focusing on marking up the places that officials moved through

and described, and such things as categories of knowledge actors, relevant concepts, and key technologies. The result is a dataset with which we can follow and compare the Bureau officials' travels over more than a century and their changing descriptions of European mining knowledge.

This form of annotated dataset makes it possible to create deep maps that describe travellers' itineraries as they moved around Europe. Thanks to the annotations, the travelogues also lend themselves to more sophisticated, and particularly more contextually aware, forms of distant reading. For example, we could explore changes in the composition of words in texts describing the same mines. At the same time, the annotations make a qualitative analysis possible, enabling us to find specific cases in the sources: anomalies, interactions between particular categories of knowledge actors, or different approaches to travel writing. The maps make it possible to compare the descriptions of mines by different travellers, and to understand the geographical spread of mining knowledge, and ultimately the circulation by locality of diverse approaches to mining. The project is thus designed to illustrate a digital historical methodology of zooming between a general level consisting of serialized data on the one hand, and several detailed contexts in which we can see the agency of individual actors as they move through different geographies on the other hand. By broadening our scope in this way, the methods moreover enable us to write a history of knowledge that focuses on contexts beyond the elite communities of universities and academies, and which thus illuminates the role of knowledge in early modern work, state-building, and transnational trade. The digital tools, as employed here, will help in constructing thick contextual descriptions. They are thus primarily aids to other historical research practices geared towards the historical understanding of the circulation of knowledge.

Conclusions

A question underlying the analysis of this essay has been the relationship between digital methods on the one hand and general big-picture history and narrower, though detailed, actor-centred accounts on the other. The *History Manifesto* has presented a vision of *longue durée* history and digital methodology as two closely knit parts of a new form of history writing, based on big data. It cannot be denied that digital methods provide highly efficient methods for analysing time series. This efficiency is perhaps the reason some digital historians point to such approaches as the key for new big-picture histories. However, as argued in this essay, previous twentieth-century criticism of big-picture history seldom faulted grand narratives for being based on too few sources or overly simplified statistical analyses. Twentieth-century historians critical of the grand narratives of their day instead argued these approaches lacked attention to the anomalies and various power relationships between historical actors, and that these deficiencies resulted in long-term narratives that were under-contextualized. Going forward, if we were to attempt new long narratives in the history of knowledge by using digital methods, we should take the spectre of under-contextualization seriously. Or in other words, we should think about how we can keep an eye on context while expanding our temporal and geographical scope.

There are several reasons why distant-reading methods carry a risk of under-contextualization. First, the structure of the data, usually as plain text, generally favours conceptual studies. As a rule, performatively inclined analyses—of, for example, controversies, relations between people, or power structures—require more fine-grained, curated, and relational data. Such studies demand ways of following speech-acts or other performances, made by specific actors in a certain context and in relation to particular audiences. Second, source selection bias makes it difficult to carry out studies of marginal actors, and thus digital analyses risk reproducing existing dominant narratives. Only specific organizations tend to leave large enough collections, which also are considered valuable enough to digitize by the financiers who

fund such large projects. Thus, the sources available to digital analysis are generally skewed towards, for example, parliamentary records, governmental reports, printed papers, or scholarly journals. Guldi and Armitage identify a similar problem with skewed archives, and how digital studies ‘other than that of the nation-state rests upon the ongoing creation and maintenance of inclusive archives’.²⁴ However, the creation and maintenance of such archives require specific resources that are seldom available without strong institutional backing.

The two examples from my own studies discussed in this essay serve to highlight how digital approaches can serve very different roles in historical inquiry. For the sake of argument, we could divide such methods into two ideal categories. On the one hand, we have techniques similar to those of distant reading, which promise a high level of automatization, and which enable us to write history using big data. Such history, as argued here, is in many ways similar to the approaches envisioned by Braudel and other big-picture historians of the twentieth century. On the other hand, we have techniques such as deep mapping. These methodologies instead promise new ways of constructing detailed contexts that can be used for writing both grand narratives and short-term history, but which also require a great deal of manual intervention in the form of annotation and structuring data.²⁵

These digital approaches offer radically different possibilities for adopting actor-centric perspectives in the history of knowledge. Generally, distant-reading techniques, such as topic modelling or collocation analysis carried out on plain text, seem to encourage a more structuralist approach to historical records, where words and concepts become the object of study. Such approaches also enable statistical analyses of actor categories. Which actors are mentioned in a specific collection of sources, and does the composition change over time? How are these actors discussed and does the textual context in which actors are mentioned change? But such digital approaches are less apt to reveal historical sources as complex networks of knowledge actors and audiences, all with diverse roles in relation to the making and circulation of the source. Less automated techniques—which revolve

around annotating data and visualizing historical contexts—show more promise for such complex historical analyses. Carefully annotated datasets could thus be a way of realizing longer narratives that still maintain the historical narrative based on thick descriptions of the past. As shown in the discussions of deep mapping and handwritten text recognition, we have a wealth of digital tools that can be integrated into the workflows of more qualitatively oriented historians.

There are great opportunities in exploring how we could write digital histories, from the micro level to studies with broader scope, using methods that do not focus on effectiveness and instead aim to support historians' research practices. Using such approaches, we could improve our understanding of marginalized actors, power relationships, and the production contexts of historical sources.

Notes

- 1 Franco Moretti, *Distant Reading* (London: Verso, 2013).
- 2 Lara Putnam, 'The Transnational and the Text-Searchable: Digitized Sources and the Shadows They Cast', *American Historical Review* 121/2 (2016); Jo Guldi, 'The Measures of Modernity: The New Quantitative Metrics of Historical Change Over Time and Their Critical Interpretation', *International Journal for History, Culture & Modernity* 7/1 (2019).
- 3 For the circulation of knowledge and the ways it relates to previous contextualizing approaches to the history of science, see James A. Secord, 'Knowledge in Transit', *Isis* 95/4 (2004); Kapil Raj, 'Introduction: Circulation and Locality in Early Modern Science', *British Journal for the History of Science* 43/4 (2010); Johan Östling, Erling Sandmo, David Larsson Heidenblad, Anna Nilsson Hammar & Kari H. Nordberg (eds.), *Circulation of Knowledge: Explorations in the History of Knowledge* (Lund: Nordic Academic Press, 2018).
- 4 For a similar argument for actor-centric studies in the history of knowledge, see Suzanne Marchand, 'Weighing Context and Practices: Theodor Mommsen and the Many Dimensions of Nineteenth-Century Humanistic Knowledge', *History & Theory* 59/4 (2020). For persona, see Lorraine Daston & Otto Sibum, 'Introduction: Scientific Personae and Their Histories', *Science in Context* 16/1 (2003); Kirsti Niskanen & Michael J. Barany, 'Introduction: The Scholar Incarnate', in ead. (eds.) *Gender, Embodiment, and the History of the Scholarly Persona* (Cham: Palgrave Macmillan, 2021).
- 5 Jo Guldi & David Armitage, *The History Manifesto* (Cambridge: CUP, 2014); Fernand Braudel, 'Histoire et Sciences sociales: La longue durée', *Annales* 13/4 (1958).
- 6 Deborah Cohen & Peter Mandler, 'The History Manifesto: A Critique', *American Historical Review* 120/2 (2015).

- 7 Carlo Ginzburg, 'Microhistory: Two or Three Things That I Know About It', *Critical Inquiry* 20/1 (1993), 21.
- 8 Ginzburg, 'Microhistory', 21.
- 9 Moretti, *Distant Reading*. For the use of distant reading in historical scholarship, see Hannu Salmi, *What Is Digital History?* (Cambridge: Polity, 2021), 29–56.
- 10 Stephen Gaukroger, 'Undercontextualization and Overcontextualization in the History of Science', *Isis* 107/2 (2016).
- 11 *Ibid.* 340.
- 12 Sten Lindroth, *Kungl. Svenska vetenskapsakademiens historia 1739–1818* (Enskede: TBP, 1967), 28; Johan Kärnfelt, Karl Grandin & Solveig Jülich (eds.), *Knowledge in Motion: The Royal Swedish Academy of Sciences and the Making of Modern Society* (Gothenburg: Makadam, 2018).
- 13 For a counter-example of how statistical methods can be a valuable aid for actor-centric studies, see Melanie Conroy & Kimmo Elo, 'Picturing the Politics of Resistance: Using Image Metadata and Historical Network Analysis to Map the East German Opposition Movement, 1975–1990', in Mats Fridlund, Mila Oiva & Patri Paju (eds.), *Digital Histories: Emergent Approaches Within the New Digital History* (Helsinki: Helsinki University Press, 2020).
- 14 Guldi & Armitage, *History Manifesto*, 121.
- 15 For metadata and the friction incurred in the effort of creating it, see Paul N. Edwards, Matthew S. Mayernik, Archer L. Batcheller, Geoffrey C. Bowker & Christine L. Borgman, 'Science Friction: Data, Metadata, and Collaboration', *Social Studies of Science* 41/5 (2011).
- 16 Johan Jarlbrink, 'All the Work That Makes It Work: Digital Methods and Manual Labour', in Mats Fridlund et al., *Digital Histories*, 113.
- 17 See, for example, Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900* (Houndmills: Palgrave Macmillan, 2007); Kapil Raj, 'Go-Betweens, Travelers, and Cultural Translators', in Bernard Lightman (ed.), *A Companion to the History of Science* (Chichester: John Wiley, 2016). For scales and scale-making in global studies, see Anna Lowenhaupt Tsing, *Friction: An Ethnography of Global Connection* (Princeton: PUP, 2005).
- 18 Stuart Dunn, *A History of Place in the Digital Age* (Abingdon: Routledge, 2019), 4.
- 19 *Ibid.* 5.
- 20 David J. Bodenhamer, John Corrigan & Trevor M. Harris, *Deep Maps and Spatial Narratives* (Bloomington: Indiana University Press, 2015).
- 21 Hjalmar Fors, *The Limits of Matter: Chemistry, Mining, and Enlightenment* (Chicago: University of Chicago Press, 2015); Jacob Orrje, *Mechanicus: Performing an Early Modern Persona* (Uppsala: Acta Universitatis Upsaliensis, 2015), ch. 3 *et passim*.
- 22 Hjalmar Fors & Jacob Orrje, 'Describing the World and Shaping the Self: Knowledge-Gathering, Mobility and Spatial Control at the Swedish Bureau of Mines', in Lothar Schilling & Jakob Vogel (eds.), *Transnational Cultures of Expertise: Circulating State-Related Knowledge in the 18th and 19th Centuries* (Berlin: De Gruyter Oldenbourg, 2019).
- 23 For a discussion of Transkribus, see Guenter Muehlberger et al., 'Transforming Scholarship in the Archives Through Handwritten Text Recognition: Transkribus as a Case Study', *Journal of Documentation* 75/5 (2019). For our approach to HTR (handwritten text recognition), see Jacob Orrje, *From Folios to Files: Evaluating*

the Use of Handwritten Text Recognition to Transcribe the Protocols of the Swedish Bureau of Mines 1700–1840 (Uppsala: Uppsala universitet, 2020).

24 Guldi & Armitage, *History Manifesto*, 113.

25 Many digital methods fall somewhere in between these two extremes, of course. For example, collocation analysis (analysing texts using the frequency of co-occurring words) is a distant-reading method easily used for more qualitative readings. Likewise, quantitative GIS (geographic information system) analyses require manual annotation, but also promise highly automated analyses of large amounts of spatial data.