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WHAT IS INFORMATION HISTORY FOR?

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"Information" has begun to be tilled by scholars across the disciplines as fertile ground for enquiry, with many hoping that cultivation of the area will yield a richer understanding of our contemporary world. But efforts to establish a footing for the study of information may have paradoxically suppressed the emergence of critical initiatives. Contributing to the intellectual quagmire are the radically divergent senses of "information," each having engendered its own particular body of scholarship on a topic that is ostensibly shared.[1] Although information is considered a regular companion in the general exchange of knowledge, the word can also be used in a more limited way to describe the non-semantic parts of a message. This mathematical sense of the term is rooted in twentieth-century studies of telecommunication signals and now flourishes in many fields under the designation of information theory.[2] In some contexts, then, "information" is understood to be devoid of meaning. In others, it is a unit of meaning that can be communicated in any form. But "information" can signify a unique embodiment of form, format, and content—or even designate anything that has the potential to be informative.[3]

Where to begin, then, if the proposed object of study is a thing that has been characterised alternately by the presence and privation of meaning? Some might prefer a retreat to more familiar territory in search of intellectual comradeship. Yet by accounting for—rather than avoiding—the diversity of attitudes and cultural practices related to information, we campaign toward a better understanding. Guidance might be found in the work of philosopher Rafael Capurro, who suggested that the main concept in the study of information is not information, but humanity: "When we say: 'we store, retrieve, exchange etc. information' we act as if (!) information were something *out there*. But it is, on the contrary, we who are *there*."[4]

If the study of information is the study of the human condition, then the humanities—and history in particular—have much to offer. Indeed, a historical perspective on the question of information transfixes attention on the human endeavour. What comes into focus is a particular grouping of intellectual efforts that are manifested in different practices across time.[5] Most prominent among such activities are those of collecting, organising, and disseminating. The interpretation and analysis of these practices and the "informationising" impulses that motivate them is the task of information history. The primary object

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of investigation in information history is not that which is informative, but the conditions in which something may come to be informative.[6] In other words, information history is a humanistic exploration of "how information becomes information."[7]

But in its pursuit of the becoming and being of information, the historical approach eschews narratives of simple causation. Indeed, "history seeks for causal wave-trains and is not afraid, since life shows them to be so, to find them multiple."[8] Not preoccupied with assigning a single cause, nor satisfied with an easy one, the work of history helps to develop "clearer ideas both of the *explananda* and of possible explanations."[9] Information history seeks to render intelligible the manifold workings of information through an examination of particular attitudes and activities. With a heightened appreciation of the diverse conditions in which information becomes information, we can begin to contend with the concept and our relation to it.

Why Hasn't History Been Used (Much) to Study Information?

Although a historical approach is by no means unusual, it has yet to be broadly adopted in studies of information.[10] One obstacle is the nature of the topic itself. Information is often understood in ways that impede or even undermine attempts at historicisation.[11] When defended as an unavoidable necessity of contemporary life, it can be construed as incompatible with the project of history. But information and its practices become mundane through practice. Ubiquity is the winding-sheet that shrouds their contingent nature.

If, as some claim, information is a distinguishing feature of modernity, a critical analysis of information must also entail a critical analysis of modernity. As Bruno Latour and others have observed, it was we who deliberately hewed time asunder, marking our difference from the past by adopting transcendental, unchanging laws that would organise the present and future.[12] This contrived estrangement obscures the fact that the digital techniques by which we make sense of the world today are the issue of rationalities that themselves only became settled after much negotiation. None of these approaches are entirely new; none of them are immutable certainties. Historians of science have shown how the codification of select practices in the early modern period would eventually determine what kind of objects should be "seen"; which of their properties should be described; and the manner in which both would be done.[13] By following standardised procedures, various and varied data points could be made to seem commensurable. How else to capture a world of infinite change, except by agreeing upon a set of rules by which dynamic phenomena could be stabilised for study? Endorsed by institutional bodies and repeated over centuries, these logics became widely accepted, habitual, and even obligatory.

It is with such an apparatus that we have draughted our present understanding of information and erected its technologies. Our modern information infrastructures are configured to retrain uncertainty. Controlled vocabularies and classification systems tolerate neither incommensurability nor imagination well. Every "null" in a relational database indicates an absent value that arrests attention; every blank space of a spreadsheet must be addressed. A species needs a genus. And it is according to these rules that we play. Because such principles now discipline our interactions with the world, ways of knowing and doing that are less amenable to their routines—and indeed *because* they are less amenable—have been located in uncertain territory. It is the work of information history to remap this terrain.

What Would a Historical Approach to Information Be?

Deciphering inscriptions, interpreting medieval relics, and running queries against datasets are performed by experts in many fields—such activity might be described as "getting" or "extracting" information. But information history must go further if it is to shed light on the human condition. The endeavour of information history therefore cannot limit itself to the hermeneutics of information, or, at least, not in the sense that refers to the reading of sources. In its study of information, its practices, and technologies, information history may draw upon the same sources that others might, but seeks to gain purchase on an information-ising attitude, that is, "what lies behind the act."[14] Information history would therefore explore how and why medieval relics were classified or by what means and for what purposes corporeal bodies are transformed for management in a database.[15] Such practices produce, situate, and sustain information in the role of information.

In searching out information-ising impulses, information history sensitises us to customs that include not only the organisation of notches on a wooden stick or scholarly commentary on a manuscript page but also the online collection of consumer data.[16] These practices are cross-fertilised in the home, school, marketplace, and bureaucracies in both the public and private sectors; they are expressed in the special arrangement of sounds, objects, graphic notations, and more. Paper devices, such as inventories, ledgers, or spreadsheets, can be taken as evidence of an information-ising attitude, and there are also counterparts made of clay, wood, wax, papyrus, parchment, string, and sand that have been worked methodically by hand, machine, or both.[17] Hand and machine often work hand-in-hand: Morse code, developed to transmit natural language with electrical pulses, has been used to encrypt messages destined to be knitted by hand into clothing for onward communication; documents continue to be marked up by hand before being rewritten or typeset by hand and machine. A historical directive can marshal such heterogeneous examples in the study of information as a human condition.

But modern notions of information cannot simply be retrojected and assigned a historical reality if we hope to discern the complexities of the past and the present. Looking for origins in an effort to reaffirm a particular position should be avoided. Even as we examine the practices and technologies of information, we must also consider such categories to be "contextual, contested, and contingent."[18] Anything that appears to operate as a foundation—including the notion of information—is open to interrogation. In this way, we "fold back" conceptions and preconceptions that are associated with the object of study as well as our act of enquiry.[19] This nonfoundational approach historicises both sides of the analytic frame. In refiguring the past, we likewise refigure our own authoritative status. Such a strategy is especially appropriate because the project of devising categories with which to assess the world is itself an information practice. Information history may then perform a "double fold": it sets its analytical sights on a past practice as well as the present category of historical interpretation, scrutinising the logics of each in relation to the ways that information is now understood. Because our understanding of the past is always implicated in contemporary concerns, the pursuit of history is also a pursuit of the present.[20]

Why Use "Information" as an Organising Principle?

Using "information" as an organising principle helps distinguish an area of investigation within a broader history of cultural practices. "Information" offers a coherent strategy for

charting a route through time and space that need not demonstrate allegiance to any particular material or intellectual domain. Such an itinerary easily traverses the boundaries of form, format, and location, as well as the divisions separating the study of scientific and scholarly activity, and those from explorations of daily life. With an expansive scope that is trained on "information," actors and activities that are not commonly in evidence, as well as the reasons for their omission, come into sight. Although the most familiar characteristics of information may not be present in all instances, it would be difficult for even the most sceptical reader to deny that something very much like a tradition of arranging data had already coalesced in ancient Babylon, or that activities bearing a resemblance to search and retrieval were conducted routinely in medieval Europe and Qing China. Despite the diverse recipients of their application—whether ideas or livestock or financial data—what becomes visible are shared strategies of management and control. We can then begin to track the multiple conceptions of information as political, examining how the formulation and rhetoric of each have been designed to realise particular ambitions. By seizing on the manoeuvres of information practice, we capture and make available for analysis the stakes of sameness and commensurability; claims of precision or repeatability; or tactics by which trust is established, expressed, and communicated over time and distance. However, the debates are not situated in isolation in the distant past. What also becomes apparent are the trajectories by which certain notions of information, seeded in certain kinds of historical consciousness, have come to be naturalised and are now orienting not only present scholarship but also future enquiry.

What if, for instance, we suppose that the hand that traces the beads of a *lukasa* also sketches algorithms and trains artificial intelligence? The lukasa is a device associated with the Bambudye society of the Kingdom of Luba, a pre-colonial central African state in the Congo Basin. A curved and carved wooden board, it represents the female body, the Luba kingdom, and the social and spiritual landscape of Luba culture. The lukasa is incised with striations or other patterns; it is also studded with beads, shells, and pieces of metal that have been arranged to stimulate recitation, imagination, and movement. The designs have the capacity to engender different narratives, but are nevertheless understood to record and transmit particular kinds of information. Indeed, some characters and relationships of events appear in the interpretations of a single lukasa with regularity. Beads organised in a circle frequently refer to centres of administrative power; straight lines generally refer to travel, an activity that is often related to the cultivation of political ties.[21]

In the double-fold of information history, the lukasa provides an occasion to revisit prevailing assumptions about information. Although sameness, repeatability, and universal accessibility are frequently invoked in the twenty-first century as ideal or even necessary conditions of information, the lukasa is suggestive of a practice that demands in its interpreter the skills of adaptability, judgement, and restraint. The lukasa is "multireferential and polysemic" in nature and cannot be deciphered without "an extensive body of knowledge that includes royal history, genealogies, and initiation procedures."[22] This is a far cry from being intellectually accessible to all; potential narratives are instead purposely delimited by a series of material and cultural controls.

Interpreters are required not only to perceive variations in shading and texture, but also to construe such distinctions as prompts for memory and music.[23] Colour and pattern recognition, hardly the exclusive realm of machine learning, is a response elicited in a particular narrator by the materiality of the lukasa. In the encounter, the lukasa reminds members of the Bambudye of their obligations to each other and their ancestral spirits.[24]

The lukasa constitutes one aspect of a complex information practice that is situated in a specific cultural and geographical landscape; it regulates, and is regulated through, the secret society of the Bambudye. In its provision of information—perhaps better characterised as an evocation—the lukasa also organises, manages, and even conceals.

Does our current understanding of information and its technologies accommodate the fact that the same set of material elements of a lukasa can generate and withhold different stories? Repeatability and accessibility, it seems, are not necessarily key features of a successful exchange of information. We may then be inspired to imagine that sameness resides elsewhere or behaves elsewise, and we may conclude that "access" is not a suitable vehicle for calling on the diversity of information practices around the world and across time. In other words, by admitting into consideration the sensorial aspects of information transmission, we claim the grounds for reassessing the putative entitlements of reproducibility and what it means to call something the same. The foundations for the principle of accessibility are also exposed for closer inspection. Pursued in this way, a historical approach to information helps "unsettle present certainties and thereby enlarge our sense of the thinkable."[25] The anomalous, unintelligible, or even unimaginable might suddenly emerge as central to understanding. In so doing, history can provide impetus for revising how we comprehend the becoming and being of information.

Hasn't Someone Else Done This?

The investigation of activities related to the management of information has traditionally been the province of so-called auxiliary disciplines. For example, scholars of palaeography examine scribal practices, often discussing the intellectual and social implications of the particular contouring of pen-strokes and letter-shapes, word spacing, ruling patterns, headings, section divisions, systems of referencing and cross-referencing, and other ways of organising information on the manuscript page.[26] Meanwhile, diplomatists, legal theorists, and others explore the performativity of documents and the repositories in which such materials are held.[27] Special insights into the curatorial challenges of facilitating the reuse of sources of all types have long been offered by those in archival science, library and information science, and museum studies.[28] Some aspects of information-ising customs, such as recordkeeping and the idea of the archive, have piqued scholarly curiosity more broadly.[29] The influence of bibliographic forms and genres of information upon the cultural imaginary has likewise stimulated interest across the humanities; other scholarship tests the heuristic possibilities of information theory.[30] Not all explorations are analytical or historical in nature, and many are not conceived in relation to the study of information. But they are nonetheless useful in illuminating the work of different agents, and how the provision of information continues to be shaped by material, institutional, and other constraints.

Different theories of information and informing have been proposed by philosophy, some taking the aforementioned mathematical understanding of information as a starting point, and others concerning themselves with how information in its general sense is involved in the processes of coming to be informed about something.[31] The distinction between the act of informing and the state of being informed became a particular matter of interest for R. A. Fairthorne and others in the middle of the twentieth century as they contemplated how automation could be deployed to improve the provision of information to users in the library and beyond. Attention to acts of informing in the context of library and documentary services would clarify the priorities of these information scientists, especially

as regards the questions of technical, semantic, and interpretive effectiveness that had been identified in earlier discussions of communication systems.[32] In a cognate field, Margaret E. Egan and Jesse H. Shera acknowledged that any such system—because it organises information *for people* and delivers information *to people*—is necessarily shaped by the society in which it is produced. They devised a framework of "social epistemology" to support considerations of how society comes to be informed.[33] In contrast to traditional epistemology which focuses on the intellectual processes of an individual, social epistemology should study such dynamics in an aggregate context. Investigating the production, distribution, and use of information in society was to give rise to a theory of how information is to be made useful.

Analyses of information infrastructures have been conducted in such fields as communication, media studies, media archaeology, as well as business and labour history. From the ambitions of Google, Apple, and Alibaba to the role of office equipment and its operators, these studies locate the various agents, materials, and systems in the global landscape, and draw out their relationships.[34] Added to histories of computing that also reveal how information technologies are entangled with the political economy, such scholarship casts a different light on some of the challenges that face society today.[35] The genealogies that they develop can be brought to bear on a consideration of the cultural influences that continue to shape information and its practices.

Our understanding of information practices is also aided in no small part by histories of scientific and scholarly activity, in which note-taking, classifying, and similar efforts have lately been explored.[36] For example, examinations of Carl Linnaeus's use of word, image, and dried specimen—on paper slips, the page, and in cabinets—elucidate the techniques by which descriptions of the natural world were created, ordered, and "fixed" on the page, thereby vivifying at least one early modern attitude toward the management of information.[37] Emerging from the traditions of intellectual history and the history of ideas, such enquiries seek to account for the sociomaterial circumstances of the production of knowledge. This broader context might include the role of paper and printing technologies, as well as the significance of heated debate, quiet conversation, and the cultivation of friendships. Studies often converge on particular actors and certain kinds of knowledge, having been influenced "either implicitly or explicitly by anachronistic criteria as to what counts as scientific" or scholarly activity.[38] Recently characterised as the history of knowledge, this burgeoning area of research has the potential to spread beyond the borders of the history of science, books, and learning, but proponents have yet to address concerns about focus and the question of "anything goes."[39]

What Is Information History For?

As a cultural history of information practices, information history offers a distinctive rationale for the constitution and analysis of a particular group of intellectual challenges. These challenges are of interest to many scholars, and especially those who work on topics related to the formation of knowledge and the dissemination of ideas. Although it is within the remit of information history to explore how acts of collecting, organising, and sharing have profoundly influenced knowledge-making, such information-ising practices are not always rehearsed in support of the creation or management of *knowledge* in an obviously immediate way. An emphasis on *information* obliges us to pause over a consequential intellectual move that can too readily be overlooked by scholars in the haste to cross the finish

line of knowledge production. Material evidence of an information-ising attitude is often discarded, contributing to the obfuscation of its own role and process. For instance, notes inscribed on strips of paper or the backs of playing cards were used to aid the rearrangement of ideas before they were committed to a particular order.[40] But once the details had been copied out in the desired sequence in a ledger or register, perhaps in tabular form, the slips were often considered to have fulfilled their function. These waypoints are common across different domains and perdure even after the advent of digital technologies; they therefore deserve close attention if we hope to catch sight of—and engage with—the ghostly armatures of management and control.

The taxonomic systems developed by Linnaeus and his contemporaries in the eighteenth century are important developments in information practice and have had critical outcomes in the history of knowledge. But further inspection of these exercises might reveal that the relationship between information-ising and knowing is not a direct one. Distinguishing one plant from another—or grouping two plants together—are activities that may be taken to have some relationship with knowing, but they are nevertheless distinct from it. Although the aim of such practices appears at first glance to be the production of something that is later called knowledge, it is not an inevitable teleology. The particular configuration of the outcome is not guaranteed. It behooves us to understand for what purposes and according to what constraints these systems were devised, and furthermore compare them with other possible approaches. As Staffan Müller-Wille has observed, "Division, definition, and classification do not represent timeless conceptual structures …. Changes in such practices can therefore not be appreciated by conceptual analysis alone."[41] Today's debates about metadata demonstrate a similar collapsing of information-ising efforts and knowing. Descriptive practices in libraries and archives were promulgated to aid search and retrieval—that is, to facilitate navigation within the context of the respective collections.[42] For this reason, the resulting descriptions might be better understood as expressive of institutional mandates which depend on a specific mode of seeing. Yet such metadata has often been taken by some as if it were a product of direct observation that could record what the objects are "about" or what they simply "are."[43] As a linguistic convenience, this imprecision may occasionally be excused. As an account of reality, however, it can have disastrous consequences. Because metadata is now frequently used in machine learning, it can be and has been constituted as evidence for assertions about not only the content of the objects represented, but also various states of affairs related to knowing and knowledge. Information practice once again slips away into the murky shadows.

In *The Historian's Craft*, Marc Bloch describes one of the special attractions of the discipline of history: "The spectacle of human activity which forms its particular object is, more than any other, designed to seduce the imagination—above all when, thanks to its remoteness in time or space, it is adorned with the subtle enchantment of the unfamiliar."[44] For those who are unmoved by its aesthetic appeal or insist on a value beyond disciplinary merit, a case for the pursuit of history may be made that is situated in its use of creativity to aid understanding. History explains by representing; history represents by interpreting. Using language and imagination, history harnesses the unfamiliar to traverse improbable ground. Such intellectual exertions make us more cognisant of the contingencies of our present situation, which, in turn, make us better able to transcend them. Good history illuminates life. Although "information" seems to have taken centre stage in our engagements with the world, it is information history that will help direct the unfolding drama that is the human condition.

Information History Remembers Our Future

As the historian of science George Sarton explained in 1924 in his vision of a "new humanism," technological advances can be understood as among the most remarkable of human activities.[45] Humanistic study must therefore include an account of creative achievements across the arts and the sciences, through time and across cultures—from the development of writing, music, and metaphor to the formulation of elegant algorithms and artificial intelligence. With a panoramic prospect across domains and technologies, information history can recognise meaningful particularities while remaining on guard against superficial resemblances and false distinctions.[46] Correspondences between the practices of philologists in the nineteenth century and those of bioinformaticians in the twenty-first are then brought into full relief. By scrutinising the usage of tree-like diagrams in earlier studies of textual transmission, we may come to a different understanding of the role played by computational phylogenetics in literary scholarship today. We may also see how the practice of bookkeeping, with its logic and language of productivity, was honed by diverse agents, used for colonial regulation, and continues to apportion society.[47] The study of attempts to "tame" chance in the eighteenth and nineteenth centuries by adopting statistical thinking and its accompanying apparatus of mechanical objectivity can provide ways to articulate contemporary concerns about the entrenchment of data science, the methods of which likewise operate according to particular rules of probability and invoke similar apparitions of impartiality.[48]

Because of its peculiar techniques, history constitutes an unexpected arena for grappling with the questions of explainability, accountability, and trustworthiness that have been major preoccupations of those who seek to understand the cultural effects of artificial intelligence. Past, present, and future are part of the same time span that the historian folds and stitches together to "imagine the past and remember the future."[49] For this reason, the historical enterprise has the potential to offer new and unusual insights that elucidate even the most recent developments in the information sector, making intelligible not only the circumstances of their emergence but also their consequences for society. The current manifestation of artificial intelligence is undergirded by specific practices of description, classification, and statistical reckoning that are themselves expressions of a narrow set of rationalities; it is according to attendant senses of certainty and efficiency that society has aligned its values.[50] Without humanistic examinations of the kinds of logics that underpin today's version of AI, we cannot hope to understand—let alone resolve—the ongoing challenges to racial equity, truth, and civil rights. These problems are not technical ones; they were not brought on by the arrival of a new information technology. A satisfactory and sustained resolution will not be exclusively technical in nature. Artificial intelligence may be one of the most significant cultural events of our time. But information and its technologies are expressions of humanity, and it is therefore to the humanities that we must turn for their interpretation and, indeed, stewardship.

With a global perspective that is cross-disciplinary and transhistorical, information history demonstrates how regard for the patterns, colours, and textures in a lukasa adds dimension to our understanding of the workings of information—from information-ising attitudes, practices, and technologies, to the broader concept that continues to evolve. Most importantly, however, such explorations enhance our sense of the human condition. Enlisting the ingenuity of both humanity and the humanities, information history offers ways to navigate society in the present. As the former president of the American Historical

Association and medieval historian Edward Muir has characterised it, "Life offers not the certainty of grace or mathematical precision but rather the responsibility to make decisions based on partial or conflicting evidence."[51] In a world adrift in a sea of uncertainty and buffeted by questions about the future, we can find direction by charting a historical course, with our heading set on the becoming and being of information.

Notes

1 See, for example, Luciano Floridi, ed., *The Routledge Handbook of Philosophy of Information* (London: Routledge, 2016); James W. Cortada, "Shaping Information History as an Intellectual Discipline," *Information & Culture* 47, no. 2 (2012): 119–144; Marcia J. Bates, "Fundamental Forms of Information," *Journal of the American Society of Information Science and Technology* 57, no. 9 (June 2006): 1033–1045; Rafael Capurro and Birger Hjørland, "The Concept of Information," *Annual Review of Information Science and Technology* 37, no. 1 (2003): 343–411; and Fritz Machlup and Una Mansfield, eds., *The Study of Information: Interdisciplinary Messages* (New York: Wiley, 1983). Recent attempts at clarification as well as demurrals in Eric Hayot, "Information: A Reader. An Introduction," in *Information: A Reader*, ed. Hayot, Anatoly Detwyler, and Lea Pao (New York: Columbia University Press, 2022), 1–14; Jack W. Chen, Anatoly Detwyler, Christopher M. B. Nugent, Xiao Liu, and Bruce Rusk, "Introduction for a History of Literary Information in China," in *Literary Information in China: A History*, ed. Chen, Detwyler, Nugent, Liu, and Rusk (New York: Columbia University Press, 2021), xxi–xxxii; Paul Duiguid, "Introduction," in *Information: A Historical Companion*, ed. Ann Blair, Duiguid, Anja-Silvia Goeing, and Anthony Grafton (Princeton, NJ: Princeton University Press, 2021), vii–xi; and Michele Kennerly, Samuel Frederic, and Jonathan E. Abel, "Introduction: Information + Humanities," in *Information: Keywords*, ed. Kennerly, Frederic, and Abel (New York: Columbia University Press, 2021), 1–16.

2 The seminal work is C. E. Shannon, "A Mathematical Theory of Communication," *Bell System Technical Journal* 27, no. 3 (July 1948): 379–423 and no. 4 (October 1948): 623–656. See also R. V. L. Hartley, "Transmission of Information," *Bell System Technical Journal* 7, no. 3 (July 1928): 535–563; and Harry Nyquist, "Certain Factors Affecting Telegraph Speed," *Bell System Technical Journal* 3, no. 2 (April 1924): 324–346. Warren Weaver underscored the difference between the ordinary usage of the word, which entails semantic meaning, and Shannon's technical notion of information, which does not: "The word *information*, in this theory, is used in a special sense that must not be confused with its ordinary usage. In particular, *information* [in this theory] must not be confused with meaning," in Shannon and Weaver, *The Mathematical Theory of Communication* (1949; repr., Urbana, IL: University of Illinois Press, 1964), 8.

3 Michael K. Buckland, "Information as Thing," *JASIST* 42, no. 5 (June 1991): 351–360. See the subsequent debate between A. Neil Yerkey and Buckland in the Letters to the Editor in *JASIST* 42, no. 10 (December 1991): 758. An important discussion in Robert A. Fairthorne, "'Use' and 'Mention' in the Information Sciences," in *Proceedings of the Symposium on Education for Information Science, Warrenton, Virginia, September 7–10, 1965* (Washington, DC: Spartan Books, 1965), 9–12.

4 Rafael Capurro, "What Is Information Science for? A Philosophical Reflection," in *Conceptions of Library and Information Science. Historical, Empirical and Theoretical Perspectives*, ed. Pertti Vakkari and Blaise Cronin (London: Taylor Graham, 1992), 82–98, esp. 83, 90. Emphasis in the original.

5 For a similar discussion about the use of the term "science" in the history of science, see, for example, Alexander Jones and Liba Taub, "Introduction," in *The Cambridge History of Science, Volume 1: Ancient Science*, ed. Jones and Taub (New York: Cambridge University Press, 2018), 1–4; Michael H. Shank and David C. Lindberg, "Introduction," in *The Cambridge History of Science, Volume 2: Medieval Science*, ed. Lindberg and Shank (New York: Cambridge University Press, 2013), 1–26; Pamela H. Smith, "Science on the Move: Recent Trends in the History of Early Modern Science," *Renaissance Quarterly* 62, no. 2 (2009): 345–375; Peter Dear, "What Is the History of Science the History *Of*? Early Modern Roots of the Ideology of Modern Science,"

Isis 96, no. 3 (September 2005): 390–406; and David Pingree, "Hellenophilia versus the History of Science," *Isis* 83, no. 4 (December 1992): 554–563.

6 See the seminal work, Suzanne Briet, *Qu'est-ce que la documentation?* (Paris: EDIT, 1951).

7 Bonnie Mak and Allen H. Renear, "What Is Information History?" *Isis* 114, no. 4 (December 2023): 747–768, esp. 761.

8 Marc Bloch, *The Historian's Craft*, trans. Peter Putnam (1953; repr., New York: Vintage, 1964), 194.

9 G. E. R. Lloyd, "Methods and Problems in the History of Ancient Science. The Greek Case," *Isis* 83, no. 4 (December 1992): 564–577, esp. 576–577.

10 Efforts to articulate such an approach in, among others, William Aspray, ed., *Writing Computer and Information History: Approaches, Connections, and Reflections* (London: Rowman & Littlefield, 2024); James Evans and Adrian Johns, "Introduction: How and Why to Historicize Algorithmic Cultures," *Osiris* 38 (2023): 1–15; Soraya de Chadarevian and Theodore M. Porter, "Introduction: Scrutinizing the Data World," *Historical Studies in the Natural Sciences* 48, no. 5 (November 2018): 549–556; Elena Aronova, Christine von Oertzen, and David Sepkoski, "Introduction: Historicizing Big Data," *Osiris* 32 (2017): 1–17; William Aspray, "The Many Histories of Information," *Information & Culture* 50, no. 1 (2015): 1–23; Alistair Black and Dan Schiller, "Systems of Information: The Long View," *Library Trends* 62, no. 3 (Winter 2014): 628–662; Antony Bryant, Alistair Black, Frank Land, and Jaana Porra, "Information Systems History: What Is History? What Is IS History? What IS History? … and Why Even Bother with History?" *Journal of Information Technology* 28, no. 1 (March 2013): 1–17; Arndt Brendecke, Markus Friedrich, and Susanne Friedrich, eds., *Information in der Frühen Neuzeit. Status, Bestände, Strategien* (Berlin: LIT, 2008); Toni Weller, *Information History—An Introduction* (Oxford: Chandos, 2008); Alistair Black, "Information History," *ARIST* 40, no. 1 (2007): 441–473; and Norman Stevens, "The History of Information," *Advances in Librarianship* 14 (1986): 1–48. Also see note 1.

11 See the discussion in Evans and Johns, "Introduction: How and Why," esp. 5–6; Laura Skouvig, "Present and Past: The Relevance of Information History," *Information & Culture* 58, no. 1 (2023): 1–16; and John Durham Peters, "*Information*: Notes towards a Critical History," *Journal of Communication Inquiry* 12, no. 2 (1988): 9–23.

12 Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press), 72.

13 For example, Lorraine Daston and Elizabeth Lunbeck, eds., *Histories of Scientific Observation* (Chicago, IL: University of Chicago Press, 2011); Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago, IL: University of Chicago Press, 2006); and Patrick Singy, "Huber's Eyes: The Art of Scientific Observation before the Emergence of Positivism," *Representations* 95, no. 1 (Summer 2006): 54–75.

14 E. H. Carr, *What Is History?* 2nd ed. (1986; repr., Houndmills: Palgrave, 2001), 46.

15 Examples may be found in Colin Koopman, *How We Became Our Data: A Genealogy of the Informational Person* (Chicago, IL: University of Chicago Press, 2019); Hallam Stevens, *Life Out of Sequence: A Data-Driven History of Bioinformatics* (Chicago, IL: University of Chicago Press, 2013); Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999); and Patrick J. Geary, *Living with the Dead in the Middle Ages* (Ithaca, NY: Cornell University Press, 1994).

16 On "practices" as a framework for investigation, see Lorraine Daston and Glenn W. Most, "Focus: History of Science and History of Philologies," *Isis* 106, no. 2 (June 2015): 378–390, esp. 389–390.

17 In addition to the chapters in this volume, see also, among others, Dominique Charpin, *Reading and Writing in Babylon*, trans. Jane Marie Todd (Cambridge, MA: Harvard University Press, 2010); Lars Heide, *Punched-Card Systems and the Early Information Explosion, 1880–1945* (Baltimore, MD: Johns Hopkins University Press, 2009); Martin Campbell-Kelly, Mary Croarken, Raymond Flood, and Eleanor Robson, eds., *The History of Mathematical Tables: From Sumer to Spreadsheets* (New York: Oxford University Press, 2003); and Jocelyn Penny Small, *Wax Tablets of the Mind: Cognitive Studies of Memory and Literacy in Classical Antiquity* (New York: Routledge, 1997).

18 Joan W. Scott, "The Evidence of Experience," *Critical Inquiry* 17, no. 4 (1991): 773–797, esp. 796. See also Gabrielle M. Spiegel, "Revising the Past/Revisiting the Present: How Change Happens in Historiography," *History and Theory* 46, no. 4 (December 2007): 1–19.

19 Kathleen Biddick, *The Shock of Medievalism* (Durham, NC: Duke University Press, 1998), esp. 187; and Peter de Bolla, "Disfiguring History," *diacritics* (Winter 1986): 49–58, esp. 57.
20 Benedetto Croce, *History as the Story of Liberty*, trans. Sylvia Sprigge (New York: W.W. Norton, 1941), 19.
21 Mary Nooter Roberts, "The King Is a Woman: Shaping Power in Luba Royal Arts," *African Arts* 46, no. 3 (2013): 68–81; and Roberts, "Locating History in a Labyrinth of Memory," *Journal of the Iris & B. Gerald Cantor Center for Visual Arts at Stanford University* 3 (2002–2003): 73–82, esp. 77.
22 Mary Nooter Roberts, "Luba Memory Theater," in *Memory: Luba Art and the Making of History*, ed. M. N. Roberts and Allen F. Roberts (New York: Museum for African Art, 1996), 116–149, esp. 134–136. For "multireferential and polysemic," see Roberts, "Locating History," 76. In general, see Mary Nooter Roberts, "Memory and Identity at the Threshold in Gregory Maqoma's *Beautiful Me*," *African Arts* 44, no. 4 (December 2011): 76–81; and Christine Mullen Kreamer, M. N. Roberts, Elizabeth Harney, Allyson Purpura, eds., *Inscribing Meaning: Writing and Graphic Systems in African Art* (Washington, DC: Smithsonian National Museum of African Art, 2007).
23 Roberts, "Luba Memory Theater," 114.
24 Thomas Q. Reefe, "Lukasa: A Luba Memory Device," *African Arts* 10, no. 4 (1977): 49–50+88, esp. 50.
25 Lorraine Daston, *Rules: A Short History of What We Live By* (Princeton, NJ: Princeton University Press, 2022), 22.
26 For instance, Bonnie Mak, "Manuscript," in *Cambridge Critical Concepts: Technology and Literature*, ed. Adam Hammond (Cambridge, UK: Cambridge University Press, 2023), 45–68; Ayelet Even-Ezra, *Lines of Thought: Branching Diagrams and the Medieval Mind* (Chicago, IL: University of Chicago Press, 2021); Erik Kwakkel, "Decoding the Material Book: Cultural Residue in Medieval Manuscripts," in *The Medieval Manuscript Book: Cultural Approaches*, ed. Michael Van Dussen and Michael Johnson (Cambridge, UK: Cambridge University Press, 2015), 60–76; Paul Saenger, *Space Between Words: The Origins of Silent Reading* (Stanford, CA: Stanford University Press, 1997); Richard Sharpe, "Accession, Classification, Location: Shelfmarks in Medieval Libraries," *Scriptorium* 50 (1996): 279–287; Armando Petrucci, *Writers and Readers in Medieval Italy: Studies in the History of Written Culture*, trans. Charles Radding (New Haven, CT: Yale University Press, 1995); M. B. Parkes, *Pause and Effect: An Introduction to the History of Punctuation in the West* (Berkeley, CA: University of California Press, 1993); Christopher de Hamel, *Glossed Books of the Bible and the Origins of the Paris Booktrade* (Woodbridge: D.S. Brewer, 1984); Richard H. Rouse and Mary A. Rouse, "*Statim Invenire*: Schools, Preachers, and New Attitudes to the Page," in *Renaissance and Renewal in the Twelfth Century*, ed. Robert L. Benson and Giles Constable with Carol Lanham (Cambridge, MA: Harvard University Press, 1982), 201–225; Parkes, "The Influence of the Concepts of *Ordinatio* and *Compilatio* on the Development of the Book," in *Medieval Learning and Literature. Essays Presented to Richard William Hunt*, ed. J. J. G. Alexander and M. T. Gibson (Oxford: Clarendon Press, 1976), 115–141; Stanley Morison, *Politics and Script: Aspects of Authority and Freedom in the Development of Graeco-Latin Script from the Sixth Century B.C. to the Twentieth Century A.D.* (Oxford: Clarendon Press, 1972); Jean Irigoin, "Pour un étude des centres de copie byzantins," *Scriptorium* 12 (1958): 208–227 and 13 (1959): 177–209; and F. Masai, "Paléographie et codicologie," *Scriptorium* 4 (1950): 279–293.
27 Among others, Trish Luker, "Sovereign Signatures: Australian First Nations Petitions," in *The Routledge Handbook of Cultural Legal Studies*, ed. Karen Crawley, Thomas Giddens, and Timothy D. Peters (London: Routledge, 2024), 333–351; Katherine Biber, Trish Luker, and Priya Vaughan, eds., *Law's Documents: Authority, Materiality, Aesthetics* (London: Routledge, 2021); Brigitte Bedos-Rezak, *When Ego Was Imago: Signs of Identity in the Middle Ages* (Leiden: Brill, 2011); Laurie Nussdorfer, *Brokers of Public Trust: Notaries in Early Modern Rome* (Baltimore, MD: Johns Hopkins University Press, 2009); Cornelia Vismann, *Files: Law and Media Technology*, trans. Geoffrey Winthrop-Young (Stanford, CA: Stanford University Press, 2008); Adam J. Kosto and Anders Winroth, eds., *Charters, Cartularies and Archives: The Preservation and Transmission of Documents in the Medieval West. Proceedings of a Colloquium of the Commission Internationale de Diplomatique (Princeton and New York, September 16–18, 1999)* (Toronto: Pontifical Institute of Mediaeval Studies, 2002); and M. T. Clanchy, *From Memory to Written*

Record, England 1066–1307, 2nd ed. (Oxford: Blackwell, 1993). In general, see Georges Tessier, *La diplomatique*, 2nd ed. (Paris: Presses universitaires de France, 1962).

28 For example, Geoffrey Yeo, *Record-Making and Record-Keeping in Early Societies* (London: Routledge, 2021); David A. Wallace, Wendy M. Duff, Renée Saucie, and Andrew Finn, eds., *Archives, Recordkeeping, and Social Justice* (London: Routledge, 2020); Jennifer Douglas, "Origins and Beyond: The Ongoing Evolution of Archival Ideas about Provenance," in *Currents of Archival Thinking*, ed. Heather MacNeil and Terry Eastwood, 2nd ed. (Santa Barbara, CA: Libraries Unlimited, 2017), 25–52; Francis X. Blouin and William G. Rosenberg, eds. *Archives, Documentation, and Institutions of Social Memory: Essays from the Sawyer Seminar* (Ann Arbor, MI: University of Michigan Press, 2006); Heather MacNeil, "Picking Our Text: Archival Description, Authenticity, and the Archivist as Editor," *The American Archivist*, 68 (Fall/Winter 2005): 264–278; Laura Millar, "The Death of the Fonds and the Resurrection of Provenance: Archival Context in Space and Time," *Archivaria* 53 (2002): 1–15; Bowker and Star, *Sorting Things Out*; James M. O'Toole, ed., *The Records of American Business* (Chicago, IL: Society of American Archivists, 1997); Susan M. Pearce, *Museums, Objects, and Collections: A Cultural Study* (Washington, DC: Smithsonian Institution Press, 1993); and Ernst Posner, *Archives in the Ancient World* (Cambridge, MA: Harvard University Press, 1972).

29 For instance, Laura E. Helton, *Scattered and Fugitive Things: How Black Collectors Created Archives and Remade History* (New York: Columbia University Press, 2024); Maryanne Dever, ed., *Archives and New Modes of Feminist Research* (London: Routledge, 2019); Angus Vine, *Miscellaneous Order: Manuscript Culture and the Early Modern Organization of Knowledge* (Oxford: Oxford University Press, 2019); Randolph Head, *Making Archives in Early Modern Europe: Proof, Information, and Political Record-Keeping, 1400–1700* (Cambridge, UK: Cambridge University Press, 2018); Alexandra Walsham, Liesbeth Corens, and Kate Peters, eds., *Archives and Information in the Early Modern World* (Oxford: Oxford University Press, 2018); Jacob Soll, *The Information Master: Jean-Baptiste Colbert's Secret State Intelligence System* (Ann Arbor, MI: University of Michigan Press, 2009); Antoinette Burton, ed., *Archive Stories: Facts, Fictions, and the Writing of History* (Durham, NC: Duke University Press, 2005); and Carolyn Steedman, *Dust: The Archive and Cultural History* (New Brunswick, NJ: Rutgers University Press, 2002).

30 Among others, Nicholas Danes, *The Chapter: A Segmented History from Antiquity to the Twenty-First Century* (Princeton, NJ: Princeton University Press, 2023); Dennis Duncan, *Index, A History of The* (New York: W.W. Norton, 2022); Chen et al., eds., *Literary Information in China*; Anatoly Detwyler, "'Distant Reading' and the Pull of Literary Abstraction in New Culture China," *Modern Chinese Literature and Culture* 33, no. 2 (2021): 1–48; Hoyt Long, Anatoly Detwyler, and Yuancheng Zhu, "Self-Repetition and East Asian Literary Modernity, 1900–1930," *Journal of Cultural Analytics* May 21, 2018; Arthur Bahr, *Fragments and Assemblages: Forming Compilations of Medieval London* (Chicago, IL: University of Chicago Press, 2013); and John Guillory, "The Memo and Modernity," *Critical Inquiry* 31, no. 1 (August 2004): 108–132.

31 Relevant work may be found in epistemology as well as the philosophies of mind, language, and information. Among others, Chris Meyns, ed., *Information and the History of Philosophy* (London: Routledge, 2021); Luciano Floridi, *The Philosophy of Information* (New York: Oxford University Press, 2011); Peter Janich, *What Is Information?* trans. Eric Hayot and Lea Pao (Minneapolis, MN: University of Minnesota Press, 2018); Fred Dretske, *Knowledge and the Flow of Information* (Cambridge, MA: MIT Press, 1981); Jon Barwise and John Perry, *Situations and Attitudes* (Cambridge, MA: MIT Press, 1983); and Rudolf Carnap and Yehoshua Bar-Hillel, "An Outline of a Theory of Semantic Information," *Technical Report (Massachusetts Institute of Technology. Research Laboratory of Electronics)* 247 (1952). See Floridi, "On Defining Library and information Science as Applied Philosophy of Information," *Social Epistemology* 16, no. 1 (2002): 37–49.

32 For example, Robert A. Fairthorne, "Repartee: The Limits of Information Retrieval," *The Journal of Library History (1966–1972)* 3, no. 4 (1968): 363–369, followed by the reply by Joseph Z. Nitecki, 369–374; and Fairthorne, "Morphology of 'Information Flow,'" *Journal of the ACM* 14, no. 4 (October 1967): 710–719. See Shannon and Weaver, *The Mathematical Theory of Communication*, 4–6.

33 Margaret E. Egan and Jesse H. Shera, "Foundations of a Theory of Bibliography," *The Library Quarterly* 22, no. 2 (April 1952): 125–137. See also Jonathan Furner, "'A Brilliant Mind': Margaret Egan and Social Epistemology," *Library Trends* 52, no. 4 (Spring 2004): 792–809.

34 For instance, Dan Schiller, *Crossed Wires: The Conflicted History of US Telecommunications, From the Post Office to the Internet* (New York: Oxford University Press, 2023); ShinJoung Yeo, *Behind the Search Box: Google and the Global Internet Industry* (Urbana, IL: University of Illinois, 2023); Hong Shen, *Alibaba: Infrastructuring Global China* (London: Routledge, 2022); Craig Robertson, *The Filing Cabinet: A Vertical History of Information* (Minneapolis, MN: University of Minnesota Press, 2021); Geoffrey C. Bowker, Stefan Timmermans, Adele E. Clarke, and Ellen Balka, eds., *Boundary Objects and Beyond: Working with Leigh Star* (Cambridge, MA: MIT Press, 2016); Jack Linchuan Qiu, *Goodbye iSlave: A Manifesto for Digital Abolition* (Urbana, IL: University of Illinois Press, 2016); Nicole Starosielski, *The Undersea Network* (Durham, NC: Duke University Press, 2015); Lisa Gitelman, *Paper Knowledge: Toward a Media History of Documents* (Durham, NC: Duke University Press, 2014); Lisa Nakamura, "Indigenous Circuits: Navajo Women and the Racialization of Early Electronic Manufacture," *American Quarterly* 66, no. 4 (December 2014): 919–941; Markus Krajewski, *Paper Machines: About Cards & Catalogs, 1548–1929*, trans. Peter Krapp (Cambridge, MA: MIT Press, 2011); Gregory J. Downey, *Telegraph Messenger Boys: Labor, Technology, and Geography, 1850–1950* (London: Routledge, 2002); Delphine Gardey, *La dactylographe et l'expéditionnaire. Histoire des employés de bureau (1890–1930)* (Paris: Belin, 2001); James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998); and JoAnne Yates, *Control through Communication: The Rise of System in American Management* (Baltimore, MD: Johns Hopkins University Press, 1989).

35 In the history of computing, among others, Janet Abbate and Stephanie Dick, eds., *Abstractions and Embodiments: New Histories of Computing and Society* (Baltimore, MD: Johns Hopkins University Press, 2022); Matthew L. Jones, *Reckoning with Matter: Calculating Machines, Innovation, and Thinking about Thinking from Pascal to Babbage* (Chicago, IL: University of Chicago Press, 2016); Nathan Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge, MA: MIT Press, 2010); and Donald E. Knuth, "Ancient Babylonian Algorithms," *Communications of the Association for Computing Machinery* 15, no. 7 (July 1972): 671–677. See discussion in Thomas Haigh, "The History of Information Technology," *Annual Review of Information Science and Technology* 45, no. 1 (January 2011): 431–487.

36 Among them, Lorraine Daston, "Cloud Physiognomy," *Representations* 135 (Summer 2016): 45–71; Blair, *Too Much to Know*; Frank Büttner, Markus Friedrich, and Helmut Zedelmeier, eds., *Sammeln, Ordnen, Veranschaulichen. Zur Wissenkompilatorik in der Frühen Neuzeit* (Münster: LIT, 2003); Peter Becker and William Clark, eds., *Little Tools of Knowledge: Historical Essays on Academic and Bureaucratic Practices* (Ann Arbor, MI: University of Michigan Press, 2001); H. J. Jackson, *Marginalia: Readers Writing in Books* (New Haven, CT: Yale University Press, 2001); Anthony Grafton, *The Footnote: A Curious History* (Cambridge, MA: Harvard University Press, 1997); and Lisa Jardine and Anthony Grafton, "'Studied for Action': How Gabriel Harvey Read His Livy," *Past & Present* 129 (November 1990): 30–78. On paper tools, see, for example, Carla Bittel, Elaine Leong, and Christine von Oertzen, eds., *Working with Paper: Gendered Practices in the History of Knowledge* (Pittsburgh, PA: University of Pittsburgh Press, 2019); Boris Jardine, "State of the Field: Paper Tools," *Studies in History and Philosophy of Science* 64 (2017): 53–63; Volker Hess and J. Andrew Mendelsohn, "*Paper Technology* und Wissenschaftsgeshichte," *N.T.M.* 21 (2013): 1–10; and Anke te Heesen, "The Notebook. A Paper-Technology," in *Making Things Public. Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel (Cambridge, MA: MIT Press, 2005), 582–589.

37 For instance, Gunnar Broberg, *The Man Who Organized Nature: The Life of Linnaeus* (Princeton, NJ: Princeton University Press, 2023); Staffan Müller-Wille and Sara Scharf, "Indexing Nature: Carl Linnaeus (1707–1778) and His Fact-Gathering Strategies," *Yearbook of the Swedish Linnaeus Society* 2011 (2012): 31–60; M. D. Eddy, "Tools for Reordering: Commonplacing and the Space of Words in Linnaeus's *Philosophia Botanica*," *Intellectual History Review* 20, no. 2 (June 2010): 227–252; Dániel Margócsy, "'Refer to Folio and Number': Encyclopedias, the Exchange of Curiosities, and Practices of Identification before Linnaeus," *Journal of the History of Ideas*, 71, no. 1 (2009): 63–89; Müller-Wille, "Linnaeus' Herbarium Cabinet: A Piece of Furniture and Its Function," *Endeavour* 30, no. 2 (June 2006): 60–64; Müller-Wille, "Systems and How Linnaeus Looked at Them in Retrospect," *Annals of Science* 70, no. 3 (July 2013): 305–317; Isabelle

Charmantier, "Carl Linnaeus and the Visual Representation of Nature," *Historical Studies in the Natural Sciences* 41, no. 4 (2011): 365–404; Charmantier and Müller-Wille, "Carl Linnaeus's Botanical Paper Slips (1767–1773)," *Intellectual History Review* 24, no. 2 (April 2014): 215–238; Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge, MA: Harvard University Press, 1999); and Gunnar Eriksson, "The Botanical Success of Linnaeus: The Aspect of Organization and Publicity," *Yearbook of the Swedish Linnaeus Society* (1979): 57–66.

38 Lorraine Daston and Glenn W. Most, "History of Science and History of Philologies," *Isis* 106, no. 2 (June 2015): 378–390, esp. 385.

39 Christan Joas, Fabien Krämer, and Kärin Nikelsen, "Introduction: History of Science or History of Knowledge?" *Berichte zur Wissenschaftsgeschichte* 42, nos. 2–3 (September 2019): 117–125, esp. 118. See also Suzanne Marchand, "How Much Knowledge Is Worth Knowing? An American Intellectual Historian's Thoughts on the *Geschichte des Wissens*," *Berichte zur Wissenschaftsgeschichte* 42, nos. 2–3 (September 2019): 126–149, esp. 149; Lorraine Daston, "The History of Science and the History of Knowledge," *KNOW: A Journal on the Formation of Knowledge* 1, no. 1 (Spring 2017): 131–154; and Peter Burke, "The Cultural History of Intellectual Practices: An Overview," in *Political Concepts and Time: New Approaches to Conceptual History*, ed. Javier Fernández Sebastián (Santander: Cantabria University Press: McGraw-Hill Interamericana de España, 2011), 103–128, esp. 119. More generally, Johan Östling, David Larsson Heidenblad, and Anna Nilsson Hammar, eds., *Forms of Knowledge: Developing the History of Knowledge* (Lund: Nordic Academic Press, 2020); Sven Dupré and Geert Somsen, "The History of Knowledge and the Future of Knowledge Societies," *Berichte zur Wissenschaftsgeschichte* 42, nos. 2–3: 186–199; Lorraine Daston and Martin Muslow, "History of Knowledge," in *Debating New Approaches to History*, ed. Marek Tamm and Peter Burke (London: Bloomsbury, 2019), 159–187; Peter Burke, *What Is the History of Knowledge?* (Cambridge, UK: Polity, 2016); and Simone Lässig, "The History of Knowledge and the Expansion of the Historical Research Agenda," trans. David B. Lazar, *Bulletin of the German Historical Institute* 59 (Fall 2016): 29–58.

40 For example, Markus Friedrich, "How to Make an Archival Inventory in Early Modern Europe: Carrying Documents, Gluing Paper and Transforming Archival Chaos into Well-Ordered Knowledge," *Manuscript Cultures* 10 (2017): 160–173; John Considine, "Cutting and Pasting Slips: Early Modern Compilation and Information Management," *Journal of Medieval and Early Modern Studies* 45, no. 3 (2015): 487–504; Krajewski, *Paper Machines*; Blair, *Too Much to Know*; and Judith Hopkins, "The 1791 French Cataloging Code and the Origins of the Card Catalog," *Libraries & Culture* 27, no. 4 (Fall 1992): 378–404.

41 Müller-Wille, "Systems," 316.

42 Elaine Svenonius, *The Intellectual Foundation of Information Organization* (Cambridge, MA: MIT Press, 2000), esp. chap. 2 on "Bibliographic Objectives." Also see MacNeil and Eastwood, eds., *Currents of Archival Thinking*; MacNeil, "Metadata Strategies and Archival Description: Comparing Apples to Oranges," *Archivaria* 39 (1995): 22–32; and Patrick Wilson, *Two Kinds of Power: An Essay on Bibliographical Control* (Berkeley, CA: University of California Press, 1968).

43 See discussion about techniques of observation above, esp. note 13.

44 Bloch, *The Historian's Craft*, 8.

45 George Sarton, "The New Humanism," *Isis* 6, no. 1 (February 1924): 9–42. An earlier iteration in Sarton, "Le nouvel humanisme," *Scientia* 23 (1918): 161–175.

46 See "analogie superficielle" in Marc Bloch, "Pour une histoire comparée des sociétés européennes," *Revue de synthèse historique* 46, nos. 136–138 (December 1928): 15–50, esp. 32.

47 Among others, Caitlin Rosenthal, *Accounting for Slavery: Masters and Management* (Cambridge, MA: Harvard University Press, 2018); Miranda Joseph, *Debt to Society: Accounting for Life under Capitalism* (Minneapolis, MN: University of Minnesota Press, 2014); and Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago, IL: University of Chicago Press, 1998).

48 For instance, Iris Clever, "Biometry against Fascism: Geoffrey Morant, Race, and Anti-Racism in Twentieth-Century Physical Anthropology," *Isis* 114, no. 1 (March 2023): 25–49; Alex Csiszar, "Bibliography as Anthropometry: Dreaming of Scientific Order at the Fin de Siècle," *Library Trends* 62, no. 2 (2013): 442–455; Ian Hacking, *The Taming of Chance* (New York: Cambridge University Press, 1990); Lorenz Krüger, Lorraine J. Daston, and Michael Heidelberger, eds., *The Probabilistic Revolution Volume I: Ideas in History* (Cambridge, MA: MIT Press, 1987);

Theodore Porter, *The Rise of Statistical Thinking, 1820–1900* (Princeton, NJ: Princeton University Press, 1986); and Stephen M. Stigler, *The History of Statistics: The Measurement of Uncertainty before 1900* (Cambridge, MA: Harvard University Press, 1986).

49 Lewis B. Namier, "Symmetry and Repetition," in *Conflicts: Studies in Contemporary History* (London: Macmillan, 1942), 70.

50 Brian Cantwell Smith, *The Promise of Artificial Intelligence: Reckoning and Judgment* (Cambridge, MA: MIT Press, 2019).

51 Edward Muir, "On Ideological Litmus Tests," *Perspectives on History* 61, no. 7 (October 2023): 6.