1 Introduction
Worlds of Paper

"The fear of obliteration obsessed the societies of early modern Europe," Roger Chartier writes in *Inscription and Erasure*. "To quell their anxiety, they preserved in writing traces of the past, remembrances of the dead, the glory of the living, and texts of all kinds that were not supposed to disappear."[1] The efforts they made to confront this anxiety, however, paradoxically generated a new, related anxiety: the urge to preserve, record, and ward off obliteration frequently led to an unmanageable accumulation of texts, records, and ephemera of wildly varying utility and quality. Most of this was paper, which was not a new technology in early modern Europe but one whose use proliferated and diversified in these centuries. Paper, as never before, became the transactional medium; the repository of personal, communal, and institutional memory; the avenue of communication; the lifeblood of bureaucracies; and the foundation and residue of learning. Early modern Europeans, whether or not they sought to, and whether or not they were pleased with or trusted the new reality, put paper inscribed with text at the center of their lives.

Information might not be knowledge, nor is it wisdom, yet its acquisition and preservation are essential because it might yield *some* knowledge, and perhaps *some* wisdom. Early modern Europe was the locus of informational transition and adjustment, and, as we shall see, the associated disruptions to European society were significant. Lorraine Daston and Katherine Park have made the suggestion that if early modern Europeans had been asked to name their era, they would have labeled it *nova aetas*, with the appearance of a "gusher of novelty."[2] Perhaps because the period is widely regarded as liminal, historians have located a number of revolutions in early modern Europe. A partial list would include the "Military

[1] Roger Chartier, *Inscription and Erasure: Literature and Written Culture from the Eleventh to the Eighteenth Century*. Trans. by Arthur Goldhammer (Philadelphia: University of Pennsylvania Press, 2007), vii.
[2] Katherine Park and Lorraine Daston, "Introduction: the Age of the New." In Park and Daston, eds., *The Cambridge History of Science*, Vol. 3: *Early Modern Science* (Cambridge: Cambridge University Press, 2006), 6.

Revolution," the "Print Revolution," the "Correspondence Revolution," the "Scientific Revolution," and the "Communications Revolution."[3] Historians of early modern Europe have pointed to at least three main areas of disruption in European knowledge: the opening up of new worlds in the voyages of reconnaissance and discovery, the rediscovery and embrace of ancient texts, and the upheavals associated with the printing press. Others have pointed to "Knowledge Revolutions," emphasizing, again, the printing press and paradigm shifts in medicine and astronomy wrought by empirical observation and new techniques of observation.[4] There is a lot going on here.

In this book, I argue that information is a central concern in all these various transformations. In particular, there was a new emphasis on information management. Europeans were faced with what, for them, were untamable amounts of data, without the benefits of complex machines, digital files, and Boolean searches. New efforts had to be devised and undertaken to store and categorize both the information itself and the paper that contained it. More and more time was dedicated to what we would call "paperwork," which moved to the center of European life: in the everyday rhythms of commerce, in the working of the state, in the lives of scholars and virtuoso naturalists, in distance-busting communication services, even in the quotidian rhythms of burghers and artisans.

Information begat more information and paper more paper. Ann Blair has undertaken groundbreaking work showing how early modern scholars exhibited what she calls "info-lust," forcing them to develop a range of publications, attitudes, and reading and research practices to cope with the resulting heaps of data.[5] They were faced with a number of recurring questions regarding the information they accumulated: how to store it? How to categorize it? How to distill it? How to make it retrievable? I believe that many of Blair's insights into the history of the book and scholarly life can be extended to European society as a whole. The pressures incidental to the new abundance of books have analogs elsewhere: in the growth of the state and the attendant paperwork, in the

[3] Of course, the label of revolution was given to these episodes only much later by historians. Unlike the political American and French Revolutions, contemporaries did not use this terminology. It was only in 1949, for example, that Herbert Butterfield, clearly influenced by the dizzying changes in science and technology in his own day (and despite his famous resistance to Whiggish teleologies), started to use the expression "Scientific Revolution." The "Information Revolution" that is the subject of this book is likewise a reading of the past that is refracted through a particular contemporary moment.

[4] Anja-Silvia Goeing, *Storing, Archiving, Organizing. The Changing Dynamics of Scholarly Information Management in Post-Reformation Zurich* (Leiden: Brill, 2017), 3.

[5] Ann Blair and Peter Stallybrass, "Mediating information 1450–1800." In Clifford Siskin and William Warner, eds., *This is Enlightenment* (Chicago: University of Chicago Press, 2010), 139–163.

proliferation of empirical observation in natural philosophy, in the unprecedented circulation of news and correspondence, and in the general commitment to record-keeping and documentary preservation embraced by all sorts of early modern institutions. In all of these cases, practitioners were compelled to develop and adapt new means of information management.

Many of the emerging habits and practices of the early modern period that have been explored in contexts such as humanism, New World exploration, diplomacy, state-building, accounting, and the new science, can be regarded as features of broader, universal transformations related to the management of information. A non-exhaustive list might include an empirical sensibility; attention to particulars; quantification; the sharing of timely news and data across distances; the commitment to recording ideas, observations, and events in writing on paper (and then preserving them); a zeal for organizing and taxonomizing these records; and the creation of tools to navigate it all. At the core of these practical and epistemological concerns, and linking them all together, was the management of unprecedented amounts of information. A bundle of knowledge practices, technologies, and sensibilities emerged in order to face these challenges, deployed along with many reams of paper, in early modern scholarly life, natural philosophy, astronomy, medicine, law, diplomacy, business and finance, and in private lives.

The responses to the accumulation of information on paper were chiefly processes on paper. As Markus Friedrich has put it: "in early modern Europe, control of knowledge not only meant control of paper, but also control by paper."[6] In general, what early modern Europeans found themselves in need of, and in many areas of European society sought to construct, was a filter, an effective strainer for the data that they generated. It is a challenge familiar to us in an age when a great premium is placed on search engines, social media applications and other information-winnowing technologies. In comparison to ours, of course, this was an information-poor age, and the production of information remained comparatively slow. Nonetheless, early modern Europeans committed unprecedented time, money, and personnel to sorting through the information before them.

The chief focus of this book, therefore, is information management, most of which involved the handling of paper. This was not a new concern, but early modern Europe was an information society in a way that

[6] 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*, 10.10 (2017), 160–173 (here 165).

the Middle Ages never were. Europe's long acquaintance and flirtation with paper now became a love match. Like many such attachments, it occasioned pain, frustration, confusion, and boredom, as well as joys and fulfilment. Among other things, the underlying story of the pages that follow is the deepening and diversifying relationship of Europeans with their paper, along with the opportunities, challenges, and vexation this marriage incurred. The nature of early modern political, social, and cultural practices shaped the sorts of paper instrument produced, but the widespread use of paper shaped those practices as well. It changed the exercise of political power, the way in which the pursuit of knowledge was conducted, and the vectors by which Europeans kept in touch with one another. I find it useful to think of the informational transformations of early modern Europe as examples of what evolutionary biologists describe as "coevolution." The changing contours of European society determined the uses to which paper was directed, but paper as a technology actively shaped that society as well. So while Europe domesticated paper, as in other instances of domestication by humankind, as when the wolf became the dog and Einkorn became domesticated wheat, humans and the non-human actor evolved in conjunction with each other.[7] Thus, Europeans deployed paper to address existing political, social, and cultural demands, using it for an expanding array of purposes, but at the same time the availability and wider use of paper created new assumptions and corresponding practices. We are accustomed to speaking of paper as a blank sheet, an empty receptacle of ink and ideas, and, indeed, the bare receptiveness of paper was a common trope in early modern Europe. The history of this period, however, is deeply suggestive that paper was in fact not a passive substance, but a motive participant in the changes that it brought about. Helen Smith has highlighted the comments of the English Baptist minister Christopher Blackwood, who in 1654 compared writing on blank paper with God writing on the will of a Christian convert: "We will when we will, but God makes us for to will . . . As my paper whereon I write, receives the ink passively, and brings

[7] The concept of species evolving in tandem can be seen as early as Charles Darwin's *Fertilisation of Orchids*, published in 1862. A good treatment of coevolution in nature is John Thompson, *The Coevolutionary Process* (Chicago: University of Chicago Press, 1994). For a brief discussion of coevolution between dogs and humans as a process of "mutual domestication," see Carl Safina, *Beyond Words. What Animals Think and Feel* (New York: Henry Holt, 2015), 229–239.

Coevolution has been recently located in the study of cosmology and computer technology (where hardware and software are seen to develop synchronically), and its application to social processes seems to me tenable. Particularly suggestive in this regard is Geerat Vermeij, *The Evolutionary World: How Adaptation Explains Everything from Seashells to Civilization* (New York: Thomas Dunne, 2010).

nothing of its own to the writing." But Blackwood complicates matters with a subsequent statement: "being written upon, it becomes an instrument with my writing: and as I write more and more, so it still cooperates with me, though in itself there be no natural beginning of the writing."[8] In this sense, then, paper collaborates and cooperates with the writer.

It is not that paper itself has any power – it only wields effective power when it acts in conjunction with a constellation of social relations.[9] Paper is a material substrate, but as Christopher Hall pithily puts it: "Materials are materials because inventive people find ingenious things to do with them."[10] In many ways, we witness, in the early modern period, the advent of the "age of paper" in the West, one which, we are told, is currently coming to an end amid sequences of ones and zeroes. If there was an early modern Information Revolution, paper was its material embodiment, its essential item of hardware.

1.1 Early Modern Information

Where did the "information age" begin? With the digital processor? With the computer? With television? With the telegraph and telephone? The best answer is that the information age neither began, nor will it end, because every age is an age of information. Information is, as Daniel Headrick has put it, "as old as humankind."[11] It has always been present in human communities. Martyn Lyons insists that every society since ancient Egypt has been an "information society ... in the sense that those who control and restrict access to knowledge in any society thereby control a key component of power."[12]

Nonetheless, important ruptures and departures in information have occurred. Michael Hobart and Zachary Schiffman, for example, have demarcated three ages of information in the history of Western society. The first of these is the classical information age. The authors believe one can only speak of information with the advent of literacy, for written language supplied the degree of abstraction necessary to create mental objects separate from experience. The alphabet allowed greater degrees of

[8] Quoted in Helen Smith, "A unique instance of art": the proliferating surfaces of early modern paper." *Journal of the Northern Renaissance*, 8 (2017) n.p.
[9] Especially germane on this point is Arndt Brendecke, *The Empirical Empire. Spanish Colonial Rule and the Politics of Knowledge* (Berlin: De Gruyter Oldenbourg, 2016).
[10] Christopher Hall, *Materials. A Very Short Introduction* (Oxford: Oxford University Press, 2014), xiii.
[11] Daniel Headrick, *When Information Came of Age. Technologies of Knowledge in the Age of Reason and Revolution, 1700–1850* (Oxford: Oxford University Press, 2000), 8.
[12] Martyn Lyons, *A History of Reading and Writing in the Western World* (Basingstoke: Palgrave Macmillan, 2010), 1.

abstraction and abetted a classifying mindset resulting in new taxonomies of knowledge. This age extended roughly until the arrival of the printing press, and the abundance of printed books, which led to a surfeit of information and to what the authors call a "rupture of classification," which overwhelmed existing categories. The most important responses were Cartesian analysis and frames of reference. Numeracy and quantification were hallmarks of the early modern adaptation to a world replete with unprecedented volumes of data. Finally, there is the contemporary age of information, which has seen the attenuation of the connections between digital symbols and the world they represented. Literacy, numeracy, and digitization demarcate three ages, which demonstrate an increasing propensity to draw further away from the world in encoding reality, to the point now that much of what we experience has been reduced to a vast sequence of ones and zeroes. Hobart and Schiffman suggest that the three ages now overlap with one another, as the digital age has not lessened the importance of literacy and numeracy.[13]

Alex Wright has undertaken similar segmentation of human history into information ages. Wright, a former librarian and now a self-described "information architect" (if ever there was a job description suited for our age, that is it), places his focus on the repeated episodes across the millennia when humankind has struggled with information overload.[14] Wright's emphasis is on the cataloging and categorization of information such as we see in the "memory theater" of Giulio Camillo (1480–1544), the *Encyclopédie* of Denis Diderot (1713–1784), and the nineteenth-century Dewey Decimal System for organizing library holdings. Unlike Hobart and Schiffman, Wright believes that writing and the alphabet were not necessary to have information: "the building blocks of complex information systems were in place long before the first scribe set stylus to clay."[15] He even identifies an "ice age information explosion," which he believes brought humankind in its hunting-gathering stage to the brink of literacy. Wright sees the struggle to stay on top of the information we produce as a distinctive feature of human society. Describing the transformations of the early modern period, Wright, following the work of Frances Yates, emphasizes the abandonment of the medieval *ars memoria* amid the abundance of printed books. The hero of the piece for Wright is the English polymath Francis Bacon (1561–1626), who abandoned the art of memory in which he had been trained in favor of an empiricism that

[13] Michael Hobart and Zachary Schiffman, *Information Ages: Literacy, Numeracy and the Computer Revolution* (Baltimore, MD: Johns Hopkins University Press, 1998).
[14] Alex Wright, *Glut: Mastering Information through the Ages* (Washington, DC: Joseph Henry Press, 2007).
[15] Wright, *Glut*, 48.

rested on observation and inductive reasoning. Bacon recognized the continued importance of memory, but also emphasized practical tools, such as commonplacing, for the retrieval of particulars gleaned through systematic study and observation. These observed phenomena and "facts" were the essential building blocks of knowledge, rather than the forms and categories inherited from the Middle Ages and largely shaped by Aristotle's speciation.

Every society, Robert Darnton stresses, develops its own means and methods of hunting for and gathering information.[16] He identifies four essential changes in information processing in the history of humankind since it gained the ability to speak. Darnton points first to the development of early forms of writing in about 4000 BCE, and the emergence of alphabets about 3,000 years later. Then came the invention of the codex in late antiquity, which transformed the practice of reading and greatly simplified cross-referencing. The third break came with printing, with its impact on the availability of texts and the size of the reading public. Finally, we come to the ongoing Digital Revolution and emergence of electronic communication. One cannot help but notice the accelerating pace of change: several thousand years between the first writing and the codex; a little less than a millennium between the codex and movable type; half a millennium between Gutenberg and the World Wide Web; and then less than half a decade between the Internet and the algorithmic search engines of Google.

Amid this change, however, Darnton chooses to focus on continuity across the millennia of information processing. Each epoch was an age of information, and a unifying feature of all of them was the inherent instability of information. As each transformation introduced more information to digest and categorize, it also produced greater volumes of uncertain information and downright misinformation. Thus, in an age where we find ourselves lamenting internet hoaxes, fake news, gossipy blogs, and essays cut and pasted from termpaper.com, we might do well to realize that information has never really been stable. Perhaps textual stability is a chimera – writing, the codex, the printed book, and the Internet: all of these means of presenting information have been shifting, unreliable, and unstable.

All three of these efforts to periodize the history of information identify the early modern period, and especially the printing press, as transformative. The changes wrought by print were profound, greatly expanding the

[16] Robert Darnton, 1999 presidential address to the American Historical Association, January 5, 2000: "An Early Information Society: News and the Media in Eighteenth-Century Paris" (www.historians.org/about-aha-and-membership/aha-history-and-archives/presidential-addresses/robert-darnton).

volume and range of learning and information available to an unprecedented array of people, but this focus on books and typography is unduly narrow. Most of the fundamental transitions related to information generation, exchange, and management were only tangentially related to print. Even without Gutenberg's invention, there would have been an early modern Information Revolution. We must not reduce the period to an "age of print," a label that both exaggerates the role of print and serves to exclude the non-printed forms that most information continued to assume. Acknowledging the pervasive (and steadily broadening) impact of print need not mean totalizing its influence.

Today, we are accustomed to speaking of "information" in a detached, antiseptic fashion, treating it as a bland, featureless substance. It is quantifiable, transferable, and shorn of any of the subjective specificities of its content. We speak of information in the abstract, as a "thing" that can be disassociated from the social and cultural circumstances of its creation. At the same time, we speak of "pieces" of information, discrete packets that can exist independent of the undifferentiated mass. The Web, for example, is a fathomless reservoir of information, but we also wade into it "looking for information," specific items consonant with our needs and required for the establishment of knowledge.

In early modern language, the term "information" rarely had this double connotation – while it might be employed to describe discrete packets of information, it did not describe information in the abstract. While the story of early modern information involved progressive levels of abstraction, as we shall see, information remained associated with tangible things: books, letters, notebooks, files, registers, accounts, as well as speeches, sermons, and pronouncements.

The word *informatio* was typically employed to describe a process of shaping or forming, and often carried didactic connotations, in the sense that it involved "in-forming" (or teaching) someone something that they did not already know. It was something gathered, collated, and then "informed" for the recipient: the delivery of information served to help knowledge take "form" within the recipient.[17] We still capture some of this connotation when we declare that we share something, "for your

[17] One recurring version of this in early modern parlance was the work that the Holy Spirit did in the "information" of a Christian believer, which we see in titles such as William Shewen, *The true Christian's faith and experience briefly declared . . . written for the confirmation, and consolation of the one, and for the information in order to the restoration and salvation of the other* (London, 1675) and John Alcock, *Plains truths of divinity. Collected out of the sacred Scriptures, & set forth by way of question and answer the best way conceived for the information of the judgment of the Christian reader* (London, 1647).

information," with a specific communicative intent to impart on the recipient or listener.

In the late Middle Ages, legal and inquisitorial bodies referred to *informatio* in relation to the discovery and collection of information for their cases. The word was employed to characterize the empirical facts discovered and introduced in the proceedings, which could then be processed, stored, and referenced subsequently, regardless of the outcome of the case. In late medieval parlance, it was frequently used to describe a charge placed with a magistrate's court. In the church, *informatio* appeared in relation to the data gathered during the examination of candidates for ordination or higher ecclesiastical office – again in the sense of empirical information gathered with particular ends in mind. Already implicit in these various uses are features of the empirical process that we now associate with information. There are facts to be sought out and gathered for specific ends, although they may not end up being used for those purposes. These facts were also, importantly, subject to recording, nearly always through documentation, to memorialize their discovery and make them available for consequent consultation.

Late medieval and early modern Europeans also regularly spoke and wrote in the abstract about "being informed." It often meant being in receipt of the empirically gathered facts. Thus in romance languages, *informarse* and *s'informer* mean to become aware of knowledge of this kind. One "informed oneself" of the relevant news by reading or speaking with others. An early modern diplomat who delivered novel facts was an "informant." Being "informed" might be among the reasons for taking a legal or political action – it was a form of legitimization, the obverse of ignorance. A decision might be delayed until one could become "well informed" or "fully informed" of the requisite facts. One became "informed" by the acquisition of intelligence, often supplied by others in the know. Information was not recognized as knowledge until a figure or body of authority recognized it as such – it had to receive that *imprimatur*. In April 1535, King Charles I issued to a viceroy in New Spain royal instructions which illustrate how informing oneself might mean gathering the available facts:

> First of all, and above all else, inform yourself, as soon as you have arrived and are beginning to understand something of the affairs of the country . . . I, after seeing your information and opinion, can decree what is appropriate . . . Take care that Mexico City and all other cities and settlements in the entire province are visited . . . Inform yourself . . . inform yourself . . . inform yourself.[18]

[18] Arndt Brendecke, *The Empirical Empire*, 144.

"Informations" were pieces of news, or particular facts, distinct extracts from books or letters, or experimental data.[19] They were gathered as part of the overall procedure. The Anglo-Irish naturalist Robert Boyle (1627–1691), for example, spoke of "the ways of information" in the study of nature, but information did not exist in inchoate reservoirs that could be consulted at any time. Its meaning derived from the specific contours of its content and the identity of its source.

Early modern Europeans did, however, regularly describe and complain about the accumulation of huge amounts of news, particulars, and numbers, almost always rendered on paper. The great expansion of the role of paper-borne text, both manuscript and print, is the chief informational transformation of the early modern period. The accumulation of information as particulars, which Europeans struggled to store, sort, categorize, and differentiate, over time caused Europeans to think of "information" as an abstract concept.

I am aware of the dangers implicit in writing a book about an "Information Revolution" in early modern Europe when contemporaries never described their circumstances in those terms. No one spoke of being witness to an "Information Revolution" during these centuries. The terms "information" and "revolution" were rarely used in isolation, let alone in conjunction with one another. But it is also the case that natural philosophers of the age did not speak of a Scientific Revolution – it was Herbert Butterfield who first employed the term in the 1950s. No one spoke of the French Revolution or the American Revolution while in the midst of them, either, although few historians would shy away from describing those events as such. It is my purpose to achieve an understanding of this period *in* our present, while remaining faithful to those who lived through it.

The temptation to engage in anachronism is always there when locating referents in the past that track with current concerns. Comparisons of early printshops with 1980s dot-com start-ups and early medieval Irish monastic scribes working in isolation with bloggers in their pyjamas, or indeed televisions with the Elizabethan theater and Habsburg address bureaus with Google (all of which are analogs that I have encountered), are provocative but problematic history. Many early modern Europeans experienced their version of information overload, but they simply could not have conceived of something akin to the World Wide Web.

But there is also nothing wrong with reading the past in light of current concerns. As Benedetto Croce once remarked: "every true history is

[19] Unlike Romance languages and German, English does not use "information" in the plural.