

TOO MUCH TO KNOW

Managing Scholarly Information
before the Modern Age



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INFORMATION MANAGEMENT IN COMPARATIVE PERSPECTIVE

Early modernists, including myself, have argued that the Renaissance experienced information overload on a hitherto unprecedented scale, drawing a parallel with our experience today. Historians have pointed especially to three main sources of information explosion in the Renaissance: the discovery of new worlds, the recovery of ancient texts, and the proliferation of printed books.¹ In this chapter, I seek to refine our understanding of the early modern information explosion in two principal ways. First, the experience of overload was not new or unique to Renaissance Europe. Even a brief nonspecialist inquiry turns up multiple premodern contexts in which the learned articulated a perception akin to overload and devised methods of information management that are still recognizable today. In addition to ancient and medieval developments that had (or were perceived to have had) a direct impact on early modern ones, I will consider examples from cultures with limited or no contact with early modern Western Europe, notably from Byzantine, Islamic, and Chinese contexts, though others could be equally illuminating.²

Second, I will emphasize the role of cultural factors in explaining the preoccupation with accumulating and managing information among the learned in the Renaissance. The accumulation of new species, new texts, and new books in the Renaissance was not a necessary consequence of new travel and new technologies but was motivated by a set of cultural attitudes, some of them new and some of them well represented in earlier centuries, that can be summed up as "information lust" or information obsession. For example, Brian Ogilvie describes the explosion in known plant species from the 500 described by Dioscorides, which represented the height of botanical learning in 1550, to the 6,000 plant species listed by Caspar Bauhin in his *Pinax theatri botanici* (1623). But Ogilvie points out

that New World plant specimens were not what drove the botanical explosion; instead the Renaissance naturalists' desire to describe plants with careful attention to detail made them newly attentive to vast numbers of unidentified plants in Europe (including eastern and northern Europe) and long-known exotic locations like the Levant.³ In examining textual compilations I have come to a similar observation: it was not the newly recovered ancient texts (Lucretius or Sextus Empiricus) that accounted for the ever-increasing size of collections of quotations in florilegia, but rather increased attention to long-familiar ancient authors central to humanist education (like Ovid, Horace, and Cicero) and a large number of recent works generated by reflection on the classics (e.g., Petrarch or the emblems of Alciati and Camerarius). A new attitude toward seeking out and stockpiling information was the crucial cause of the information explosion, more significant than any particular new discovery.

The ambition to encompass all knowledge and the technique of juxtaposing excerpts from authoritative sources to achieve universal scope were not new to the Renaissance. Various ancient and medieval works were similar in form and scope, which historians have traditionally called encyclopedias, though the term was not an actors' category (i.e., it did not exist at the time these works were composed). The word "encyclopedia" was coined in the sixteenth century from a misinterpretation of a Greek expression held to mean the "circle of learning" (as if from *kyklos* for circle). Modern scholars have shown that the Greek expression involved was actually *enkuklios paidēia*, which designated "common knowledge" or "general education," but the circle image has proved long-lived and is still invoked in modern encyclopedias.⁴ "Encyclopedia" in the sixteenth and seventeenth centuries mostly designated the relations between the disciplines and was not associated with a kind of reference book until the eighteenth century when Ephraim Chambers's *Cyclopaedia* (1728) and the French *Encyclopédie* inspired triggered the popularity of the title and of the new genre of the dictionary of arts and sciences. In modern parlance, however, it is reasonable to speak of encyclopedic ambition as a central ingredient of the Renaissance obsession with accumulating information. Though this ambition was not new, it drove some Renaissance figures (like Theodor Zwinger) to new heights of megalomania.

Distinctively new to the Renaissance was the awareness of the great cultural trauma suffered through the loss of ancient learning during what Petrarch was the first to call the Middle Ages. Although humanists were proud to have recovered many lost texts, notably through careful research in Byzantine and European libraries followed by philological emendation, they were acutely aware that the bulk of ancient literature remained lost.⁵ A number of early modern authors articulated the hope that with proper storage and management the informa-

tion accumulated henceforth would be safe from another catastrophic loss. The obsession with avoiding loss may be linked to another feature I find unique—the desire to save every note taken, to rescue and use every text. Although this position was of course not universally shared (some authors focused instead on drawing up more or less restrictive lists of acceptable books), those engaged in large-scale compiling repeated the line attributed to Pliny, "There is no book so bad that some good cannot be gotten from it." As a result Renaissance compilations rapidly surpassed in size medieval works of the same kind. Authors of printed compilations declared that they contributed to the common good by pooling together information on many topics to meet the interests of a public, which they described as legitimately varied. The increased scale of compilation and range of sources in turn inspired new methods of working and new kinds of finding devices, to be examined in later chapters.

Printing also created new possibilities and constraints for the production and diffusion of information. Printing had the principal effect of reducing the cost and the time necessary to produce books. This impact has especially been highlighted in the production of widely distributed genres. Indulgences, for example, were produced in massive quantities quite cheaply as small single-sided flyers, but they survive in very small numbers. For example, of the 200,000 indulgences printed between 1498 and 1500 at the behest of the Benedictines of Montserrat in Catalonia, only 6 survive.⁶ The impact of printing on the production of big books has been discussed less often, but it was significant in both obvious and surprising ways. Given the especially high cost of producing very large manuscripts in any great number, printing made possible the diffusion and preservation of large books on an unprecedented scale. At the same time printing created distinctive constraints: those large books had to sell in hundreds of copies for the printer to recover the costs of production. Compilers of large and expensive books, like reference tools, therefore worked hard to appeal to as wide and varied an audience as possible by broadening the range of sources used and the range of topics addressed.

The requirement that printed books find buyers constrained the maximal sale price and size of a printed book, although the maximum size rose over time from one folio volume of 1,500 pages in the incunabular period to multiple much larger folios by the mid-seventeenth century.⁷ But the largest books of all to be produced before the modern era were not commercially viable. They were commissioned by Chinese emperors, often in manuscript, for their own rather than commercial purposes. Printing shaped both the nature of the information explosion, by making more books on more topics available to more readers, and the methods for coping with it, including a wide range of printed reference tools.

Printing diffused more broadly than ever before existing techniques for managing information and encouraged experimentation with new ones, including new layouts, finding devices, and methods of composition.

INFORMATION MANAGEMENT IN ANTIQUITY

Granted a liberal interpretation of the expression, forms of information management can be identified from the earliest times. The invention of writing was certainly one of them. The earliest forms of writing were designed to keep records of commercial transactions or grain stored—information that it was useful to preserve, sometimes over long periods of time, given the lapses of individual memory and the biases of self-interest. Early documents were often archived and some surviving documents (on clay tablets, for example) comprise lists up to one hundred items long, but these lists offered no discernible finding devices; they most likely had to be browsed when searching for something.⁸ Oral cultures also engaged in information management, notably through the telling and retelling of traditional narratives and the recall of complex commercial transactions. The once widespread view that literacy first made possible certain kinds of thought (historical and logical among others) is now much contested.⁹ But only once writing spread beyond utilitarian texts can we glean evidence of attitudes toward the process of managing information, and these attitudes were often contradictory.

Plato's famous critique of writing offers an early example of the ambivalence that has often accompanied the adoption of a new technology. As the practice of writing spread in fourth-century Athens, Plato (ca. 428–348 BCE) used writing (the invention of which he praised elsewhere) to articulate the fear that written words, in circulating beyond the author's control, were more readily misunderstood and misused than words spoken to an interlocutor.¹⁰ Around the same time a much-longer-lived complaint articulated a kind of feeling of overload, but without blaming writing or books especially. Best known in its abbreviated Latin form as *ars longa, vita brevis*, the first of the aphorisms attributed to Hippocrates (ca. 460–370 BCE) observed: "Life is short, art is long, opportunity fleeting, experiment treacherous, judgment difficult. The physician must be ready not only to do his duty himself, but also to secure the co-operation of the patient, of the attendants and of externals."¹¹ But Hippocrates' practical advice about success in medicine became divorced from the pithy tag about life and art that is still well known today in the Latin form coined by the Roman moralist Seneca (4–65 CE). "*Ars longa, vita brevis*" has proved an especially versatile tag, invoked by both optimists and pessimists about the accumulation of knowledge.¹²

Seneca's point was that that life is long enough, but it seems short because we waste so much of it in luxury and carelessness. Seneca complained in particular that his well-to-do contemporaries wasted time and money accumulating too many books. He coined a tag of his own to decry their indiscriminate and superficial way of reading: "the abundance of books is distraction" (*distringit librorum multitudo*). Instead Seneca recommended focusing on a limited number of good books to read thoroughly and repeatedly: "You should always read the standard authors; and when you crave change, fall back upon those whom you read before."¹³ This position exemplifies an effective and often dominant method of information management—to limit the quantity and nature of information to an established canon of works deemed acceptable, usually on moral grounds. Seneca's advice and negative assessment of the *multitudo librorum* found favor with a number of authors in early modern Europe, including the Jesuit pedagogue Francesco Sacchini (1570–1625) discussed in chapter 2.¹⁴

In contrast, "*ars longa, vita brevis*" motivated others to envision alternatives to the focus on a narrow canon. Francis Bacon (1561–1626), for example, invoked Hippocrates' tag to explain the need for a new science that would "abridge the infinity of individual experience as much as the conception of truth will permit, and to remedy the complaint of *vita brevis, ars longa*, which is performed by uniting the notions and conceptions of science."¹⁵ Bacon called for generalizations from particulars to manage the excess data accumulated through experience and offered in his *Sylva sylvarum* an example of such accumulation in progress, which integrated direct observations along with information gained from books.¹⁶ For Bacon, sheer bulk of accumulation was a valuable step on the path toward mastery and knowledge of nature.

The Hellenistic period contributed further exemplary arguments both for and against accumulation: a biblical condemnation, on the one hand, and models of collecting books and texts on an unprecedented scale, on the other. The verse in Ecclesiastes 12:12 "Of making books there is no end" (in the Vulgate: *faciendi plures libros nullus est finis*) is probably the oldest condemnation of overabundance, likely dating from the fourth or third century BCE, though agreement on the date of composition of this book of the Bible has proved particularly difficult.¹⁷ In it the wise man dismisses books and studiousness amid the many vanities of human life. While the role of the passage in discouraging authors cannot be assessed, its impact on those who did write seems limited. The passage did not attract much Christian or Jewish commentary in the Middle Ages,¹⁸ though several authors cited the passage without adopting its tone of condemnation. In 1255 the great compiler Vincent of Beauvais pointed out, for example, that the endless making of books was matched by the endless curiosity of readers and lis-

teners; and Richard de Bury (1281–1345) ignored any pejorative message in citing the passage in his chapter entitled “that it is meritorious to write new books and to renew the old.”¹⁹ Only in recent decades has the book of Ecclesiastes become well known (notably thanks to a song by Pete Seeger), and today this verse is widely cited as ancient wisdom that speaks to our current concerns about overload.²⁰

Certainly this message did not hamper the enthusiasm for accumulation, which is evident, though no literary articulation of it survives, in the activities at the Library of Alexandria around the same time. Shortly after the foundation of Alexandria in 331 BCE, the Egyptian pharaohs of the Ptolemy family pursued the ideal of gathering copies of all works ever composed in Greek in a royal library; the library principally served the scholars whom the pharaohs employed at the nearby Mouseion. The pharaohs resorted to such aggressive methods of acquisition as confiscating manuscripts found on incoming ships, then returning a hasty copy to the owner instead of the original, which would remain in the library. The Library of Alexandria was legendary in antiquity as the largest in the world, though other major libraries were founded on its model. Estimates about the size of its collections have varied but now stand around 500,000 papyrus rolls; the total number of works was lower, since rolls did not hold as much text as the later codex form and many works required multiple rolls (or volumes). The library’s destruction became equally legendary; it was complete by the fifth century CE, more likely due to a succession of degradations than to a single catastrophe. Although most of the works produced there have been lost, the scholars active in the library and Mouseion at Alexandria produced editions of and commentaries on Homer and other Greek authors, studies in astronomy and medicine, and lexicographical works of various kinds (focused variously, for example, on rare words, local words, or Hippocratic terms).²¹

The collecting of such great numbers of books occasioned the development of what was probably the first large-scale reference tool: a bio-bibliography of Greek literature based on the library’s extensive holdings. The *Pinakes* (from the Greek *pinax* for list, register, or board) originally comprised about 120 rolls, but the text survives only in fragments quoted by other ancient authors. From these we learn that the entries offered biographical and sophisticated bibliographical information, including title, incipit, and number of lines for each work, sorted by literary form or scholarly discipline; authors within a category and the titles of works by a given author were likely alphabetized.²² The *Pinakes* were neither an inventory nor an exhaustive catalog of the works in the library: they did not list all the copies of a work that the library owned and did not give any indication of how to locate a book in the library—actual access would have required consulting

the librarian. The *Pinakes* built on preexisting practices of list making (including Aristotle’s *pinakes* of poets), sorting (such as Theophrastus’s doxographies sorted topically and chronologically), and alphabetizing, the principles of which were likely already understood although they had never been put to such extensive use before.²³

The *Pinakes* required multiple preparatory stages, starting with a library inventory and using intermediate drafts to sort the entries topically and alphabetically.²⁴ The result is attributed to one man, Callimachus, who was active at Alexandria ca. 280–240 BCE, but no doubt involved the collective labor of many working at the Mouseion where scholars were supported by many secretaries who took dictation and made copies.²⁵ Callimachus is best known today for his quip that a “big book is a great evil” (*mega biblion, mega kakon*), but he likely coined that expression as a defense of the short lyric and elegiac poems he composed and favored over the traditionally more prestigious and much longer epic poems.²⁶ That preference did not prevent Callimachus from producing (as editor in chief, we might say today) one of the largest works of his time as a tool for mastering the texts that the library accumulated on a vast scale. In Alexandria, far from complaining about overload, scholars seem to have thrived on the challenges of mastering increasing numbers of books.

A similar enthusiasm for the accumulation of information is evident in the activities of Hellenistic *polygraphoi* or abundant writers. The most abundant of all, Didymus the Brazen-Gutted or Book-Forgetting, reportedly wrote more than 3,500 books in Alexandria in the first century BCE. Even bearing in mind the ambiguities of the term “book,” which could refer to a single roll or to a whole work comprising many rolls, we can assume that writing on such massive scales consisted primarily of copying and compiling—with what organizational tools we do not know.²⁷ Since very few of the polygraphers’ works survive, we must rely principally on ancient doxographies, which collected the lives and opinions of philosophers. Diogenes Laertius, for example (third century CE), reported that Theophrastus wrote 300 books totaling 232,808 lines; Chrysippus, 75; and Varro, 74 works in 620 books. Early modern pedagogues recycled these reports, notably to encourage students to take notes that would help them, too, write abundantly.²⁸

The one well-transmitted example of ancient polygraphy, on the more modest scale of thirty-eight books, is the *Natural History*, in which Pliny the Elder (23–79 CE) boasted that he had gathered some 20,000 *res* (things), drawn from 2,000 volumes by one hundred authors. Pliny’s work was known in parts in the early Middle Ages (through summaries of the medical sections by Serenus and of the geographical ones by Solinus) and circulated complete and more widely starting

in the twelfth century.²⁹ Pliny's *Natural History* offered a powerful counterpart to Seneca in celebrating the abundance of accumulation and was long a model for encyclopedic compilation. In the Renaissance enthusiasts for the accumulation of books and their contents frequently cited the aphorism that Pliny the Younger attributed to his uncle who "used to say that there is no book so bad that some good cannot be got from it."³⁰ Although the nephew described Pliny's working habits with some bemusement, humanists and early modern pedagogues embraced Pliny as the consummate model of abundant reading and note-taking.

Pliny's *Natural History* is remarkable among surviving ancient works in that the first book consists of a detailed table of contents. Pliny likely composed it to facilitate retrieval of specific items of information, even while he generally arranged his material associatively, in a way that invited sequential reading. Pliny's table of contents was probably not as unique in its day as it is today, given that finding devices at the beginning of a book, stored in the outermost layers of a papyrus roll, would have been particularly vulnerable to damage and loss.³¹ Another extant table of contents from antiquity is that of Aulus Gellius's *Attic Nights* (ca. 180), which makes the text searchable in such a way as to undermine the author's claim to offer only a haphazard collection of reading notes. Recent analysis has emphasized that Gellius's miscellany was carefully constructed to serve as an entry into the accumulated mass of Greek and Latin literature, the mastery of which every educated Roman wanted to display. Even without tables of contents, many texts from antiquity and late antiquity were transmitted with headings (*tituli*) and summaries (*capitula*) for each book or section, facilitating access to a particular part. Although we cannot be sure when these were added or if they were modified in the process of transmission, recent attention to them has uncovered their presence in some papyri.³²

The difficulties of transmission seriously hamper our understanding of other ancient tools for managing an increasing abundance of texts. Under normal circumstances, papyrus naturally degenerated within less than two hundred years.³³ For a text to be transmitted, therefore, it often had to be copied more than once within antiquity, and ultimately onto more durable parchment, which came into common use with the transition to the codex from the second to fourth centuries. Unlike a papyrus roll, a parchment manuscript could survive centuries of benign neglect and come back into circulation much later. Humanists of the fifteenth and sixteenth centuries were thus thrilled to find parchment manuscripts of ancient texts long forgotten in monastic libraries, but at the same time they remained keenly aware of the great many ancient texts for which they found no surviving manuscripts. Indeed, the copyists of the early Christian period preserved only a small fraction of ancient literature. Of course they could copy only

texts that were available to them, and many earlier texts that had not been copied in the intervening centuries had already become lost. In addition, many copyists worked in monastic settings and typically copied works that seemed useful to them, either for teaching or study, or worth preserving due to their reputation among the pagans. Given those criteria, the copyists were unlikely to choose writings that they perceived to be mere working tools rather than polished works.

We are left to deduce the existence of such tools from the nature of some surviving texts. One scholar has argued, for example, that Athenaeus relied on collections of literary references in composing his *Deipnosophistae* (or "Learned Banquet") (ca. 192 CE). Its fifteen (perhaps originally thirty) books are full of complex literary allusions and wordplay larded with precise and often accurate citations unlikely to have been recalled from memory alone. Scholars like Athenaeus and those whose learned conversation he portrays probably relied on working tools such as glossaries and lexica, which grouped passages and word commentaries thematically. Some of these aids to learning would have remained in the state of private notes, others would have circulated among a small group of friends; Athenaeus cites a few that were apparently published (i.e., released for circulation by their author), though none of these are extant.³⁴ We can also deduce the existence of Greek collections of excerpts in late antiquity from the survival of later compilations, such as the four books of Stobaeus's "Selections" and "Anthology," composed in the early fifth century and probably heavily indebted to existing compilations.³⁵ One of the great feats of information management in late antiquity was the composition of ten books of ecclesiastical history by Eusebius (260–339 CE), who worked with the support of a large staff to excerpt from the abundant holdings of the Library of Caesarea. This work was transmitted entire, including its chronological tables, but many other works of scholarship produced at Caesarea were transmitted only in part or not at all. For example, the great polyglot Bible of the early Christian period, the *Hexapla* of Origen (185–255 CE), which laid out in six columns different versions of the Old Testament (in Hebrew and in various Greek translations), survives only in fragments.³⁶

Large books fared especially poorly in the process of transmission, since each copy required more resources to make than shorter books. Pliny's *Natural History*, for example, was one of a number of encyclopedic works published around the turn of the Common Era, alongside those of Varro and Celsus, among others. But only Pliny's survives, aided crucially, one scholar has argued, by the support of the emperor Vespasian, whom Pliny managed to please in his carefully crafted dedication.³⁷ Humanists commented on the loss of large works of ancient history, which some blamed on the existence of epitomes in antiquity that circulated instead of the originals. Erasmus especially bemoaned the loss of the greater part

of Livy's history of Rome, *Ab urbe condita* (of which only 36 of the original 142 books survive), which he attributed to the circulation of the *Epitome* of Lucius Annaeus Florus (in mid-second century).³⁸ Erasmus claimed to draw this assessment from "some Latin scholars," whom I have not been able to identify. In 1685 one writer dismissed the notion that an insignificant summary like Florus's could be responsible for the neglect of such an important original as Livy, but in one case modern scholars have found this phenomenon plausible.³⁹

The techniques of text management that ancient authors developed most effectively and bequeathed to the Latin Middle Ages directly were those of summarizing and compiling. The summary was used throughout the period as a method for reducing the material to be mastered, from plot summaries for Attic plays (fourth century BCE) to epitomes and summaries of long prose works. Large-scale compiling emerged as a dominant form of literary activity, especially from the second century, both in Latin (Pliny and Valerius Maximus already in the first century, Aulus Gellius) and in Greek (Aelian, Athenaeus, and, much later, Stobaeus), and among Christians (e.g., the *Stromateis* or "miscellanies" of Clement of Alexandria, ca. 200 CE).⁴⁰ Literary miscellanies appealed to a cultivated elite at a time when the "volume of Greek and Latin writing had swollen far beyond the capacity of any normal person to read (let alone remember)."⁴¹ Collecting was also central to other genres, such as collections of lives (Diogenes Laertius, Eusebius, Jerome) and collections of wonders or paradoxographies, pagan and Christian. Compiling and summarizing were central to the formation of Jewish and Christian religious texts, from Deuteronomy to the use that Matthew and Luke made of the Gospel of Mark and other sources.⁴² Similarly, the codification of Roman law commissioned by the emperor Justinian (527–65 CE) involved condensing some 1,500 existing works of Roman law into fifty books topically arranged: the *Digesta* or *Pandectae*. Thirty-nine scholars worked over four years, first to collect the sources, often fragmentary, then to select and summarize what they found of value, eliminating repetition and contradictions and arranging the selections systematically. Justinian's *Digest* had the result of preserving much of earlier Roman law but also of destroying what it did not include, since Justinian banned all other law codes.⁴³ Even when the Latin West lost awareness of most Greek collections and summaries, given the decline of education in an empire increasingly overrun by invaders and sharply separated into East and West, the accumulative and summarizing forms were already so well established in Latin that their continuity was assured.

In sum, scholars in various ancient settings, such as Callimachus's Alexandria, Pliny's Rome, and Eusebius's Caesarea, accumulated information on a large scale and devised new methods for managing an abundance of books and of texts. For

a variety of reasons (difficulties of transmission especially of large works, loss of mastery of Greek) many examples of ancient information management were not transmitted directly to the Latin West. The *Pinakes* were imitated in the major libraries of the Eastern Roman Empire in the Hellenistic period and helped to spread the use of alphabetical order in Byzantine lexicographical collections.⁴⁴ While one of these later lexica, the *Suda*, was well known to the humanists, the memory of the *Pinakes* themselves was lost in the West, even after the humanist recoveries: Conrad Gesner made no mention of them in his attempt at a universal bibliography in 1545, citing only Callimachus's poetic works.⁴⁵ Similarly, whatever compilations and glossaries were devised by the scholars in Athenaeus's context (and possibly others), they can be known only through later compilations for which they probably served as sources and models. Among these, Stobaeus was rediscovered by the humanists, and Gesner hailed Stobaeus as a model for the orderly collection of excerpts in the translation of his work that he first published in 1543.⁴⁶ The most basic techniques of compiling and summarizing were directly transmitted through the Middle Ages from Latin works of antiquity and late antiquity, including Pliny, but also the textbooks of Boethius (480–524) and the encyclopedic compendia of Cassiodorus (490–585) and Isidore of Seville (600–636). Only one ancient work, Aulus Gellius's *Attic Nights*, directly inspired a new genre of reference tool in the Renaissance, the miscellaneous arranged commentary, which included in its early modern form one or more indexes as finding devices (as I will discuss in chapter 3). This genre inspired a long-lived exemplar in Erasmus's *Adages* but did not have a lasting impact on forms of information management after the sixteenth century.

Even if many ancient reference tools were lost to later periods, the heritage of antiquity—that is, what scholastics and humanists felt they had inherited from the classical past—was a powerful and versatile set of precedents and aphorisms that could be invoked to justify two different kinds of response to the explosion of knowledge.⁴⁷ On one hand, Seneca (and Hippocrates whom he cited) could be invoked to advocate focusing on a few books intensively and ignoring the mass of presumably "bad books." On the other hand, Pliny and his enthusiasm for gathering information, the memory of the Library of Alexandria, and a new interpretation of Hippocrates' tag were used even more often to justify pursuing large-scale accumulation and note-taking, occasionally in the Middle Ages and especially in the Renaissance. Humanists could thus look to antiquity to justify their approach to the explosion of knowledge, even if in practice they relied heavily on techniques of information management that were first developed in the thirteenth century. But at the same time as humanists recovered a new abundance of ancient literature in the Renaissance, they also drew new conclusions

about the fragility of the transmission of learning, which so often had resulted in corruptions and permanent losses. As a result, I argue, early modern scholars were especially eager to safeguard information: by stockpiling it, by sharing it with others in manuscript and in print, and by encouraging the foundation of great libraries by wealthy princes and patrons.

A COMPARATIVE INTERLUDE: BYZANTIUM, ISLAM, AND CHINA

In many cultures the transmission of ancient authorities fueled an increasing accumulation of texts both old and new, and effective ways of sorting, storing, selecting, and summarizing them. By considering forms of textual abundance and management outside the Latin West I seek to highlight the complexity and diversity of interactions between cultural factors and technologies like oral transmission, writing, paper, and printing in shaping methods of information management. Neither textual abundance nor reference tools were unique to the Latin West. We can better understand what developments were peculiar to early modern Europe—most famously the impact of commercial, moveable type printing—by examining reference tools in other contexts. Byzantium, Islam, and China offer prime areas for comparison, not only because of a long-standing historiography on the encyclopedic tradition in those cultures, but also because recent book historical work enables us to study the multiple factors that shaped attitudes toward textual technologies there. Most visibly, printing began early if fitfully in China (eighth century) and was adopted much later (in 1795) in Islam (which had by then subsumed Byzantium), but in each case multiple technologies (including manuscript and oral transmission) were involved in the formation and transmission of texts and reference tools. A comparative look at reference tools in other cultures belies any claim that effective information management required printing or any other peculiarly “modern” or “Western” feature.

BYZANTIUM

While the Latin West lost contact with its Greek sources, fostering an abiding sense of loss, the Eastern or Byzantine Empire never did, and it produced a steady stream of commentaries on Greek classics like Homer. In the Islamic world contact with the Byzantine Empire fueled a movement of translation of Greek philosophy into Arabic in the ninth and tenth centuries, which shaped the development of Islamic philosophy and institutions of higher learning. Furthermore, paper spread in the reverse direction around the same time, from China to Islam starting in the late eighth century, replacing both the more fragile pa-

pyrus and the more expensive parchment and facilitating an explosion of manuscripts. In Byzantium paper was imported rather than produced locally. It therefore remained an expensive commodity and coexisted with parchment through the twelfth century.⁴⁸

Despite linguistic continuity, learning in Byzantium suffered a relative lull from the seventh to the ninth centuries, which coincided with pressures generated by the expansion of Islam and by internal conflicts over iconoclasm. Starting in the late ninth century, a Byzantine renaissance of learning fueled the study of old texts and the writing of new ones, perpetuating, for example, a long tradition of commentaries or scholia on Homer.⁴⁹ The emperor Constantine VII Porphyrogenetos (905–59), one of the patrons of this renaissance and the author of a variety of treatises (on the history of his family, military campaigning, and imperial administration), envisioned seeking out all the Greek works that had accumulated since antiquity and across the inhabited world (*oikoumene*) to select the useful parts from them: “In the course of so many centuries the number of events has become infinite, as has the number of books that have been composed. . . . This is why Constantine . . . has decided that for the utility of all and the advantage of practical life, it would be best actively to seek out and gather from all corners of the *oikoumene* books of all kinds, full of varied science. Then the enormity of these writings, which is tiring just to think about, should be divided and fragmented to make available to all what they contain which is useful; in making a choice one will draw the more sustained attention of students of letters.”⁵⁰ For Constantine, abundance was the result of a steady accumulation of works over centuries. The best remedy was to compile selections, as he did in his “eclogues” arranged in fifty-three thematic sections, which could then be studied more closely.⁵¹

A more unusual work produced in response to the abundance of Greek literature was the *Bibliotheca* of Photius (810–93), a high-ranking official of Constantinople who, before going on a dangerous diplomatic mission, wrote up at his brother’s request his comments on some 280 books he had read. Photius provided author, title, a summary, and some personal judgments on each book in a form that has been compared to the book reviews that first appeared in literary periodicals in the late seventeenth century. The entries varied in length from a few lines to seventy pages, for a total size of ca. 500,000 words. Photius reported composing in haste and from memory, with the help of a secretary and with no attempt at ordering, though he may have relied on notes taken earlier, notably on books that he did not own. The *Bibliotheca* discusses many Hellenistic and Byzantine works that have since been lost, including a few books that could be considered reference works—a dictionary of dates by Phlegon of Tralles (second

century CE) and the “Historical Notes” of Pamphila, a female scholar under the reign of Nero (first century CE).⁵²

Of even greater proportions and clearly designed for consultation, the *Suda* lexicon was composed anonymously in the late tenth century, drawing on multiple lexicographical and historical compilations of the Byzantine renaissance (including the eclogues of Constantine VII). The *Suda* was an encyclopedic dictionary of massive proportions—31,342 entries and more than 1.5 million words—that combined historical, biographical, and lexicographical information under alphabetical entries comprising common and proper nouns. Possibly the work of a group of authors, the *Suda* offered information and assessments from an orthodox Christian perspective on Greek and Roman literature from antiquity to the mid-ninth century.⁵³ A Greek concordance of the whole Bible was reportedly compiled by the Basilian monk Euthalius of Rhodes ca. 1300 but was never printed (and unknown to Gesner).⁵⁴ The availability of Byzantine works has likely been underestimated in the Latin Middle Ages: for example Robert Grosseteste (1175–1253) translated substantial selections from the *Suda* in a manuscript for his personal use. Nonetheless, the humanists were responsible for the wider circulation of Byzantine reference works. The *Suda* was first printed in 1499, and Photius’s *Bibliotheca* in 1601, though Gesner, who praised both works highly, expressed the hope of having the latter printed some fifty years before that.⁵⁵

ISLAM

Islam also experienced an abundance of texts, fueled by the translation of Greek works and by the growth of disciplines devoted to the study of the Koran. Religious texts were transmitted primarily through oral instruction in mosques (starting in the seventh century) and in numerous madrasahs (especially from the eleventh century). Oral transmission was considered essential to a correct understanding of religious texts, given the potential ambiguities of a script without vowels. Students would travel far and pay high fees to learn a text from an authoritative master; the “certificate of audition” the student received authorized him to teach the text in turn. Teachers and students first relied only on informal written notes to support their teaching and learning of recited texts, but pressure from caliphs and then a growing audience of cultured readers prompted the publication of “books” containing religious and secular literature starting in the ninth century.⁵⁶ For example, the extensive collection of hadiths, authoritative sayings that were recited along with the (progressively longer) list of authoritative transmitters of the saying, were published in the ninth century with an ordering by content, which made a saying easier to find in case memory failed.⁵⁷

Secular topics included *falsafa*, focused on ancient Greek natural philosophy and astronomy, and *adab*, or the humanistic disciplines of grammar, rhetoric, and poetry in classical Arabic. Many genres offered access to these fields for a cultured elite, including topically arranged compilations of stories and facts, manuals of many kinds, and various works, called “encyclopedias” in the Western historiography for convenience, which explained the relations between the disciplines and outlined their contents.⁵⁸ One motivation for these compilations, as in the Latin West, was a fear of the loss of knowledge, as articulated for example by one early collector of *adab*, al-Jāhiz (781–869).⁵⁹

The great number and variety of books produced in classical Islamic culture centered in Baghdad is visible in the *Fihrist* published in 938 by Ibn al-Nadīm, a bookseller in Baghdad. This first attempt at a complete bibliography of works in Arabic was organized into ten sections defined by discipline or topic (writers on the scriptures, grammarians, historians, poets, philosophers, and so on), indebted to the classification of disciplines of al-Farabi (872–951). Ibn al-Nadīm’s goal was to be exhaustive: he described more than 3,500 authors, listing all their works, including light and ephemeral texts by obscure authors and books that he was not able to see himself and about which he solicited information from his readers. Ibn al-Nadīm may have been aware of Byzantine bibliographical efforts, notably through an abridgement of the *Ornamentologus* of Hesychius of Miletus of the late eighth or early ninth century, which is cited as a source for the *Suda*. Most of the works listed in the *Fihrist* are no longer extant, but the *Fihrist* survived in more than one partial copy and first became known to European scholars in the late seventeenth century.⁶⁰

Among the genres specially designed for consultation in the Islamic world, bibliographies and biographical dictionaries made use of alphabetical order, often within thematic or other systematic categories; alphabetization in dictionaries often followed final rather than first root letter (presumably to aid in finding rhymes). Alphabetization was typically not strict (involving only the first few letters) and might place the Mohammeds first in a list of names for symbolic reasons.⁶¹ Alphabetical indexing occurred principally in the collections of hadith; indexing was not much used beyond that genre in classical Islam—possibly due to the focus on memorization as the ideal form of learning—but tables of contents were more common.⁶²

Experienced readers could engage in consultation reading even without an index or a table of contents, given the predictable order in which topics were generally treated in various genres. For example, al-Juzajani, the biographer of the great medical scholar Ibn Sina (Avicenna, 980–1037), reported on the reading habits of this autodidact: “One of the remarkable things about the Master was

that for the twenty-five years that I was his companion and servant, I did not once see him, when he came across a new book, examine it from beginning to end. Rather he would go directly to its difficult passages and intricate problems and look at what its author had to say about them."⁶³ Whereas al-Juzajani described Avicenna's skill in approaching any book in this way as exceptional, many works traditionally called "encyclopedias" offered surveys of knowledge that could fairly readily be consulted because they followed an explicit or predictable thematic or systematic arrangement.

Encyclopedias from the classical period (ninth to eleventh centuries) generally did not exceed one volume (a few hundred pages in later printed editions), but during the second period of encyclopedic activity (thirteenth to fifteenth centuries) the compilations could be much longer and relied on new forms of layout to facilitate consultation.⁶⁴ Arabic manuscripts from early on used different colors of ink for headings and proper names among other special terms. Starting in thirteenth-century Egypt new features of manuscript layout included hierarchical and numbered divisions of the text, running heads, lettering of differing sizes and colors, and tables of contents. For example, a fourteen-volume instructional treatise for clerks by Ahmad al-Qalqashqandi (1355–1418) in Mamluk Egypt used a detailed table of contents and cross-references to facilitate retrieval from its mass of 6,500 large pages, even though it had no alphabetical index; in some manuscripts the structure of the textual divisions was highlighted using color, blank space, and changes in font.⁶⁵ The possibility that contact with Arabic manuscripts inspired the development of similar features of manuscript layout in thirteenth-century Europe would be well worth careful study.⁶⁶

Islamic books were produced exclusively in manuscript until the gradual introduction of printing after 1795. Fears of inaccurate printing of the Koran (which was banned from printing until much later), along with the special value placed on writing and calligraphy and the powerful position of scribes, help to explain the long persistence of the manuscript production of books, into the twentieth century.⁶⁷ Just as in the ancient and the Byzantine contexts, but with better surviving textual and contextual evidence, in the Islamic world manuscript production was no bar to polygraphy and the authoring of both very large and very many works. For example, the religious scholar Ibn Asakir (1105–76) is credited with one hundred books, many of them multivolume, including an eighty-volume *History of Damascus*, a copy of which was produced by ten scribes working for two years.⁶⁸ When Hajj Khalifa, also known as Kâtip Çelebi (1609–57), composed the first complete bibliography of Arabic literature since the tenth-century *Fihrist*, the work comprised 15,007 alphabetized entries for a total of more than 800,000 words in Latin translation.⁶⁹ Analysis of the surviving drafts of the bibli-

ography (*Kashf*) and accompanying biographical dictionary (*Sullam*) shows that Çelebi wrote some of the draft on smaller sheets of paper glued together and added insertions by gluing in more such slips. Historians suppose that he also used slips to alphabetize the material in his books, which are unusual in being strictly alphabetized rather than alphabetized only by first letter or two.⁷⁰ No other examples of the use of slips have yet been identified in the Islamic world, and Kâtip Çelebi had no reason to be aware of the use of slips in early modern Europe, so he may have invented this technique himself.

As in the Latin West, the accumulation of textual abundance and of summaries and textbooks in particular elicited concerns from scholars. The physician Ali Ibn Ridwan (988–1061) complained that compilations caused the "disappearance and destruction of the really valuable aspects of medical science" among Muslim physicians. Similarly, but with a different target, the account of the transmission of medicine by Ibn Jumay, physician at the Fatimid court in Egypt in the twelfth century, criticized early Christians for relying on manuals and compendia, to the detriment of the study of ancient originals to which Islamic physicians alone were still committed.⁷¹ Ibn Khaldūn (1332–1406), who was himself a prolific scholar and historian, commented most insistently on the negative consequences of the "great number of scholarly books" available in every field that could not be read even in a lifetime. He noted that one of the consequences of this condition of overload was an increased reliance on textbooks, which was detrimental to scholarship and to the acquisition of good study habits by students.⁷² As in early modern Europe, the abundance formed by accumulation over time did not preclude complaints about a lack of copies of particular works. In the Ottoman Empire in the seventeenth century, for example, the fear of a dearth of books, notably on nonreligious topics, led to a prohibition on exporting manuscripts.⁷³

Islamic methods of information management included methods widespread in the ancient and Byzantine contexts—compilations and summaries, and the use of tables of contents and predictable topical arrangements. They also included alphabetical ordering in bibliographies and biographical dictionaries and features of manuscript layout to facilitate consultation. These tools were well developed in particular cases and contexts but remained the purview of specialists rather than becoming increasingly widespread over time.⁷⁴ The value placed on memorization and the transmission of personal authority from master to student limited the utility of indexes. Since manuscripts circulated mostly through personal contacts, among those already initiated into the methods of reading the books they needed, finding devices were not essential for expert users. In an exclusively scribal culture until the end of the eighteenth century, large refer-

ence books were unlikely to have been copied often, given the great expenditure of money and effort involved.⁷⁵ Nonetheless the motivation of scholars and the interest of specialized readers produced a remarkable range of reference works in the medieval and early modern Islamic world, a few of them of massive proportions. Due to impressive cultural and linguistic continuities, a number of these works, not only bibliographies like the *Fihrist* and the *Kashf* but also encyclopedic compendia, are available in print and in active use today.⁷⁶

CHINA

The Chinese tradition of textual accumulation and aids to learning developed without contact with the Latin, Greek, or Islamic traditions (even while technologies like paper and gunpowder spread to those cultures from China) but offers a valuable point of comparison featuring similarities as well as contrasts.⁷⁷ As in those other cultures, learned culture in China was focused on the study of authoritative texts — Confucian classics as codified in the second century BCE — and generated a great accumulation of anthologies, commentaries, and compilations. As in other cultures, these genres rested on a combination of selecting from and summarizing existing texts, then sorting the gathered material, most often according to a traditional topical order. But these common methods of information management were shaped by a number of institutions unique to China. On one hand, emperors commissioned vast collective projects to anthologize and organize the whole tradition, which reached sizes unparalleled elsewhere. On the other hand, the pressures to prepare for civil service exams fueled the production of large numbers of commercial *leishu*, which gathered quotations for candidates to use in their answers. Woodblock printing, the most common form of printing in China (and well suited to logographic writing, though movable type was occasionally used starting in the eleventh century), facilitated the production of books in small print runs and later reprints and in decentralized locations.⁷⁸ Printing spread gradually and fitfully in China, from its origins in the eighth century in the reproduction of Buddhist texts, to a broad range of popular genres and some governmental use in the eleventh to thirteenth centuries. Despite major expansion in printing in the twelfth to thirteenth and sixteenth to seventeenth centuries, scholarly elites never abandoned their admiration for fine calligraphy and carefully produced manuscript notes (*biji*).⁷⁹

Chinese emperors sponsored scholarship at least as early as the Han dynasty (206 BCE–220 CE), including a list of books to be retained in the imperial library. The fact that 153 of the 677 texts listed there survive today attests to the great care given to the transmission of texts by regular copying, first on bamboo strips, then on paper starting in the second century CE.⁸⁰ The oldest

surviving books date only from the ninth century, and most ancient Chinese texts are known through woodblock imprints produced in the Song (960–1279) or later periods. A keen sense of the fragility of books in both manuscript and print, which were easily destroyed by natural forces but especially during wars, motivated many emperors to commission large compilations of texts. These anthologies ensured the availability of the selected texts in the imperial library for the use of the emperor and his court; they also testified to the greatness of the emperor and gave him a measure of control over the works that would remain in circulation since those omitted from imperial compilations were at greater risk of being lost to posterity.⁸¹

One of the earliest extant collections on a very large scale was commissioned by the emperor Taizong (976–97) of the Northern Song dynasty to mark the end of a period of wars with an anthology of extant literary and scientific knowledge. A team of imperial officials worked on the project from 977 to 983, drawing on histories and encyclopedias from the preceding Tang dynasty, among other sources. The resulting *Taiping Yulan* (Imperial Digest of the Reign of Great Tranquility) comprised 1,000 *juan* or volume-like divisions, with the material sorted under more than 5,000 headings distributed in 55 categories. The work was not printed until the eleventh century but was present in manuscript in good private libraries. Taizong's son and successor, Zhenzong (998–1022), also supervised a compilation of his own that included topics his father had ignored.⁸² The next record for the largest compilation was set by the *Yongle Dadian* (Great Handbook of Eternal Joy), commissioned by the Ming emperor Zhu Di, known as the Yongle emperor (1402–24), at a whopping 370 million characters. Compiled by more than 2,000 imperial officials under the leadership of select literati, this vast work drew on the accumulation of texts during the preceding centuries, 400 of which are known only because they were reproduced in it. With 22,877 chapters in more than 10,000 volumes, it proved too costly to print, even for the emperor; it remained in manuscript, from which two further copies were made in the sixteenth century in an attempt to preserve it. But due to losses in the intervening centuries only 865 chapters, less than 4 percent of the original, are extant today.⁸³ In the eighteenth century it was surpassed in size by the *Siku Quanshu* commissioned by the Qianlong emperor, of the Manchu dynasty, who instructed his officials to destroy anti-Manchu works at the same time as they gathered manuscripts and books from the many libraries they examined for inclusion in the compilation. The *Siku Quanshu* comprised 79,000 chapters in 36,000 volumes and was produced in seven manuscript copies between 1773 and 1782 (by more than 3,800 copyists); of these, one copy survived intact in the Forbidden City, from which the work was photolithographically reprinted in the 1980s and is now

available online. At 800 million words it has been only recently surpassed by the English Wikipedia (over 1 billion words as of June 2010), but in the eighteenth century it far surpassed the 40 million words in the fifteenth edition of the *Encyclopaedia Britannica*.⁸⁴

As these three record-setting works attest, manuscript was the medium of choice for the largest compilations produced under imperial patronage. But other massive imperial compilations were printed, the longest of which was the *Ku-chin t'u-shu chi-ch'eng* (Collection of Texts and Illustrations Old and New), printed in 1729, unusually in copper movable type (possibly under Jesuit influence), and totaling 750,000 pages. Only some sixty-four copies were produced at the time. Such a low print run was a financially sound strategy in the case of woodblock printing because the blocks, once carved, could be saved and used for more impressions later, but when movable type was involved (as in this case), it was imperative to print as many copies as were necessary to recover the investment involved in production—once the type was distributed any reprint would require as much labor as the initial typesetting had. But in this case imperial funding presumably allayed the need to recoup the investment with sales.⁸⁵ In these massive compilations the principal finding device was a table of contents, itself very long (comprising 60 chapters, for example, in the *Yongle Dadian*, 40 in the *Ku-chin t'u-shu chi-ch'eng*). Classification schemes ranged from various topical arrangements (e.g., heavens, earth, man, ceremonies, and so on) to phonetic ones (like the *Yongle Dadian* in which the headings were sorted by rhyme and initial syllable) or graphical ones (by the order of brushstrokes or the radicals in a character, which became the norm for dictionaries in the eighteenth century).⁸⁶

Another distinctively Chinese impetus to the development of aids to learning was the institution under the T'ang dynasty (618–907) of a system of civil service exams to select government officials at both national and local levels. The clear social and financial rewards for success on these exams fueled a large and increasing market for printed aids in preparing for them, including collections of authoritative quotations, summaries of subjects to master, and model essays. The success of these genres only exacerbated the problem they were designed to solve and fueled their own further success: as they helped more candidates prepare for the exams, the exams became more difficult and selective and required still more texts to be memorized (up to 500,000 characters) and new and better aids to be purchased and studied. Exam preparation aids were produced and sold in massive quantities down to the nineteenth century, when these genres were discredited and banned on the grounds that they encouraged cheating.⁸⁷

One of the dominant genres designed for exam preparation was the *leishu*, or

book of classification, which first appeared as a category in a bibliography finished in 945.⁸⁸ *Leishu* compiled quotations, anecdotes, and information from a wide array of sources, sorted under topical headings and subheadings, so that the exam candidate could learn them efficiently and cite them in his compositions. They could be read through but also consulted. The development of *leishu* and other works for consultation in the ninth century (e.g., dictionaries of rhymes) coincided with a shift in book format, from the ancient roll to the butterfly binding akin to the codex and better suited to consultation reading.⁸⁹ By the twelfth century the codex format included many features of layout that facilitated consultation, including headings and notes in the margins, running information about book title or chapter along the outside edge of the page (or center strip), the use of two registers to separate a text above from commentary or annotations below (or vice versa), and different sizes and colors of font. By the sixteenth century concern for readability of the page and legibility of each character had led to increasingly standard practices of printing of characters in a horizontal as well as a vertical grid and in a regular, more square style.⁹⁰

Leishu followed various thematic classifications and often offered cross-references; within a topic they cited authors in descending order of authority, with the Confucian classics in first place. As a result *leishu* could be consulted fairly efficiently by a reader who had mastered enough cultural cues. Most *leishu* were commercial ventures funded by printers on the promise of sales in the marketplace and ranged in size from one to many volumes. They were written by scholars, often working in teams, who declared that they offered moral edification as well as literary instruction.⁹¹ *Leishu* were frequently repetitive and borrowed from one another and from other works without acknowledgment. Given the ease of reprinting from old woodblocks, but also of introducing variations to them, and given the low and unpredictable survival rates for old imprints, no attempts have been made to estimate the numbers of editions of *leishu* or of books overall that were printed in premodern China; estimates of print runs are also difficult—100 to 600 is considered typical for Song imprints, when demand was not yet strong, but a woodblock could probably produce 10,000 copies before requiring repair.⁹² Printing developed rapidly in Europe between 1450 and 1500, whereas it took centuries to spread thoroughly in China (from the eighth to the sixteenth), but once it had become established, woodblock printing facilitated the development of a myriad of print shops throughout the hinterlands, so that one historian has estimated that “more items [were printed] in China than anywhere else in the world between 1600 and 1800.”⁹³

Chinese scholars certainly faced an unusually long and continuous tradition of textual accumulation and were instrumental in devising tools for man-

aging it, from large imperial compilations and collected editions, on one hand, to the shortcuts to learning promised in the *leishu*, on the other. Both kinds of solutions prompted complaints, especially as printing first entered the arena of scholarship in the Song period. Ye Mengde (1077–1148) lamented the consequences of imperial editions of the classics in 990–994 in much the same terms as some humanists would in fifteenth-century Europe: “As it was so easy [now] for scholars to get [printed] books, their reciting them from memory also deteriorated. And yet, the woodblocks were not correct to begin with, there was not one without errors. But this [and the following generations] altogether accepted wood-block texts as correct, while the manuscripts of collectors have been lost with every passing day. And so the errors can never be corrected. What a pity!”⁹⁴ Ye Mengde feared that the easy availability of printed texts would undermine traditional modes of scholarship involving the collection, memorization, and correction of manuscripts and consign to oblivion manuscript variants or texts omitted from the imperial editions. Although I am aware of no complaints about the manuscript compilations commissioned by the emperors, they too likely stemmed the tide of textual accumulation in China by impairing the survival of works not included in them, even if only one compilation project (the *Siku Quanshu* of the Manchu dynasty) directly destroyed some of the texts encountered in the process of gathering material.

Leishu were also the object of regular complaints. Following Ye Mengde on many points, Zhu Xi (1130–1200) argued that *leishu* encouraged fragmented, careless, and cursory reading whereas true learning required slow reading and deep understanding of the classics and memorization of passages with attention to their original context. Zhu Xi recommended the kind of reading that historians have called intensive and opposed habits associated with extensive reading: “Read little but become intimately familiar with what you read; experience the text over and over again. . . . Don’t strive for quantity. . . . I especially don’t want people to skip around as they read. . . . The reason people today read sloppily is that there are a great many printed texts.”⁹⁵ Zhu Xi blamed bad reading habits on the abundance books in his time and offered his own educational program as a remedy. But, just like early modern European critics of overabundance, Zhu Xi relied on print to spread his message and his reputation as broadly as possible. Printing continued to expand after Zhu Xi’s time and with it the production both of *leishu* and of complaints about them as shortcuts that encouraged the neglect of true study. Five hundred years later Gu Yanwu (1617–82) raised familiar concerns: because of exam handbooks, scholars “were reducing themselves to perusing ready-made books” and were thus cut off from the tradition of scholarly

debate that preceded them.⁹⁶ In premodern China as in early modern Europe the complaints of scholars about aids to learning offer indirect evidence for the use of these reference tools that was rarely openly acknowledged.

Textual abundance and complaints of overload can be traced in any number of times and places—wherever the study of texts generated a succession of further texts considered worth studying. The great variety of aids to learning devised in different contexts typically involved combinations of a few basic methods of managing texts that are still central today—sorting and storing selections from and summaries of them. But the results in each case were shaped by many contextual factors, including political, educational, and religious institutions; technologies for the reproduction of texts; and cultural traditions ranging from language and script to ideals of learning. No single factor, neither a technology nor an institution nor a cultural tradition, is sufficient to explain the nature and fortune of aids to learning in different contexts, as I hope these few elements of comparison have illustrated. I expect also that continued reflection on these comparisons will introduce further factors of complexity.

REFERENCE TOOLS IN THE LATIN MIDDLE AGES

Renaissance scholars are famous for looking back to antiquity for models to imitate and sources to study. A number of ancient compilations, like those of Pliny, Diogenes Laertius, and Stobaeus, were indeed valued as both sources and models in the Renaissance, and authors of miscellaneous arranged compilations invoked Aulus Gellius as the founder of that genre. Ecclesiastical historians motivated by religious schism in the sixteenth century also saw in Eusebius a model for collective historical projects and chronological tables. But the most important sources for early modern methods of information management were medieval, though the humanists were perhaps not conscious of and certainly did not acknowledge this debt. Most of the reference tools produced in early modern Europe were based on tools developed before or during the thirteenth century, including florilegia and dictionaries alphabetically arranged; compendia and encyclopedias systematically arranged; tables of contents; biblical concordances and alphabetical indexes; precise citations by book and chapter number (e.g., for the Bible) or other textual subdivisions; and page layouts that facilitated consultation with running heads, numbered sections, lettering of different sizes and colors, and margins for annotations. Even foliation and pagination can be found in some late medieval manuscripts.⁹⁷ I will discuss in more detail later the ways in which medieval models and sources were transformed and put to new uses by

early modern compilers operating both in manuscript and in print, but we must first understand how so many information management techniques we consider modern originated in the Middle Ages.

During the shift from late antiquity to the early Middle Ages the compendium remained the principal genre for transmitting ancient learning, both for pagans (e.g., Macrobius or Martianus Capella in the fifth century) and for Christians (Cassiodorus and Isidore of Seville). Cassiodorus wrote his *Institutions of Divine and Secular Learning* (early sixth century) for the monks at the monastery that he founded after retiring from public office under the Ostrogoths, and Isidore, bishop of Seville, addressed his *Etymologies* principally to the priests in his diocese (early seventh century). Both works were designed to spread the knowledge of books that had become scarce and difficult to access following the fragmentation of the Roman Empire and the decline of its educational system.⁹⁸ First composed for the use of a specific community, they were spread through frequent copying to readers in many different contexts.

Isidore described compiling his *Etymologies* “from [his] recollections of readings from antiquity”; he may also have had help from assistants in excerpting from and summarizing available works on liberal arts, natural history, and human affairs. Isidore’s junior colleague Braulio, who prepared the manuscript for circulation, explained that since the book was “enormous” he divided it into twenty books; he also added a table of contents listing the rather unsystematic order of topics treated. Isidore’s *Etymologies* circulated throughout the Middle Ages: copies were present in every major European cultural center by 800 and continued to be made through the fifteenth century, including in ten printed editions before 1500. One thousand manuscripts survive, but given the substantial size of the work (ca. 250,000 words in English translation), only sixty of them include the complete work.⁹⁹ Later authors recycled from it liberally, especially Hrabanus Maurus (*De naturis rerum*, in the ninth century) but also Alexander Neckham (*De naturis rerum libri duo*, ca. 1195) and Thomas of Cantimpré (*De natura rerum*, ca. 1245). The *Etymologies* offered a long-influential model for information management based on summarizing books, notably those difficult of access, and following a topical order that was not always predictable but that could be navigated through a table of contents listing book and chapter headings.¹⁰⁰

The other genre that served to palliate the scarcity of books in the early Middle Ages was the florilegium, which, rather than summarizing, selected the best passages or “flowers” from authoritative sources. The term “florilegium” (from *flores* for flowers and *legere* in the sense of “select”) dates from the early modern period, likely first used by Aldus Manutius for a Latin translation of a collection

of Greek epigrams, but the practice of gathering the memorable elements of a text or a disputation certainly existed in antiquity.¹⁰¹ Judging from the lack of medieval copies of ancient collections of sayings, these did not play a significant role as sources for medieval ones.¹⁰²

The earliest medieval florilegium is probably the *Liber scintillarum* composed by Defensor of Ligugé at the end of the seventh century, which arranged extracts under topical chapters in descending order of the authority of their sources—Gospels first, then St. Paul and other apostles, other books of the Bible, and the doctors of the church.¹⁰³ Under the impact of the Carolingian Renaissance, florilegia included classical authors as well, often arranged haphazardly in the order in which they were read. Some florilegia focused on poetic excerpts and were used to teach prosody, others specialized in prose. Both kinds were likely used in teaching at many levels—from the young boys (*pueri*) mentioned in the *Opus prosodiacum* of Micon Centulensis in the mid-ninth century to the twenty-year-old Heiric who wrote under dictation from Lupus of Ferrières, ca. 859–62, a *Collectanea* comprising excerpts from Valerius Maximus and Suetonius, followed by philosophical and theological *sententiae*.¹⁰⁴

On one hand, florilegia diffused selections from and helped to reinforce a canon of authors who were otherwise well known in the Middle Ages, starting with the Bible and church fathers and emphasizing ancients like Ovid, Virgil, Horace, Cicero, Juvenal, Lucan, and Seneca (in descending order of citations).¹⁰⁵ On the other hand, florilegia could include excerpts from authors who were otherwise hardly known in the period. The twelfth-century *Florilegium Gallicum*, for example, extant in many copies, was the “main vehicle through which Tibullus was read in the Middle Ages,” and its excerpts were further diffused by being copied in later florilegia and by Vincent of Beauvais.¹⁰⁶ Similarly, the *Anthologia Valerio-Gelliana* announced its utility in offering passages from Valerius Maximus and Aulus Gellius because those texts were hard to find.¹⁰⁷ Medieval florilegia have thus long been valued by classical scholars, from Joseph Justus Scaliger and Janus Dousa in the seventeenth century down to the present day, as witnesses to rare or unique ancient passages, although current assessments do not consider them faithful records of the ancient originals.¹⁰⁸ Whether the authors cited were relatively well known or not, early florilegia made the material more widely available and easier to access in a period when libraries were few, small, and generally closed to all but privileged members of a monastic community. Florilegia likely first originated as personal notes of items worthy of memory taken on the occasion of access to a text and then shared with others who would not otherwise have access to it, as a remedy against “underload.”

During the High Middle Ages many social and political developments con-

tributed to an increased use of writing in legal and administrative as well as religious and intellectual activities.¹⁰⁹ Starting in the twelfth century, overload rather than the scarcity of texts was the condition that compendia and florilegia increasingly addressed. The prologue of the *Libri deflorationum* (Book of Flower Pluckings), better known as the *Florilegium Duacense* from its twelfth-century Douai manuscript, explained that it was useful in sparing the user the distraction of too many books, which would impair proper retention: “Indeed the multitude of books is distracting and no one can have the memory of all of them. Even more, whoever tries to retain everything will retain nothing well.”¹¹⁰ Tacitly invoking Seneca’s dictum, this and other florilegia promised to offer only those passages worthy of retention — compilers also silently Christianized passages from ancient works when this seemed necessary.¹¹¹ Florilegia also spared their owners the expense and inconvenience of buying and storing these bulky items, as the early thirteenth-century Cistercian *Flores paradysi* (Flowers of Paradise) boasted: “Here you have at your fingertips briefly and in summary all that you could find in many bookchests full of large volumes.” Indeed, florilegia manuscripts were often of small format to facilitate portability in contrast with the manuscripts of the texts that they excerpted.¹¹²

Florilegia formed an integral part of the explosion of information management tools in the thirteenth century: they were produced in much greater numbers and were more carefully ordered than in earlier centuries. Of the 1,000 extant manuscripts of florilegia, only 10 percent date from before the thirteenth century. Starting in the thirteenth century the quotations in florilegia were generally sorted for easy retrieval, whereas previously readers had to look through the whole text in order to find a specific item. Following the use of alphabetical order in the biblical concordance, the quotations in florilegia were increasingly either arranged alphabetically by incipit or grouped under topical or thematic headings that were arranged alphabetically or systematically. Some florilegia were even indexed, presumably to facilitate their use by preachers in search of material on a theme for a sermon.¹¹³

Among the most striking achievements of the period were three massive collective projects: the biblical concordances that indexed every word in the Holy Scriptures (the first one completed ca. 1247); Vincent of Beauvais’s *Speculum maius* (1255), which compiled summaries and excerpts on the unprecedented scale (in the Latin West) of some 4.5 million words; and a union catalog of the holdings in Franciscan libraries across Ireland, England, and Scotland produced in the early fourteenth century. Richard and Mary Rouse have pioneered the study of these innovations in information management and the factors that explain them.¹¹⁴ First, these and other new works built on earlier, less formal-

ized, and “unpublished” tools devised during the eleventh and twelfth centuries. Second, new institutions favored a significant expansion in preaching and teaching, the two principal activities served by these tools. The mendicant orders were founded (Franciscans in 1210 and Dominicans in 1216) for the purpose of combating religious heterodoxy by diligent preaching. Whereas the Cistercian Bernard of Clairvaux (1090–1153) offered an example for the abundant production of sermons (some 377 have come down to us), the mendicants launched thousands of preachers throughout Europe. At the same time, in major intellectual centers throughout Europe informal cathedral schools became incorporated as universities, starting with Bologna, Oxford, and Paris in the late twelfth century and followed by others in the thirteenth. Universities rapidly accelerated the accumulation of texts by requiring teachers and students to comment on, cite, and debate authoritative sources as well as one another’s arguments.¹¹⁵ In both settings (and at their intersection, since mendicants formed a strong presence in many universities) preachers and teachers were motivated to locate relevant passages on a theme more systematically and directly than florilegia allowed.

Crucial to the development of scholasticism were the authoritative texts that inspired commentary and discussion. Scholastic teaching in canon law and theology focused on a few set texts composed for the use of cathedral schools in the twelfth century that used a combination of summary and selection to distill the material in those fields for students to master. Gratian’s *Decretum* in law and in theology Peter Lombard’s *Sentences* and the *Glossa ordinaria* with its commentary on the Vulgate compiled previous opinion and sorted it in a systematic order (following a standard order of legal or theological topics or the order of the Bible). Since students were expected to memorize the order of presentation, they could navigate these texts effectively even in the absence of finding devices.¹¹⁶ By the thirteenth century the translation into Latin of previously unknown Aristotelian and Arabic texts (ca. 1130–1230) added to the range of authoritative sources and interpretations to be cited and to the scale of philosophical and theological argument. Scholastic works could reach massive proportions, most spectacular among them the *Summa theologica* of Thomas Aquinas at around 2.2 million words.¹¹⁷

To facilitate access, scholastic works typically included careful divisions of the text into books and chapters but also numbered questions, objections, and responses. The hallmark of scholastic manuscripts was a layout that invited precise citation and consultation: running heads on each opening announced the section of the text included, rubrication, numbering, and changes in the size and character of the script or in its layout (in the margins or with extra spacing) sig-

naled distinctions between different parts of the text — objections and responses, or source, commentary, and commentary on the commentary. In this area too scholastic practice built on earlier models: in manuscripts produced in earlier monastic contexts, Mary Carruthers has emphasized that a distinctive look for each page, through the use of color and illumination, was considered a crucial aid to retaining the page in memory. Scholastic layouts similarly created a distinctive look for each page that offered cues to the memory but also facilitated locating a specific passage with numbering (including Arabic numerals, which became common in the thirteenth century) and clearly delineated divisions into sections.¹¹⁸

The biblical concordance was the single most important tool devised in the thirteenth century, and it encouraged further reference works based on collective work, precise citation, and alphabetical order. The biblical concordance too built on earlier efforts. In the twelfth century Peter Comestor and Alan of Lille had “published” *distinctiones*, which listed alphabetically some words found in the Bible (action words, abstract words, and concrete words), along with explanations of their various allegorical meanings, as an aid to preachers in search of appropriate biblical passages on a theme.¹¹⁹ Judging from various surviving notebooks, students and masters also drew up lists for personal use of allegories and of unusual words in the Bible or partial indexes to works of interest. In a further sign that there was widespread interest in indexing the Bible, biblical concordances were developed independently in both Paris and England around the same time, although the English concordance was overshadowed by the Parisian one and survives only in a single, partial copy. Around 1230 the Dominicans of the house of St. Jacques in Paris started a project that was completed by 1247: each member of the team recorded the words he encountered in reading the Bible beginning with the letter (or first two letters) he had been assigned, along with a brief indication of the context and a precise location. This version survives in twenty-two manuscripts, most from the thirteenth century, all of them plain and of small size for portability. A later version of this concordance survives in eighty manuscripts made between 1280 and 1330 — these are large, handsome volumes with rubrication to facilitate use, a few of which show signs of having been used as exemplars to be copied by university students according to the *pecia* system (in which students would rent from a stationer successive sections of the exemplar for copying, so that each student would end up with his own new copy of the exemplar).¹²⁰

The method used to refer to the Bible had to be layout-independent, since each manuscript would vary in the amount of text included on each page. The division of the Bible into books had been established by the early church councils,

but there was no standard numbering of the chapters in each book among Christians until the Dominican concordance, in using Stephen Langton’s numbering of 1203, made it standard. Verse numbering was first introduced in printed editions of the Bible in the sixteenth century.¹²¹ In the absence of verse numbering, in order to refer to a specific place within a chapter of the Bible, the Dominican concordance introduced a novel form of locating a passage, by subdividing each chapter into seven equal sections labeled A through G. These divisions never appeared in the written text, but the user was expected to make them mentally. Each lettered subsection represented one-seventh of a chapter and would vary in length with the size of the chapter, but users of the concordance, being already familiar with the Bible, would likely have had little difficulty making the requisite calculation to locate a passage.¹²² This system of reference spread from the concordance to other manuscripts and was likely the source for the practice in some large printed books of adding letters in the margins of a folio page to which the references in the index would refer (e.g., in Erasmus’s *Adages*); in print the finding letters were printed on each page and thus easier to use.

Christians were not the only ones engaged in close study and extensive commentary on the Bible. Yeshiva teaching in the modern period famously relied on memorization of the most important texts, but a few medieval Hebrew manuscripts from the twelfth or thirteenth centuries include examples of alphabetical lists of words with the biblical phrases in which they occurred, but without precise locations in the Bible — presumably because the learned would know them. At least one of these predated the Dominican concordance, which in turn triggered more such works in Hebrew in the fifteenth century.¹²³ In the preface to the first biblical concordance in Hebrew (*Me’ir nativ*), composed between 1437 and 1445, Yitshaq Nathan ben Kalonymos of Arles explained that he hoped to refute his Christian opponents by using their own tool against them. Indeed he had found that when he used the Christian concordance “there was no argument that I was not able to refute with the aid of this book.” Rather than translating the Christian concordance, Nathan drew up a concordance from the Hebrew Bible directly but followed the Christian division into chapters, which then became standard in printed editions of the Hebrew Bible.¹²⁴ More generally, a number of Jewish encyclopedias were composed in the thirteenth and fourteenth centuries, in both Islamic and Christian environments (e.g., Toledo and Arles).¹²⁵

Among Christians the verbal concordance to the Bible was soon followed by other similar tools. We have evidence for the existence of “real” concordances to the Bible starting in the 1240s, though the texts do not survive. These “concordances” (called so at the time) offered an alphabetical index not of the words themselves but of the theological concepts found in the Bible (*realia*); in modern

parlance they were subject indexes.¹²⁶ In rapid succession there followed alphabetized subject indexes to major authors like Aristotle (indexed anonymously by 1250 in Paris), Augustine (by the Dominican Kilwardby at Oxford, 1256–61), or Aquinas (owner-indexed by Godfrey of Fontaines, then circulated more broadly). These indexes used a clear ordering system (the alphabet) and subject terms that were standard in scholastic circles, with the result that they could serve as a collective resource for students and scholars throughout Europe who had access to a copy, and they circulated separately from the works they indexed.¹²⁷ They offered a general solution to a problem that some had tackled more idiosyncratically in earlier decades. For example, Robert Grosseteste (1175–1253) annotated his copies of the Bible and of the works of church fathers with more than four hundred symbols (Greek letters and mathematical and other symbols) that stood for different themes according to a key that he also left in one of his manuscripts. Likely with the help of others (including another prominent English Franciscan, Adam Marsh, 1200–1259), Grosseteste was apparently working toward a theological subject index of many texts. The index remained unfinished; how usable it would have been for others would have depended on how the topical headings were displayed (by symbol or verbally) and arranged.¹²⁸

Alphabetical order was not unknown prior to the concordance. A Latin herbal drawn from the Greek Dioscorides survives in alphabetized manuscripts as early as the late eleventh century. But the concordance inspired the broader use of alphabetical order: a florilegium of 1306, the *Manipulus florum* (Bundle of Flowers) in which the topical headings were ordered alphabetically, explained that it was arranged “after the fashion of a concordance [more concordantiae].”¹²⁹ Some draft pages of the first Paris concordance have been recovered because they were used in the bindings of manuscripts produced at St. Jacques in the fifteenth century. They show that the concordance was alphabetized in the way that scholars have identified as common in antiquity and the Middle Ages, which often resulted in partial alphabetization by first or first two letters: the compiler entered words on a sheet reserved for words beginning with that letter in the order in which he encountered them, and the terms could be alphabetized more carefully as the page was copied over a second time. Alphabetical order was already the norm in the first Latin dictionaries of the eleventh century—by first three letters in Papias’s *Elementarium doctrine erudimentum* (ca. 1053) and by first letter only in the *Derivationes* attributed to Huguccio of Pisa (twelfth century). Huguccio’s weak alphabetization hampered access to such an extent that more than one alphabetical index to the *Derivationes* was drawn up in the thirteenth century, the most widely circulated being that of Petrus de Alingio. But the *Catholicon* of 1286 by the Dominican Giovanni Balbi was the first Latin dictionary to be com-

pletely alphabetized. Balbi offered a detailed explanation of this order (e.g., *justicia* comes before *justus*), which suggests that he felt it was new to the dictionary genre.¹³⁰ Balbi described himself as writing for the use of other Dominicans, but the work survives in 190 manuscripts and was owned by many other ecclesiastical institutions, including five preciated copies showing use by university students; it was among the first books printed by Gutenberg in 1460.¹³¹

The alphabetical indexes of authoritative texts (from the Bible to major ecclesiastics) can be explained only in part as offering more expansive aids to preachers. For the average preacher, model sermons along with florilegia, *distinctiones*, and collections of exempla (anecdotes illustrating a moral point) were the basic tools, multiple copies of which were present in almost every clerical library.¹³² The other factor motivating the use of more exhaustive and expensive tools was the scholastic context for preaching and arguing. In the university environment, the audience for sermons was experienced and demanding. Sermon writing was required of all masters and, once a year, of all students in theology; students also attended about one hundred sermons per year, not necessarily with pleasure.¹³³ In this context the reliance on florilegia and presorted excerpts was inadequate. One master at Paris in the 1270s, for example, owned an alphabetical dictionary of terms, a biblical concordance, and two collections of biblical distinctions in addition to indexes to various works that he purchased ready-made or devised himself. More generally, the term *originalia* was first coined in the thirteenth century to indicate the greater authority of original sources as opposed to excerpts, precisely as these became more widely diffused, in a case of conceptual “back formation.”¹³⁴ At least one widely diffused florilegium responded to the complaint that the genre fostered an excessive reliance on excerpts. The *Manipulus florum* (1306) of Thomas of Ireland offered the usual excerpts but also exhorted readers to turn to the *originalia* after finding a quotation of interest and, to aid in that task, offered in an appendix a list of the authorities cited and their works. This list was also copied independently of the accompanying florilegium as a kind of bibliographical guide by those interested in following Thomas’s advice to read the original texts.¹³⁵

Alongside the biblical concordance the other massive work that originated in the training of mendicant preachers but far exceeded their needs is the largest and most famous of the medieval “encyclopedias”—Vincent of Beauvais’s *Speculum maius* (composed 1244–55). Weighing in at some 4.5 million words in four parts (the last of which was composed and added after Vincent’s death) and divided into a total of eighty books and 9,885 chapters, it is likely the largest reference work in the West before 1600. A complete manuscript required at least seven folio volumes of 500 pages each.¹³⁶ Vincent devoted an extensive prologue

to explaining his work and began it with a vivid statement of the perception of overload: "Since the multitude of books, the shortness of time, and the slipperiness of memory do not allow all things which are written to be equally retained in the mind, it occurred to me, the least of all the brothers, as I pored over assiduously the books of very many [authors] and read studiously for a long time, finally (and on the advice of my superiors) to reduce in one volume in a kind of compendium and in summary order some flowers chosen according to my talent, from almost all those authors which I was able to read, whether our own, that is Catholic doctors, or gentiles, that is philosophers and poets, and from historians of both kinds [ecclesiastical and secular]." ¹³⁷ Vincent articulated eloquently the constraints of time and memory in the face of overabundance. He then offered his *Speculum* as a solution of a classic kind: the selection of the best bits but on a scale of authors used and topics covered that was unprecedented. Vincent drew on a range of well-known ancient and patristic sources, and also on newly available sources like Aristotle and Avicenna, and on other encyclopedias, from Isidore's *Etymologies* to the recent *De natura rerum* of the Dominican Thomas of Cantimpré. ¹³⁸ But Vincent was not content to compile what was readily available—he also sought out sources to fill what he perceived as gaps in his principal sources. Arno Borst describes that Vincent of Beauvais had his assistants prepare a "subject index to Pliny" so that he could assess the lacunae in Pliny's treatment of the natural world and turn to other authors to fill these gaps (for example, he used Isidore for his treatment of Vesuvius, which was not discussed in Pliny). ¹³⁹

Like the reference tools studied by the Rouses, the *Speculum maius* was designed as an aid to preachers. Vincent only alluded in his prologue to the institutional origins of the work, but specialists have elucidated it in good detail. The mendicant orders prescribed the training of the friars by a lector in each convent; many of these authored collections of notes, which they shared with others within the order and beyond. Vincent was asked by his superiors in the Dominican order to write an *opus universale* for the lectors, particularly for those working in monasteries with no or inadequate libraries. ¹⁴⁰ The *Speculum maius* went through at least five different states, by successive enlargements, probably due in part to Vincent's (and his collaborators') access to new books. In addition to the libraries of the Dominican abbots of St. Victor in Paris, of Royaumont where Vincent was a lector, and of Beauvais, where he was from, Vincent may have had access to the royal library of Louis IX. ¹⁴¹ Vincent announced the utility of his massive work for lectors like himself but also for a whole range of pious activities: "But I am certain and trust in God, that this work is of no small use not only to me, but to every studious reader, not only to know God himself and his creatures visible and invisible, and through this knowledge to love God and to

excite his heart to devotion by the sayings and examples of the charity of many doctors, but also to preach, to read, to dispute, to resolve, and generally to explain clearly almost any kind of art." ¹⁴² Vincent's *Speculum* included much more than the average lector or preacher needed and was designed as a multipurpose resource for users in many occupations. Vincent acknowledged that he also hoped to satisfy "others who, perhaps out of some curiosity to know and laboring on things unknown to them, would be pleased by the knowledge of such things." ¹⁴³

Anticipating accusations of excessive prolixity and novelty, Vincent emphasized that his work was in fact brief and ancient: "This new work is at the same time old, and it is also equally both brief and prolix. Indeed it is ancient by its authority and material, but new by the compilation and arrangement of its parts. And it is brief because of the reduction of many sayings to brevity. Nonetheless it is long because of the enormous multitude of material." ¹⁴⁴ Vincent's scope was indeed universal: his purpose was to bring to light the presence of God throughout nature (in part 1, *Speculum naturale*), the arts and sciences (part 2, *Speculum doctrinale*), and, at greatest length and in the most widely read part of the whole, in an account of universal history (part 4, *Speculum historiale*). Part 3, the *Speculum morale*, was added posthumously, lending a more philosophical dimension to the otherwise historically oriented project. ¹⁴⁵ At one point Vincent accused himself of the sin of curiosity and of exceeding the bounds of what was necessary for the salvation of souls, but even while doing so he insisted that "all the things which are contained in this work . . . are good in themselves and useful to the studious." ¹⁴⁶ In fact Vincent seems mostly to regret having read too little rather than too much: "I know that I was not able to find or read everything that has been written. And I do not claim that I expressed everything which was noteworthy even from what I was able to read, otherwise I would have had to add an enormous volume. But of good things I gathered, I think, the better ones and certainly of the better things, a few of them." ¹⁴⁷ Vincent's ambition was to cover as much material as thoroughly as possible toward a goal of exhaustive encyclopedic mastery.

Research into the medieval reception of Vincent's *Speculum* has turned up only two extant copies of the whole work from a handful that were made in the Middle Ages. The *Speculum* circulated mostly in partial copies, three hundred of which survive, most of them focused on the *Speculum historiale*. But even the *Speculum historiale* survives in only thirty-seven complete copies. Given its massive size, the *Speculum* was prohibitively expensive to copy except partially. Printing was the key to its circulation either as complete parts during the incunabular period or as a complete set of four in 1591 and 1624. ¹⁴⁸ But Vincent of Beauvais was widely known and used as a source in shorter, more portable and

affordable encyclopedic compilations. Among these the *Libri de proprietatibus* by Bartholomaeus Anglicus was widely copied in the Middle Ages and printed nine times down to 1491 and in English as late as 1582.¹⁴⁹ A study of preachers' reactions to the three principal encyclopedias of the thirteenth century, those of Thomas of Cantimpré, Vincent of Beauvais, and Bartholomaeus Anglicus, suggests that none of them in fact was much used by preachers. The encyclopedic ambitions and the assumptions of harmony in these works did not match the experience of hardship and strife that preachers mostly addressed in their sermons.¹⁵⁰ These works, initially justified as aids to preachers, thus formed their own genre with distinctive ambitions and tone. Nonetheless, a majority of surviving copies were the property of monastic (often Cistercian and Benedictine) libraries, where they offered new access to a wide range of topics and texts.

The *Speculum maius* was consultable although it did not include an index. Only the most frequently used part, the *Speculum historiale*, was indexed some seventy years after its composition, ca. 1320–23, by Jean de Hautfuney (later bishop of Avranches).¹⁵¹ But the text was arranged systematically, as Vincent explained, so that the reader could find his way. The *Speculum naturale* followed the hexameral order of creation as described in the Bible, and the *Speculum historiale* the order of chronology; material in some sections (on minerals, plants, and animals) was alphabetized (and strictly so). Vincent indicated that he had consultability in mind in dividing the work into many short chapters: "So that each of the parts of this work will appear more easily to the reader, I wanted to divide the whole work into books and chapters."¹⁵² Manuscripts of the *Speculum* typically included a list of chapter titles at the front or the back of the manuscript or at the beginning of each book. In addition, Vincent included summaries for each book. Only with the printed editions did the text circulate with an index attached.¹⁵³

Explaining the appearance in the thirteenth century of new large-scale reference tools, like the concordance to the Bible and Vincent of Beauvais's *Speculum maius*, is complex. From a practical perspective the institutional context of a religious order, in both of those cases the Dominicans, was crucial in providing a team of educated men with the time and resources to engage in the painstaking work of a decade or more of excerpting, sorting, and compiling textual material.¹⁵⁴ The investment was justified by hailing the value of the results to preachers among other pious purposes. From an intellectual perspective, factors beyond a desire to improve the quality and ease of preaching were also at work. Concordances and indexes to authoritative texts are evidence of a new sense of the limitations of the florilegium, which seemed increasingly inadequate to the complexity of university teaching and preaching. Vincent of Beauvais com-

plained that existing compilations silently removed, added to, or changed the words of their sources and corrupted their meaning.¹⁵⁵ The reception of Aristotle added to the awareness of philosophical complexity and of the risks of faulty transmission, even if the "vast majority of students in the late Middle Ages knew the philosophers only in extracts," such as the *Parvi flores* (Little Flowers).¹⁵⁶ But the motivation behind the concordance clearly antedated the reception of Aristotle, and the most recent assessments of Vincent of Beauvais emphasize the extent to which he too steered clear of Aristotle and the controversies surrounding him.¹⁵⁷

Even before the reception of the new texts of Aristotle, Hugh of St. Victor (1078–1142) advocated an encyclopedic approach to the Holy Scriptures — "learn everything; you will see afterwards that nothing is superfluous" — and to knowledge in general — "hold no learning in contempt, for all learning is good." Further such variations on Piminy's "no book so bad . . ." appeared in the prologues of other medieval encyclopedias.¹⁵⁸ This new attitude more than any objective case of overload was the most important factor, I would argue, driving the appearance of the exhaustive and universalist ambitions of the largest reference books of the thirteenth century.¹⁵⁹ Although the Rouses emphasize that early indexes enforced a narrow canon of authoritative positions and topics, the tool itself could easily be applied to an increasing diversity of material.¹⁶⁰ Even if the *Speculum* was copied only in parts, Vincent of Beauvais exposed the reader to multiple opinions on any topic he discussed. Neither the concordance nor the encyclopedic compendium resolved the textual difficulties or contradictions that they helped bring to light. Vincent explicitly left to the reader the task of reaching a final conclusion amid the diversity of authoritative opinions that might exist on a question: "I am not unaware of the fact that philosophers have said many contradictory things, especially about the nature of things. . . . I warn the reader, lest he perhaps be horrified, if he finds some contradictions of this kind among the names of diverse authors in many places of this work, especially since I have acted in this work not as an author, but as an excerptor, that I did not try to reduce the sayings of the philosophers to agreement but report what each said or wrote on each thing, leaving to the judgment of the reader to decide which opinion to prefer."¹⁶¹ In this way the pressures of the multitude and diversity of authoritative opinion, already articulated in the previous century by Peter Abelard (1079–1142), were heightened by the development of reference books, from indexes and concordances that made *originalia* searchable and to the large compilations that excerpted and summarized from diverse sources.

By the middle of the thirteenth century, the principal ingredients both of a perception of overload and of solutions to it were in place. Even before the re-

ception of Aristotle and his Arab commentators, but all the more so after it, an elite of scholars cultivated access to a vast and continuously increasing corpus of biblical, patristic, ancient, Arabic, and scholastic opinion and commentary. They devised new tools of text management, such as alphabetical indexing, systematic sorting, logical divisions of a text, and the visual cues for navigating them, and cultivated a new universalist ambition to accumulate material beyond the requirements of a particular profession. During the later Middle Ages a staggering growth in the production of manuscripts, facilitated by the use of paper, accompanied a great expansion of readers outside the monastic and scholastic contexts.¹⁶² The rhetoric of overload, of “infinite volumes,” of the “variety of writers and of books,” and of the “infinite deeds of history” spread to other genres, such as historical compendia.¹⁶³ Judging from the copies now extant, the number of compilations, especially florilegia and encyclopedic compendia, continued to grow as more writers engaged in selecting and summarizing for their own use and that of others.¹⁶⁴ Together with the techniques of summarizing and selecting inherited from antiquity, the new methods devised by the mid-thirteenth century formed an effective and sophisticated set of tools that remained central to information management into the early modern and the modern periods.

IMPACTS OF PRINTING

This brief survey reveals that many features we associate with early modern and modern reference works were present in scribal contexts, including compilation, even on a large scale (e.g., Vincent of Beauvais, the *Suda*, al-Qalqashqandi, or the *Yongle Dadian*), and various forms of order (systematic, alphabetical, or miscellaneous) typically made visible in the page layout and subdivisions of the text. With these examples in mind we can resist any simple causal claims between the invention of printing in Europe and the nature of early modern reference genres. For example, it is not the case that alphabetical indexing, or large-scale compiling, or consultation/extensive reading first appeared with printing. Printing spread familiarity with the trappings of consultation reading to larger and more diverse audiences and facilitated the production of larger and more numerous books, but only a few features of the early printed book were innovations: the title page, which became necessary to market books produced on speculation rather than mostly on commission, and new methods for signaling section breaks and hierarchies given the greater inconvenience of introducing red (or other colors), whether by hand or in two-tone printing.

Historians of the book have debated the impact of printing at different levels, from broad cultural trends to narrow technical ones. The more general cul-

tural consequences of printing are particularly hard to disentangle from those of multiple other cultural changes under way during precisely the same time.¹⁶⁵ In Western Europe, unlike in China, for example, the invention of printing coincided with multiple challenges to received opinion that originated from other causes (the recovery of new ancient authorities, travel and the discovery of a new world, and religious schism) and that spawned new habits of critical thinking and new philosophical systems founded on empirical and rational argument. Just as these various movements would have developed differently without the presence of print, so too the impact of the technology would have been different if it had not coincided with these movements. Instead of trying to reduce the complex causal nexus behind the transition from Renaissance to Enlightenment to the impact of a technology or of any particular set of ideas, we can examine how contemporaries responded to an increasingly abundant and varied range of sources of information, both in theory and in practice.

Initially, the dominant reaction to printing was one of great admiration for it as a “divine invention.”¹⁶⁶ Contemporaries were impressed with the labor that printing saved, although quantitative estimates of the savings varied and are probably more rhetorical than reliable: one contemporary marveled that “as much can be printed by one man in a day as could be written in a whole year by many scribes.”¹⁶⁷ With more realistic attention to the infrastructure involved in a print shop (where more than one person was generally employed), an Englishman in 1630 estimated that four men could print in a day what it used to take ten men a whole year to write by quill.¹⁶⁸ Another noted that the printers did not even need to be learned in letters.¹⁶⁹ Contemporaries also noted a great drop in book prices due to printing. Printing made books affordable to greater numbers than before, as various humanist observers noted, whether they felt this was for the better (Andrea de Bussi, Ludovico Carbone) or for the worse (e.g., Hieronymo Squarciafico).¹⁷⁰ Finally, printing promised preservation: if the ancients had had printing, their works would not have been lost — this comment by Ludovico Domenichi was so appealing that it was plagiarized by his rival Anton Francesco Doni.¹⁷¹

Alongside the praise contemporaries also voiced complaints. The earliest kind of complaint concerned the quality of the books printed and the errors they contained, whether because the books were hastily composed and corrected or because they were based on poorly chosen manuscripts. In either case the profit motive was perceived to threaten the quality of the final product, just as similar concerns are raised today about projects to digitize books. Some humanists advocated regulations to guarantee the quality of printed editions. One of the first edicts of censorship, issued by the archbishop of Mainz in 1485, was issued to guard against faulty printing and false attribution of authorship as well as affronts

to the church.¹⁷² But these efforts had little impact and were soon overshadowed by more strenuous religious censorship established in the wake of the Reformation in both Protestant and Catholic places. By mid-sixteenth century comments on the impact of printing often focused on the vast and cumulative increase in the number of books being written and printed. The multitude of books became a refrain that authors used to motivate their own diverse projects, whether in the abundant spirit of Pliny or the restrictive spirit of Seneca, because they could expect their readers to be swayed by this argument from common experience, as I will discuss in more detail below.

The most easily identified consequences of printing are ones on which contemporaries did not comment but that created the trappings of the book with which we are still familiar, including title page, pagination, and finding devices. The earliest printed books consisted of texts already available in the Middle Ages and printed to mimic medieval manuscripts. Among reference works the *Catholicon*, the carefully alphabetized large Latin dictionary composed in 1286, was the first to be printed, by Gutenberg in 1460 and again in 1469. In these first years of working with movable type, Gutenberg used his second edition of the *Catholicon* to experiment with casting type not letter by letter but in two-line slugs that could be reused in later printings, saving the labor of distributing then resetting the type letter by letter. The technique was a kind of linotype, two lines at a time, which played a central role in the mass production of cheap print in the nineteenth century, along with its full-page equivalent, the stereotype, used in setting type for newspapers, for example. But in 1469 the experiment was not repeated.¹⁷³ Nonetheless it shows that Gutenberg anticipated reprinting the *Catholicon* even beyond the second edition for which he cast the two-line slugs. Indeed, the *Catholicon* was printed at least nine more times before 1500 (though not again by Gutenberg) and offered a good example of the strong commercial viability of the printed reference book from the very beginning. The dictionary remained the best selling of the reference genres. Ambrogio Calepino's *Dictionary* of 1503 rapidly pushed the *Catholicon* off the market and performed even better, with one edition every two years on average (compared to one every four years for the *Catholicon*) until 1700.¹⁷⁴

The earliest printed books looked just like their manuscript counterparts, but by 1500 or so printing had caused a number of changes in the look of reference works, as in other genres, including the use of white space rather than color on the page to guide the reader through the text, a title page, and folio or page numbers, which then served as the principal locators in additional features like indexes or lists of errata.¹⁷⁵ In medieval manuscripts of reference works color was especially valuable in making a text or finding device more easily consultable.

Rubrication typically highlighted each new entry in a dictionary or florilegium; it played an essential role in manuscripts in which entries followed one another with no line break, to maximize text on a page. Rubrication involved the extra expense of hiring a rubricator in addition to the scribe who copied the text. As a result a number of manuscripts of reference tools were plain though they seem considerably more difficult to use as a result.

Printing produced a text in black. Two-tone printing in red and black was occasionally used in the early modern period, notably for title pages and some calendars, but it required considerable extra work and expense to run each page through the press a second time to apply the red ink. During the incunabular period (to 1500) owners of early printed books could pay a rubricator to apply color to their texts. But that profession, dependent on commissions to rubricate manuscripts as well, soon dwindled.¹⁷⁶ Printing encouraged other ways of enhancing the legibility of the page, through the use of blank space, varied fonts, and typographical symbols or woodblock decorations or illustrations. Reference works in particular were often the site of such innovations, which facilitated consultation. By contrast, other long works shunned such devices. For example, Montaigne's *Essays* (1580) did not even include paragraphs within chapters, some of which spanned up to one hundred pages of continuous prose.

Reference books were also the site of innovations in textual locators. From the beginning printing prompted the numbering of sheets in the form of signatures to aid printers and binders. Folio numbers on each leaf were the first numbers provided to aid readers; in printed editions folio or page numbers were almost always preferred over layout-independent forms of reference for tools, such as tables of contents, indexes, and errata lists, even though the numbering had to be redone in every new edition as a result.¹⁷⁷ Pagination with Arabic numerals on both sides of a page was probably first used in a 1513 edition of Niccolò Perotti's *Cornucopiae*. This commentary on Martial's epigrams offered a wide-ranging commentary on every word that Martial used and was valued as the most sophisticated Latin dictionary of its time. But since the words were discussed in the order in which they appeared in Martial's poems, a powerful alphabetical index was essential. The printer Aldus Manutius of Venice explained the novelty of using page numbers in his index: "a very copious index in which each word that is sought can most easily be found, since each half page throughout the whole work is numbered . . . with arithmetical numbers." Not coincidentally, Aldus was also a learned humanist himself and maintained a reputation for high-quality imprints. Another great humanist printer, Johannes Froben of Basel, introduced further refinements in textual locators. The errata sheets of the 1528 edition of Erasmus's *Adages* by Froben referred to passages by page and line number, prob-

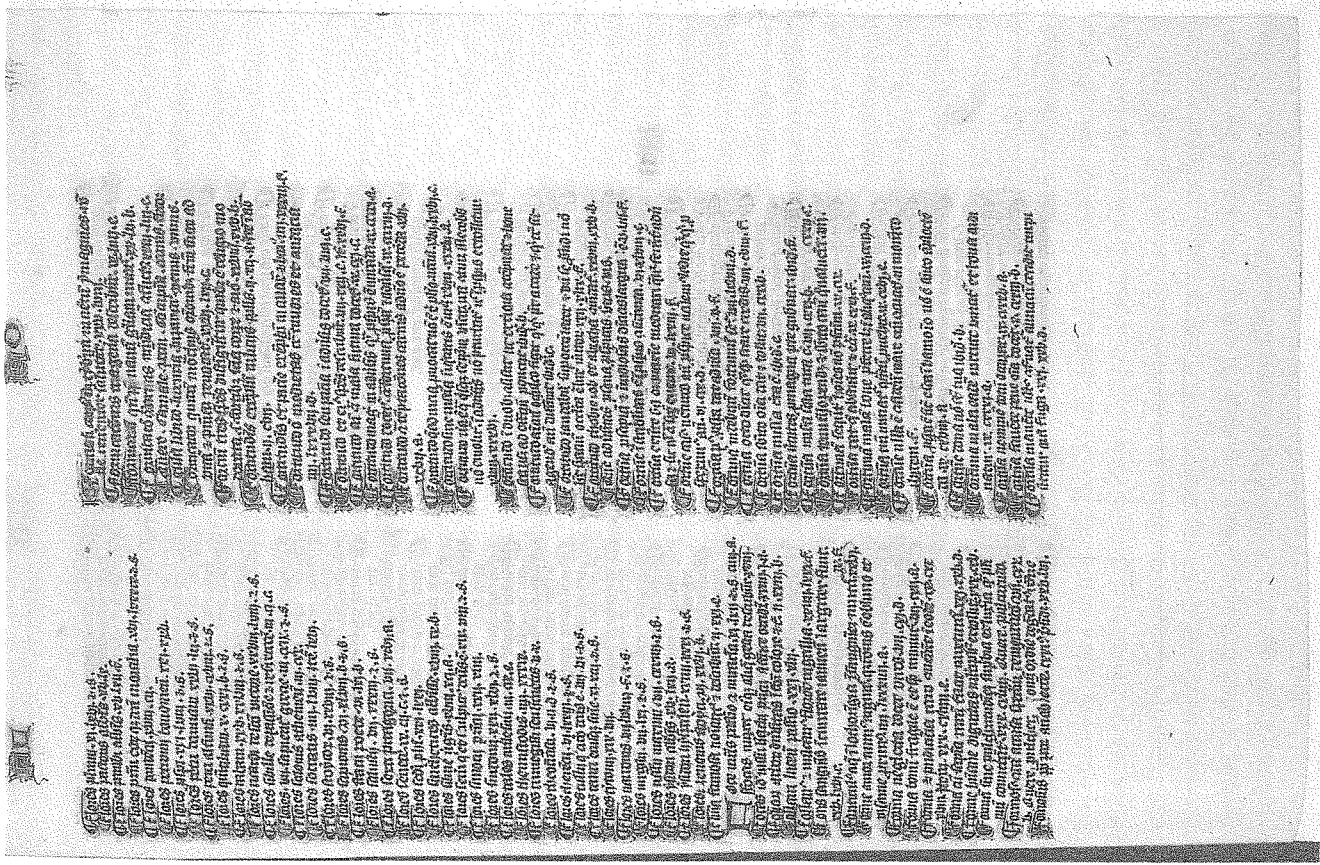


Figure 1.1
A fourteenth-century manuscript of Jean de Hautfuney's index to Vincent of Beauvais's *Speculum historiale* (1255). The red and blue rubrication added to the expense of producing this manuscript but also made it easier to consult. Reproduced with permission from the Bibliothèque nationale de France, Paris, MS Lat 14355, f. 353r.

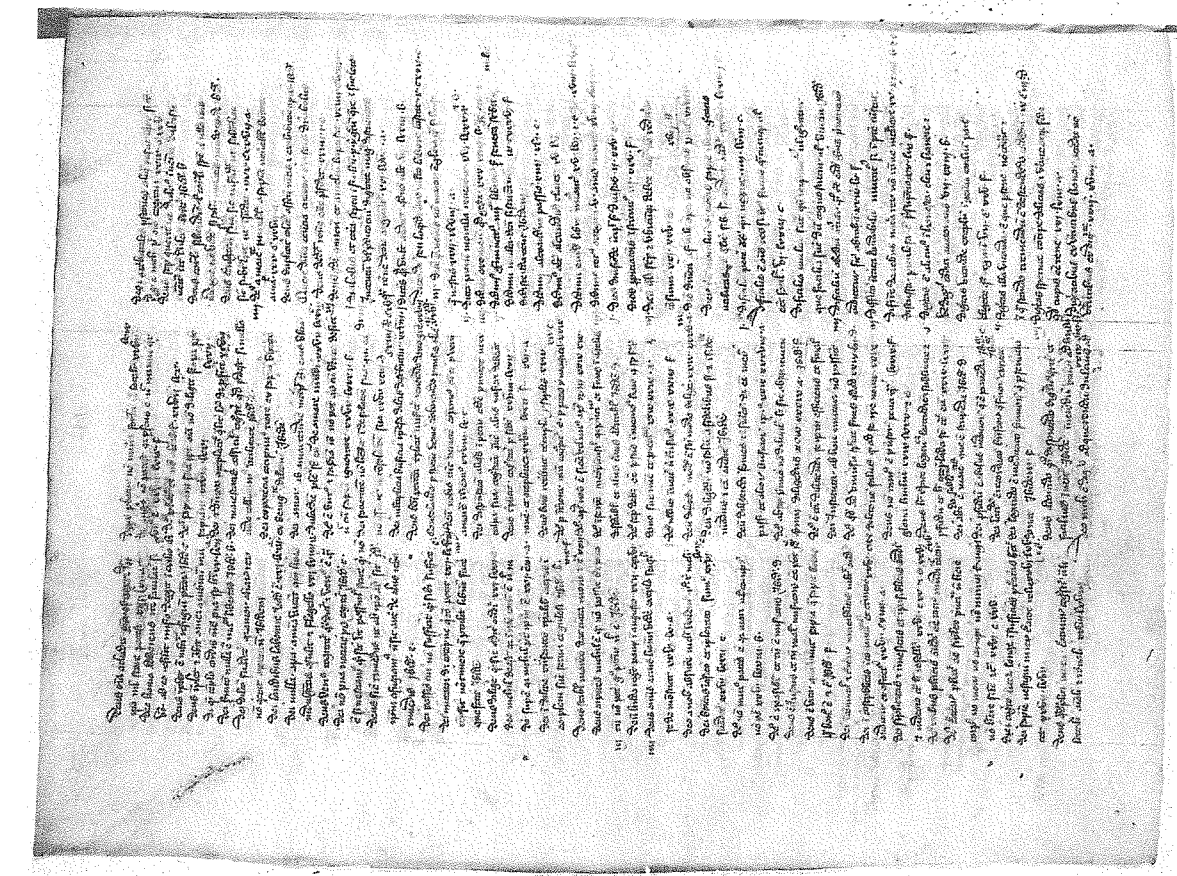


Figure 1.2
Another fourteenth-century manuscript of Hautfuney's index to Vincent of Beauvais's *Speculum historiale*. The absence of rubrication and the narrower columns make the entries harder to identify although the two indexes contain the same information. Reproduced with permission from the Bibliothèque nationale de France, Paris, MS Lat 14356, f. 17v.

ably for the first time; the index in that edition referred to page numbers and specified beginning, middle, or end (p, m, f, respectively), and in later editions of the *Adages*, passages were identified by page number supplemented by a capital letter A through F printed alongside the columns of text.¹⁷⁸

Above all, printing changed the economic dynamics of book production. Manuscripts were most often produced on commission, with payment or a promise to pay preceding the requisite investment of materials and time. By contrast, printers did much of their work on speculation. They invested considerable capital in the metal type, the paper, and the labor required to print a book and then needed to recover expenses and make a profit by selling the copies. The printer would profit only if enough copies were sold and could easily fall into debt and bankruptcy if not. Scholarly books especially sold slowly, and printers traded their stock of unsold printed sheets to help reach new markets and diversify their offerings.¹⁷⁹ To mitigate the risks involved and to generate revenue to fund the capital outlay required to print a large book, printers also took on small jobs, often paid for in advance (government decrees and forms or indulgences), or short works (pamphlets or almanacs) that could be finished and sold rapidly.¹⁸⁰ We have little firm evidence for the print runs common in the fifteenth and sixteenth centuries—they varied according to the kind of book and its estimated salability, but the economics of printing created a threshold for a print run below which it was not commercially viable to invest in printing the book. A number of incunabula mention that 300 copies were printed, though this figure may have become formulaic. Most scholars assume that despite contextual variations, print runs generally increased during the sixteenth century—1,000 is often used as a ballpark estimate.¹⁸¹

Expensive books (illustrated or very large) required a larger print run to create the possibility of a profit, given the greater expenses involved in producing them. Sebastian Münster's heavily illustrated *Cosmographia* was a particularly costly production for the printer, despite the voluntary contributions made by some of the cities featured in the book; we know that the edition of 1550 was printed in 3,600 copies.¹⁸² Although I do not have any evidence for particular print runs of the printed reference books I have studied, we can reasonably assume that since these books were large, they were printed in numbers at the higher end of the scale—at least in 500 to 1,000 copies per edition. Despite the existence of commercial scriptoria (which produced manuscripts in bulk and on speculation) in certain university centers like Paris, printing multiplied books on a completely different scale from that of a manuscript economy.¹⁸³ The differences between manuscript and print production were especially acute in the case of large books. In a manuscript economy large books were very expensive to copy entire and

were often copied only in parts selected to suit the commissioner's interests.¹⁸⁴ By contrast, printers had incentive to produce large books in more copies than smaller ones to allow the possibility of a profit, and generally entire, since to sell as many copies as possible required appealing to as many different readers and sets of individual interests as possible.

The need to sell books once they were printed also accounts for the appearance of the title page among early printed books. Medieval manuscripts did not include title pages, and bibliographers identify them by incipit or opening words: no special markers were needed to recognize a book that one had commissioned and waited for while it was copied.¹⁸⁵ By contrast, a printed book needed to appeal to buyers who had no advance knowledge of the book, so the title page served as an advertisement, announcing title and author, printer and/or bookseller (where the book could be purchased), generally a date of publication, and also additional boasts about useful features—"very copious indexes" or a "corrected and much augmented" text. Title pages occasionally made deceptive claims, proclaiming novelty where there was little or none, for example.¹⁸⁶ The variation bibliographers have observed among copies of a hand-printed edition was not considered deceptive: when errors were corrected during a print run, the uncorrected sheets were used alongside the corrected ones, resulting in usually small differences between the copies within an edition.¹⁸⁷ To make a more radical correction, printers could also replace a whole page or quire with a new one (called a cancel). Occasionally printers introduced a new title page proclaiming a new and improved edition to dress up and help sell copies of an old book that remained unsold (in which case bibliographers speak of a new issue rather than a new edition of the work).¹⁸⁸

Title pages reveal that indexes were a major selling point with sixteenth-century buyers. In the Middle Ages indexes were few in number and generally separate from the works they indexed. In a printed reference book each copy combined text and index, although indexes to major works (e.g. Bible, Galen, Aristotle) were sometimes printed separately. Medieval indexes used perfectly effective modes of reference by book, chapter, and section, which might have been copied into print and been usable across different editions as well as manuscripts, but printed indexes were generally made specifically for each edition by referring to page or folio number. It is possible that printers avoided layout-independent locators in their indexes in the hope of luring buyers to purchase a new edition for its new and improved index. Certainly printed books spread familiarity with indexes to a much broader readership than that reached by medieval indexes. Even vernacular works and "accessible" genres like dialogues featured indexes. Presumably printers invested the extra effort and expense because

they expected the index would help sell the book, whether the index suggested gravitas or usefulness or both to potential buyers.¹⁸⁹

While these changes in the presentation of the book were manifest within the first fifty to seventy years after Gutenberg, the cumulative impact of printing elicited comment starting in the sixteenth century in a refrain often repeated down to the present. Clearly the printing press vastly increased the number of books available for sale. To put specific numerical values on this growth has proven remarkably difficult, however, given the variability of print runs among other features of handpress printing. Estimates for the number of books printed before 1500 range from 8 million to 20 million copies, despite the existence of a near-exhaustive catalog of incunabula totaling some 27,000 imprints.¹⁹⁰ After the incunabular period we have no complete listing of European imprints. Estimates based on the holdings of libraries that were supposed to receive copies of all printed works, such as the French royal library, are problematic because the deposit system was not effective, with perhaps less than half of Paris imprints arriving in the royal collections, not to mention provincial production.¹⁹¹ The Short-Title Catalog of extant British imprints 1475–1800 is also difficult to turn to careful statistical use because it does not distinguish first editions and reprints. Nonetheless, it shows impressive increases, from 416 titles in the incunabular period to 4,373 titles printed between 1500 and 1550. In the seventeenth century production spiked from some 500 imprints per year up to an average of 2,000 per year during the unregulated period of the civil war (1643–60), a level that was reached again only after 1685. Print production then rose steadily to an average yearly output of 4,000 by 1775 and more steeply to 8,000 titles by 1800.¹⁹²

Even without satisfactory figures, we can conclude that the cumulative impact of printing was massive and constantly increasing printing production. New imprints tended to add themselves onto, rather than displace, earlier ones. Only ephemeral cheap imprints, like pamphlets and almanacs designed for short-term impact, were likely to be reused for the paper itself, for example, in wrapping goods. Some imprints were meant to supersede and replace older ones, but the latter could often find new owners through the market in used books.¹⁹³ Historians can most easily document the accumulation of books in the increasing sizes of libraries of all kinds from the fifteenth to eighteenth centuries. The largest private collections reached 3,000 or 4,500 volumes in the late sixteenth century and tens of thousands of volumes in the mid-eighteenth century. (Hans Sloan owned 45,000 books and 4,000 manuscripts at his death in 1753.)¹⁹⁴ There were certainly objective grounds for the perception of a new and increasing abundance of books in the Renaissance and beyond. But that perception was also

heightened for many scholars by their ambition to read as widely as possible and to save and stockpile as much information as possible (as I will discuss in the next chapter). Other reactions, notably ignoring or minimizing the abundance, might have been plausible under different cultural circumstances, notably if humanists had not been so keenly aware of the catastrophic loss of ancient learning and anxious to prevent future losses.

THE THEME OF THE ABUNDANCE OF BOOKS

As noted above, references to the abundance of books appeared well before the early modern period, whether cast favorably (as cornucopian abundance) or unfavorably (as overabundance).¹⁹⁵ Given the rapid accumulation of printed matter by the sixteenth century, the *multitudo librorum* was treated as a matter of general experience and agreement and was invoked in support of a variety of arguments, both familiar and new. The moralist critique of ostentatious book owning articulated by Seneca in the first century CE was at the core of Sebastian Brant's complaints in his *Ship of Fools* (1494).¹⁹⁶ And in 1566 Jean Bodin echoed the authors of medieval historical compendia when he observed that "the life of a man, however prolonged, is hardly sufficient for reading" histories.¹⁹⁷ Authors of reference books (including compilations, bibliographies, and guides to libraries) typically invoked the *multitudo librorum* to justify their work in a tone that was often appreciative of abundant accumulation. Others complained of overabundance of books to target writings that struck them as bad in some way.

Humanist concerns about printing motivated one early appearance of the theme, in Erasmus's famous digressive commentary on the adage *festina lente* (make haste slowly), first published in 1525: "Is there anywhere on earth exempt from these swarms of new books? Even if, taken out one at a time, they offered something worth knowing, the very mass of them would be a serious impediment to learning from satiety if nothing else, which can do far more damage where good things are concerned or simply from the fact that men's minds are easily glutted and hungry for something new, and so these distractions call them away from the reading of ancient authors." Erasmus complained here about a flood of new books because these were of lesser value than ancient texts and distracted readers from true learning. Erasmus blamed the flood of bad new books on printing. In part in order to heighten his praise of Aldus as the ideal printer, Erasmus noted by contrast that most printers, given the absence of regulations, "fill the world with pamphlets and books [that are] . . . foolish, ignorant, malignant, libellous, mad, impious and subversive; and such is the flood that even

things that might have done some good lose all their goodness."¹⁹⁸ The overabundance of bad books drowned out even any good bits that might be present among them.

Just as Erasmus sought to promote the publication and study of high-quality humanist texts, but with a different benchmark of goodness, the reformer John Calvin (1509–64) complained "of that confused forest of books" in order to recommend the writing of "grave commentaries, erudite and solid coming from pious and right-thinking men gifted with as much authority as judgment."¹⁹⁹ Each invoked the plethora of bad books around them to call for more of the kind of good book (humanist or pious) that he hoped to produce and promote.

A complaint more specific to the quantity of books was articulated in 1522 by the jurist Giovanni Nevizzano of Asti (d. 1540) who observed that the great number of available books made it hard to find the books one needed. Proper selection among the many books available was crucial because "if a scholar does not have the books required for his subject, he does not enjoy the privileges of a scholar."²⁰⁰ Some new genres responded precisely to these concerns, offering guidance about choosing books in bibliographies and books on how to form libraries. The authors of these books about books often feigned frustration at the problem of abundance—in the first vernacular bibliography Anton Francesco Doni lauded the happiness of the illiterate who were spared the "maldiction of books"—but they also relied on the theme of abundance to justify and create demand for their work.²⁰¹ In the massive *Bibliotheca universalis* (1545), spanning all known literature in learned languages (Latin, Greek, and Hebrew), Conrad Gesner (1516–65) also complained of the "silliness of useless writings in our time" and of the "harmful and confusing abundance of books," but he explicitly left the latter as a problem for kings and princes to solve. Citing Pliny's "no book so bad," Gesner made a point of accumulating information about all the texts he could learn about, barbarian and Christian, in manuscript and in print, extant and not, without separating the good from the bad: "We only wanted to list them, and we have left to others free selection and judgment."²⁰² In the associated *Pandectae* (1548) Gesner offered an ambitious thematic index to the books listed in the *Bibliotheca* (though the index to theological works appeared in 1549 and the index for medicine was never completed). These tools, he explained, would help readers identify more easily one or two books of use on a topic, amid a plethora of others, and forestall the production of further useless books.²⁰³ Even as he was critical of overabundance, Gesner exulted in it, seeking exhaustiveness in his accumulation of both themes and works from which others could choose according to their judgment and interests.

In the early seventeenth century the new genre of guides to forming and arranging a library also cited overabundance as a justification: "In our time the multitude of books becomes an immensity, so that it is more effort to find and distinguish the books than it is to obtain/read the letters [one reader has added in manuscript at 'more': 'or at least no less']." In this way Francisco Araoz, a royal official in Seville, explained the utility of his guide to the selection and arrangement of good books for one's library (published in 1631).²⁰⁴ In his book in the same genre, in 1627, Gabriel Naudé legitimated the practice of relying on the catalogs of other respected library owners to help make one's own selection "because we cannot through our labors alone come to know the qualities of all those books that we must have." For similar reasons both authors also recommended the purchase and use of reference books as aids to "indefatigable" study, since "the shortness of our life and the multitude of things that one must know today to count among the learned do not allow us to do everything ourselves."²⁰⁵

The problem of overabundance involved not only too many books, but books ferrying too many different, new, and conflicting authorities, opinions, and experiences. Books were of course only one of the media through which this diversity was diffused—letters, conversation (among other forms of orality and manuscript communication), and direct experience all contributed to the density of overload. Printed books served early on as sources of vicarious experience, diffusing travel reports to exotic places as well as to European destinations, including libraries and cabinets of curiosities. Furthermore, in a culture founded on the mastery of long-lived textual traditions, both in philosophy (centered on Aristotle) and religion (around the Bible and church fathers), the printing of new and newly recovered opinions posed with renewed intensity the difficult problem of reconciling conflicting authorities. Responses ranged from syncretism (which labored to present the diverse opinions as parts of a single truth), to arguments in favor of one authority over others (e.g., Aristotle, Plato, Epicureanism, Stoicism), to a more generalized skepticism, which questioned the possibility of reaching certainty based on any textual or human authority (a position that also had the warrant of ancient antecedent). Complaint about overabundance was often part of the skeptical stance. Francisco Sanchez, for example, exclaimed that 10 million years would not suffice to read all the books there were, in which nothing useful could be found in any case; his conclusion was explicit in his title, that "nothing is known" (*Quod nihil scitur*, 1581).²⁰⁶

References to overabundance were equally plentiful among the Moderns who responded to the skeptical crisis with calls to ignore the knowledge accumulated in textual authorities in favor of building a new philosophy from experience and

rational principles. While René Descartes (1596–1650) dismissed as inefficient the consultation of so many books to gain knowledge, Francis Bacon warned against ceasing to write books on the grounds that there so many: “For the opinion of plenty is amongst the causes of want, and the great quantity of books maketh a show rather of superfluity than lack; which surcharge nevertheless is not to be remedied by making no more books, but by making more good books, which, as the serpent of Moses, might devour the serpents of the enchanters.”²⁰⁷ Similarly François de La Mothe Le Vayer (1588–1672) worried that “the great abundance of books which one sees accumulated in so many places” would discourage new authors from writing; on the contrary he hoped that modern authors would not be deterred by the abundance of extant writings from rivaling and surpassing the ancients.²⁰⁸

In the second half of the seventeenth century the Moderns (who maintained the superiority of recent work over ancient writings) generally prevailed in more and less explicit contests with the Ancients (who viewed the achievements of antiquity as superior), but this did not spell relief from overabundance. Even in fields like natural philosophy, where ancient authorities were cast aside (Aristotle and Ptolemy for Newton and the mechanical philosophy), there were already more than enough modern authorities and works to overwhelm. Reference books focused on the new philosophy proclaimed their utility in reducing the mass of material to manageable levels.²⁰⁹ In other areas, like history, “modernity” spelled new archival and archeological research and the publication of massive collections of documents and manuscripts. Complaints about overload were a refrain throughout the activities of the Republic of Letters. Editors of collections of letters expressed the need to prune down the mass of documents, to make selections and extracts, and to work in haste.²¹⁰ Journals were often couched as a response to overabundance. Henri Basnage de Beauval (1656–1710), editor of the *Histoire des ouvrages des savants* from 1687 to 1709, spoke of the Republic of Letters being submerged by a “kind of flood and overflow of books” and proposed the book review as a remedy.²¹¹ But periodicals, including weeklies, like the *Spectator* and the *Tatler*, and daily newspapers that originated in England in the early eighteenth century, further added to the mass of printed matter.

Warnings about overabundance became more alarmist than ever, typically in service of a solution offered by their author. In 1680 Gottfried Wilhelm Leibniz complained of “that horrible mass of books which keeps on growing . . . ; the indefinite multitude of authors will shortly expose them all to the danger of general oblivion.” Leibniz concluded that “a return to barbarism” could be avoided only by coordinating energies, notably under the patronage of a great ruler like

Louis XIV. Though the circumstances of the composition of this manuscript are unknown, here as in other writings Leibniz was appealing for support for one of his many schemes for collaborative work.²¹² The theme of impending barbarity was articulated in print by Adrien Baillet (1649–1706), author of a biography of Descartes, at the beginning of his multivolume *Jugemens des sçavans* (1685), designed as observations on books for the use of his son: “We have reason to fear that the multitude of books which grows every day in a prodigious fashion will make the following centuries fall into a state as barbarous as that of the centuries that followed the fall of the Roman Empire. Unless we try to prevent this danger by separating those books which we must throw or leave in oblivion from those which one should save and within the latter between what is useful and what is not.”²¹³ The solution Baillet offered was his collection of “judgments” (akin to short book reviews) in nine volumes (and left unfinished). While Baillet was taken to task by contemporaries for many specific points in this work, his wonderfully dramatic sense of the gravity of the crisis due to the overabundance of books was not singled out for criticism.²¹⁴ This was evidently a point on which contemporaries could agree.

For a time historians spoke of a “reading revolution” in eighteenth-century Europe, a rapid shift from a predominantly intensive reading focused on a careful and repetitive reading of a small number of texts that carried authority, to extensive reading that involved skimming and browsing through a much larger quantity and range of material—especially the new periodicals and vernacular reference books that all offered indirect access to recently published books, through reviews, excerpts, debates, and cursory references. More detailed work in the history of reading has cast aside the strict periodization and the suddenness of change implied in the notion of a “reading revolution.”²¹⁵ Rather than sudden shifts, I trace the development and spread of new methods of reading alongside the continuation of older options. Consultation reading existed among the learned in earlier centuries, and in an unbroken line of transmission at least as far back as the thirteenth century, so the most distinctively new kind of reading in the eighteenth century was not consultation reading but rather engrossment in the novels that were a new and successful genre. Conversely, “intensive reading,” classically identified with repetitive meditation on the Bible, was also practiced in the eighteenth century, in religious circles at least, for example, among Pietists, Methodists, and in Catholic religious orders. (Witness the 1786 publication of Sacchini’s recommendation for intensive reading, which I discuss in the next chapter.) Proficient readers engaged in different kinds of reading depending on the text and their purpose in reading it. This is true today and was no doubt

true in the thirteenth century, though the range of options was not as broad then (without novels or periodicals); weaker readers, then as now, generally have fewer options about what and how they can read.

A study of Samuel Johnson (1709–84) has identified four different kinds of reading in which Johnson described himself engaging: “hard study” for learned books read with pen in hand, “perusal” for purposeful consultation in search of information, “curious reading” for engrossment in a novel, and “mere reading” for browsing and scanning “without the fatigue of close attention.”²¹⁶ More cheerfully than those who foretold the decline of civilization from the overabundance of books, Samuel Johnson’s friend James Boswell (1740–95) defended the state of learning in his day: “It has been maintained that this superfoetation, this teeming of the press in modern times, is prejudicial to good literature, because it obliges us to read so much of what is of inferior value, in order to be in the fashion; so that better works are neglected for want of time, because a man will have more gratification of his vanity in conversation, from having read modern books, than from having read the best works of antiquity. But it must be considered that we now have more knowledge generally diffuse; all our ladies read now, which is a great extension.” Boswell echoed some of Erasmus’s complaints but concluded with satisfaction that standards of learning had improved: “Men in ancient times dared to stand forth with a degree of ignorance with which nobody would dare now to stand forth. . . . There is now a great deal more learning in the world than there was formerly; for it is universally diffused.”²¹⁷ Whether by “ancient times” Boswell meant antiquity or the High Middle Ages or the Renaissance, his focus on the social diffusion of learning as the distinctive feature of the eighteenth century captures the main conclusion of my overview in this chapter.

References to the abundance of books occurred in many premodern contexts, mostly as moralist critique or as justification for a new work of some kind. But the abundance of texts was a perception limited to a narrow elite of the learned until the cumulative impact of printing, combined with various other factors, brought it to the experience of a substantial portion of the educated. Despite disagreement over the significance of abundance (its advantages or disadvantages and proposed solutions), there was no disagreement in Europe in the seventeenth and eighteenth centuries on the reality of the phenomenon, even if, as Richard Yeo has pointed out, individuals could still complain of lacking specific books (as we may indeed today, without denying the general phenomenon of overload).²¹⁸ The *multitudo librorum* was not an inevitable outcome of a new technology — the perception of abundance predated printing in Europe and elsewhere, and in China printing existed for centuries without being considered a cause of abundance. The invention of printing in Europe coincided with a renewed enthu-

siasm, visible in earlier centuries but revitalized by the humanists, for the accumulation of information. Large-scale compilations in print and in manuscript starting in the fifteenth century contributed to the abundance of information but also offered models for the management of it. In the next chapter I will consider the origins of these compilations in methods of note-taking by which the learned selected and sorted excerpts from their reading to store as a treasury of information, for their own benefit or that of others.