

1

INTRODUCTION

Paperworlds: Imagining the Renaissance Computer

Neil Rhodes and Jonathan Sawday

From manuscript to print

The defining moment of the European Renaissance is neither the fall of Constantinople in 1453, nor the discovery of the Americas in 1492. Rather, it was the ‘Gutenberg Revolution’ of the mid-fifteenth century which marked the emergence of modernity in the Christian west. By 1455, Johann Gutenberg, an engraver and gem-cutter from Mainz, had established the foundations of printing which were to remain virtually unaltered for the next five hundred years: a means of moulding the faces of the letters, the press itself, and oil-based inks.¹ A new world—a paperworld—had come into existence some fifty years before Columbus’s encounter with the ‘New World’ of the Americas. This paperworld was a place of the imagination and the intellect rather than a geography of curious beasts, peoples, and plants. Its growth was phenomenal. Spreading outwards from Germany, printing presses were soon established all over Europe: appearing in Italy (1465), France (1470), Spain (1472), Holland and England (1475), and Denmark (1489). Eventually the paperworld was to cross the Atlantic to Mexico City where a press was established in 1533, and later to the English speaking colonies in north America where the first press was installed in Cambridge, Massachusetts (1638).

By 1500, over 280 European towns had some form of printing press. From these presses, books were distributed in unprecedented numbers. Assuming an average print-run of 1000 copies to an edition in the early sixteenth century, it has been calculated that 20 million individual books were in circulation in Europe by 1500.² Irrespective of whether or not they could actually read the products of the presses, few Europeans at that time could have been unaware of the flood of printed material flowing out of urban centres. Potentially, the book was now a commodity, rather than (as in the manuscript world which the printing press helped to supplant) an exclusive, crafted, object. At the same time, a new occupation entered the lexicon of human endeavour. Reading, whether for instruction, pleasure, information, delight, devotion or distraction was to become at least a possibility for countless numbers of people.

The situation facing publishers and readers in the first century of print (the sixteenth century) is in many ways analogous to that facing publishers and readers in our own period, the first century of computers. Of course, the paperworld created in Europe in the mid-fifteenth century is still with us, but it might equally be true that, half a millennium later, the postmodern era will eventually be understood as beginning with the development and deployment of computing technology. Computers have already begun to complement the world of the book with the electronically

digitized reality of hypertext, hypermedia and the global network. One consequence of these new conditions is not so much the death of the book, so often predicted, as the fact that we no longer take the book for granted as the natural medium for storing and transmitting knowledge. The experience of our own new technology has enabled us to re-imagine the impact of new technologies in the past. In the pre-print age, a centuries-old, labour-intensive, under-capitalized form of production (scribal transmission) was able to create only a very few texts for an elite market. The products of this labour were too expensive to be purchased by any but a very few hugely wealthy individuals.³ Rare texts might, however, be made available to scholarship via an emerging library system, but it was not until the late nineteenth century that European states established national libraries and reading rooms, making archives and collections available to those who would have possessed neither the money nor the social credentials to access the private libraries of previous ages.⁴ Sometimes, as is well known, books were literally chained up within the libraries annexed to cathedrals, the pre-Reformation monasteries, and the universities, in much the same way that a modern PC may be protected in a public workstation cluster. A given text would exist in only a few copies (numbered in tens rather than hundreds), all of which were unique objects. Although this situation was to shift in the later fourteenth and fifteenth centuries when the curricula of European universities imposed a demand amongst students for common textbooks, the production of books in the pre-print age was essentially a craft industry. Christopher De Hamel describes that industry for us:

If a layman in the fifteenth century wanted to buy a Book of Hours, for example, he would go to a bookshop or stationer and commission one. Such shops were clustered around the cathedrals and market squares of big towns. The customer might be shown second-hand copies but if he wanted a new manuscript he would have to discuss the size and content and the extent of decoration and the price of the book. Then a time was probably agreed on, and the bookseller set to work writing the book or, more likely, subcontracting the work to professional scribes and then to professional illuminators.⁵

The very activity of purchasing books was radically different before Gutenberg. Rather than purchasing a ready-made book from a large stock of bound volumes, potential reader-purchasers were far more involved than we are in the production process, they were aware of the costs involved, and aware, too, of the necessity of tailoring their demands to the bookseller's sliding scale of prices. Like a Savile Row suit, each book was the outcome of a negotiation between the producer and the customer.⁶

In search of books

Despite the gradual appearance of the book buyer in the fifteenth century, the circulation of books was undoubtedly far more limited in the absence of print technology. Rather than texts circulating amongst communities of readers, it was the task of readers to circulate themselves around those centres where books were known to exist. Often, these travelling readers were uncertain about what, exactly, was to be found in the many scattered locations which they visited in search of books: their journeys were as much voyages of discovery into *terrae incognitae* of the past as they were attempts at working with known collections of books and manuscripts. The journeys of the humanist scholar and papal secretary, Poggio Bracciolini, in the early fifteenth century might be taken as

representative of the extraordinary efforts which were made in pursuit of books. Between 1414 and 1417, Poggio was based in Constance, where the papal court had taken up residence. From Constance he travelled widely in search of manuscripts: to the monastery of Cluny in Burgundy in 1415, where he uncovered ancient manuscripts of Cicero's speeches; to Saint Gall in 1416 where a complete copy of Quintilian was discovered; to France and Germany in the summer of 1417 where further Ciceronian texts were retrieved. After spending some time in England, in 1423 Poggio returned to Italy by way of Cologne, where manuscripts of Petronius were to be found in the cathedral library.⁷ Poggio's hunt for books and manuscripts was never-ending, but his wanderings underline just how thinly books were dispersed amongst the population of Europe before the advent of printing.

In western Europe, the only library to exceed two thousand volumes (an attainable collection for the private scholar only from the later seventeenth century onwards) was the Papal library at Avignon.⁸ Hence, the weary, time-consuming and expensive journeys undertaken by pre-Renaissance and Renaissance scholars to isolated locations where a unique text might be found, copied, or (better still) purchased or even removed. Thus the period 1380-1490 has been termed the 'heroic age' of manuscript discovery, foreshadowing, in the world of books and manuscripts, the terrestrial voyages of Columbus and his imitators.⁹ At the same time, these scholars can be compared to medieval pilgrims who sought out the sacred sites of Christendom. As a unique object, the manuscript book, particularly the devotional text, could inspire a quality of devout intensity which was to all but disappear with the widespread availability of printed books. Like the pilgrims who journeyed to Canterbury, Conques-en-Aveyron, or Santiago de Compostella, they left a physical imprint on the objects they had come to see which, centuries later, can still be perceived by the modern researcher as a kind of greasy residue adhering to the relics of the pre-Gutenberg age. In Michael Camille's words:

When I open a medieval manuscript, this is entirely different from the experience of opening a modern printed book, for I am conscious not only of the *manuscript*—the manual handling of materials in production, writing, illumination—but also of how in reception the parchment has been penetrated, of grease stains, thumb marks, erasures, drops of sweat, places where images have been kissed away by devout lips, holes of various animal eating places; in short, of how bodies, human, animal, and insect, have left their imprint upon it.¹⁰

Camille is here describing the encounter with sacred texts and images, but each book (whether its author was considered to have been a Christian or a pagan) was a unique cultural artefact, and, as such, like the pre-Reformation religious image, it might possess a quasi-mystical power, which made it worthy of something more than mere consumption.¹¹

This situation was to alter once printed books began to be more widely available. A whole new *class* of readers was to be created to whom books (Alberto Manguel writes) had become:

Less symbols of wealth than of intellectual aristocracy, and essential tools for study. After Gutenberg, for the first time in history, hundreds of readers possessed identical copies of the same book, and (until a reader gave a volume private markings and a personal history) the book read by someone in Madrid was the same book read by someone in Montpellier.¹²

The new, capital-intensive print technology of the early sixteenth century was able to produce *almost* flawless replicas of a given text over and over again. At once, the symbolic power of the

book is redefined. Comprehending the book as an intellectual tool rather than as a devotional object or as the badge of luxury, was a direct result of Gutenberg, whilst the creation of a community or network of scholars throughout Europe was equally a phenomenon associated with the arrival of print. The beguiling myth of the impoverished scholar, sustained by membership of an invisible community of the mind, could only have emerged once books were more widely available. It was the printed book, in other words, which created both intellectuals and their murky alter egos who would eventually inhabit Grub Street.

Instead of the world of the 'scriptorium' (brilliantly imagined in Umberto Eco's *The Name of the Rose*) where teams of scribes laboured in silence to produce a very few copies of a work, the 'Gutenberg Galaxy' had arrived. Just how impressive this new world must have appeared to those who witnessed the arrival of print culture is vividly conveyed in the story of Leon Battista Alberti who (according to Martin Davies), sometime before 1466, heard of the German invention of printing whilst sitting in the Vatican gardens, talking with a papal courtier. Alberti was told how it was now possible for just 3 men to make 200 copies of a single book in 100 days. The true significance of these figures can be appreciated when it is recalled just how labour-intensive was the pre-print process of book manufacture. When Cosimo de' Medici decided to provide manuscript books for a library at Fiesole, 45 scribes laboured for 2 years to produce just 200 texts, a task which was then considered a model of labour organization.¹³ We should be wary of making a direct comparison between these figures in order to calculate some putative post-Gutenberg productivity gain since, of course, the result of the labours of Cosimo's scribes were 200 *different* books, and preparing a book for the printing press was a highly-skilled and time-consuming operation. But the point remains: a small number of trained operators, together with a relatively primitive distribution system, could now spread a text throughout the literate world with extraordinary speed.

Print and the public arena

And that world was expanding in unforeseeable ways. The most famous example of the power of this new technology to participate in (or even precipitate) radical change is to be found in the experience of Martin Luther, whose early writings on indulgences have come to be seen as founding texts of the protestant Reformation. Yet the ways in which the press intervened in the communication of Luther's ideas to a wider public is still not fully appreciated outside the community of historians who have worked in this field. Luther's exploitation of this new medium gives us an insight into the ways in which the energies unleashed by the printing press, like those generated by the computer today, were beyond the power of any one individual to master. We tend, now, to perceive the pinning of Luther's famous *Ninety-five Theses against Indulgences* in placard form to the door of The Collegiate Church of All Saints in Wittenberg in the autumn of 1517 as a radically defiant public gesture against the authority of the church. And it is true that the symbolic power of the act as a way of understanding a movement as complex as the German Reformation is seductive. Yet deciding to nail a placard to a church door when the printing presses were readily available would now be seen as a fairly conservative form of public address: the potential readership was tiny, the orbit of public debate thus created was severely circumscribed.¹⁴

In fact, it is doubtful whether the traditional account of a heroic, proto-revolutionary Martin Luther defiantly pinning his *Theses* to the church door is in fact true.¹⁵ Luther first communicated his *Theses* in a private letter (31 October 1517) to the archbishop-elect of Mainz. It is possible that further handwritten copies were then privately circulated, and that, as a subject of public

academic disputation, a copy *may* have been pinned to the door of the collegiate church, since this was the 'academic notice board' of the University of Wittenberg. In other words, far from expressing some kind of radical contempt for the church (which is how the story is often uncritically understood today) Luther had behaved judiciously, even cautiously.¹⁶ True, he had initiated a public debate, but one that would be conducted according to the customary rites of scholastic disputation, in which an oral mode of address predominated.

But the very existence of the printing presses was to transform the debate in ways that Luther could never have anticipated. We do not know how many copies of the *Theses* were in circulation in the winter of 1517, but editions were soon being issued from Leipzig, Magdeburg, Nuremberg, and Basle. It has been claimed that only a tiny humanist elite had actually read the *Theses*, but nevertheless it seems that the existence of so many duplicated copies alarmed their author. Perhaps it was the very novelty of widespread distribution which prompted Luther, in March 1518, to write to a friend (Christopher Scheurl):

I did not wish to have them [the *Theses*] widely circulated. I only intended submitting them to a few learned men for examination, and if they disapproved of them, to suppress them; or make them known through their publications, in the event of their meeting with their approval. But now they are being spread abroad and translated everywhere, which I never could have credited, so that I regret having given birth to them..¹⁷

We do not, of course, have to take these protestations of innocence at face value. Luther was versed in the subtle art of disputation, where dissimulation was but one of the many weapons in the rhetorician's armoury; later, of course, disowning one's published works by claiming that they had reached the press against the author's wishes became an elaborate literary game amongst Renaissance writers. But Luther's anxiety (if we read this letter as guileless) must be one of the earliest examples of blaming the medium for the message.

Did the experience of seeing his *Ninety-five Theses* translated into print teach Luther something fundamental about the possibility of transforming a matter of scholastic disputation into public controversy almost overnight? Certainly, in his letter to Scheurl, after he has tried to evade the responsibilities of authorship, a quite different tone suddenly emerges. 'I propose issuing a book' he continues '...on the use and misuse of the Indulgences.... I have no longer any doubt that the people are deceived...'.¹⁸ There is no hint, now, of addressing an elite group of scholars and fellow ecclesiastics. Rather, Luther has understood that the medium, as much as his own words, had created an audience, and new ways of addressing that audience now had to be invented. Luther's invention, his great contribution to the paperworld, was a book whose title (now) would hardly be calculated to appeal to a mass readership. The printed *Sermon on Indulgences and Grace* was first published in April 1518. In the words of Mark Edwards, this new book 'swept through the major centres of the empire and was snapped up in large numbers by the curious'.¹⁹ Achieving 23 editions in just three years, Luther's short theological work was followed by a series of treatises aimed at what would now be termed a mass market. Edwards describes this process:

This first 'best seller' was quickly followed by a series of short German sermons and devotional works written specifically for the laity. They were issued in a handy format that was cheap to produce, inexpensive to buy, and easily passed from reader to reader.... The reading public

sought them out with an avidity that had not been seen before in the short history of printing. Dozens of different pamphlets in multiple editions of hundreds of copies each poured from the presses to meet the demand. Printers competed with each other to see who could quickly rush to market a new work by ‘Martin Luther, Augustinian’ or, as his fame grew, simply ‘M.L.A.’.²⁰

Few historians would argue that a movement as politically, intellectually, and socially complex as the Reformation was *created* by the new technology, but it is equally difficult to imagine the extraordinary speed with which a centuries-old mode of thinking could have been so radically questioned in such a relatively brief period in the absence of a new means of disseminating ideas. Note, too, the appearance of a whole set of terms and activities which would have been inconceivable in the pre-Gutenberg age. It was the paperworld which coined terms such as ‘mass readership’, ‘best seller’, and ‘reading public’, even if, by modern standards, the numbers involved as a proportion of the total adult population were still small. Equally, it is now quite possible to term Luther an ‘author’, in the modern sense, of the texts which printers were scrambling over one another to produce and distribute in such numbers. Many individuals could now own books, amass their own libraries, refer in their correspondence with one another to texts in commonly available editions, and (a dangerous undertaking in the manuscript age) even pass texts from hand to hand.²¹ Above all, as Luther’s own words testify, an entirely new social entity had been created, one which had never existed in any previous age. ‘The people are deceived’ Luther had written, believing that it was now his task to undeceive them. In that phrase one glimpses the shadowy outline of a new social structure emerging: a public arena, a place of uncontrollable and noisy debate, dispute, and exchange. Within just a few years of their first appearance, the Mainz engraver’s creaking contraptions of wood and metal had begun to refashion the mental world of Europeans.

The Renaissance computer

The parallels between the dispersal of the products of this new technology in the early sixteenth century and our own experience of technological change in the twentieth century are striking. In our own age computer-based storage and data manipulation systems began their existence only within large-scale institutions or corporations as the preserve of a technocratic elite, but then became so cheap that a PC could be individually owned. Similarly, in the earlier age, the book was gradually to emerge from the cathedral or university library to enter the private study of the humanist scholar. An object of private consumption had been created, the focus of solitary pleasures. As in our own period, this passage between technologies involved massive conceptual reorientation. Scribal technology, particularly during the twelfth century, had begun to develop a series of conventions by which large volumes of information could be stored, indexed, found and re-found.²² With the advent of printing, these conventions were expanded on an enormous scale, becoming ever more sophisticated or powerful. The modern ‘search engine’ had arrived, so that, in Anthony Grafton’s words, ‘where Medieval humanists accumulated . . . Renaissance ones discriminated’.²³

In the west, the book or codex had become the standard format for storing printed material because it possessed clear advantages over the only other form of storage and retrieval available—the roll.²⁴ The book might contain tables of contents and indexes, running heads, chapters and partitions, all of which enabled a more rapid searching of its contents backwards and forwards. The roll or *volumen*, on the other hand, because of its format, tended to be read sequentially. ‘Searching’

a roll, in the modern sense, was simply far more difficult than thumbing backwards and forwards through a book.²⁵ But it was the very multiplicity of printed books that rapidly schooled their readers in *how* to read. The reader had to learn how to participate in the construction of a text, searching it in ways that the author might never have anticipated, yoking ideas together which were to be located at different points in the work, even comparing the ideas or texts to be found in different sources with relative ease. The modern researcher's desk, cluttered with leaves of paper and writing implements, overflowing with opened books piled on top of one another, had arrived.

At the same time, the printed page, with its system of sections and subsections, footnotes, marginal notes and paragraph divisions developed a standardized spatial display: different typefaces might denote hierarchies of information; graphics and illustrations, sometimes (in the case of medical works) deploying the new device of a keying mechanism to relate word and image, complemented what was to be found in the text. More than this, printed pages, despite the variety of typefaces that were available, *looked* similar to one another. In the first age of print, two main typefaces were in circulation in Europe: Gothic or Black Letter, and the Roman face known as Latin or Antiqua, but by the end of the sixteenth century, Roman type had become the dominant printed form.²⁶ In the manuscript world of the *scriptorium*, by contrast, widely different, localized, scripts evolved, which might be unique to a particular monastery or group of monasteries: the M produced in St Mary's Abbey at York, for example, or the Q of the Austin Canons of Carlisle, were both letter forms which were peculiar to their specific places of origin.²⁷ In the scribal world, there was very little quality control.²⁸ As in our world of computers, where one corporation is rapidly coming to dominate the entire digital world and impose its standards on all other enterprises in the market place, so the arrival of print might be compared to the creation of a new 'Disc Operating System' for the storage and transmission of ideas. 'Print gave texts fixity, for good or ill' Martin Davies observes.²⁹ More than this, print taught readers what to expect of a book, and enabled them to pass with ease from one book to another. Once readers of print had acquainted themselves with the generic idea of the page, they could turn from book to book with little or no difficulty. A modern reader, turning to a sixteenth-century printed book, is broadly familiar with the conventions according to which the pages operate, because those conventions have remained remarkably stable over the centuries. In contrast, reading a manuscript book involves becoming familiar with a vast range of different page formats and letter forms. Abbreviations and contractions, for example, abound: does the abbreviated *mia* represent the word *miseria* or *misericordia*?³⁰ Handwriting styles, equally, varied enormously in the manuscript world according to both chronology and location. Between the fifth and the eleventh centuries, no fewer than five distinct 'national' hands have been identified: Irish, Anglo-Saxon, Merovingian (France), Beneventan (Italy), and Visigothic (Spain). Merovingian was, in turn, to evolve into a standard Carolingian Minuscule in the ninth and tenth centuries, and then fragment once more into different English, French, German, Italian, and Spanish varieties.³¹ The twentieth-century reader of early manuscripts, faced with this profusion of forms, styles, and layouts, soon realizes that their own reading 'software', capable of coping with a printed page originating from any number of European or New World presses operating over a wide chronological range, is just not capable of accessing the data of the pre-Gutenberg world without first mastering an entirely new set of reading skills.

The early printers, combining the functions of venture capitalists, publishers, literary agents, typesetters, marketers, distributors, and retailers, found themselves experimenting with all manner of different methods of presenting knowledge and information (although a distinction between these terms would have made little sense within this context). At the same time, they developed

sophisticated retrieval systems so that the older methods of storing and retrieving information were supplemented, and then superseded by new organizations, or systems, of data manipulation. It is important to stress just how slowly these new systems of knowledge storage and retrieval evolved. For example, a basic ‘tool’ of data storage and retrieval in the modern world is the use of the alphabet as a classificatory system. To imagine a world in which information is not stored alphabetically is, now, almost impossible; yet this seemingly natural aid to data manipulation only came into widespread use over a lengthy period of time. The use of the alphabet as a classificatory system was known some 250 years before the birth of Christ, and was deployed in the eighth-century Leiden Glossary, whilst (according to Jonathon Green) ‘the first three-letter ABC-order [glossary] has been traced to a 94-page tenth-century manuscript’. But it was still possible, in 1554, to produce a best-selling Latin-English dictionary (by John Withals) organized thematically.³² Alphabetization, Tom MacArthur has observed, ‘must have seemed a perverse, disjointed and ultimately meaningless way of ordering material to men who were interested in neat frames for the containing of all knowledge’.³³ Indeed, it was not until the seventeenth century that the arbitrary alphabet became the dominant means of storing and retrieving information within books.

The databases of the Renaissance computer are the great collections of knowledge assembled by the humanists: rhetorical thesauri, dictionaries, mythologies, histories, atlases and cosmologies. These were passed over to the printers to emerge as ‘encyclopaedias’, ‘mirrors’, ‘anatomies’, ‘theatres’, ‘digests’, and ‘compendia’, terms which suddenly proliferated in the sixteenth century. These collections became far more than mere repositories of knowledge. In the seemingly limitless world of production, distribution, and retrieval spawned by print culture, a new model of the human mind itself began to emerge. In much the same way, the advent of digital technology has helped us to re-imagine the operation of the brain, so that we now use metaphors of the web or net to describe both our modern information systems and the mind’s own ‘operating system’.³⁴ One (famous) example of a sixteenth-century ‘mind model’ is offered in the ‘House of Alma’ section of Edmund Spenser’s *Faerie Queene* (1590). Anamnestes the elderly and infirm ‘man of infinite remembrance’, together with his younger assistant, Eumnestes, lurks in his chamber which is:

...hangd about with rolles,
And old records from auncient times deriv’d,
Some made in bookes, some in long parchment scrolles.
These were all worme-eaten, and full of canker holes.

(II. ix. 57)³⁵

This moth-eaten library, in which the two librarians toil ceaselessly, is an image of the human mind, endlessly turning over fragments of experience, imagined as gatherings of books and manuscripts. But this Borgesian structure, like the mind, is imperfect in its recollections: sometimes the records are ‘lost’ or ‘laid amiss’. The essence of the problem, Spenser had realized, was that there was no efficient, stable, method of classification and indexing. The imaginary library in ‘The House of Alma’ functions imperfectly since, it was believed, the operation of the fallen human intellect was not itself perfect. By the same token, what method of classification is ever anything other than an arbitrary imposition of order on a disordered or fragmentary universe? Then, as now, new technology seemed to promise the realization of that ancient dream of the scholastics of amassing universal knowledge (*omne scibile*—all that is knowable) in an infinite library, but the reality was rather harder to achieve.³⁶ The ancient library of Alexandria, with its fabled collection of half a

million scrolls, might have represented, to the ancient world, a form of collective memory, but how would it be possible to access this tremendous store of recollection?

The relationship between the age of print and the electronic age was first discussed, in very different styles, in the extraordinarily prescient work of Walter Ong and Marshall McLuhan, raising issues that are only now beginning to occupy a central role in academic debate in the humanities. As this debate becomes more intellectually sophisticated, and with our widening experience of the cultural impact of the computer, many of their claims have been challenged, but their influence should not be doubted. It was McLuhan who coined the term 'surfing' in an electronic context in the early 1960s, thirty years before it came into general currency as use of the world wide web spread. McLuhan's catchphrase from the same period, 'the medium is the message' has resurfaced in the sociological bibliography of D.F.McKenzie and work on the history of the book by Roger Chartier in the assertion that 'Forms effect [sic] meanings'.³⁷ Walter Ong's studies of rhetoric and orality together with McLuhan's more anarchic exploration of the electronic media have fed directly into our new perceptions of the relations between speech, writing, print and screen.³⁸ At the same time, under the aegis of the 'New Philology', the nature of orality and writing in medieval culture has been re-examined in recent years.³⁹ Modern experience of multimedia delivered via the computer is prompting us to think again about the relations between voice and script, text and image in earlier periods.

One aspect of Ong's work which has been challenged (as it is in the pages of the present book) is the extent to which the experiments of the early printers in presenting knowledge through this new medium led to a reconceptualization of space itself. Ong argued that 'the format of printing involved a radically different commitment to space', developing new intellectual processes which brought about a move from 'the stage at which a book could be assimilated only by being read through...to the definitively typographical stage, when a book could be assimilated by being "looked through" or "skimmed through"'.⁴⁰ This transition in the process of reading is associated with the work of the sixteenth-century 'methodizer' Peter Ramus (Pierre de la Ramée). It was Ong who first alerted us to the idea that Ramus was a significant figure in any discussion of the cultural effects of printing in the early modern period. Whether or not Ramus propelled a huge shift in human consciousness is a matter for debate, and the question may largely be one of degree, but there is no doubt that he exploited the possibilities of the visual forms of print to create innovative ways of delivering knowledge and that pedagogically his influence was immense. Ramus' idea of 'Method' was seized upon by printers, so that in the second half of the sixteenth century, long before its adoption by Descartes, the term 'method' appears more frequently as part of book titles even than the more familiar mirrors, theatres and anatomies.⁴¹ It may also be the case that the Ramist method of simplifying the arts, dealing with each division of knowledge as a discrete entity operating according to its own set of rules, was developed precisely to cope with the kind of information overload, familiar to all users of the modern computer, created by the energies of the Gutenberg revolution.

But perhaps the crucial point about Ramist method, in the present context, is that it was a streamlined vehicle for the transmission of old knowledge rather than a means of discovering new, and it is this point which raises a fundamental question both about the modern computer and its imagined prototypes in the early modern period.⁴² The relative novelty of computing technology itself, and the neomania attendant upon the constant updates of hardware and software, disguise the fact that this machine also perpetuates the old. Similarly, in the sixteenth century, printers eager for copy put into circulation and prolonged the lifespan of age-old collections of knowledge about the world, which continued to have influence throughout the period of the literary renaissance in England:

Spenser's imaginary library, we recollect, was stored with 'old records from auncient times deriv'd'.⁴³ Only very gradually were these collections supplemented or replaced in the course of the seventeenth century, under the stimulus of the 'New Philosophy' of reason initiated by Descartes and his contemporaries: Hobbes, Harvey, Boyle, Newton and Pascal. The Renaissance Computer is thus Janus-faced, looking both forwards and backwards. Promising access to a new means of exploring and understanding the world, its tendency, initially, was simply to gather together ever-expanding catalogues of what was already known. Only much later would these catalogues of the known world be searched in order to make new and unforeseen connections whose validity would be tested in the laboratory or in the observation of the operation of the world itself. Hence the caution which must be exercised in distinguishing between a medieval 'accumulatory' passion, and a more analytical, Renaissance, 'discriminatory' instinct.

What we encounter, then, in the last years of the twentieth century as much as in the sixteenth century, are extended periods of overlap between two technologies: scribal and print in the Renaissance, print and digital resources in our own era. The conceptual reorientation brought about by print took place alongside surviving practices from the pre-print age. Recent work on the circulation of manuscript collections of poetry in the seventeenth century, for example, has demonstrated that this form of publication survived for two centuries after the invention of the printing press.⁴⁴ The modern researcher who, seated in the rare book rooms of the Huntington Library or the British Library, laboriously copies out passages from an early printed book is participating in an ancient tradition. Martin Davies reminds us that there are 'hundreds of manuscripts...copied from printed editions.... Necessarily, one still relied on hand copying'.⁴⁵ Even more remarkably, the academic 'lecture'—originally the reading out loud of a single, manuscript copy of a book from which students would take notes—has so far survived not only five hundred years of printing, but also the advent of the photocopier and online access to teaching materials. Whilst there may be an obvious analogy to be made between the printing press and the computer, two machines with a number of similar functions, the effects of these technologies are in some ways quite different. Print culture tended to produce a concept of the text as a relatively fixed and stable entity: the book. The great, multi-volumed, 'standard' editions of the late nineteenth and earlier twentieth centuries, for example, which stand as monuments to Victorian and Edwardian endeavour, and which encompass the canon of English letters, are also monuments to a belief in the stability of the printed word, and the possibility of freezing, for all time, that which has been thought and said. It is significant that the origins of these works are rooted in Renaissance 'standard' editions of the authors of classical antiquity, often still used as a common reference points in modern editions and translation, which first made their appearance in the post-Gutenberg era.⁴⁶ In their own sphere, nineteenth-century editions are still as impressive, and in many respects as useful, as other more widely-appreciated forms of Victorian industry—the tunnels, railways, bridges, and sewerage systems which, particularly in Britain, still form part of the (decaying) civic infrastructure. Today, the 'variorum' edition remains a highly prestigious form of published academic output, though it is one associated less with individuals, and rather more with networks of editors and institutions. Yet the very term 'variorum', suggestive of a gathering in of different states or versions of a text, indicates the enormous difficulty, even impossibility, associated with achieving such textual stability. The 'variorum' edition is, in some measure, an admission of failure, a recognition that there is no last word in textual matters.

The computer, through its possibilities for interactivity, 'play' and the creativity of hypertext, is now rapidly undoing that idealization of stability, and returning us to a kind of textuality which

may have more in common with the pre-print era. Thus, Vincent Gillespie has argued that the contemporary user's experience of hypertext '... seems to me to be similar to a medieval reader's experience of illuminated, illustrated and glossed manuscripts containing different hierarchies of material that can be accessed in various ways'.⁴⁷ Computer-generated texts, now, are beginning to exist as far more provisional entities than we have ever been used to since Gutenberg first printed books from moveable (that is, redistributable) type. 'Ink and paper' writes Leah S. Marcus 'are relatively stable media by comparison with the computer screen'.⁴⁸ This shift represents not so much the oft-proclaimed 'Death of the author' but, rather, the possibility of multi-authorship, where an individual's contribution to a scholarly or scientific debate is just one voice amongst many which go to make up the totality of responses. Consequently, the literary and legalistic infrastructure which supported the paperworld—the nexus of publishers, authors, distributors, and retailers—has begun to look increasingly flimsy as we move towards the digital world. How, in the case of an electronic 'discussion list' (which can be archived, and revisited, just as one might shelve and then retrieve a book) can one attribute 'copyright' or ownership in the words or the ideas which emerge as different 'authors' contribute to the 'thread' of discussion? Perhaps the true analogy, here, is with the scholastic disputation: a multi-vocal public debate conducted (as are so many computer-based debates on the Internet) before a largely silent audience who are able to witness the gradual construction of an argument as each of the disputants contributes to the lengthening thread of the discussion. As Dale Spender has recently observed: 'There's no ending online. There's no closure, no linear basis. It's about bringing it in, checking it out, constantly evaluating.'⁴⁹ Is the modern distinction between author and reader (producer and consumer) at the point of collapse? Did the earliest progenitors of the paperworld experience a similar *frisson* of anxiety and optimism as they contemplated the miraculously identical products of the new instrument which Martin Luther, for one, was to exploit so brilliantly?

Where there is an indisputable resemblance between the effects of the printing press and those of the computer is in the increased volume of information which both systems generate. Kathryn Sutherland has recently commented on the downside of this, pointing to the possibility that 'in its display of instantly accessible and multiply manipulable data, the computer screen will deliver information from the constraints of understanding'.⁵⁰ For the riches of knowledge substitute the impoverishment of information overload: in the words of Ovid's Narcissus, '*inopem me copia fecit*' ('plenty has made me poor'). We will need to develop techniques, as Ramus did, for coping with *copia*; and such abundance may also remind us that the products of the early printing press coincide with the period in which rhetoric achieved its highest moment of prestige in Western culture. Print technology was harnessed to create vast collections of adages, aphorisms, examples, figures of speech, proverbs and similitudes, which aimed to facilitate mastery of rhetoric and achieve what R.R. Bolgar has called 'a system of eloquence which could cover the whole range of the human mind'.⁵¹ This was the programme outlined by Erasmus, perhaps the first scholar with international connections to use new technology for networking and self-publicity. Central to Erasmus' programme was his book *De copia verborum atque rerum* ('On the abundance of words and things').⁵² The generic name for this kind of text is the commonplace book, whose cultural importance in the Renaissance has been so well described by Ann Moss. The commonplace book was a collection of useful quotations from different sources usually arranged under thematic rather than alphabetic headings. It acted as 'the principal support system of humanist pedagogy', Moss writes, and as an 'information retrieval system' responding to 'the explosion of knowledge in printed books during the course of the sixteenth century'.⁵³ While printed commonplace books abounded,

they were also part of an educational practice which required students to compile their own (manuscript) collections, so that, again, we can glimpse that overlap, or continuity, between different technological regimes. The business of gathering and arranging (or cutting and pasting) fragments of text from hundreds of authors sharpened taxonomic skills and developed encyclopaedic ways of thinking. Works such as Pierre de la Primaudaye's *The French Academy*, organized by 'days', or Thomas Heywood's *Gunaikeion*, which presents itself as a 'history'—both discussed in detail in the present volume—are products of this kind of activity. They represent a paradoxical distillation of humanist despair and optimism. Despairingly, the burgeoning of printed information has made the world more complex, more unknowable than ever. Yet, optimistically, the belief is maintained that it might still be possible to represent all knowledge within the gatherings of a single volume.

Clearly, however, there is a tension between a system in which bite-sized pieces of information could be manipulated and rearranged and that sense of 'the order of things' (the structure of correspondence), which underpinned the world views given a new lease of life by the medium of print. Here again there is a strange resemblance to modern conditions, in which certain aspects of the computer create a bewildering sense of fragmentation and disorder, while others, working in conjunction with political, economic and environmental processes, reinstate an awareness of a global network, a sense of universal interconnectedness. The early modern version of field theory and chaos theory is Montaigne's observation that 'toutes choses se tiennent par quelque similitude' (similitude binds everything together) and this is where poetry (or literature as a whole) enters the realm of the Renaissance Computer.⁵⁴ The paperworlds of the poets—of Spenser or the Renaissance Ovid—derive imaginatively from a concept of the book of nature as a giant intertext of multiple connections and allusions. So while the rhetorical programme of sixteenth-century pedagogy involved the dismemberment and dislocation of texts (terms which remind us that the text is a *corpus* and that the commonplaces of rhetoric were known as *loci communes*), it also encouraged their relocation and re-membling—or, to be explicitly rhetorical, their reconfiguration. The encyclopaedism of many texts of this period seems to be generated by a desire to 'remember' or retrieve a lost order, and especially so in the case of those texts from the later part of the period, in the works of John Donne and Sir Thomas Browne for example, where there is an awareness of the 'new philosophy' which is about to replace the structures of correspondence with a mechanistic view of nature.

The essays in this book, then, explore the technology of the early printed text to reveal how many of the functions and effects of the modern computer were imagined, anticipated, or even sought after long before the invention of modern digital computing technology. Each essay is preceded by a short editorial introduction, which highlights the significance of what follows to the themes we have set out here. In the essays, we move from the operation of memory systems now and in the Renaissance (Leah Marcus), to the emergence of key terms associated with computer culture (Jonathan Sawday). Timothy J. Reiss explores the mathematical roots of the Renaissance computer, whilst Stephen Orgel's theme is the interplay between text and image in early-modern printed books. The essay by Thomas Corns looks at some of the features we have come to associate with modern computer-generated texts, asking whether or not their equivalent was to be found in early-modern books. Andrew Hadfield is concerned with the problem of creating national boundaries now and in the Renaissance, whilst Sarah Annes Brown looks at the Renaissance response to Ovid—one of the key databases of early-modern culture. Thomas Heywood's *Gunaikeion* and the idea of a female memory bank is the subject of Nonna Crook's and Neil Rhodes's essay. Anne Lake Prescott examines the organization of knowledge within Pierre de la Primaudaye's *The French Academy*.

Organization and method is also the subject of Claire Preston's account of cabinets of curiosity in the seventeenth century. The concluding essay of the collection, by Neil Rhodes, looks at the idea of the fragmentation of systems of knowledge in the Renaissance. Taken together, these eleven essays provide us with pathways for exploring the Renaissance Computer, the paperworld of knowledge and technology in the first age of print.

Notes to Introduction

- 1 Alberto Manguel, *A History of Reading*, London: Flamingo, 1997, p. 133. Gutenberg was, of course, amongst the first of the *western* printers to use moveable type. In the east, moveable type had been known since the eleventh century.
- 2 Antonia McLean, *Humanism and the Rise of science in Tudor England*, London: Heinemann, 1972, p. 14. On printing history see also: C.F.Buhler, *The Fifteenth Century Book*, Philadelphia: Pennsylvania University Press, 1960.
- 3 Although, as Christopher De Hamel points out, by the fifteenth century it was becoming possible for laymen to commission and purchase manuscript books. See Christopher De Hamel, *Medieval Craftsmen: Scribes and Illuminators*, London: British Museum Press, 1992, p. 5.
- 4 Anthony Grafton, *The Footnote: A Curious History*, London: Faber & Faber, 1997, p. 226.
- 5 De Hamel, *Medieval Craftsmen*, p. 5.
- 6 By the late fourteenth century, some booksellers might keep a limited stock of commonly used, cheaper, textbooks, but the process we have described was still the chief means by which books came into existence.
- 7 See L.D.Reynolds and N.G.Wilson, *Scribes and Scholars: A Guide to the Transmission of Greek and Latin Literature*, 2nd edition, Oxford: Clarendon Press, 1974, pp. 120–4.
- 8 Manguel, *History of Reading*, p. 189. In England in the late sixteenth and earlier seventeenth centuries, relatively large private libraries were established by (amongst others) John Dee, John Donne, John Harington, and Gabriel Harvey. But, as Nicolas K.Kiessling has observed, it was only in the mid seventeenth-century that an era of intensive book-collecting began, when libraries such as those of John Selden (8,000 books), John Evelyn (2,000), John Locke (3,200) and Samuel Pepys (3,000) were assembled. See Nicolas K.Kiessling, *The Library of Robert Burton*, Oxford: The Oxford Bibliographical Society, 1988, p. xxvii.
- 9 See Reynolds and Wilson, *Scribes and Scholars*, p. 123.
- 10 Michael Camille, 'Sensations of the Page: Imaging Technologies and Medieval Illuminated Manuscripts' in George Bornstein and Theresa Tinkle (eds), *The Iconic Page in Manuscript, Print, and Digital Culture*, Ann Arbor: The University of Michigan Press, 1998, p. 42.
- 11 Compare Camille's comments on the physical 'strangeness' of the manuscript to Bernard Cerquiglini's comments on the 'alterity of the manuscript': 'Everything about medieval literary inscription seems to elude the modern conception of the text, of textual thought'. Bernard Cerquiglini, *In Praise of the Variant: A Critical History of Philology*, (trans. Betsy Wing), Baltimore: The Johns Hopkins University Press, 1999, p. 21.
- 12 Manguel, *A History of Reading*, pp. 137–8.
- 13 See Martin Davies, 'Humanism in Script and Print' in Jill Kraye (ed.), *The Cambridge Companion to Renaissance Humanism*, Cambridge: Cambridge University Press, 1996, p. 54, p. 51.
- 14 Though the use of posters and placards as a way of communicating radical or subversive ideas still flourishes in the twentieth century: cf. post 1917 Soviet propaganda posters, the posters and graffiti produced during the May 1968 demonstrations in Paris, or the more recent use of wallposters in China. But it is arguable that the subsequent fame of such ephemeral forms of communication is only secured when they are enshrined and distributed as historical, cultural, or aesthetic artifacts in book form.

- 15 See E.G.Rupp and Benjamin Brewery, *Martin Luther*, London: Edward Arnold, 1970, pp. 12–13; Euan Cameron, *The European Reformation*, Oxford: Clarendon Press, 1991, p. 100.
- 16 It is worth noting that Luther's letter to the Archbishop of Mainz mentions the enclosed *Theses* almost as an afterthought, drawing attention to them only after he has closed the main body of the letter: 'If agreeable to your Grace, perhaps you would glance at my enclosed theses, that you may see the opinion on indulgences is a very varied one, whilst those who proclaim them fancy they cannot be disputed. Your unworthy son, Martin Luther'. For the text of the letter and the theses, see Rupp and Drewery, *Martin Luther*, pp. 17–18.
- 17 Rupp and Drewery, *Martin Luther*, p. 25.
- 18 Rupp and Drewery, *Martin Luther*, p. 26.
- 19 Mark U.Edwards, Jr., *Printing, Propaganda, and Martin Luther*, Berkeley, Los Angeles, London: University of California Press, 1994, p. 163.
- 20 Edwards, *Printing, Propaganda, and Martin Luther*, pp. 163–4. It is one of the ironies of scholarship that the initials 'MLA', which now possess an almost talismanic power in the modern world of university-based humanities scholarship, first appeared, under a quite different guise, in the early sixteenth century.
- 21 Manuscripts in the pre-print age were circulated, by way of loan, amongst communities of scholars, though sometimes with disastrous consequences for the generous lender. In the 1420s, Poggio lent a unique Petronian manuscript to a fellow scholar, which then disappeared and did not resurface until it was rediscovered in 1650 in Trau (Dalmatia). See Reynolds and Wilson, *Scribes and Scholars*, p. 123.
- 22 See Richard H.Rouse and Mary A.Rouse, 'Statim invenire: Schools, Preachers, and New Attitudes towards the Page' in Robert L.Benson and Giles Constable (eds), *Renaissance and Renewal in the Twelfth Century*, Oxford: Clarendon Press, 1985, pp. 201–25.
- 23 Cited in Manguel, *History of Reading*, p. 137. It could be argued that this distinction is perhaps an oversimplification.
- 24 There are exceptions to this rule, most notably the printed scroll of the *Torah*.
- 25 See Ruth Samson Luborsky, 'Connections and Disconnections between Images and Texts: The Case of Secular Tudor Book Illustration' *Word and Image* (1987), vol.3, pp. 74–85.
- 26 See R.A.Houston, *Literacy in Early Modern Europe: Culture and Education 1500–1800*, London and New York: Longman, 1988, p. 211.
- 27 See Falconer Madan, *Books in Manuscript*, London: Kegan Paul, 1920, p. 45. See also: C.E.Wright, *English Vernacular Hands from the 12th to the 15th Centuries*, Oxford: Clarendon Press, 1960.
- 28 The form of book production which was instituted at the University of Paris in the second half of the thirteenth century, suggests, however, that some kind of quality control was attempted in at least one urban book-production centre. In Paris, authorized university stationers would hire out sections of textbooks (*peciae*) to scribes or to students who wished to reproduce the text. A given book, known as the exemplar, was divided into loose-leaf sections, and these sections were then hired out to be copied simultaneously, with each copy being at only one remove from the exemplar or master copy. Under this system, in theory, there was only one occasion for error, compared to the normal system of reproduction of a manuscript text down a chain of transmission, with each scribe adding their tranche of errors, whilst reproducing the errors they had inherited from the previous link in the chain. Under the *pecia* system the University closely controlled publication, examining exemplars for accuracy and forcing revision of a text where it was found to contain errors. For a detailed and fascinating account of this process, see: Christopher De Hamel, *A History of Illuminated Manuscripts*, London: Phaidon Press, 1994, pp. 130–132.
- 29 Davies, 'Humanism in Script and Print', p. 57.
- 30 Abbreviation in medieval manuscripts was not, however, arbitrary. Three systems of abbreviation evolved: using abbreviative signs, abbreviating by the position of letters, and abbreviation by omission. These systems might be combined in a given text. Elements of these systems of abbreviation were also deployed in early printed books. See Madan, *Books in Manuscript*, pp. 33–9.

- 31 Madan, *Books in Manuscript*, p. 26.
- 32 Jonathan Green, *Chasing the Sun: Dictionary-Makers and the Dictionaries they Made*, London: Jonathan Cape, 1996, p. 56.
- 33 Tom MacArthur, *Worlds of Reference*, Cambridge: Cambridge University Press, 1986, pp. 76–7.
- 34 The parallels (as well as the disjunctions) between computing technology and the operation of the mind, associated in particular with the work of the mathematician John von Neumann in the 1930s and 1940s, are traced in George Dyson, *Darwin amongst the Machines*, London: Penguin Books, 1997, pp. 155–9.
- 35 Edmund Spenser, *The Faerie Queene* ed. A.C.Hamilton, London: Longman, 1977.
- 36 Roger Chartier, *The Order of Books: Readers, Authors, and Libraries in Europe Between the Fourteenth and Eighteenth Centuries*, (trans.) Lydia G.Cochrane, Oxford: Polity Press, 1994, p. 62.
- 37 Marshall McLuhan, *The Gutenberg Galaxy: The Making of Typographic Man*, London: University of Toronto Press, 1962, pp. 144, 248; Chartier, *Order of Books*, p. 90; D.F.McKenzie, *Bibliography and the Sociology of Texts*, London: The British Library, 1986, p. 4.
- 38 See in particular Walter J.Ong, *Rhetoric, Romance, and Technology*, Ithaca, NY: Cornell University Press, 1971; *Orality and Literacy: The Technologizing of the Word*, London: Methuen, 1982.
- 39 See in particular: Michael Clanchy, *From Memory to Written Record: England 1066–1307*, 2nd edition, Oxford: Clarendon Press, 1993; Brian Stock, *The Implications of Literacy: Written language and Models of Interpretation in the Eleventh and Twelfth Centuries*, Princeton: Princeton University Press, 1983; Brian Stock, *Listening for the Text: On the Uses of the Past*, Baltimore and London: Johns Hopkins University Press, 1990.
- 40 Walter J.Ong, *Ramus, Method, and the Decay of Dialogue*, Cambridge, MA: Harvard University Press, p. 311.
- 41 See Neal Gilbert, *Renaissance Concepts of Method*, New York: Columbia University Press, 1960, pp. 67–81.
- 42 See Timothy J.Reiss, *Knowledge, Discovery and Imagination in Early Modern Europe: The Rise of Aesthetic Rationalism*, Cambridge: Cambridge University Press, 1993, pp. 80–82.
- 43 See Elizabeth L.Eisenstein, *The Printing Revolution in Early Modern Europe*, Cambridge: Cambridge University Press, 1993, p. 50.
- 44 See Arthur F.Marotti, ‘Manuscript, Print and the Social History of the Lyric’ in Thomas N.Corns (ed.), *The Cambridge Companion to English Poetry: Donne to Marvell*, Cambridge: Cambridge University Press, 1993, pp. 52–79.
- 45 Davies, ‘Humanism in Print and Script’, p. 58.
- 46 Thus it is still customary to refer to Plato’s works in the 1578 edition of Stephanus.
- 47 Vincent Gillespie, ‘Medieval Hypertext: Image and Text from York Minster’ in P.R.Robinson and Rivkah Zim (eds), *Of the Making of Books: Medieval Manuscripts, Their Scribes and Readers Essays Presented to M.B. Parkes*, Aldershot: Scolar Press, 1997, pp. 208–9 (note).
- 48 Leah S.Marcus, *Unediting the Renaissance: Shakespeare, Marlowe, Milton*, London and New York: Routledge, 1996, p. 26.
- 49 Jennifer Wallace, ‘Sheila Still Making Waves’, Interview with Dale Spender, *The Times Higher Education Supplement* 13 November 1998, p. 20. Conversely, the comparison between contemporary cyberspace discussion groups—newsgroups—and Elizabethan polemical writings has been made in Evelyn B.Tribble, ‘The Peopled Page: Polemic, Confutation, and Foxe’s *Book of Martyrs*’ in Bornstein and Tinkle, *The Iconic Page*, p. 120.
- 50 Kathryn Sutherland (ed.), *Electronic Text: Investigations in Method and Theory*, Oxford: Clarendon Press, 1997, p. 10.
- 51 R.R.Bolgar, *The Classical Heritage and its Beneficiaries*, Cambridge: Cambridge University Press, 1954, p. 273.
- 52 See Lisa Jardine, *Erasmus, Man of Letters: The Construction of Charisma in Print*, Princeton: Princeton University Press, 1993. On the relationship between Erasmian collections, rhetorical handbooks, and

emblem books (themselves a further innovation associated with print-culture), see Michael Bath, *Speaking Pictures: English Emblem Books and Renaissance Culture*, London and New York: Longman, 1994, pp. 31–42.

- 53 Anne Moss, *Printed Commonplace Books and the Structuring of Renaissance Thought*, Oxford: Clarendon Press, 1996, p.v.
- 54 Michel de Montaigne, *Oeuvres complètes* ed. Albert Thibudet and Maurice Rat, Paris: Gallimard, 1962, p. 1047. It is worth noting, within this context, that N.Katherine Hayles prefaces her study of field theory in relation to modern literature with Montaignian epigraphs from Saussure ('Tout se tient') and Pynchon ('Everything is connected'). See N.Katherine Hayles, *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century*, Ithaca, NY: Cornell University Press, 1984.